

Monitoring and Reporting Plan

Salt Marsh Mitigation for the Elk River Wildlife Trail Improvement Project Eureka, California

Prepared for:

City of Eureka

EXHIBIT NO. 10

APPLICATION NO.

1-11-037

CITY OF EUREKA

SALT MARSH MITIGATION,
MONITORING, & REPORTING
PLAN (1 of 17)

SEW Consulting Engineers & Geologists, Inc.

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March 2011
006107.110

Reference: 006107.110

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QA/QC: LKS 

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Abbreviations and Acronyms

sq. ft.	square feet
ACOE	U.S. Army Corps of Engineers
CDFG	California Department of Fish and Game
RWQCB	Regional Water Quality Control Board
SHN	SHN Consulting Engineers & Geologists, Inc.

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1.0 Introduction

This monitoring and reporting plan has been prepared by SHN Consulting Engineers & Geologists, Inc. (SHN) to address the wetland mitigation planning components for the City of Eureka's Elk River Wildlife Trail Improvement Project. This plan outlines the proposed approach for the creation of a coastal salt marsh as mitigation for freshwater wetland and salt marsh impacts associated with the proposed trail alignment.

2.0 Project Background

The City of Eureka is proposing to improve and connect segments of the existing Elk River Wildlife Trail along the Eureka Waterfront. The trail is located on undeveloped land in the southwest portion of Eureka and begins approximately at the Truesdale Vista Point and extends south over the railroad tracks to the Herrick Avenue Park and Ride (western ½ of Section 33, Township 5 North, Range 1 West of the Humboldt Base and Meridian).

As a result of the project, impacts to coastal wetlands require mitigation to compensate for the loss of biologically significant natural resources. The mitigation areas are based upon SHN's *Wetland Delineation for Phase II of the Elk River Trail Improvement Project, Eureka, California* (SHN, October 2007a). This delineation indicated approximately 11,178 square feet (sq. ft.) (0.26 acres) of freshwater wetlands and approximately 911 sq. ft. (0.02 acres) of salt marsh will be impacted by the proposed trail improvements. In discussion with California Coastal Commission staff and City of Eureka, it was determined that a 4:1 mitigation ratio shall be used to mitigate impacts to wetlands. Additionally, it was determined that impacts to freshwater wetlands and salt marsh will be mitigated by the creation of salt marsh only.

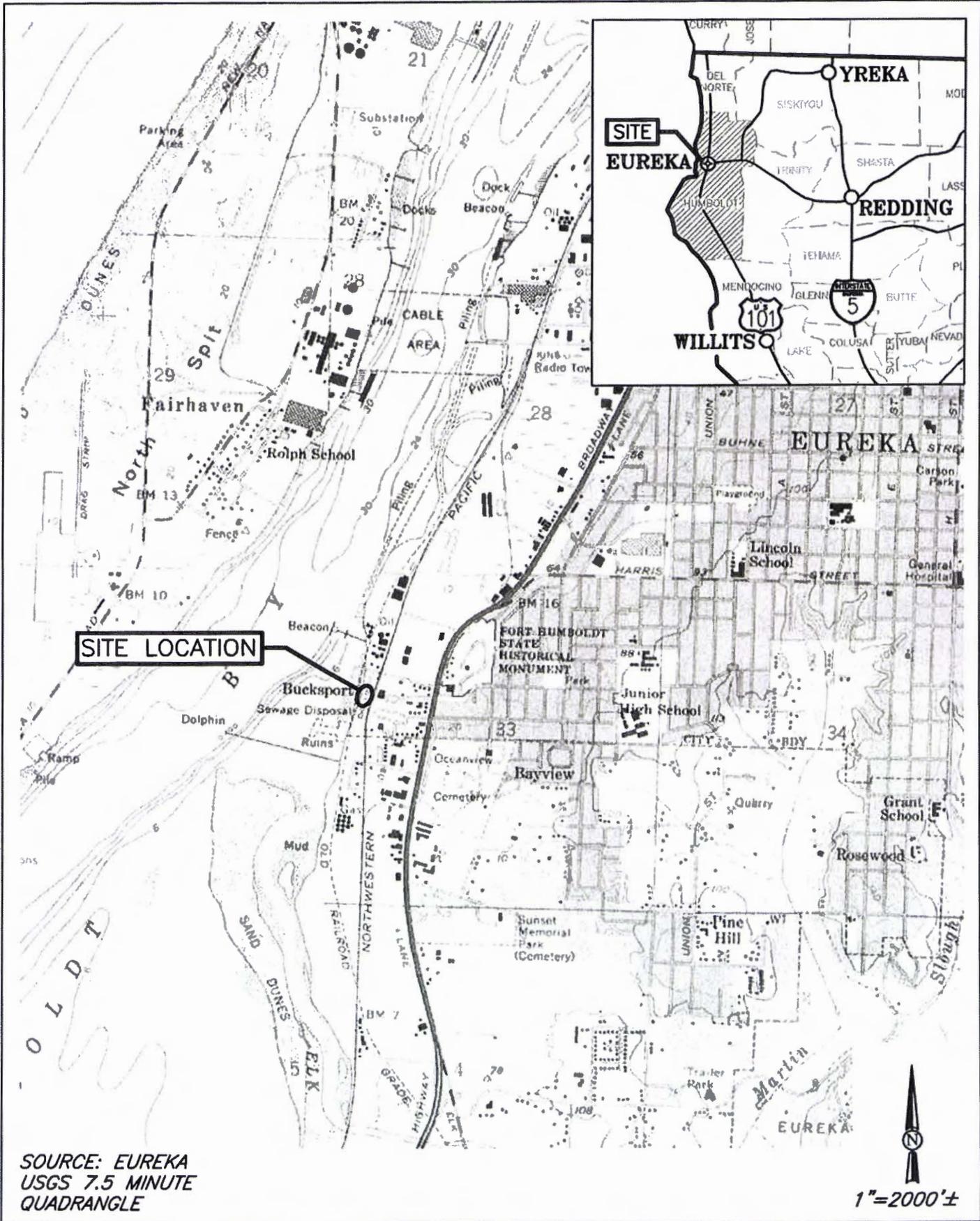
The City of Eureka is proposing to construct a segment of the Elk River Wildlife Trail along Hilfiker Lane. The proposed mitigation site for this project was located between the undeveloped areas adjacent to the existing parking lot and the area west of the proposed trail segment along Hilfiker Lane (Figure 1). A 5-foot buffer from the proposed Elk River Trail segment and existing parking lot would enable the City to achieve a 4:1 (wetland creation to wetland loss) mitigation ratio at the proposed mitigation site. Any other alternative would require the City to mitigate in more than one area. At the selected mitigation site, the City proposes to convert a degraded coastal prairie to salt marsh and to remove the invasive cordgrass (*Spartina densiflora*) in the adjacent salt marshes.

Initially, the proposed mitigation for the project required sites designated for both freshwater wetland and salt marsh creation. However, implementation of a mitigation plan to provide for creation of both habitat types would have required construction at multiple sites and resulted in disconnected "pocket-wetland" mitigation areas. The creation of salt marsh at the selected mitigation site, as proposed in this plan, will provide a continuous connection between salt marsh habitats along Humboldt Bay, and provide long-lasting environmental benefits to the Humboldt Bay ecosystem.

3.0 Goal of Mitigation

The goal of this mitigation plan is to compensate for project impacts to jurisdictional wetlands through the creation of approximately 48,356 sq. ft. (1.11 acres) of salt marsh habitat. This objective is to be met primarily through the excavation and removal of upland fill material, debris, and

I:\2006\006107-ELK RIVER\006107-110 - SAVED: 12/29/2010 12:49 PM CNEWELL, PLOTTED: 12/29/2010 12:54 PM, CHRIS D. NEWELL



SOURCE: EUREKA
USGS 7.5 MINUTE
QUADRANGLE

1" = 2000' ±

SH
Consulting Engineers
& Geologists, Inc.

City of Eureka
Salt Marsh Mitigation Project
Eureka, California
December 2010

Site Location Map.
SHN 006107.110
006107-110-SITE-LCTN

Figure 1

leaf 17

ruderal vegetation at the mitigation site, and by creating tidally-influenced hydrology. The grading plan that has been developed for the mitigation site shows the target elevations and layout of the proposed mitigation area (Appendix A). The intent of the grading plan is to grade to target elevations at the site and then allow estuarine sediments to build up in the mitigation area.

Some material excavated from the adjacent salt marsh habitat will be placed in the mitigation area. Through deposition and subsequent tidal scouring, it is anticipated that tidal hummocks, or irregular sediment undulations, will form across the western boundary. Once sediments have developed in the mitigation area, there will be an opportunity for natural colonization of salt marsh species. To accelerate habitat development, the mitigation area may be planted with native salt marsh species the first spring following site grading activities or at a later date to be determined.

Implementation of the monitoring and reporting program outlined in this plan is intended to satisfy the mitigation measures required by the California Coastal Commission, California Department of Fish and Game (CDFG), Regional Water Quality Control Board, North Coast Region (RWQCB), and U.S. Army Corps of Engineers (ACOE).

4.0 Existing Conditions Within and Adjacent to Mitigation Area

Areas adjacent to the existing salt marsh, and within the proposed mitigation area, consist of disturbed habitat and degraded coastal prairie vegetation. These areas are dominated by herbaceous species including bent grass (*Agrostis* sp.), yarrow (*Achillea millefolium*), common velvet grass (*Holcus lanatus*), sweet vernal grass (*Holcus lanatus*), California aster (*Aster chilensis*), strawberry (*Fragaria vesca*), and scattered tufted hair-grass (*Deschampsia cespitosa*). A few large lodgepole pines (*Pinus contorta*) are located near the parking lot.

Existing salt marsh habitat is comprised entirely of herbaceous vegetation that is interspersed with patches of intertidal mudflat scattered with brown and green algae. Pockets of this habitat have a fairly intact native species composition, but the majority is dominated by substantial mono-stands of the non-native dense-flowered cordgrass (*Spartina densiflora*). Other dominant species include pickleweed (*Salicornia virginica*), salt grass (*Distichlis spicata*), sandspurry (*Spergularia macrotheca*), dodder (*Cuscuta salina*), spearscale (*Atriplex triangularis*), and spear oracle (*A. patula*) with lesser amounts of salt rush (*Juncus leseurii*), gumweed (*Grindelia stricta*), fleshy jaumea (*Jaumea carnosa*), and tufted hairgrass. Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*) was detected in the salt marsh habitat within the vicinity of the project site, during focused botanical surveys (SHN, January 2007). A tidally influenced drainage ditch is located south of the parking lot. Vegetation within and along the ditch includes a mix of freshwater and brackish tolerant hydrophytes. Dominant species include silverweed (*Argentina anserine*), spearscale, common rush (*Juncus effuses*), pickleweed, brass-buttons (*Cotula coronopifolia*), and dense-flowered cordgrass, with scattered seaside arrow grass (*Trigolchin maritima*).

Soils at the surface (upper 12 inches) appear to be sandy, poorly graded, and the origin is currently unknown. Organic material has accumulated in the upper 6 inches of the soil horizon to support ruderal plant species. However, a previous site visit indicates soils are sandy up to 5 feet below the ground surface.

5.0 Performance Standards

Success of the mitigation program is defined as the creation of functional salt marsh habitat of equal or greater value than those impacted. Adjacent salt marsh habitat, located north of the proposed mitigation site, shall be used for the reference site for the project, with the specific reference plot to be determined through further consultation with CDFG.

5.1 Target Surface Area

Specific performance standards for the mitigation program include the establishment of approximately 1.1 acres of salt marsh habitat. The current grading plan, as shown in Appendix A, includes creation of approximately 1.1 acres of salt marsh below the 7-foot contour. After five years, the salt marsh created by this project should have at least 75 percent of the native vegetation cover and native plant species density as compared to a reference site of existing salt marsh habitat. The final mitigation area achieved will be verified as part of the as-built reporting requirements.

5.2 Target Elevations

Salt marsh plains naturally colonize near Mean High Water (MHW), which is approximately 6.2 feet at the project site. A fully vegetated salt marsh typically ranges between MHW to Mean Higher High Water (approximately 6.9 feet). Initial mitigation area marsh plain elevations are designed at 6 feet to allow for estuarine sediments to build up within the mitigation area. All elevations are referenced to Mean Lower Low Water (MLLW) at the North Spit tidal bench mark (NOAA Station ID 9418767), assuming that the project site fluctuates within a similar tidal range. Existing soils are composed of sand, which is not ideal for propagating salt marsh vegetation. Through sediment deposition and subsequent tidal scouring at the site, it is anticipated that tidal hummocks, or irregular sediment undulations, will form across the bottom surface of the mitigation site. Once sediments have developed in the mitigation area, there will be an opportunity for natural colonization of salt marsh species. Although sedimentation rates are not available at this site, it is prudent to assume that they may range between 0.02 and 0.04 feet per year based on measurements in Humboldt Bay (PWA, 2002). Based on these sedimentation rates, a marsh plain near MHW will likely be colonized with native vegetation in 5 to 10 years and a mature salt marsh near MHHW may be developed in 20 to 40 years.

5.3 Target Hydrologic Regime

The salt marsh mitigation area is designed to be inundated diurnally within a tidal range of approximately 6 to 6.9 feet, MLLW, with higher tides up to 9.7 feet. Surface elevations are designed to be consistent with the existing, outboard salt marsh, with the intention that the mitigation area will expand the existing salt marsh area. Twenty foot wide openings are designed through the existing salt marsh to allow for the mitigation area to be completely inundated during high tide.

5.4 Target Functions and Values

The habitat functions and values of the mitigation salt marsh should be similar to those provided by existing adjacent habitats. The use of the salt marsh mitigation area by wildlife and cover by native vegetation should be similar to the reference site by the end of the five-year monitoring period. The diversity of native salt marsh species must be at least 75 percent of the diversity present within the existing salt marsh reference site.

6.0 Monitoring and Reporting Program

The monitoring program will begin with the construction process and continue for five years following completion of construction activities. Daily monitoring during the site excavation shall be conducted. Monthly monitoring shall be conducted between the initial site grading in the fall and salt marsh planting the following spring. At the completion of grading activities, a five-year mitigation and monitoring reporting program will be initiated. The monitoring and reporting program will consist of four field visits the first two years of the mitigation program and twice per year thereafter. The proposed monitoring schedule is provided in Table 1.

Phase	Monitoring Schedule
Grading	Daily
Period Between Grading and Plant Installation	Monthly
Plant Installation (If Determined Necessary)	Daily
Years 1 and 2	Quarterly: 3-month intervals, starting 2 months after completion of salt marsh planting
Years 3 to 5	Semi-Annual: 6-month intervals
Quantitative Sampling	Annually in late spring
Qualitative Sampling (Visual Monitoring)	During each monitoring event

As part of the monitoring program, both qualitative (visual assessment) and quantitative (transect data collection) sampling will be performed by a qualified professional. The monitor will assess general characteristics of cover, soil, and hydrologic conditions, and general use of the mitigation areas by wildlife. During the first two years of monitoring, marsh plain accretion should be carefully evaluated. Plant installation is proposed if the site has not revegetated or lacks species richness after two years of monitoring has been completed.

Transect sampling data shall be collected once per year, in the late spring/early summer, to document compliance with the performance standards. Results of all field visits will be documented and maintained on file at the City of Eureka. The field notes will be used for the preparation of annual reports, which will evaluate the success of the mitigation.

6.1 As-Built Conditions

Following the planting and grading of the salt marsh mitigation areas, a report will be prepared summarizing all work completed. The report shall include the following:

- name of the contractor(s) who completed the work,
- name of the party responsible for supervising the work,
- work dates and time within which the work was completed,
- a site plan illustrating the limits of work in each of the mitigation areas,
- as-built topographic plans of the mitigation areas, and
- pre- and post-construction photographs of the mitigation area.

The report will be submitted to the City of Eureka, which will then forward the report to the Coastal Commission, CDFG, RWQCB, and ACOE. The report will be submitted within 30 days of completion of the grading and planting phases. In the event that any unusual circumstances occur that will delay the completion of the mitigation plan once it has been initiated, the Coastal Commission, CDFG, RWQCB, and ACOE will be notified.

6.2 Qualitative Visual Assessment

During each monitoring event, visual observations of habitat conditions will be noted. The qualitative visual assessment will be the primary tool by which habitat development is evaluated and the need for any remedial measures identified. Particular attention will be paid to the following:

- species recruitment and habitat development in the salt marsh mitigation area,
- evidence of viable plant reproduction in the salt marsh mitigation area,
- the presence of shorebirds and other wildlife in the intertidal mudflat mitigation area compared to reference habitat,
- the introduction and infestation of exotic species,
- the accumulation or erosion of sediment within the mitigation area, and
- verification of functioning tidal hydrology in the mitigation areas.

6.3 Quantitative Sampling

Quantitative comparative vegetation data will be collected annually in the late spring/early summer. Transects will be randomly located for the first sampling event and permanently marked to facilitate their use in subsequent years. Transects will also be placed in a salt marsh reference site supporting similar, undisturbed habitat types as present in the mitigation area. One-meter square quadrants will be sampled along the monitoring transects in the mitigation area and salt marsh reference site. These data will be used to determine if final performance standards for the mitigation site have been met (that is, 75 percent of native vegetation cover, plant density, and species diversity relative to the reference site).

If adequate natural colonization has not occurred after two years, or the site lacks species richness in comparison to the reference site, containerized plants or cuttings shall be installed pursuant to the requirements in the grading plan. Species richness is defined as 50 percent of native vegetation cover, plant density, and species diversity relative to the reference site.

Initial elevations will need to be met post-construction (as-built). Marsh plain elevations should be measured along two transects annually to demonstrate that sediment accretion is occurring at a rate that will meet the vegetation requirements for the target surface area.

6.4 Photo Documentation

In addition to the general qualitative assessment and transect sampling, several permanent stations for photo documentation will be established in each mitigation area. Photos will be taken prior to grading and included as part of each annual monitoring report.

6.5 Annual Reports

A report summarizing the status of the mitigation effort will be completed within three months of completing the implementation phase of the plan (that is, completion of as-built drawings). The first annual monitoring event will occur at least six months following installation. The annual monitoring report for Year 1 shall be submitted no later than September 30, and by December 30 annually thereafter. Annual reports will be submitted to the Coastal Commission, CDFG, RWQCB, and ACOE. Recommendations for any corrective action necessary to ensure the continued success of the mitigation will be included in the report.

7.0 Corrective Action Plan

In the event that the monitoring program identifies conditions that significantly affect the performance standards, or if the performance standards indicated above are not achieved after five years, a corrective action plan will be developed by the City of Eureka with consultation with the Coastal Commission, CDFG, RWQCB, and ACOE. Recommendations for specific corrective actions shall be reviewed and evaluated in conjunction with field observation data. The mitigation site will be inspected with resource agency personnel to verify the suitability of the recommended corrective action or make modifications.

Corrective actions may also include extending the maintenance and monitoring program one year at a time until the standards are met. Specific remedial measures (approved by the Coastal Commission, CDFG, RWQCB, and ACOE) will be used during any extension of the monitoring program. Monitoring extensions will be done only for areas that fail to meet final success criteria. This process will continue until all standards are met or until the agencies determine that other mitigation measures are appropriate.

If it is determined that the mitigation site will not likely result in attaining the performance standards, then the potential need for identification of other sites will be reviewed. Details pertaining to the selection of an alternative site will be discussed and presented to the resource agencies as part of the corrective action plan. The corrective action plan will be submitted to the resource agencies for review and comment prior to completion of any action.

8.0 Completion of Mitigation

The project proponent will notify the Coastal Commission, CDFG, RWQCB, and ACOE upon completion of the five-year mitigation program through the submittal of a final monitoring report. If the project meets performance standards at the end of the five-year monitoring period, the mitigation will be considered a success; if not, a corrective action plan will be initiated.

If the mitigation effort meets all goals prior to the end of the five-year monitoring period, the resource agencies, at their discretion, may terminate the monitoring effort.

9.0 References Cited

Philip Williams & Associates, Ltd. (2002). *A Restoration Plan for the McDaniel Slough Tidal Marsh*. Prepared for the City of Arcata, Environmental Services Department, Arcata, CA. San Francisco:PWA.

SHN Consulting Engineers & Geologists, Inc. (January 2007). Biological Assessment Elk River Wildlife Trail Improvement Project, Eureka, California. Eureka:SHN.

---. (October, 2007a). Wetland Delineation for Phase II of the Elk River Trail Improvement Project, Eureka, California. Eureka:SHN.

CITY OF EUREKA SALT MARSH MITIGATION FOR ELK RIVER WILDLIFE TRAIL IMPROVEMENT PROJECT EUREKA, CALIFORNIA

PREPARED BY:



DECEMBER 2010

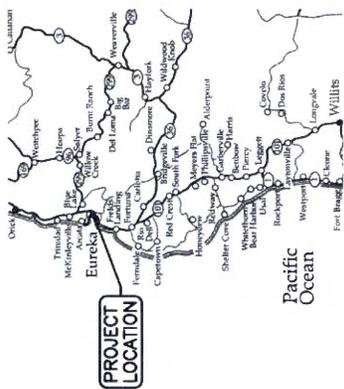
APPROVALS

WILEY SLATTERY,
PROJECT MANAGER
DATE: 3/21/11

Gregory R. Hartford, PE
DESIGN ENGINEER
DATE:



VICINITY MAP



LOCATION MAP

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3/21/11

NO.	DATE	REVISION	BY

DSCR/ENR
 DR GNM/CON
 CHK
 APVD
 CITY OF EUREKA
 ELK RIVER WILDLIFE TRAIL IMPROVEMENT PROJECT
 EUREKA, CALIFORNIA
 COVER
 DRAWING: G-1
 SHEET: 1
 DATE: 3/20/11
 PROJ. NO.: 2008102.110

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 SALES ACCOMPANY
 THIS SHEET MUST BE USED IN ORIGINAL DRAWING.
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