City of Arcata
California Dept. of Fish & Game

McDaniel Slough Wetland Enhancement Project

Draft EIR
March 2006
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Volume 2 of 2

McDaniel Slough
Marsh Enhancement Project
Draft EIR ~ March 2006

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ACRONYMS

ACOE	Army Corps of Engineers
AMWS	Arcata Marsh and Wildlife Sanctuary
BMP	Best Management Practices
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CNPS	California Native Plant Society
CWA	Clean Water Act
db	decibel
EIR	Environmental Impact Report
ESA	Environmental Site Assessment
FAC	facultative plants
FACW	facultative wetland plants
FEMA	Federal Emergency Management Agency
KV	kilovolt
MRSWA	Mad River Slough Wildlife Area
MHHW	mean higher high water
MHW	mean high water
MLLW	mean lower low water
MLW	mean low water
MMP	Mitigation Monitoring Plan
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NOP	Notice of Preparation
NRHP	National Register of Historic Places
NPDES	National Pollutant Discharge Elimination System
OBL	obligate wetland plants
OSHA	Occupational Safety and Health Administration
ppm	parts per million
RWQCB	Regional Water Quality Control Board

CHAPTER 1
INTRODUCTION

1.1 PURPOSE AND INTENDED USES OF THE DOCUMENT

The City of Arcata California has prepared a plan for enhancing wetland habitats at McDaniel Slough located at the confluence of Janes Creek and northern Humboldt Bay. A portion of the Proposed Project area occurs on the City of Arcata property, the remainder is located on the California Department of Fish and Game Mad River Slough Wildlife Area. The City of Arcata and the Department of Fish and Game (DFG) have an existing cooperative agreement that provides the framework for this joint undertaking. The Proposed Project requires discretionary approval from numerous Agencies, and is subject to review under the California Environmental Quality Act (CEQA). The City, acting as lead agency, must identify and document the potential environmental impacts of the Proposed Project in accordance with CEQA, (Public Resources Code Section 21000 et seq.), and the CEQA Guidelines (California Administrative Code Section 15000 et seq.). After reviewing *A Restoration Plan for the McDaniel Slough Tidal Marsh* (Oct. 2002), prepared by Phillip Williams and Associates (PWA), and developing an additional refined restoration option, the City completed an Initial Study. Based upon the Initial Study the City determined that the project could have potentially significant impacts on the environment, and that an Environmental Impact Report (EIR) should be prepared. The EIR will evaluate the restoration's potential effects, both adverse and beneficial, as well as a reasonable range of alternatives. The EIR will also identify measures to avoid or reduce impacts, analyze cumulative effects, and include findings necessary for certification. An EIR has two primary purposes:

- To analyze the effects that the Proposed Project and a range of alternatives will have upon the environment; and
- To make this analysis available to the public and to any other agencies that might be affected by the Proposed Project.

The City of Arcata will use the EIR in determining the environmental effects of the proposed restoration, and whether or not to approve the Proposed Project. If the Proposed Project is approved, all conditions and mitigations made in the adopted EIR will become part of any subsequent actions taken by the City and/or the Department of Fish and Game (DFG) to carry out the Proposed Project. The EIR will also be used by permitting agencies, funding agencies and the public to support Proposed Project decisions; required permits are identified in Section 1.5, Required Permits and Agency Approvals.

1.2 PROPOSED PROJECT BACKGROUND, GOALS, AND OBJECTIVES

The City of Arcata (City) has received grant funds to plan the project from the California State Coastal Conservancy (SCC). Funding for land acquisition of portions of the project area were, provided by the State of California Wildlife Conservation Board (WCB), the State of California

Environmental Enhancement and Mitigation Program (EEMP), and the United State Fish and Wildlife Service. Implementation/construction funding is also provided by the U.S. Fish and Wildlife Service administered by the Division of Bird Habitat and the North American Waterfowl Conservation Act (NAWCA). SCC enhancement guidelines emphasize the restoration of saltmarsh habitat, alleviation of flooding and restoration of natural hydrologic functions, and the creation of passive recreational opportunities. 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. The EEMP funds require restoration or enhancement of resource lands. Resource lands include natural areas, wetlands, forests, woodlands, meadows, streams or other areas containing fish and wildlife habitat. NAWCA funds are provided to private or public organizations to carry out wetlands conservation Proposed Projects in the United States, Canada, and Mexico. Proposed Projects must support long-term wetlands acquisition, restoration, and/or enhancement that implement the North America Waterfowl Plan (cite).

Goal

The goal of the McDaniel Slough Marsh Enhancement Proposed Project, as specified by the City of Arcata and the Department of Fish and Game is:

> "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

The Proposed Project goal, as described above, in combination with the specific objectives listed below, will be used as the basis for evaluating the Proposed Project and alternatives in this EIR.

Primary Objectives

1. Maximize the opportunity for restoring a large area of tidal marsh habitat dominated by pickleweed.
2. Provide unimpeded access for anadromous fish migration between Humboldt Bay and McDaniel Slough.
3. Create a tidal channel system that maximizes the estuarine fisheries habitat in large high-order subtidal channels.
4. Provide connectivity of habitats using "ecolevees" to create a gradation between the saltmarsh/mudflat habitats and uplands.
5. Provide connectivity with existing habitats which also include freshwater meadows, riparian, fresh and brackish marsh) at the Arcata Marsh and Wildlife Sanctuary and the CDFG Mad River Slough Wildlife Area.

6. Achieve desired wetland ecologic function as rapidly as possible for the freshwater and brackish water ponds and within a period of a few decades for the establishment of saltmarsh habitat.
7. Alleviate rural and urban area flooding due to tidegate restrictions.

Secondary Objectives

1. Create a visually appealing landscape.
2. Provide opportunities for public access, education/interpretation and recreation.
3. Create a passively managed system to the greatest extent possible that minimizes the need for maintenance activities on the site.
4. Breach the Bay-front levee to achieve reduced flooding upstream of Samoa Boulevard and increase tidal scour in lower Janes Creek.

Public Involvement

A public scooping session was conducted on February 5, 2001 for the purposes of soliciting comments and input on restoration scenarios and concepts. A restoration plan was presented to the public on December 11, 2002 and additional public input was obtained. The Client Team, composed of staff from the City of Arcata, Department of Fish and Game and Coastal Conservancy, developed the proposed project based upon technical information and input received by the public. The proposed project became the "agency preferred" alternative following endorsement by the Arcata City Council at a public hearing in 2004.

1.3 CONTENT AND ORGANIZATION OF THE EIR

This EIR describes the *McDaniel Slough Marsh Enhancement Proposed Project* and the alternatives to that Proposed Project; identifies and evaluates the anticipated effects of the Proposed Project and alternatives, including cumulative impacts; and identifies mitigation measures to avoid or minimize the identified effects. The document is organized into the chapters described below.

Chapter 1- Introduction

This chapter includes the following topics:

Section 1.1 Purpose and Intended Uses of the Document
Section 1.2 Proposed Project Background, Goals & Objectives
Section 1.3 Content and Organization of the EIR
Section 1.4 The Environmental Review Process
Section 1.5 Required Permits and Agency Approvals
Section 1.6 Proposed Project Findings
Section 1.7 Summary of Significant Impacts and Mitigation
Section 1.8 Background Documents Incorporated by Reference

Chapter 2 - Proposed Project and Alternatives

Descriptions and diagrams of the Proposed Project, and the Proposed Project alternatives, are provided in this chapter. The EIR analyzes Proposed Project and the following alternatives:

Alternative 1 – The No-Action Alternative
Alternative 2 --Tidal Restoration with Bay-front Levee Breach
Alternative 3 – Full Tidal Restoration with Bay-front Levee Removal
Alternative 4 – Bay-front Levee repair with freshwater marsh restoration

Chapter 3 - Natural Environment

This chapter describes the environmental setting, impact evaluation criteria, impacts, and proposed mitigation measures associated with the following topics:

- Hydrology and water quality;
- Biological habitats;
- Geology and soils;
- Air quality;
- Hazards; and
- Noise.

Chapter 4 - Community Environment

This chapter describes the environmental setting, impact evaluation criteria, impacts, and proposed mitigation measures associated with the following topics:

- Cultural and historic resources;
- Land use;
- Aesthetics and visual resources;
- Public facilities and services;
- Circulation;
- Population and housing, and
- Agricultural resources and land conversion

Chapter 5 – CEQA Considerations

This chapter includes an analysis of possible cumulative impacts resulting from past, present, and reasonably foreseeable future Proposed Projects. It analyzes the possible growth-inducing effects of the Proposed Project, and what significant irreversible effects might occur as a result of the Proposed Project. Chapter 5 also identifies the environmentally superior alternative.

Chapter 6 - Document Preparers and References

Persons responsible for preparing the EIR and references used in the environmental analysis are identified in this chapter.

1.4 THE ENVIRONMENTAL REVIEW PROCESS

During the Proposed Project planning phase, the City prepared an Initial Study (IS) to determine what level of Environmental review would be required for the Proposed Project. Because the Proposed Project had the potential to result in significant impacts, the City made a determination

to prepare an EIR.

The environmental review process includes the following steps:

Prepare and Distribute a Notice of Preparation

The environmental review process began with a Notice of Preparation (NOP). This is a notice that an EIR will be prepared, and a brief description of the Proposed Project. The NOP was publicized locally, and also distributed to a wide array of government agencies through the State Clearinghouse. The NOP for this document was distributed on February 13, 2003 and is contained in Appendix A. Its State Clearinghouse Number is 2003022091. The following agencies and members of the public responded to the NOP:

County of Humboldt Public Works Department
CALTRANS
California Coastal Commission
Pacific Gas and Electric Company
U.S. Army Corps of Engineers
Industrial Electric Service Company
S&W Properties
North Coast Unified Air Management District
C & K Johnson Industries

Prepare and Distribute the Draft EIR

The lead agency and its consultants prepared the Draft EIR document, which was distributed for review on March 27, 2006 This Draft EIR is being circulated to interested agencies and made available for public review for 45 days, or until May 9, 2006. The draft EIR is available for review at the following locations:

Arcata City Hall
736 F Street
Arcata, California

Arcata Public Library
500 - 7th Street
Arcata, California

Humboldt State University
Library - Humboldt Room
Arcata, California

Northcoast Environmental Center
879 - 9th Street
Arcata, California

CA. Department of Fish and Game
619 Second Street
Eureka, CA 95501

The Draft EIR is also available on the Internet, at: www.arcatacityhall.org

Receive Comments on the Draft EIR

The Draft EIR is being circulated for 45 days to allow the public and interested public agencies to review and comment on the document. Copies of the EIR are available at the four locations listed above. Interested parties may also attend the public hearing, which will be held by the City of Arcata on in 2006. The time and location of the public hearing will be publicized in local newspapers and posted in the County Clerk's office. Interested parties should send their comments by the end of the review period to:

Mark Andre, Deputy Director
Environmental Services Department
City of Arcata
736 F Street
Arcata, CA 95521

Respond to Comments and Prepare the Final EIR

At the end of the public review period, the City will evaluate comments on environmental issues received from the public and agencies that reviewed the DEIR and will prepare a written response (Section 15088 CEQA Guidelines). The comments and the responses will be added to the EIR, which then becomes the Final EIR.

Certify the Final EIR and Prepare a Notice of Determination

The City of Arcata will address each of the significant impacts that have been identified in the Final EIR, and must determine that either:

(a) Alterations or mitigations have been incorporated into the Proposed Project that reduce to a level of less than significant, or eliminate the significant impacts; or
(b) Even though there are significant impacts that cannot be feasibly avoided or mitigated, the Proposed Project is of overriding social or economic benefit to the community, and therefore should be approved.

At that point, the City certifies that the Environmental Impact Report is complete. A copy of the Final EIR is forwarded to responding responsible agencies ten day prior to approval of the Final EIR. After approval, the City then posts a Notice of Determination (NOD), files it with the County Clerk, and submits it to the State Clearinghouse for circulation to any agencies that expressed interest in the Proposed Project. The NOD describes the Proposed Project, lists all significant adverse impacts on the environment, and lists necessary mitigations for these impacts. The mitigations become a condition of Proposed Project approval, and will be carried out by the City (and/or other identified entities). If the Proposed Project will result in significant but unavoidable adverse impacts that cannot be mitigated, the City will include a Statement of Overriding Considerations in the NOD, explaining why the benefits of the Proposed Project outweigh the environmental risks. After the Notice of Determination has been published, CEQA requires that a period of 30 days must elapse before the Proposed Project can actually begin (where is this cited and specify section); so that any person or agency that takes issue with the approval can file legal challenges to the Proposed Project. Only legal challenges based on

noncompliance with CEQA are permitted during this 30-day period. After the waiting period has elapsed, the Proposed Project's environmental requirements have been legally completed, and work on the Proposed Project may begin.

1.5 REQUIRED PERMITS AND AGENCY APPROVALS

The McDaniel Slough Restoration Proposed Project will require permit approvals, certification, or agreements from the following agencies:

- **California Department of Fish and Game**—Streambed Alteration Agreement
- **California Regional Water Quality Control Board**—401 Certification and/or Discharge Permit
- **Army Corp of Engineers—**Individual and Section 10 Permits
- **California Coastal Commission—**Plan Approval and Coastal Development Permit
- **Humboldt Bay Harbor, Conservation and Recreation District**
- **City of Arcata—**Plan Approval and Grading Permit
- **U.S. Fish and Wildlife Service**—Section 7 Consultation
- **Caltrans, District 1-**-Encroachment Permit

The following individuals attended a meeting to discuss permitting issues on November 21, 2002:
Melissa Bukosky, CA Dept. of Fish and Game
Jim Watkins, U.S. Fish and Wildlife Service
Mike Kelly, National Marine Fisheries Service
Misha Schwarz, Winzler and Kelly
Gina Bauer, Winzler and Kelly
Larry Margler, Winzler and Kelly
Dave Ammerman, Army Corps of Engineers
Mark Andre, City of Arcata
Juli Neander, City of Arcata
Mike Mullen, City of Arcata

1.6 PROPOSED PROJECT FINDINGS

The following Proposed Project findings are excerpts from the *McDaniel Slough Marsh Restoration/Enhancement Plan* (Phillip Williams and Associates, 2000) and from information provided by the City of Arcata Environmental Services staff.

1. The McDaniel Slough restoration site is located entirely on what was part of the extensive tidal saltmarsh that previously bordered Humboldt Bay. These tidal marshes used to provide vital ecologic functions to the estuarine ecosystem, including nurseries for fish, feeding areas for birds, and habitat for a wide variety of organisms.

2. It is feasible to restore tidal marsh habitat on the site by breaching the Bay-front levee provided adjacent properties are protected from coastal flooding by construction of new levees.
3. It is expected that a vegetated tidal marsh will develop at the site in approximately 10 years because the diked former tidal marsh has only subsided one to two feet and is still high enough relative to the tide level for plants to colonize.
4. It is uncertain whether the dominant vegetation colonizing the site will be native pickleweed or exotic cordgrass.
5. Removal of the tidegates at McDaniel Slough will remove a barrier to the migration of salmonids between the Bay and McDaniel Slough/Janes Creek.
6. The bay-front levee along the north shore of Humboldt Bay has deteriorated and is susceptible to overtopping during extreme tides. Construction of a new inboard levee as part of this Proposed Project will improve protection against coastal flooding in some areas immediately adjacent to the site.
7. Removal of the tidegate and reconnecting McDaniel Slough to the Bay will slightly reduce peak flood levels and periods of flooding upstream of Samoa Boulevard during coincident major floods and high tides.
8. Tidal scouring will enlarge McDaniel Slough, improve flood flow conveyance with time, and further reduce flood hazards upstream of Samoa Boulevard.
9. The two freshwater ponds will utilize ground and stormwater and one brackish pond will utilize a mix of treated wastewater discharges and bay water. Islands in the brackish pond are designed to provide roosting and nesting habitat and maximize hydraulic mixing within the ponds. The two freshwater ponds will be excavated to six to 10-foot depths. Excavated fill from the fresh and brackish ponds will be used for levee construction.

1.7 SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION

See section 5.7

1.8 BACKGROUND DOCUMENTS AND REFERENCES

REFERENCES (Partial List)

Allen, J.R.L. 2000. Morphodynamics of Holocene salt marshes: a review sketch from the Atlantic and southern North Sea coasts of Europe. Quaternary Science Reviews 19, pp. 115-1231.

Arcata Drainage Master Plan 1997.

Arcata General Plan and EIR -2002

Barnhart, R.A., M.J. Boyd, and P.E. Pequegnat. 1992. The ecology of Humboldt Bay, California: an estuarine profile. Biological report 1, U.S. Fish and Wildlife Service, Washington, D.C. 120 pp.

Bivin, M. Hunt Property and California Department of Fish and Game Parcels Vegetation Survey. 1998, 1999, 2000.

Bukosky, M. Wetland Determination of the Dept. of Fish and Game McDaniel Slough Salt Marsh Restoration Project. March 2004.

California Dept. of Fish and game Natural Diversity Database 2005 run date

Casebier, T. and L. Toimil. 1973. Physical dynamics of Arcata Bay. Senior thesis, Humboldt State Univeristy, Arcata, CA. 23 pp.

Chmura, Gail et. al. *Global carbon sequestration in tidal, saline wetland soils* , 2003 *Global Biogeochemical Cycles.* American Geophysical Union.

Costa, S.L. 1982. The physical oceanography of Humboldt Bay. Pages 2-31 in C. Toole and C. Diebel, eds. Proceedings of the Humboldt Bay Symposium. Humboldt State University, Centre for Community Development, Arcata, CA.

Eicher, A.L. 1987. Salt marsh vascular plant distribution in relation to tidal elevation, Humboldt Bay, California. M.A. thesis, Humboldt State University, Arcata, CA. 86 pp.

Federal Emergency Management Agency (FEMA). 1997. Flood insurance study, City of Arcata, Humboldt County, CA.

Geonex Aerial Surveys. 1995. Topographic survey and map of Janes Creek marsh area. Prepared for Environmental Services Department, City of Arcata, CA.

Graham Matthews & Associates, 2000. North Arcata Bay levee survey by Keith Barnard and Randy Klein. Prepared for Environmental Services Department, City of Arcata, CA.

Intergovernmental Panel on Climate Change (IPCC). 2001. Climate change 2001: the scientific basis. Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson, eds. Cambridge University Press.

Intergovernmental Panel on Climate Change (IPCC). 2001. Climate change 2001: the scientific basis. Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson, eds. Cambridge University Press.

Johnson, M. and the Upland Wildlife Habitat Ecology Class Spring 2002. Modeling Wildlife Responses to a Proposed Marsh Enhancement for the McDaniel Slough Project Area, Arcata, California. Humboldt State University Dept. of Wildlife.

Klein, R.D. and J.K. Anderson. 2000. Hydrologic data preparation and analyses for Janes Creek, City of Arcata, CA. Prepared for Environmental Services Department, City of Arcata, CA.

Pickart, Andrea Distribution of *Spartina densiflora* two rare salt marsh plants in Humboldt Bay 2001. USFWS

Phillip Williams & Associates (PWA). 2002. A restoration plan for the McDaniel Slough Tidal Marsh. Prepared for Environmental Services Department, City of Arcata, CA.

Pritchard, J. 2004 Late Holocene Relative Sea-Level Changes, Arcata Bay, California: Evaluation of Freshwater Syncline Movement Using Coseismically Buried Soil Horizons—A Thesis Presented to the Faculty of Humboldt State University, Arcata, Ca.

Scalici, M., P. Olofson, J. Nosera, R. Norman, B. Lydgate, B. Job (aka The Hydrology Group). 1992. Project site hydrologic conditions evaluation for the Mad River Slough wildlife area wetland enhancement project at North Point. Presented to Dr. Bob Gearheart and Doug Titus, ENGR 480, Humboldt State University, Arcata, CA.

SHN, Geotechnical Evaluation of McDaniel Slough Marsh Enhancement Project 2003

Thom , Ronald M., Susan L. Blanton , Dana L. Woodruff , Gregory D. Williams Amy B. Borde, Carbon Sinks in Nearshore Marine Vegetated Ecosystems *Pacific Northwest National Laboratory,Marine Sciences Laboratory, 1529 W. Sequim Bay Road Sequim, WA 98382*

Van Kirk, Susie. 2001. Historic Resources Report Bull-Hunt Barn

Williams, P & Associates 2002. A Restoration Plan for the McDaniels Slough Tidal Marsh

Williams Philip, Faber M. Phyllis, DESIGN GUIDELINES FOR TIDAL WETLAND RESTORATION IN SAN FRANCISCO BAY, December 29, 2004

Williams, P.B., M.K. Orr, N.J. Garity. 2002. Hydraulic geometry: a geomorphic design tool for tidal marsh channel evolution in wetland restoration projects. Restoration Ecology Vol. 10 No. 3, pp. 577-590.

Allen, J.R.L. 2000. Morphodynamics of Holocene salt marshes: a review sketch from the Atlantic and southern North Sea coasts of Europe. Quaternary Science Reviews 19, pp. 115-1231.
Barnhart, R.A., M.J. Boyd, and P.E. Pequegnat. 1992. The ecology of Humboldt Bay, California: an estuarine profile. Biological report 1, U.S. Fish and Wildlife Service, Washington, D.C. 120 pp.
Baye, Peter. Personal communication. Casebier, T. and L. Toimil. 1973. Physical dynamics of Arcata Bay. Senior thesis, Humboldt State Univeristy, Arcata, CA. 23 pp.
City of Arcata, CA. Personal communication.

Costa, S.L. 1982. The physical oceanography of Humboldt Bay. Pages 2-31 in C. Toole and C. Diebel, eds. Proceedings of the Humboldt Bay Symposium. Humboldt State University, Centre for Community Development, Arcata, CA.

Eicher, A.L. 1987. Salt marsh vascular plant distribution in relation to tidal elevation, Humboldt Bay, California. M.A. thesis, Humboldt State University, Arcata, CA. 86 pp. Faber, Phyllis. Personal communication.

Federal Emergency Management Agency (FEMA). 1997. Flood insurance study, City of Arcata, Humboldt County, CA.
Geonex Aerial Surveys. 1995. Topographic survey and map of Janes Creek marsh area. Prepared for Environmental Services Department, City of Arcata, CA.

Graham Matthews & Associates, 2000. North Arcata Bay levee survey by Keith Barnard and Randy Klein. Prepared for Environmental Services Department, City of Arcata, CA.

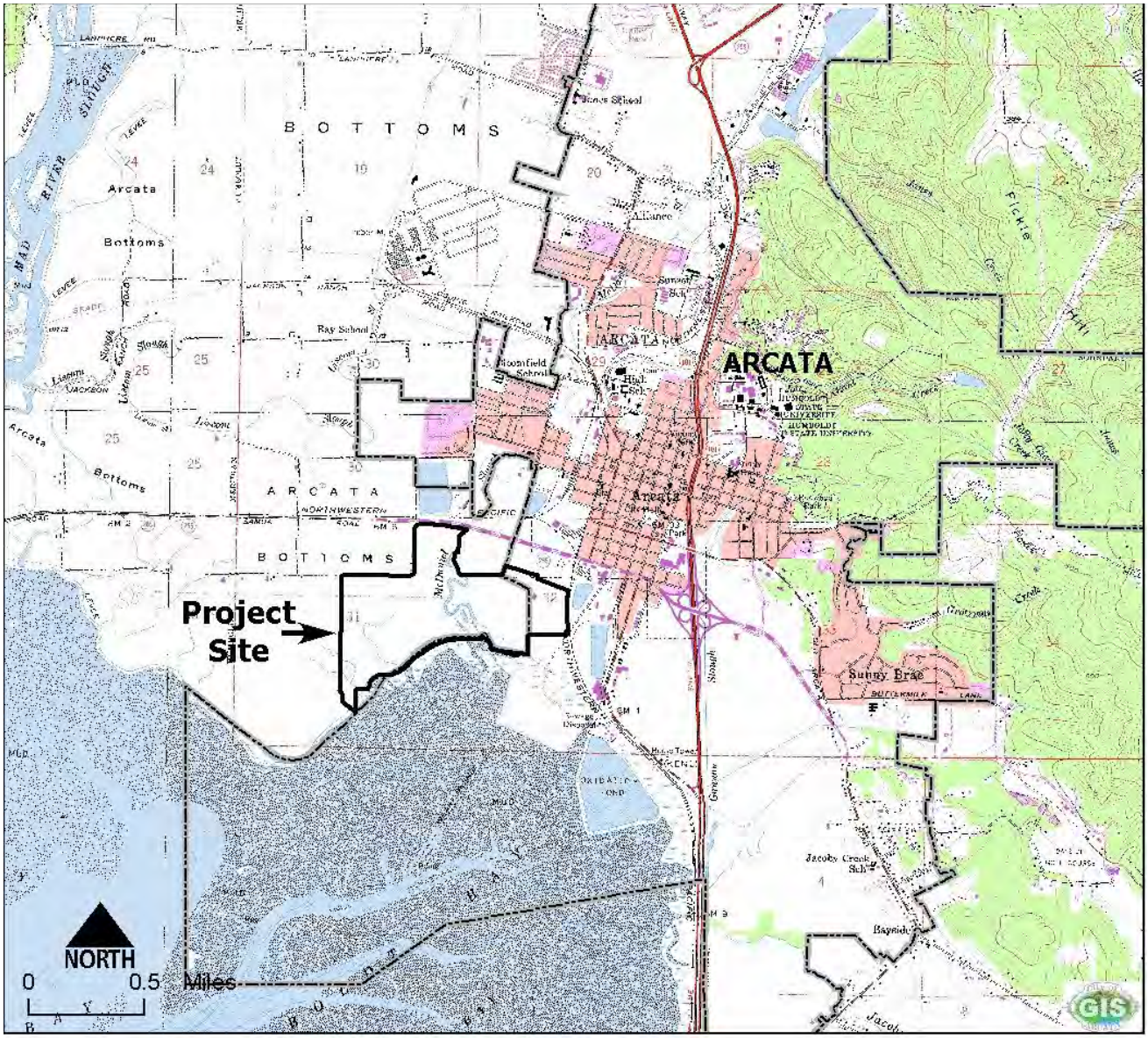
Intergovernmental Panel on Climate Change (IPCC). 2001. Climate change 2001: the scientific basis. Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A.

Johnson, eds. Cambridge University Press.
Klein, R.D. and J.K. Anderson. 2000. Hydrologic data preparation and analyses for Janes Creek, City of Arcata, CA. Prepared for Environmental Services Department, City of Arcata, CA.

Krone, R.B. 1987. A method for simulating historic marsh elevations. Coastal Sediments 1987. Proceedings of the Specialty Conference on Quantitative Approaches to Coastal Sediment Processes, pp. 316-323. New Orleans, LA. May 12-14.

Ogden Beeman & Associates and Ray B. Krone & Associates. 1992. Sediment budget study for San Francisco Bay. Prepared for the U.S. Army Corps of Engineers, San Francisco District, CA.
Scalici, M., P. Olofson, J. Nosera, R. Norman, B. Lydgate, B. Job (aka The Hydrology Group). 1992.

Project site hydrologic conditions evaluation for the Mad River Slough wildlife area wetland enhancement project at North Point. Presented to Dr. Bob Gearheart and Doug Titus, ENGR 480, Humboldt State University, Arcata, CA.
Spicher, D.P. and M.N. Josselyn. 1985. Spartina (Gramineae) in northern California: distribution and taxonomic notes. Madrono 323, pp. 158-167.
Williams, P.B., M.K. Orr, N.J. Garrity. 2002. Hydraulic geometry: a geomorphic design tool for tidal marsh channel evolution in wetland restoration projects. Restoration Ecology Vol. 10 No. 3, pp. 577-590.



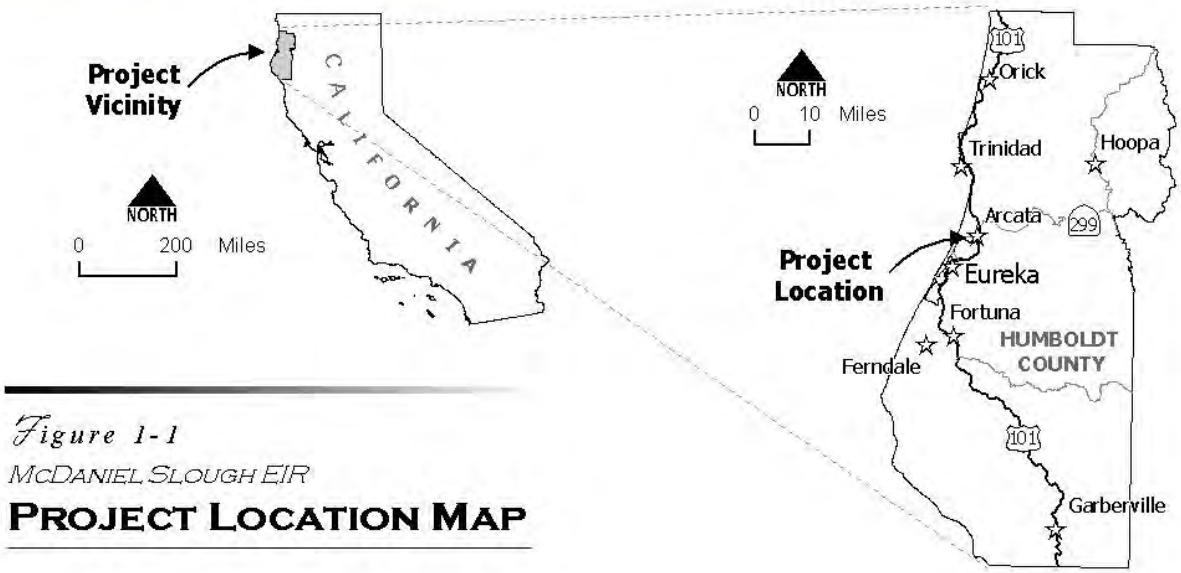
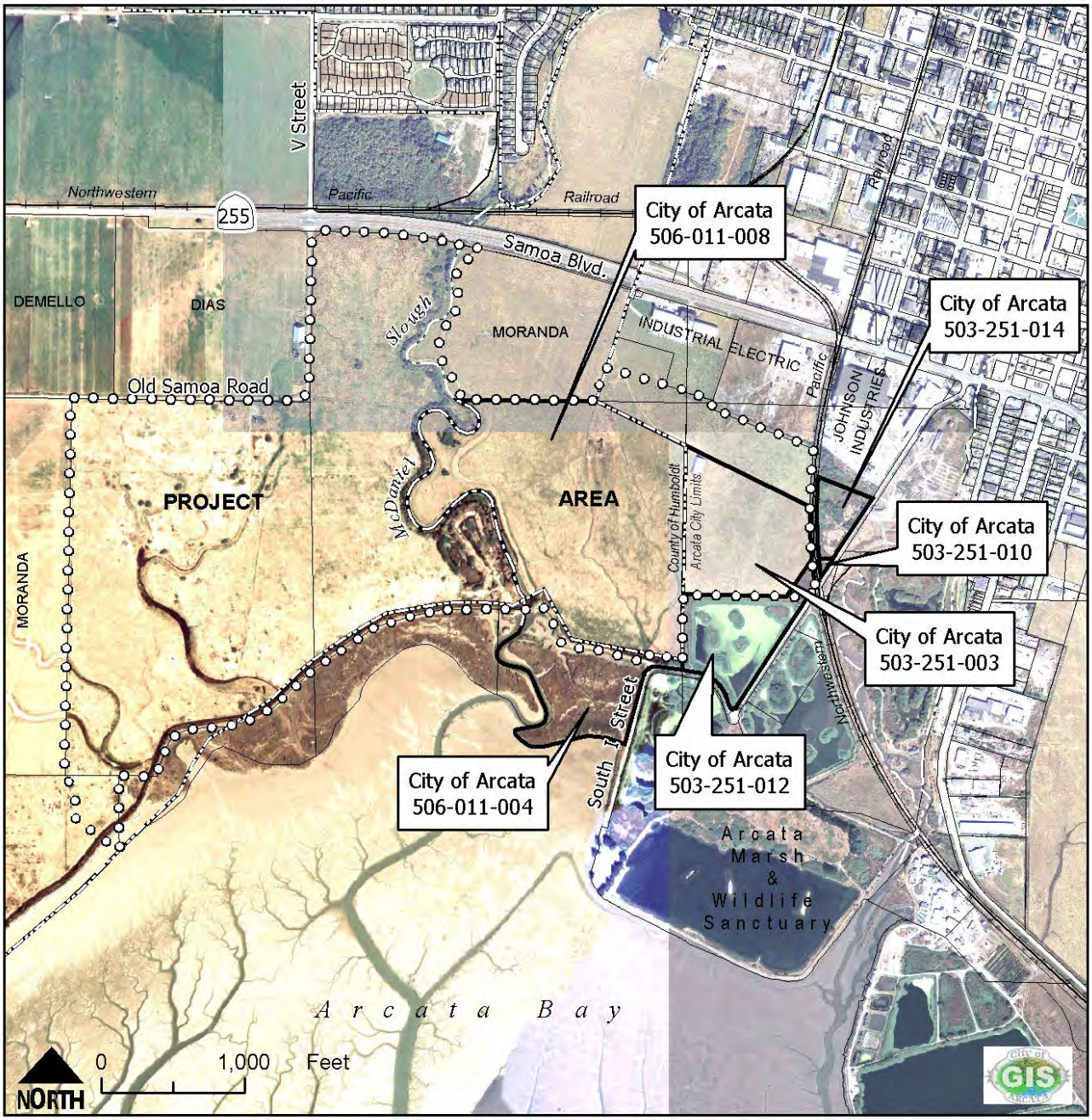


Figure 1-1

McDaniel Slough EIR

PROJECT LOCATION MAP



Boundaries
- Project Boundary
- Arcata City Limits

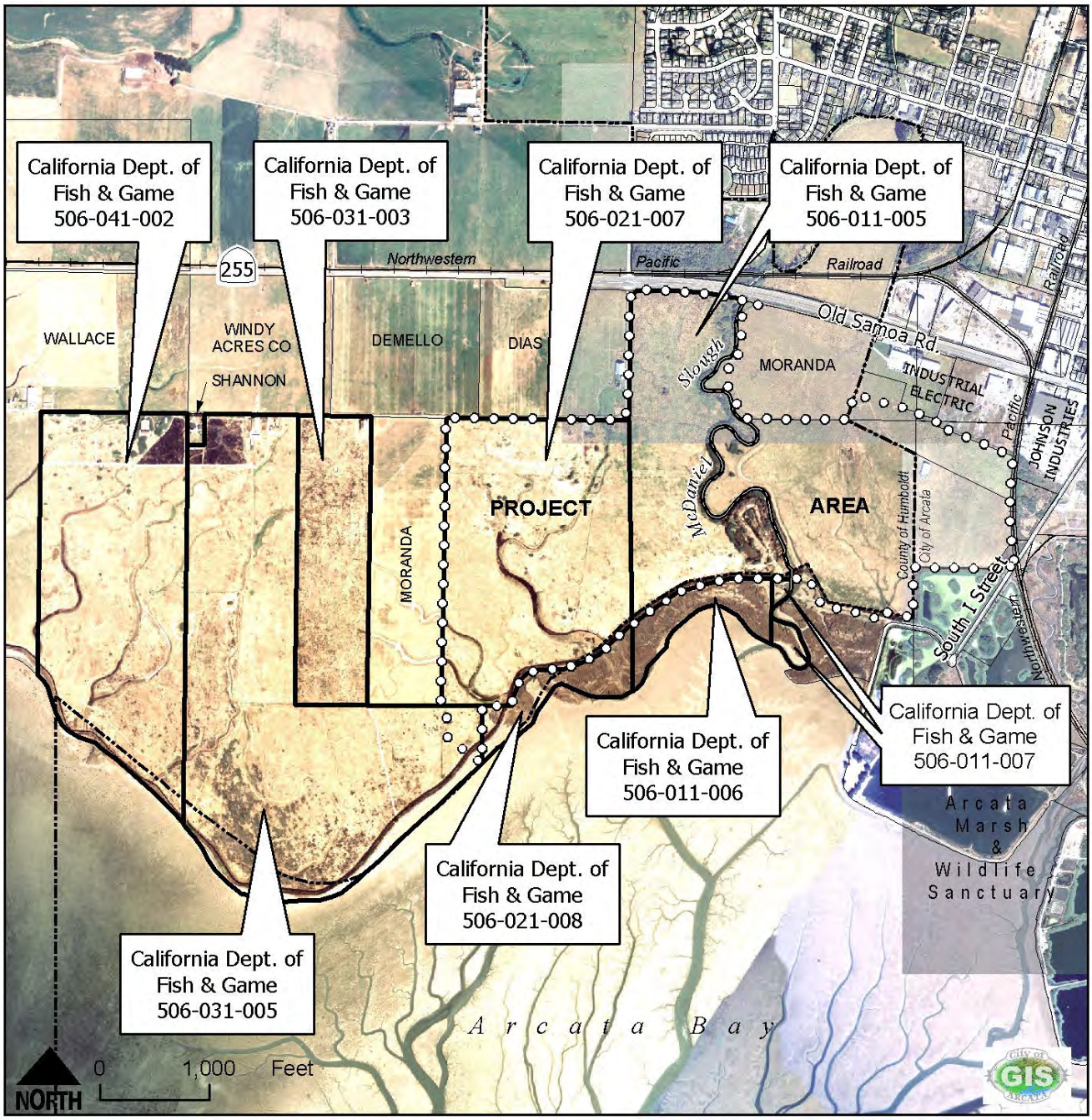
Water Features
- Creek

Transportation
- Railroad

Parcels
- Parcel
- City of Arcata parcels

Source: City of Arcata GIS, CD-Data 2/2004

Figure 1-2
McDaniel Slough EIR
CITY OF ARCATA OWNED PARCELS



Boundaries
- Project Boundary
- Arcata City Limits

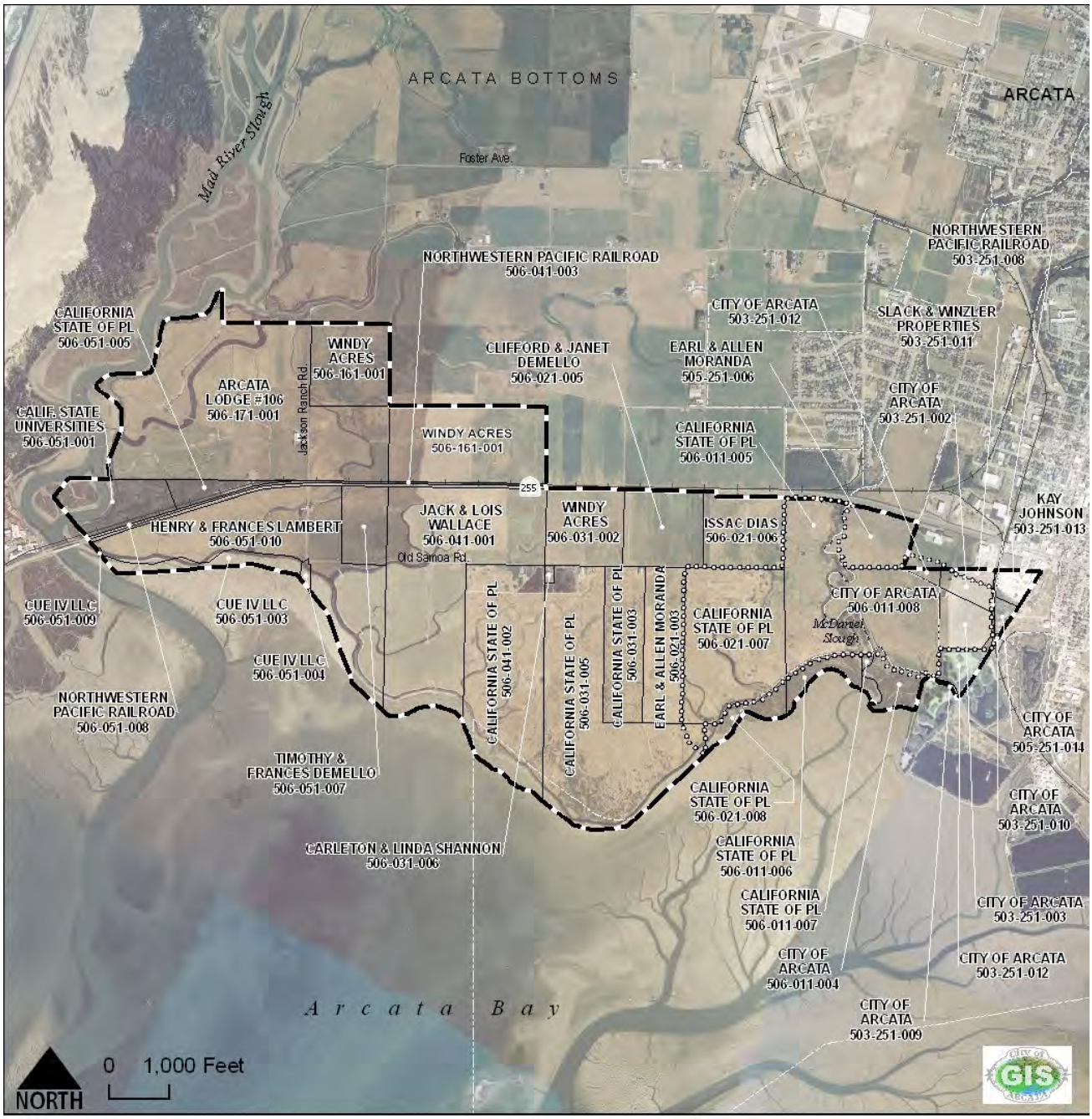
Water Features
- Creek

Transportation
- Railroad

Parcels
- Parcel
- California Dept.of Fish & Game parcels

Source: City of Arcata GIS, CD-Data 2/2004

Figure 1-3
McDaniel Slough EIR
CALIFORNIA DEPTARTMENT OF FISH & GAME OWNED PARCELS



Boundaries
- Reclaimation District 768
- Project Boundary
- Arcata City Limits

Water Features
- Creek

Transportation
- Railroad

Parcels
- Reclaimation District Parcels

Source: City of Arcata GIS, CD-Data 6/2005

Figure 1-4
McDaniel Slough EIR
RECLAIMATION DISTRICT 768

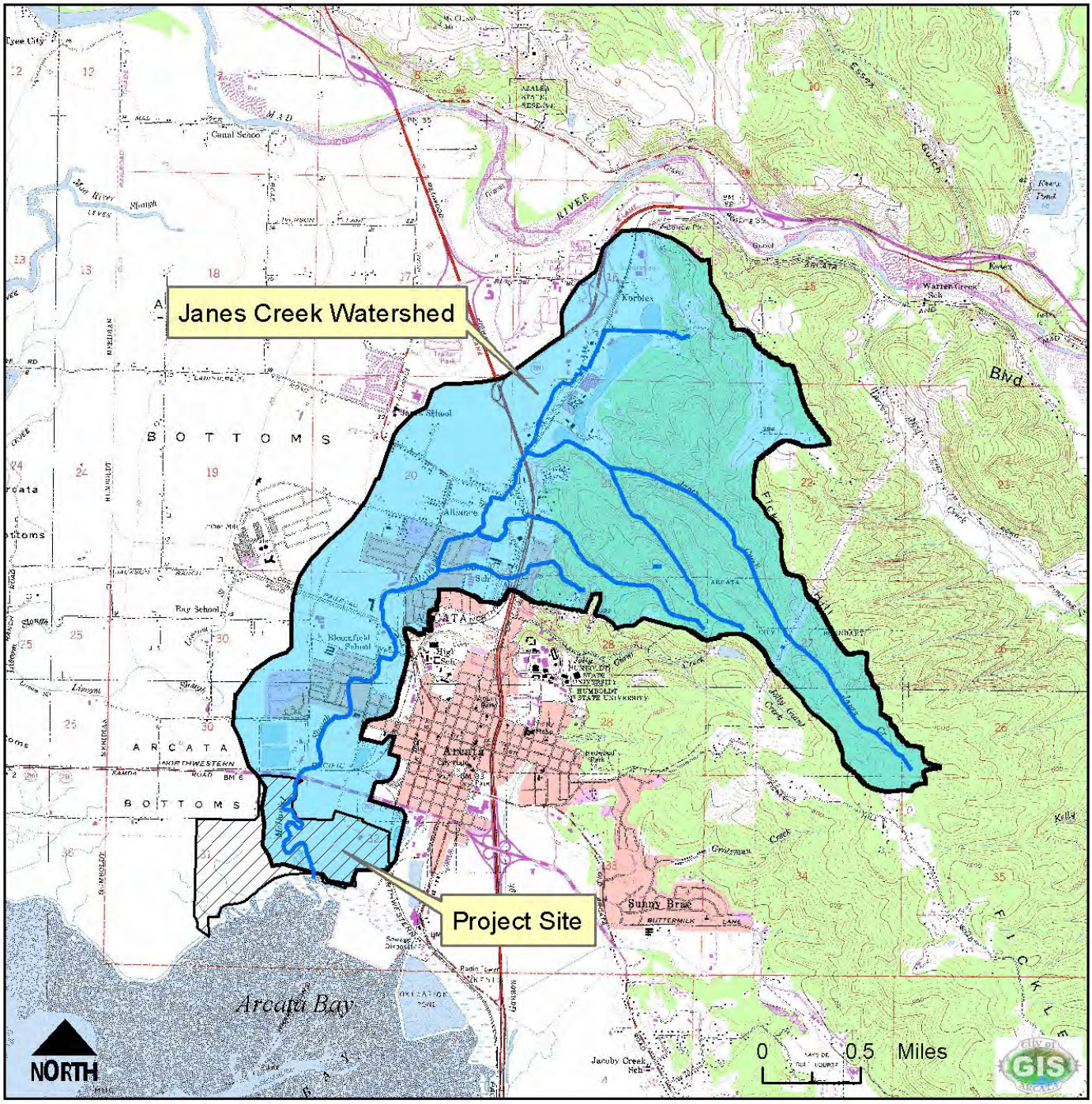


Figure 1-5

McDaniel Slough EIR

JANES CREEK WATERSHED

Boundary

Project Boundary

Water Features

Streams

Janes Creek Watershed

CHAPTER 2
PROPOSED PROJECT AND ALTERNATIVES

2.1 OVERVIEW

This chapter describes the McDaniel Slough Marsh Enhancement Proposed Project located in and adjacent to the southwest corner of the City of Arcata and the Department of Fish and Game Mad River Slough Wildlife Area in northwestern California. The proposed marsh enhancement Proposed Project (Proposed Project), and a range of alternatives will be analyzed. The Proposed Project includes the following features:

- Wetland habitat restoration on 200 acres of Department of Fish and Game and City lands surrounding McDaniel Slough;
- Creation of 35 acres of brackish and freshwater ponds at the Arcata Marsh & Wildlife Sanctuary;
- Construction of trails and interpretative features;
- Increasing storm water storage capacity and improving drainage;
- Constructing eco-levees, flood levees, and pond perimeter levees to protect surrounding land;
- Maintaining PG&E transmission tower access; and
- Providing access for anadromous fish to McDaniel Slough/Janes Creek.

The Proposed Project and alternative descriptions are based on information provided by the City of Arcata Environmental Services Department, a Restoration Plan for the McDaniel Slough Tidal Marsh (Philip A Williams Ltd. 2002), the McDaniel Slough Tidal Marsh Restoration Proposed Project Preliminary Initial Study and Checklist (Winzler and Kelly 2002) and the McDaniel Slough Marsh Enhancement Proposed Project Notice of Preparation for a Draft EIR (City of Arcata 2003).

The marsh enhancement Proposed Project alternatives were developed to satisfy CEQA guidelines §15126.6, which requires an EIR to "describe a range of reasonable alternatives to the Proposed Project, or to the location of the Proposed Project, which would feasibly attain most of the basic objectives of the Proposed Project but would avoid or substantially lessen any of the significant effects of the Proposed Project, and evaluate the comparative merits of the alternatives. A "No Proposed Project" alternative must be included and should describe the impacts associated with existing conditions, as well as impacts that would be reasonably expected to occur in the foreseeable future if the Proposed Project were not approved, based on current plans and consistent with available infrastructure and community services. In addition to the Proposed Project the alternatives analyzed in this EIR include:

Alternative 1: The No Action Alternative;
Alternative 2: Tidal Restoration with Bayfront Levee Breach;
Alternative 3: Full Tidal Restoration with Bayfront Levee Removal; and
Alternative 4: Bayfront Levee Repair with Freshwater Marsh Enhancement.

2.2 PROPOSED MARSH ENHANCEMENT: PROPOSED PROJECT (MIXED HABITAT ALTERNATIVE)

The goal of the McDaniel Slough Marsh Enhancement Proposed Project, as specified by the City of Arcata, DFG and California Coastal Conservancy, is:

> "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

The City of Arcata (City) and the California Department of Fish and Game plan to restore tidal wetland functions to 200 of 240 acres of former tidal salt/brackish marsh and freshwater wetlands adjacent to Humboldt Bay in northern California. The remaining 40 acres will be enhanced and managed as freshwater and brackish ponds, and grassland/riparian areas. The proposed Project was identified as the Freshwater / Estuarine Alternative 4.1 in the Restoration Plan for the McDaniel Slough Tidal Marsh (PWA 2002). This is a modified version of Alternative 4 from the Enhancement Plan. The Proposed Project is shown in Figure 2.2-4 on page 2-10.

The Proposed Project area is owned by the City (88 acres) and the CDFG (166 acres). The Proposed Project site is located adjacent to the existing Arcata Marsh and Wildlife Sanctuary's (AMWS) northwest boundary. This 88-acre, City owned property provides a critical link from the 154-acre AMWS to the CDFG Mad River Slough Wildlife Area (547 acres) located west of Janes Creek/McDaniel Slough. The Humboldt Bay National Wildlife Refuge is located to the south of the AMWS. These properties form a total area of contiguous public land on north Humboldt Bay of more than 1,000 acres.

The City of Arcata would be responsible for implementing the project under a cooperative agreement with the California Department of Fish and Game (CDFG).

McDaniel Slough/Janes Creek Tidal Restoration

The Proposed Project includes the enhancement of McDaniel Slough/Janes Creek. The enhancement is designed to remove barriers to fish access and includes deepening historic slough channels, partial removal of failing or obsolete levees, and restoring the tidal estuary.

To restore the tidal connection between Humboldt Bay and the tidal 200 acres of the site, the tidegates at McDaniel Slough would be removed creating a single breach through the Bayfront levee. Approximate breach dimensions will be 100 feet wide at the top of the levee and 40 to 50 feet wide at the bottom of the levee. Channel depth will be 10 ft below MHHW (i.e. seven feet NGVD thalweg elevation). (NGVD is a vertical geodetic datum formerly called "Sea Level

Datum of 1929" or "mean sea level". The datum was found by averaging the sea level over a period of many years at 26 tide stations along the coasts of the US and Canada. Because it is an average, it does not represent the local mean sea level at any particular place).

The McDaniel Slough breach site would be armored with rock riprap to protect the levee from scour. The breach dimensions are designed to allow for adjustments depending on results of ongoing monitoring.

The Proposed Project would improve fish passage to McDaniel Slough/Janes Creek by removal of the tidegates; which would allow tidal exchange to the slough/stream reaches. The existing tidegates have effectively blocked salmonid migration into McDaniel Slough/Janes Creek because they close during high tides when fish have the best opportunity to move through the Bay channels. McDaniel Slough/Janes Creek has had an absence of salmonids over the past few years except during a season when one of the tidegates failed. During the period of tidegate failure, adult salmonids where found upstream in Janes Creek.

However, because the bed of the Samoa Boulevard Culvert is at –0.7 ft NGVD (National Geodetic Vertical Datum), which is several feet higher than the natural channel bed, there would still remain a possible barrier to fish passage on Janes Creek following scour of the channel post tidegate removal.

Reestablishing tidal influence would eliminate cattail and reed canary grass that have developed in the lower channel. The cattails and canary grass trap sediments in the stream channel, which exacerbates sedimentation and creates a morphological feature that is not desired at this site. Allowing tidewater to return to the channel would cause die-off of sediment trapping vegetation, which would allow the channel to deepen and remain open to fish passage.

The several smaller historic slough channels that have aggraded with sediment will be deepened by excavation to improve site drainage and habitat. Deepening the channels provides increased habitat diversity for native vegetation and wildlife.

Portions of the existing levee that borders the McDaniel Slough/Janes Creek channel will be removed to improve marshplain drainage and habitat transition. The existing levee system adjacent to McDaniel Slough/Janes Creek channel does not allow for floodplain function, channel meandering, or marsh plain drainage. Some portions of the levee will remain intact to serve as roosting islands and to break up wave fetch within the project area in order to promote deposition of suspended sediment.

Rapid colonization of the intertidal area of this Proposed Project is expected within the first ten years, because the site has suitable elevations for colonization and a nearby source of estuarine sediment. After 50 years, a mature marshplain will develop throughout the area below MHHW, with initial colonization of pickleweed (*Salicornia virginica)* in the lower elevations and cordgrass (*Spartina densiflora*) in higher areas. Approximately 30,000-40,000 cubic yards of suitable excavated soil obtained from the freshwater and brackish pond sites will be graded onto 23 acres of low elevation subsided areas within the Proposed Project area in order to build up the marsh plain and accelerate the development of the desirable pickleweed habitat. Building up the

marshplain elevation in selected areas will also serve to break up the wind fetch potential within the project area.

Saltmarsh vegetation will be planted on much of the area suitable for saltmarsh. A planting plan is described in Appendix H.

Freshwater and Brackish Ponds

The eastern 35 acres of the Proposed Project includes the creation of two freshwater ponds, that utilize ground and stormwater, and a brackish pond that utilizes a mix of treated discharged wastewater and bay water. The brackish pond will be excavated to appropriate elevations for mixing bay water with treated wastewater to create the brackish marsh habitat. The treated wastewater meets Humboldt Bay discharge standards and is an expansion of the City's beneficial use of wastewater. Approximately 1-6 cubic feet per second (CFS) of treated wastewater will be gravity fed to the new brackish marsh. Flows volumes will be managed to mimic natural seasonal fluctuations in other Humboldt Bay tributaries. This flow is in addition to the existing surface runoff that will continue to be directed to the brackish pond from an upland area of approximately 20 acres. Stormwater flows will be buffered by flowing to a 2.5-acre freshwater marsh prior to discharge to the brackish pond location. The brackish marsh outlet will be adjustable in order to mute the tidal cycle and to provide flexibility to adjust salinity to desired ranges. Desired salinity ranges of 5-10 parts per thousand (ppt) within the brackish marsh will be suitable for tidewater gobies. The brackish marsh will serve to extend the estuarine conditions of McDaniel Slough and likely provide similar habitat conditions as that of McDaniel Slough when one of the tidegates was missing. That is, a muted tidal exchange with a freshwater input. Islands in the brackish marsh provide roosting and nesting habitat and maximize hydraulic mixing.

Upland areas will support the riparian forest and perennial grassland. These areas will be seeded with a native grass seed such as *Dechampsia cespitosa, Bromus carinatus, Hordeum brachyantherum and Leymusa triticoides,* and planted with native trees and shrubs such as A*lnus rubra*, *Picea sitchensis* and S*alix sp.*

The freshwater ponds will be excavated to six- to 10-foot depths to expose groundwater and provide year round pond habitat. The ponds will provide recreational opportunities and increased storm water storage capacity while reducing storm water pollution to Humboldt Bay. The existing "log pond" located within the AMWS southeast of the project site on South G Street provides a reference site. The proposed freshwater ponds are expected to develop similar habitat conditions. Excavated fill from both types of ponds will be used for levee construction and to build up marshplain elevations in low-lying areas. The upland area around the freshwater ponds will be planted with native trees and shrubs creating a riparian forest. Artificial roosting "snags" will be installed by excavating deep holes and setting several large conifer logs into the soil set on end. Bat boxes and swallow nesting platforms will be anchored to the snags.

Trails and Interpretive Facilities

The Proposed Project includes trails, wildlife viewing structures, benches, and information kiosks. An 800-foot trail would be constructed along the eastern portion on the bayfront levee trail that would provide access from the Arcata Marsh to the McDaniel Slough main levee breach. A wildlife viewing structure and information signs describing the Proposed Project

would be located at the mouth of Janes Creek. A second hiking trail would be constructed along the eco-levee that separates the ponds and the McDaniel Slough tidal marsh. Wildlife viewing structures, benches, and interpretative signs would also be constructed along the eco-levee trail. The levee trails would enhance the views to and along Humboldt Bay.

A barn with cultural significance existed adjacent to the proposed eco-levee trail. The barn blew down in a late December windstorm.

Storm-Water Storage Capacity and Drainage Changes

The Proposed Project includes changes to the Proposed Project site drainage pattern resulting in improved flood capacity and sediment routing. The Proposed Project includes a natural deepening of the McDaniel Slough/Janes Creek channel, installation of drainage pipes with tidegates into the newly constructed levees, and construction of freshwater ponds.

The tidegate and culvert removal would result in a natural deepening of the McDaniel Slough/Janes Creek channel. Resulting tidal scour will kill emergent vegetation in the channel, increasing channel capacity. This deepening at the mouth would move upstream into the lower reaches of Janes Creek. Incision is needed to return the channel to a more natural condition that existed before installation of the tidegates. A deeper channel would increase channel capacity, which should reduce flooding in residential portions of the Arcata Bottom.

Drainage of properties adjacent to the restoration Proposed Project, as well as overflow from the proposed freshwater ponds, will be controlled by the installation of drain pipes equipped with tidal flap gates. The drainpipes and tidegates allow adjacent properties to drain to the Proposed Project site at lower tides and prevent tidal flooding of the adjacent properties during extreme high tides. A larger tidegate at the southwest corner of the Proposed Project site, which serves to drain the large storage area to the west, will remain. The culvert located at the southeast corner of the Proposed Project site would be removed.

Construction of the two freshwater ponds would improve storm water storage capacity that should reduce flooding on surrounding property. The ponds would be excavated to a depth that exposes groundwater during the summer dry season. During the rainy season, runoff from surrounding property will enter the ponds via surface flow.

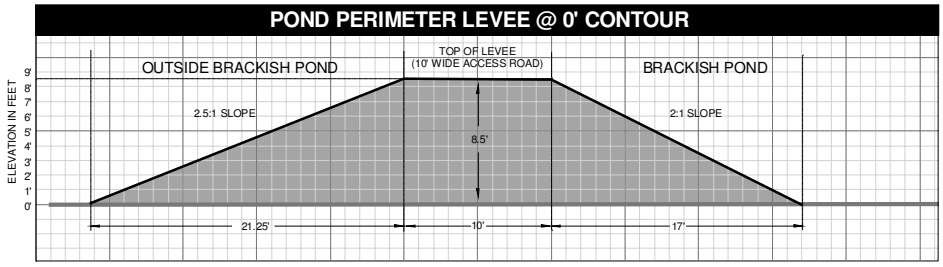
Levee Construction

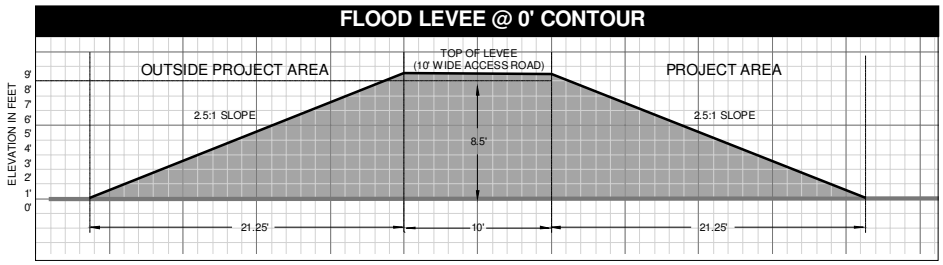
Three types of levees will be constructed around the Proposed Project site perimeter to provide improved flood protection for surrounding properties, create a transition from low saltmarsh to high saltmarsh to upland habitat, and contain constructed ponds. The levees will blend with the natural environment.

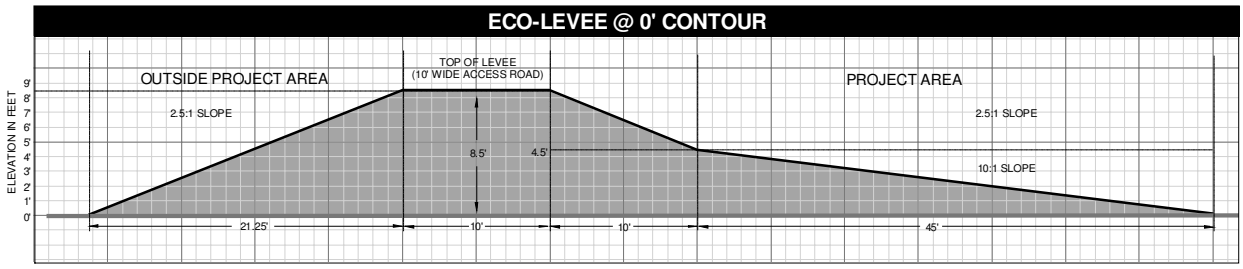
Construction of levees on the Proposed Project site would result in the filling of agricultural wetlands. The restoration of tidal wetland function and construction of the fresh water and brackish ponds in the east portion of the Proposed Project would mitigate for wetland loss caused by levee construction.

The following levees would be constructed as part of the Proposed Project:

- flood levees,
- eco-levees with benched upland slopes, and
- pond perimeter levees.







The eco-levees will be constructed adjacent to private property along the northwest site boundary with Old Samoa Road, along the boundary with the fresh and brackish wetlands and along the existing levee for Gearheart Marsh. Eco-levees are to be constructed in locations where no further marsh expansion is likely to occur at any time in the future. Eco-levees are designed to be permanent features. Levee elevation of +8.0 feet NGVD provides protection against the 100-year extreme tide (includes accounting for sea level rise).

The eco-levees will have an approximate 2.5:1 outboard slope and an approximate 10:1 inboard side slope. The eco-levees will provide a band of transitional from low to high marsh habitat.

The eco-levees will have a 2.5:1 side slope down to 4.5 ft NGVD and a 10:1 side slope on the inboard side between 4.5 and 3.5 feet NGVD. The eco-levees are designed to support a wider range of vegetation and provide a more diverse range of wildlife habitat. In addition, the eco-levee is a more aesthetically pleasing levee design that blends more naturally with the bay/saltmarsh environment.

The footprint of an eco-levee is greater than the footprint of the flood or pond levees because of the gradual slope on one side. However, the larger area of the footprint does not cause additional wetland areas to be filled because the lower slope of the levee continues to support wetland vegetation.

The flood levees would be constructed along the west side of the Proposed Project perimeter and along the northeast portion of the Proposed Project. The flood levees will be constructed with a straight 2.5:1 side slope down to existing grade and will therefore require less fill material. Flood levees would be constructed in locations adjacent to the Proposed Project where future restoration of property is possible.

The pond perimeter levees would be similar to the flood levee; however, they would be designed to permanently contain pond water. The pond perimeter levees would be constructed on the north, east, and south sides of the brackish pond. The total amount of fill material required to develop the levees is 60,000 cubic yards.

The proposed project would eliminate the need for Reclamation District #768 to maintain 4,234 linear feet (or 28% of the total current bayfront levee structure) of levee and the associated tidegates. Long-term management and maintenance of the proposed project perimeter levees would be the responsibility of the City of Arcata and DFG.

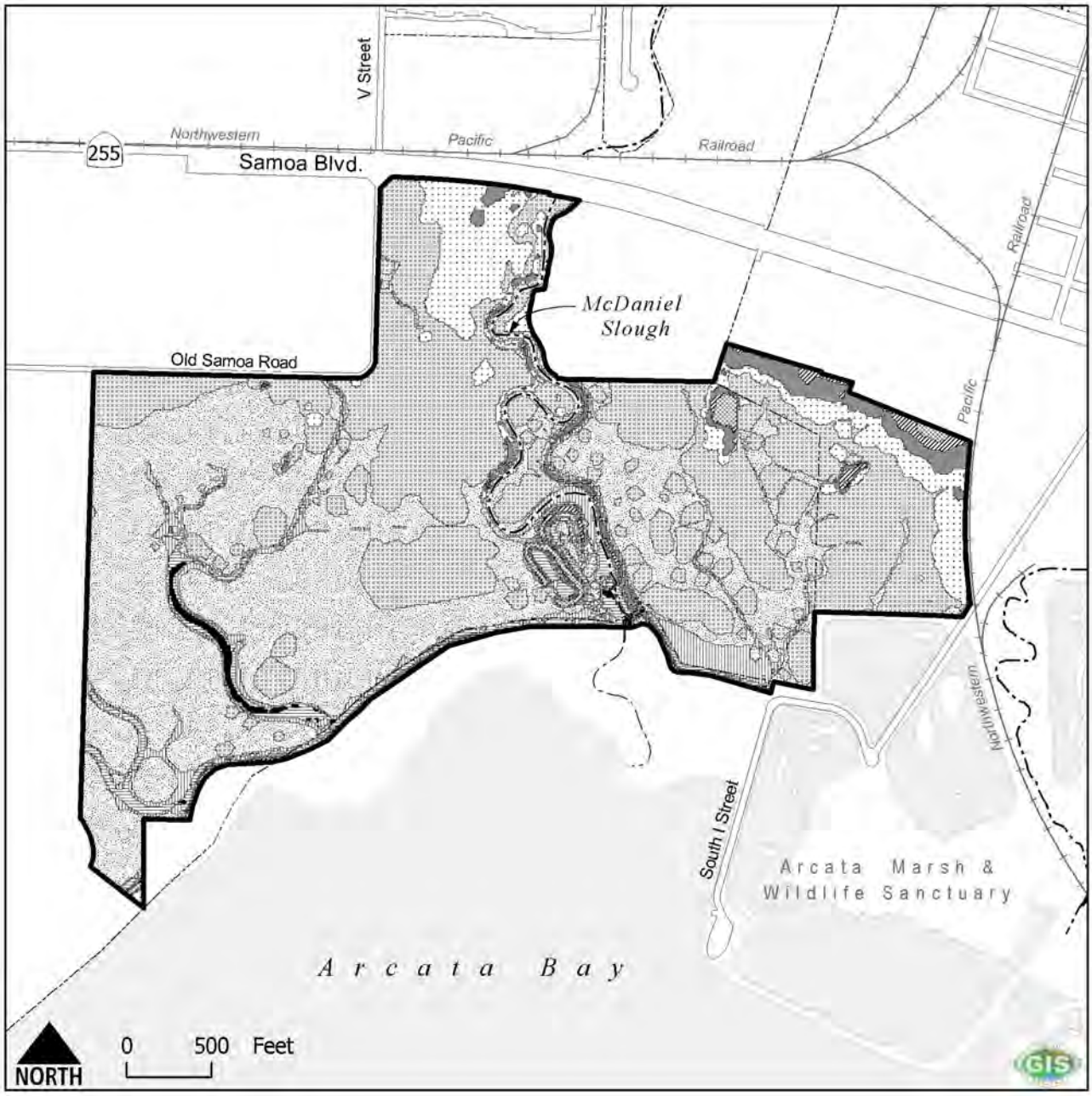
Transmission Tower Access

The Proposed Project would include features to accommodate PG&E power transmission line tower access. A PG&E access boardwalk leading south from Old Samoa Road to a PG&E power tower will be constructed. Another access will be provided from the existing levee east of the breach. Boardwalks will be constructed with redwood or recycled plastic lumber. A third tower that is located in the middle of the site will be reinforced. PG&E will access that tower by boat or helicopter as needed.

Project Phasing and Timing

The project will be implemented as follows:

1. Construct the freshwater ponds, build up marshplain, construct northern and western levee sections, remove Janes Creek lateral levees and plant upland areas. June-Nov. 2006
2. Construct power line access spurs, brackish marsh and eastern levee section. Plant new levee sections and islands. April-December 2006
3. Remove tidegates, construct trails, plant saltmarsh areas, open to public access. December -April 2007
4. Breach bayfront levee, final native plant planting of saltmarsh and estuary areas, October -2007



Boundaries
- Project Boundary
- Arcata City Limits

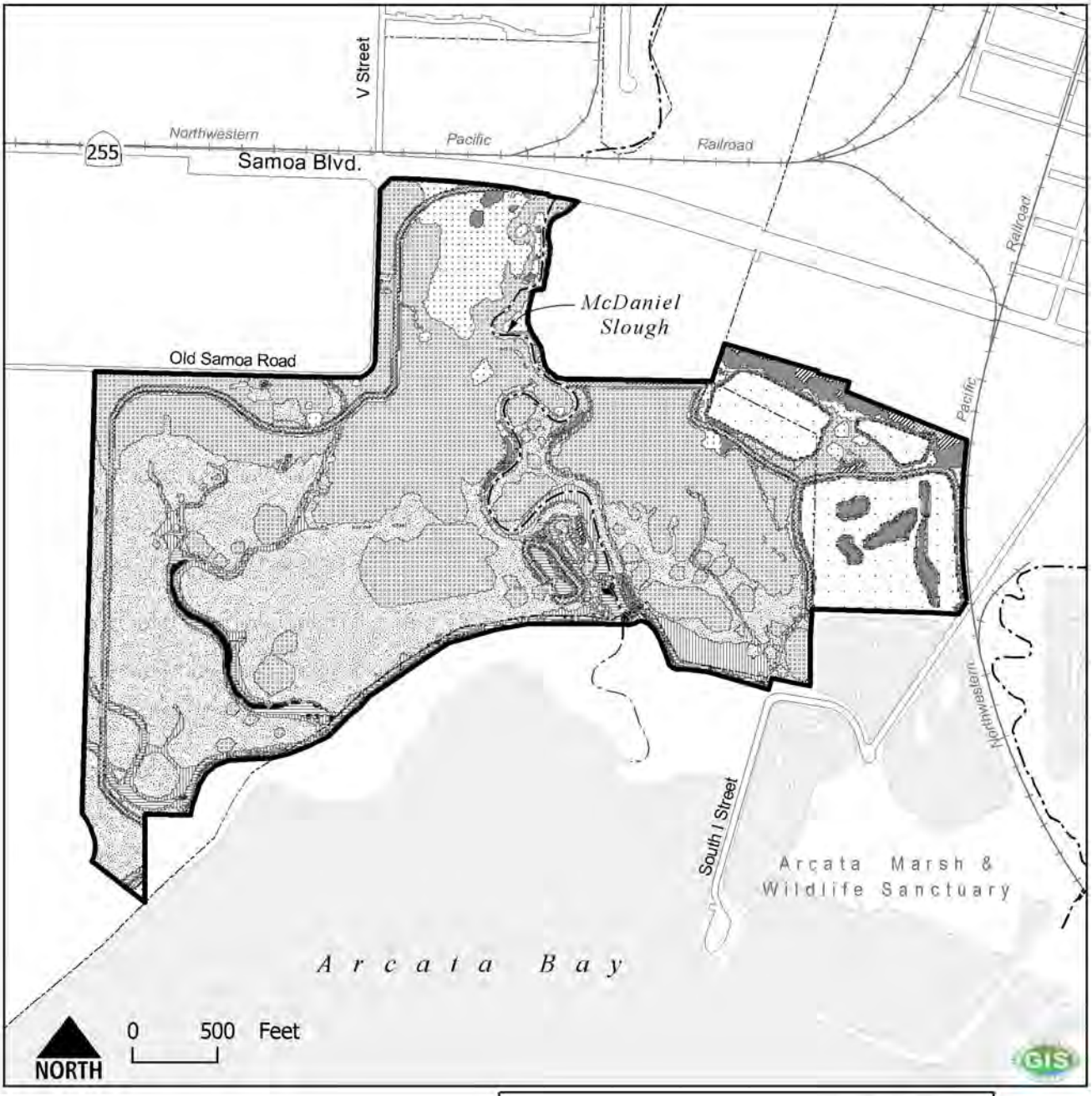
Water Features
- Streams
- Waterbody

Transportation
- Railroad
- Streets

Source:
Geonex Aerial Surveys
1' contour mapping
1995, NGVD29

Elevation in Feet
- -2 - -1
- -1 - 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 15

Figure 2.2 - 2
McDaniel Slough
EXISTING TOPOGRAPHY



Boundaries
- Project Boundary
- Arcata City Limits

Water Features
- Streams
- Waterbody

Transportation
- Railroad
- Streets

Source:
Geonex Aerial Surveys
1' contour mapping
1995, NGVD29

City of Arcata, Environmental Services

Elevation in Feet
- -8 - -2
- -2 - -1
- -1 - 0
- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 15

Figure 2.2 - 3
McDaniel Slough
POST PROJECT TOPOGRAPHY

Boundaries
- Project Boundary
- Arcata City Limits

Recreation
- Trail
- Bird Blind
- Information Kiosk
- Boat Launch

Levee Types
- Flood Levee
- Eco-Levee
- Pond Perimeter Levee

Water Features
- Streams
- Freshwater Marsh
- Brackish Pond

Transportation
- Access Road
- Railroad

Other Features
- Potential wastewater flow
- Surface Water Flow
- Drainage Ditch
- Remove Culvert/Tide gate
- Drainage pipe
- PG & E Tower
- Trees
- Remove Levee
- Roosting island
- Parcel

Source: City of Arcata

Figure 2.2-4

McDaniel Slough EIR

PROPOSED PROJECT

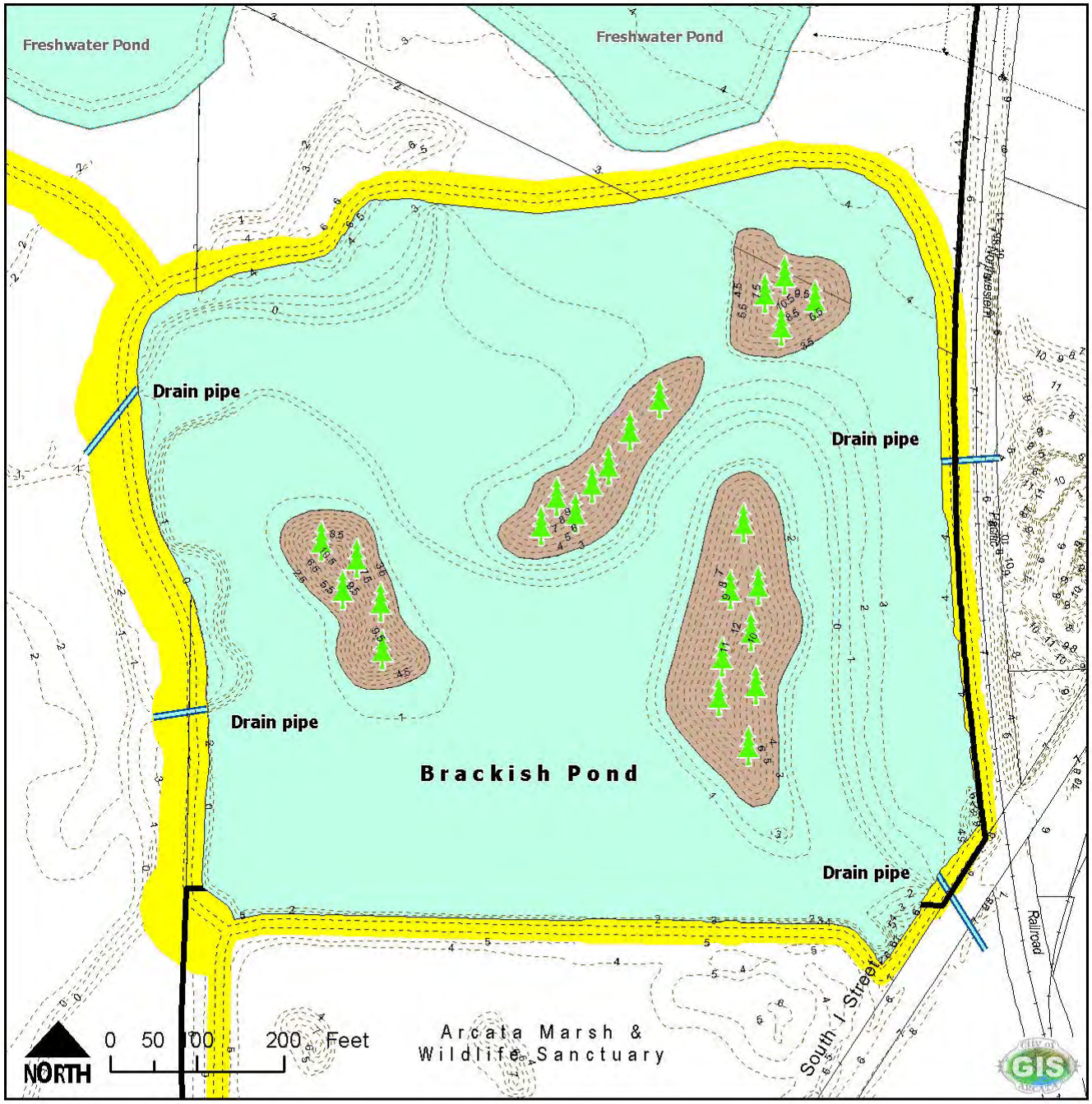


Figure 2.2 - 5

McDaniel Slough EIR

Brackish Pond Post Topography

Boundaries
- Project Boundary

Transportation
- Access Road (8.5' Contour)
- Railroad

Other Features
- Levee Footprint
- Waterbody
- Islands
- Potential wastewater flow
- Surface Water Flow
- Drainage pipe
- Parcel
- 1' Contour Interval
- Trees

Source: City of Arcata

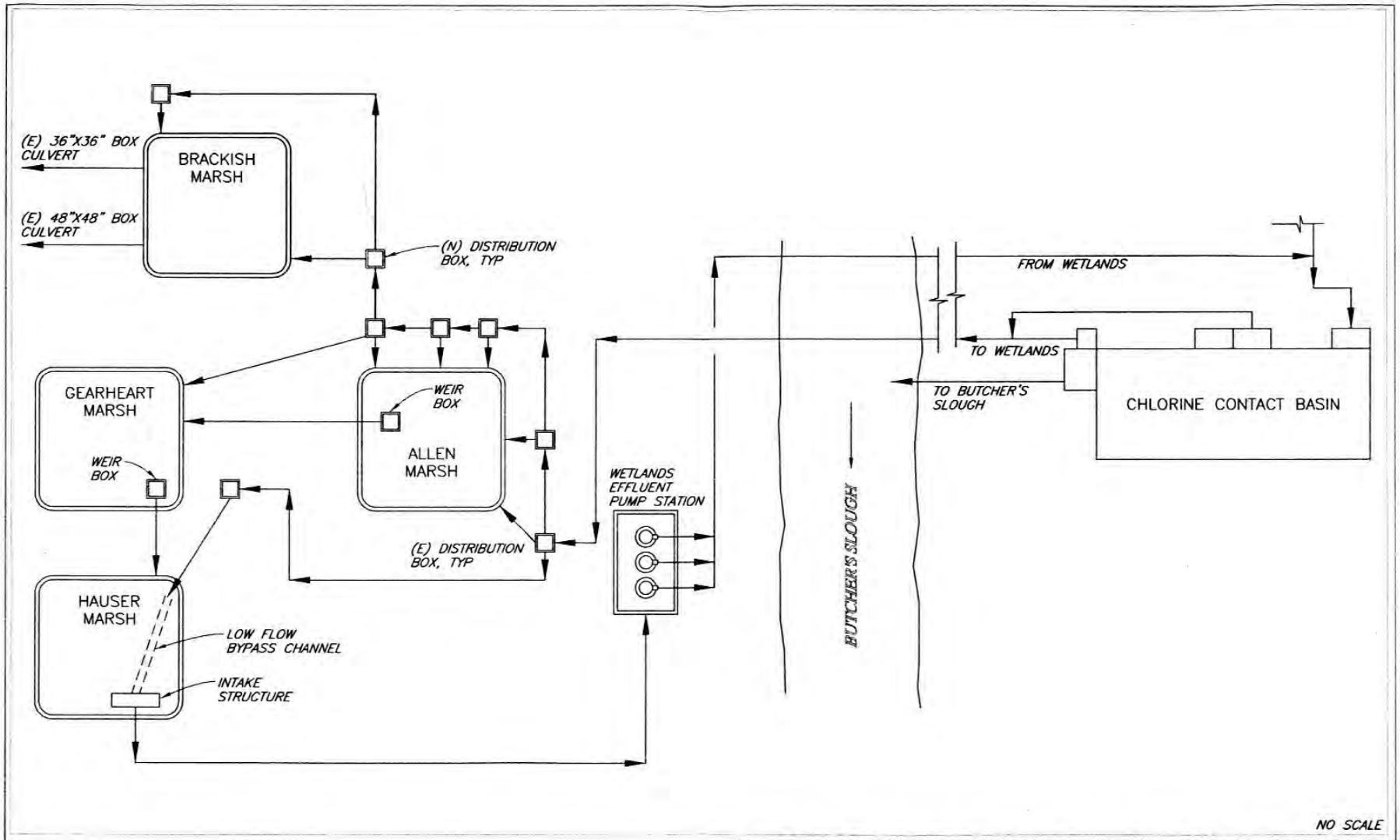

(E) 36"X36" BOX CULVERT
(E) 48"X48" BOX CULVERT
BRACKISH MARSH
(N) DISTRIBUTION BOX, TYP
GEARHEART MARSH
WEIR BOX
ALLEN MARSH
WEIR BOX
HAUSER MARSH
LOW FLOW BYPASS CHANNEL
INTAKE STRUCTURE
(E) DISTRIBUTION BOX, TYP
WETLANDS EFFLUENT PUMP STATION
BUTCHER'S SLOUGH
FROM WETLANDS
TO WETLANDS
TO BUTCHER'S SLOUGH
CHLORINE CONTACT BASIN
NO SCALE
SHN Consulting Engineers & Geologists, Inc.
City of Arcata
Brackish Marsh Project
Arcata, California
NOVEMBER 2004
004209-FLOW
Wetlands Process Diagram
SHN 004209

Figure 2.2 - 6

2.3 PROPOSED PROJECT ALTERNATIVES

CEQA requires that a range of alternatives be evaluated as part of the EIR. The following alternatives will be analyzed:

Proposed Project Figure 2.2-4

Alternative 1 – The No Action Alternative
The No Action Alternative is included as a baseline condition against which the other *4 alternatives* can be assessed in terms of delivering Proposed Project objectives. Figure 2.3-1. It is assumed that the site would continue to be managed at its current condition. The City lands would continue to be grazed, the DFG lands would remain as grasslands with potential succession to shrub and wooded area, and the McDaniel Slough/Janes Creek channel would continue to aggrade, thereby increasing the flood hazard level for adjacent areas. The No Action Alternative would also include retaining the existing bayfront levee and McDaniel Slough levee, which were constructed between 1893 and 1895. There are several physical processes that will shape the future evolution of the project site given the No Action course is taken. These include:

- Continued sedimentation of McDaniel Slough from watershed-derived fine sediments.
- Long-term gradual sea-level rise in response to climate change. Recent studies have indicated this could be of the order of 0.2 to 0.9 ft in the next 50 years (IPCC, 2001).
- Accelerated wind wave erosion of fringing marsh due to sea level rise.
- Continued settlement and erosion of the bayfront levee. The bayfront levee is currently in a poor state of repair and has subsided since construction. The poorly functioning tidegates, likely combined with poorly constructed levees have resulted in saltwater intrusion on the interior of the site. With sea level rise this problem is likely to worsen. These processes will combine over the medium to long-term to worsen conditions for continued use of the site for cattle grazing or other agricultural use.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach
The levee breach alternative would allow tidal action to be reintroduced to the site by removing the existing tidegates and excavating a breach in the levee sufficient to convey tidal and flood flows on Janes Creek. Estimates of breach sizing indicate that a breach of 100 feet or more may be required. A new levee system composed of eco-levees and flood control levees would be reconstructed inboard around the perimeter of the site. The levees would be designed to be constructe3d to elevation 8.0 feet NGVD to protect against the 100-year tide level of 6.5 feet NGVD reported by FEMA (1997). The flood control levee is proposed for areas bounding zones that could be incorporated into the restoration site at a future date, and eco-levees would be constructed where no future expansion would occur.
This alternative provides a somewhat muted tidal influence similar to the proposed project. It differs in that a larger area of mud flat habitat would result and the brackish marsh and freshwater habitat would not be a component in this alternative. Trails would be provided on the tops of the newly constructed levees on the eastern side of the project. Please see Figure 2.3-2 for a diagram of Alternative 2.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal
The Levee removal alternative would require the complete removal of a large section of the bayfront levee (4,237 feet) and selective filling of the levee borrow ditch to provide complete ecologic connectivity between the Bay and restored marsh. Tidal connector channels and additional levee breaches would be designed according to the respective drainage areas. This alternative is based on restoring, where possible, the tidal drainage system as shown on the 1870 U.S. Coast Survey of Humboldt Bay. Removing the levee would allow for deposition of a woody debris wrackline during spring tides that creates natural disturbance and colonization opportunities for rare plants. This alternative would incorporate a site boundary trail along the new flood control levees shown, and is also intended to minimize human disturbance to wetland wildlife use. This alternative prevents any future use of the bayfront levee as a regional trail link. This alternative results in the maximum amount of future saltmarsh habitat. Please see Figure 2.3-3 for a diagram of Alternative 3.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement
The levee repair alternative would be a repair of the existing bayfront levee with an upgrade of the tidegates to allow for increased flood capacity. The bayfront levee would be raised to a level of 6.5 feet NGVD to protect against the 100-year tide level. In addition, the McDaniel Sough area waterbird habitat would be enhanced with two shallow freshwater seasonal ponds fed by groundwater. Fill excavated during pond construction would be used to improve the bayfront levee. This alternative would maintain most of the existing freshwater/agricultural wetlands and would not optimize salmonid access to Janes Creek. Reclamation District #768 would continue to maintain the bayfront levee and tidegate structures. Please see Figure 2.3-4 for a diagram of Alternative 4.

Alternatives Evaluation Summary

Alternative	Proposed Project	Alternative 1 No Action	Alternative 2 Breach bayfront levee	Alternative 3 Remove bayfront levee	Alternative 4 Managed wetlands
OBJECTIVES					
Area of tidal restoration	215	0	240	240	0
Graduation of habitats	++	0	+	+	0
Fish access	+	0	+	+	0
Tidal channel system	+	0	+	+	0
Connectivity	+	0	+	+	0
Lateral connectivity	+	0	+	+	0
Rate of evolution	++	0	+	+	0
Public Use	++	+	++	+	+
Passive management	++	–	+	++	–
CONSTRAINTS					
Land subsidence	NA	NA	NA	NA	NA
Wind waves	NA	NA	NA	NA	NA
Drainage	+	NA	NC	NC	0
Exotic species	+	NA	0	0	0
Feral animals	+	NA	+	+	0
Protected species	NA	NA	NA	NA	NA
Adjacent properties	+	NA	+	+	+
PG&E access	+	NC	+	+	NC
Flood impacts	+	NC	+	+	NC
Managed wetlands	+	NA	0	0	+
Capital Cost (millions of dollars)	$3.0	NA	$2.5	$2.9	$ .9

1 Does not include active management required for 35-acre managed wetland
+ Meets objectives/reduces constraints
++ Exceeds objective/reduces constraint
0 Does not meet objective/has no impact on constraint
– Fails objective/worsens constraint
NA Not applicable
NC No change

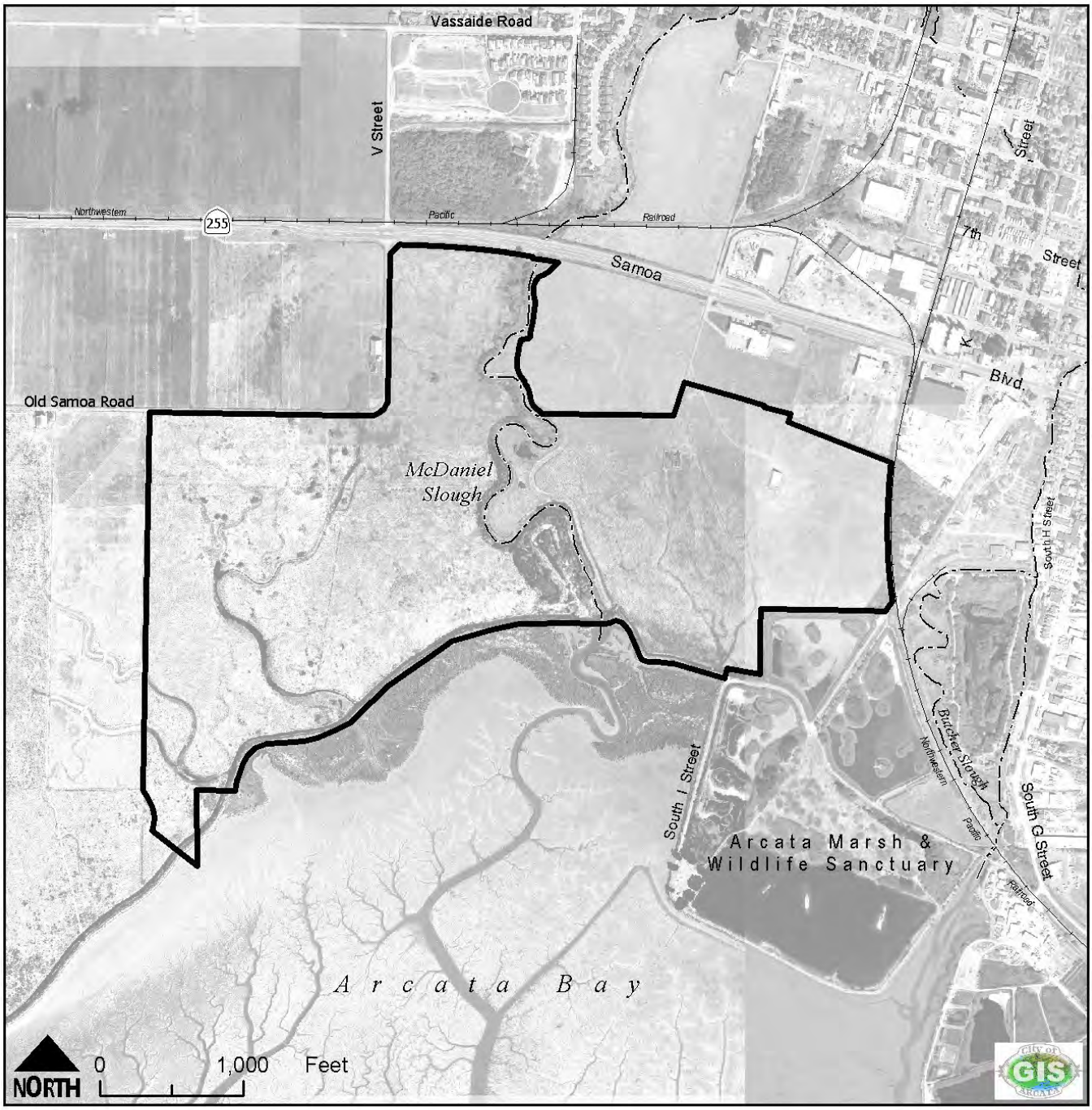


Figure 2.3 - 1

McDaniel Slough EIR

ALTERNATIVE 1

NO-ACTION ALTERNATIVE

Boundary

Project Boundary

Transportation

Railroad

Water Features

Streams

Figure 2.3 - 2

McDaniel Slough EIR

Alternative 2

Tidal Restoration with Bay-front Levee Breach

Boundaries
- Project Boundary
- Arcata City Limits

Levee Types
- Flood Levee
- Eco-Levee
- Bay front levee

Features
- Drain pipe/Tide gate
- Drainage Ditch
- Railroad
- Streams
- Maintain drainage through borrow ditch
- Levee breach site
- Parcel

Source: PWA-McDaniel Slough Draft Alternatives, 11/1/2000, "Alternative A"

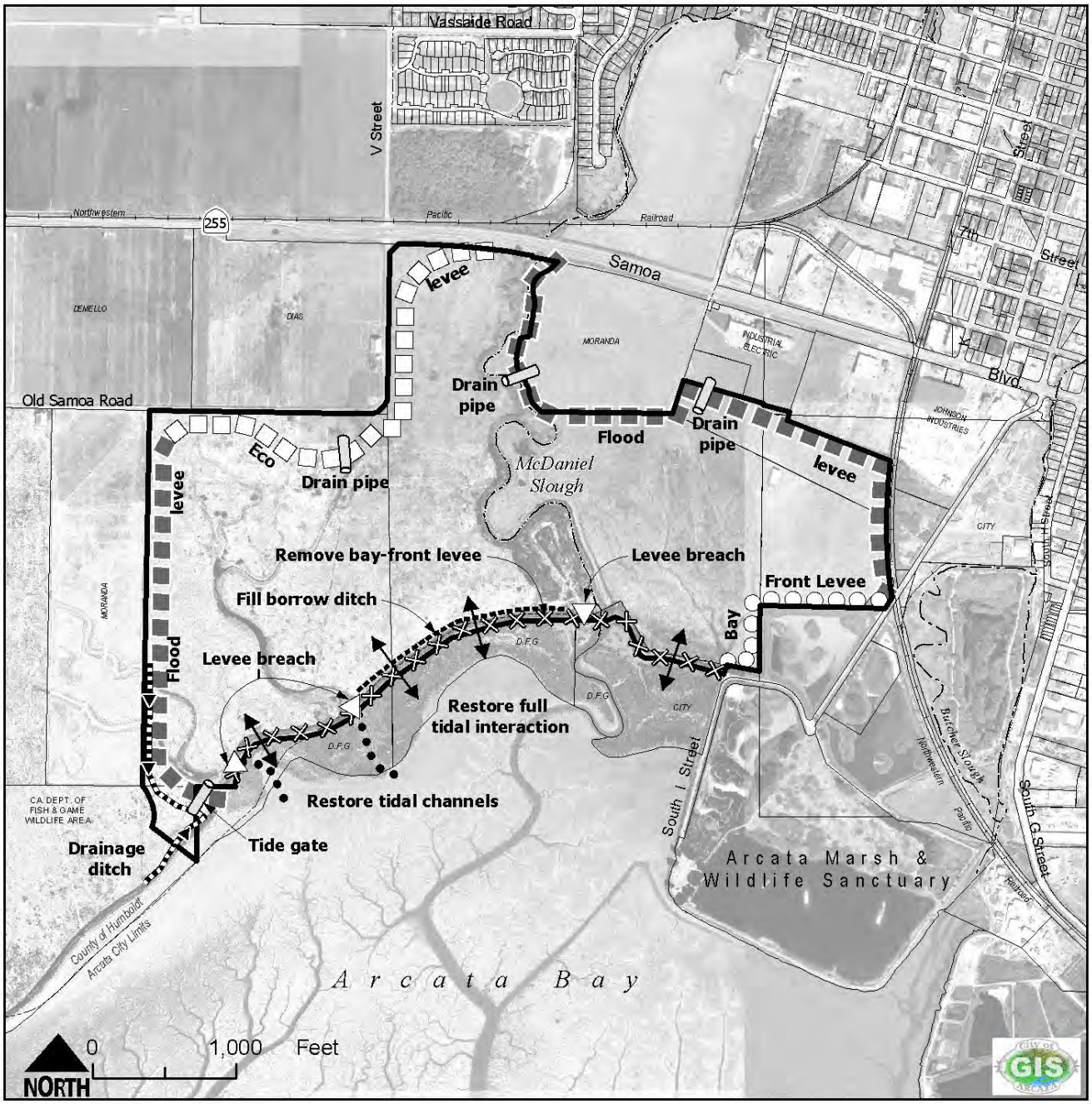


Figure 2.3 - 3

McDaniel Slough EIR

ALTERNATIVE 3

TIDAL RESTORATION WITH BAY-FRONT LEVEE REMOVAL

Boundaries
- Project Boundary
- Arcata City Limits

Levee Types
- Flood Levee
- Eco-Levee
- Bay front levee

Features
- Drain pipe/Tide gate
- Drainage Ditch
- Railroad
- Streams
- Restore tidal channels
- Restore full tidal interaction
- Fill borrow ditch
- Remove bay-front levee
- Levee breach
- Parcel

Source: PWA-A restoration plan for the McDaniel Slough tidal marsh, 10/25/2002, "Alternative 3"

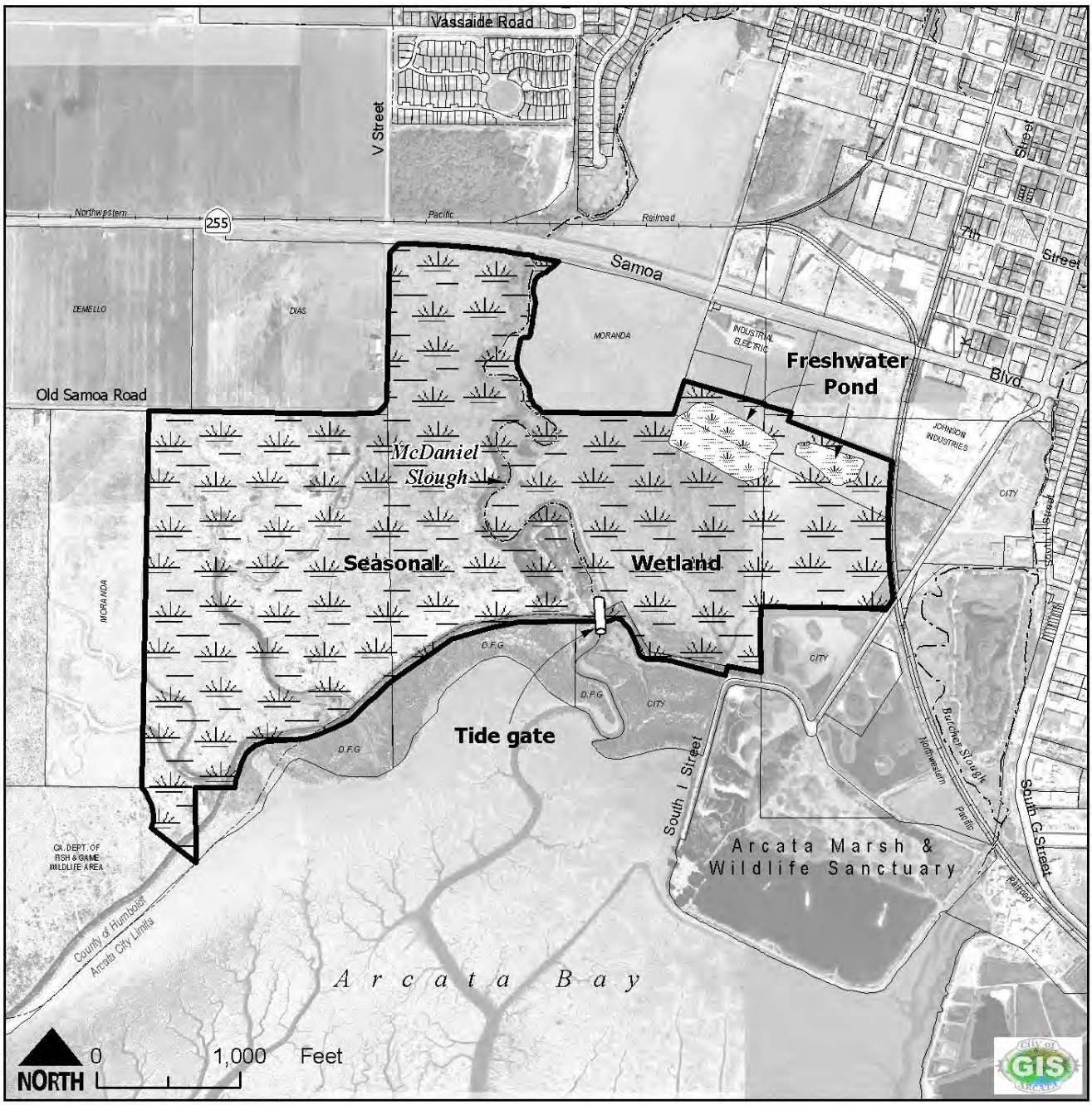


Figure 2.3-4

McDaniel Slough EIR

ALTERNATIVE 4

FRESHWATER MARSH & STRENGTHENED BAYFRONT LEVEE

Boundaries
- Project Boundary
- Arcata City Limits

Water features
- Creek
- Freshwater Pond
- Seasonal Wetland

Other Features
- Railroad
- Parcel
- Tide gate

Source: City of Arcata

CHAPTER 3
NATURAL ENVIRONMENT

3.0 OVERVIEW

Humboldt Bay is a unique estuarine ecosystem on the West Coast of the United States, best described as a multi-basin coastal lagoon with limited freshwater input (Costa, 1982). About 15,000 years ago, during the last glacial advances, sea level was approximately 400 feet below its present elevation. Following glacial retreat the sea level rose rapidly, and then slowed about 6,000 years ago. Tidal marshes formed over the last few thousand years on the margin of the Bay, expanding inland with the gradual rise in sea level. These tidal marshes kept pace with the sea level by the accumulation of peat in the soil and by capturing estuarine sediments brought in on the tide. In one location, the tidal marshes encroached on the southern edge of the alluvial fan created by flood overflows of the Mad River discharging into Humboldt Bay. The entire 'Arcata Bottoms' was part of the alluvial plain for the Mad River system and the main channel of Janes Creek probably formed as a tributary channel of the Mad River during flood flows. As Janes Creek entered the Arcata Bay portion of Humboldt Bay, it formed a tidal slough channel, named McDaniel Slough.

One hundred and fifty years ago McDaniel Slough not only discharged Janes Creek flows but also conveyed the ebb and flood tide to approximately 300-400 acres of historic tidal marsh plain. These marsh plains typically formed at the elevation of the average diurnal high tide (Mean High Water/MHHW) and were drained by a complex dendritic tidal channel system. In its natural state the marsh plain was vegetated by native salt tolerant plant species such as pickleweed (*Salicornia virginica*), saltgrass (*Distichlis spicata*), jaumea (*Jaumea carnosa*), and Humboldt Bay owl's clover (*Castilleja ambigua ssp. humboldtiensis*). Historically, McDaniel Slough and the surrounding marsh areas provided rich coastal habitat. This habitat supported nursery and harvest functions for fish, shellfish, waterfowl, and wildlife species within the expansive marsh ecosystem (Barnhart et al, 1992). In general, estuarine and tidal marsh ecosystems are important coastal habitats characterized by high biotic diversity and high primary productivity. Tidal marshes provide vital habitat for fish and shellfish, as well as waterfowl and water related birds.

The major alterations of Humboldt Bay began in the 1880s, when large scale diking of tidal marshes ringing Humboldt Bay began. The diked and drained wetlands were used primarily for dairy cattle grazing. A levee ringing northern Humboldt Bay was constructed along the edge of the marsh plain using material from an inboard borrow ditch. This levee eliminated saltwater marsh habitat, including the historic habitat of the project site. Levees existed along Janes Creek prior to the installation of the tidegates. Tidegates were installed in several locations to allow for freshwater drainage, including those at the mouth of Janes Creek at McDaniel Slough. The intertidal area of Humboldt Bay at high tide has been reduced from 27,000 acres to 18,000 acres. The lost 9,000 acres was almost entirely comprised of tidal saltmarsh and today less than 1,000 acres of saltmarsh remains (Barnhart et al, 1992). With construction of the levee and landfill to the east, the marsh edge has changed over time. Over the last century, wave-exposed areas have eroded back approximately 70 feet and accreted in sheltered areas up to 650 feet.

During the same period, the forested watershed of Humboldt Bay was settled and logged. The elimination of ancient woodlands altered the hydrologic and sediment regimes of the streams flowing into Humboldt Bay. In addition the lower reach of the Mad River was diked to prevent flood overflows onto the farmland of the Arcata Bottom.

As the City of Arcata expanded, significant portions of the McDaniel Slough/Janes Creek watershed and floodplain were developed. Agricultural interests in the Arcata Bottom installed tidegates at the mouth of McDaniel Slough to prevent tidal inflow into the creek while allowing discharge through the bayfront levee at low tide. Over time, this caused backwater and sedimentation in lower Janes Creek. The levees and tidegates also impeded natural tidal scouring, allowing sediment to accumulate in the McDaniel Slough channel and riparian vegetation to colonize within the channel upstream, decreasing flood conveyance. Occasionally, accumulated sediment has been dredged from the channel and side-cast in mounds on-site.

The diked McDaniel Slough project site currently functions as a degraded seasonal agricultural wetland. The borrow ditch and McDaniel Slough currently support very limited areas of incidental muted tidal and brackish habitat, and freshwater riparian habitat. Eight habitat types were identified on the project site, including 1) ruderal/upland, 2) agricultural field, 3) perennial grassland 4) freshwater marsh, 5) brackish marsh, 6) willow riparian, 7) aquatic and 8) a small developed area. The majority of the site is seasonally wet agricultural field (91%). Only a small percent (5%) is riparian and aquatic habitat or brackish or freshwater marsh.

The McDaniel Slough Marsh Enhancement Project would potentially effect the natural environment of Arcata and surrounding areas. This chapter describes those potential effects, addressed under the following topics:

3.1 Hydrology and Water Quality describes the impacts associated with implementation of the proposed Marsh Enhancement project on changes in surface and ground water, flooding, sedimentation and erosion, and drainage patterns.

3.2 Biology describes the existing setting and the impacts associated with implementation of the proposed marsh enhancement project on wetlands, fish, special status plants, avian species, amphibian species and other wildlife.

3.3 Geology and Soils describes the impacts associated with implementation of the proposed Marsh Enhancement project on soil erosion, tsunami inundation, and geologic hazards.

3.4 Air Quality describes the impacts on air quality associated with implementation of the proposed Marsh Enhancement project.

3.5 Hazards and Hazardous Materials describe the impacts associated with implementation of the proposed Marsh Enhancement project on accidental spills during construction and ongoing maintenance, and hazardous features of the site.

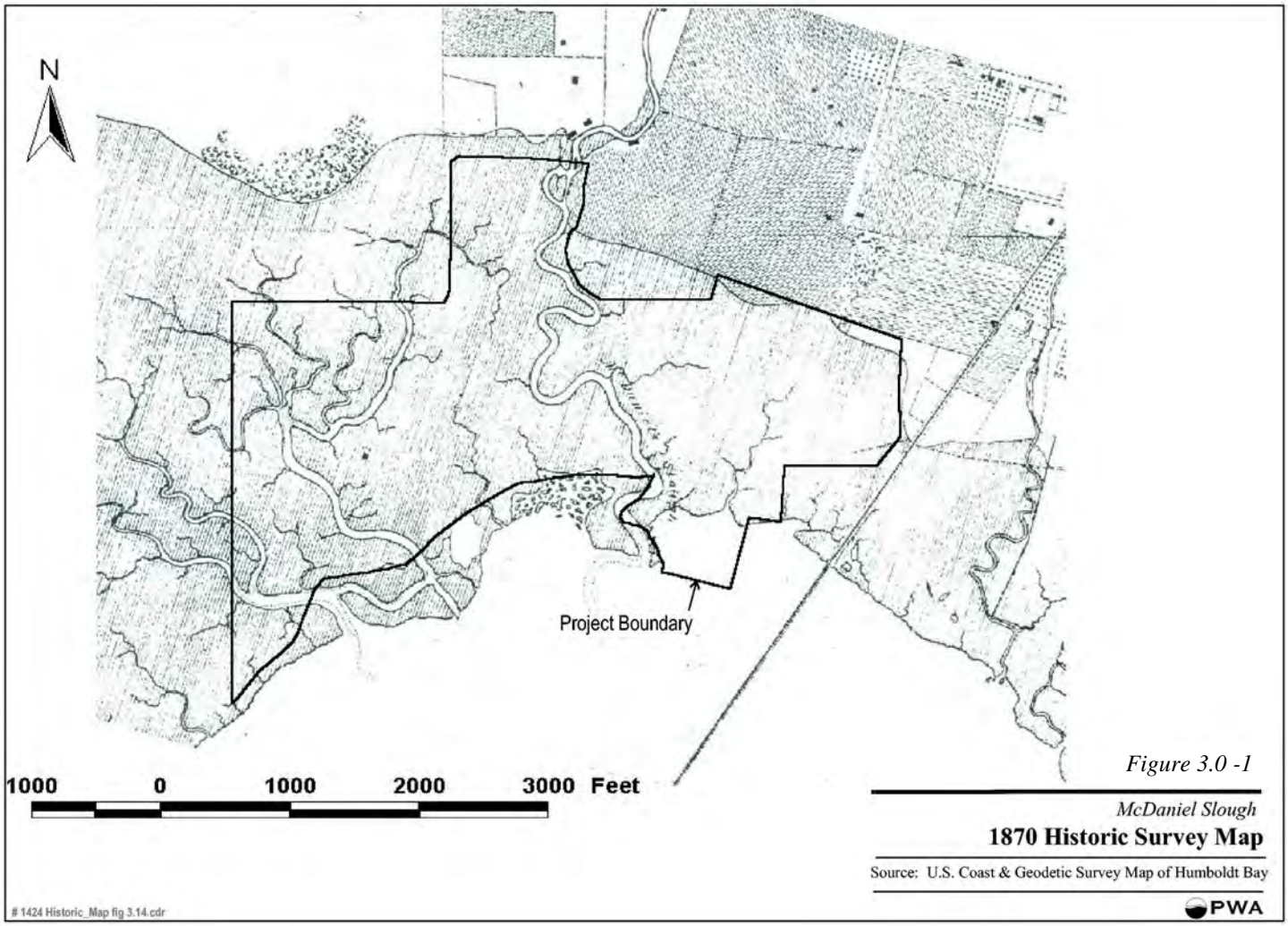


Figure 3.0 -1

McDaniel Slough

1870 Historic Survey Map

Source: U.S. Coast & Geodetic Survey Map of Humboldt Bay

3.1 HYDROLOGY, DRAINAGE, AND WATER QUALITY

Hydrology, drainage, and water quality are important environmental issues related to the McDaniel Slough Marsh Enhancement Project. This section describes the current environmental setting of the site and the changes in surface and ground water, flooding, sedimentation and erosion, and drainage patterns that would take place due to the project. The potential impacts, mitigations, and an alternatives analysis are also discussed.

ENVIRONMENTAL SETTING

Janes Creek Watershed and Site Topography

As shown in Figure 3-1, Janes Creek flows into the project site and becomes the meandering McDaniel Slough channel, which in turn drains into Arcata Bay through 4 tidegated culverts in the Bayfront levee (North Humboldt Bay). The Janes Creek watershed drains approximately 4.5 square miles, flowing through forestlands, an industrial complex, urban areas, and low elevation pasture. Seasonal rainfall is often high in intensity and results in surface water runoff. Typical stream flows in Janes Creek and its tributaries are perennial, with high flows in the winter and little flow in the late summer. The upper Janes Creek watershed is forested with second and third growth redwood. West of Highway 101, Janes Creek winds through residential and commercial property and passes through culverts under streets and residential areas.

The McDaniel Slough project site lies entirely within the area of diked former saltmarsh as shown in Figure 3.1-2. With diking and draining the land surface has subsided one to two feet and has flat or very gently sloping topography. The imprint of the larger former tidal sloughs is still a feature in the site. Elevations are higher where alluvial deposition occurs near the mouth of Janes Creek and typically range from about 4.0 feet national geodetic vertical datum (NGVD) in the north to 1.5 feet NGVD in the south. McDaniel Slough itself has been extensively modified through dredging, straightening and sedimentation. A partial levee was constructed along both sides (east and west) of McDaniel Slough with a crest elevation of approximately 5 feet NGVD. However breaches in this internal levee allow free connection of flows between the eastern and western parts of the site. To provide material to build the partial levee, a borrow ditch was excavated along the eastern side of the levee.

The site is diked by the bayfront levee, which extends along the length of the north shore of Arcata Bay. Within the site, the bayfront levee is typically 6 to 7 feet NGVD, with its lowest elevation at 5.4 feet NGVD. The existing bayfront levee is in poor condition, and does not provide protection against extreme tide events in Humboldt Bay. A borrow ditch runs parallel to the bayfront levee and continues to the west beyond the project boundary.

Outboard of the levee the typical elevation of the mature vegetated marsh plain is approximately 3.5 feet NGVD based on elevation surveys. This is consistent with equilibrium elevations for emergent tidal marshes in mesotidal estuaries that are typically at around Mean Higher High Water (MHHW) tidal elevation. For northern Humboldt Bay, MHHW is taken as 3.46 ft NGVD (Table 3-1-1).

Geonex Aerial Surveys (Sacramento, CA) conducted an aerial photographic survey of the project site in 1995 for the City of Arcata. Figure 2.2-2 is an elevation grid for the project site based on this data with NGVD as datum. PWA surveyed transects of the project site in 2000 and verified these elevations based on local benchmarks.

Drainage and Runoff Hydrology

The site receives runoff directly from the 4.5 square mile Janes Creek watershed and indirectly from the Arcata Bottom through the bayfront levee borrow ditch. During the winter the project site can receive runoff from about 8 square miles to the north and west of the project boundary within the Arcata Bottom. This water flows through a system of drainage ditches in the Arcata Bottom to the low lying area inboard of the bayfront levee and discharges through the bayfront levee borrow ditch either towards the west to Mad River Slough or towards the east to McDaniel Slough. Runoff from the adjacent industrial land and city streets drains directly to the site overland at various locations. This runoff drains to McDaniel Slough through ditches and tributary slough channels on site.

During low tide, flows discharge to Humboldt Bay through four 48-inch culverts equipped with tidal flap gates. Due to poor maintenance, the tidal gates are not fully effective and allow saltwater intrusion into the site. On a rising tide, these gates usually close and runoff is stored in the low-lying areas of the site until the succeeding ebb tide when the bay level drops below the water level in the site. When the tidegates are closed or runoff to the project site exceeds the culvert capacity, a portion of this runoff can flow westwards along the levee perimeter borrow ditch to low lying areas of the Arcata Bottom. Water stored in the Arcata Bottom discharges into Humboldt Bay and Mad River Slough through smaller culverts at two locations in the Bayfront levee. Runoff from the Arcata Bottom can also flow eastwards along the levee perimeter borrow ditch onto the project site, mixing with stored McDaniel Slough/Janes Creek water.

Flows on Janes Creek can vary seasonally from a few cubic feet per second (cfs), to more than 1,000 cfs during extreme floods (Klein and Anderson, 2000a). There have been various estimates of 100-year peak flow discharges at Samoa Boulevard. The 10- and 100-year peak flood flows given by the Federal Emergency Management Agency (FEMA) for Janes Creek further upstream at Q Street are 610 cfs and 1030 cfs respectively (FEMA, 1997). Klein and Anderson (2000a) estimated the 10-year peak flow to be between 516 cfs and 695 cfs and the 100-year peak flow to be between 974 cfs and 1,312 cfs based on a 3.9 square mile watershed. Scalici et al (1992) more accurately estimated the watershed limits to be 4.5 square miles. Applying this to Klein and Anderson's analysis gives an upper estimate of 730 cfs for the 10-year peak flow and 1,400 cfs for the 100-year peak flow, which include estimated baseflows of 50 cfs and 30 cfs respectively.

Tidal Hydrology

Tidal data for McDaniel Slough is available from a National Ocean and Atmospheric Administration (NOAA) maintained tide gauge at Mad River Slough in Humboldt Bay, which is located approximately 0.3 mile from the project site. Table 3.1-1 shows tidal statistics based on data from this gauge.

TABLE 3.1-1 HUMBOLDT BAY TIDE DATA

Tide Elevation	Feet MLLW	Feet NGVD
Highest Observed Tide	10.60	6.32
Mean Higher High Water (MHHW)	7.74	3.46
Mean High Water (MHW)	7.03	2.75
NGVD29 Zero Datum	4.28	0
Mean Tide Level (MTL)	4.18	-0.1
Mean Low Water (MLW)	1.32	-2.96
Mean Lower Low Water (MLLW)	0	-4.28
Lower Observed Tide (12-10-1977)	-1.24	-5.52

Notes: (Derived from NOAA Station ID: 9418865)

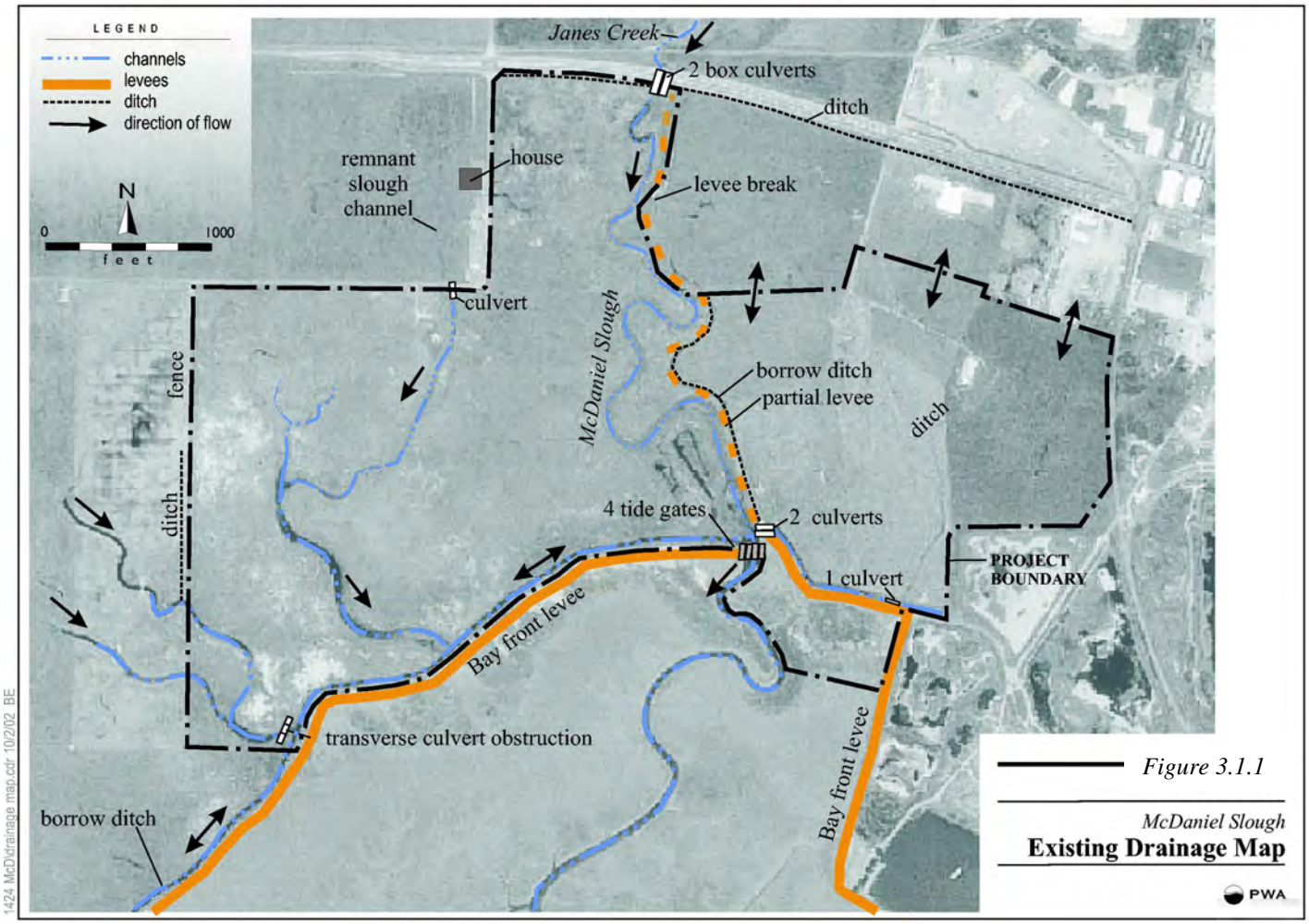
During the winter high winds, low air pressure and swell conditions offshore can combine to create storm surges that elevate tide levels in Humboldt Bay. The 100-year extreme high tide level taking into account storm surges is estimated by FEMA to be 6.5 feet NGVD and is derived from approximate methods (FEMA, 1997).

Flood Hazards

Existing flood hazards at the McDaniel Slough project site result from coastal flooding caused by extreme tides and from high flood flows in Janes Creek. The existing bayfront levee does not protect against extreme high tide storm surge events. Also, during high tides when the tidegates are shut, flood flows from Janes Creek are stored on-site and back-up flow in lower Janes Creek as a result. This leads to a backwater flood hazard in lower Janes Creek. This backwater effect has also caused sediment to accumulate in the McDaniel Slough channel, which limits the capacity of the channel to convey flood flows. During peak runoff, flooding also occurs on properties adjacent to the project site.

The existing Bayfront levee along the southern boundary of the site has deteriorated due to subsidence and poor maintenance and does not provide protection against extreme tide events in Humboldt Bay. The elevation of the existing Bayfront levee in the project vicinity is typically 6 to 7 ft NGVD and 5.4 ft NGVD at its lowest point (Graham Matthews & Associates, 2000). The existing Bayfront levee would be overtopped by the 100-yr high tide storm surge event (6.5 ft NGVD, FEMA 1997), regardless of flood conditions in Janes Creek. Inland properties below elevation 6.5 ft NGVD are therefore susceptible to coastal flooding.

Under existing conditions, flood flows from the Janes Creek watershed fill the storage area within the project site and cannot discharge to the Bay until the tide level in the Bay drops or the Bayfront levee is overtopped. Before this happens, floodwaters can back up McDaniel Slough and Janes Creek causing flood hazards on-site and in lower Janes Creek. The accumulation of sediment and establishment of vegetation in the McDaniel Slough channel, which limits the channel capacity, also causes flood flows to back-up lower Janes Creek.


LEGEND
channels
levees
ditch
direction of flow
N
0
1000
feet
Janes Creek
2 box culverts
ditch
remnant slough channel
house
levee break
culvert
McDaniel Slough
borrow ditch
partial levee
ditch
fence
ditch
4 tide gates
2 culverts
1 culvert
PROJECT BOUNDARY
Bay front levee
transverse culvert obstruction
borrow ditch
Bay front levee
1424 McDidrainage map.cdr 10/2/02 BE
Figure 3.1.1
McDaniel Slough
Existing Drainage Map
PWA

Sedimentation and Erosion

The two potential sources of sediment for the McDaniel Slough project site are the Janes Creek watershed and Humboldt Bay mudflats. The primary processes for potential erosion are flows from the Janes Creek watershed, tidal flows from Humboldt Bay, and wind-wave action. Under existing conditions, sediments from the watershed are deposited on-site and the tidegates prohibit scour from Janes Creek and tidal flows.

Logging and development in the Janes Creek watershed over the last century have altered the sediment regime in Janes Creek. Fine grain sediment derived from the Janes Creek watershed is delivered to McDaniel Slough. Due to the backwater at high tide and the loss of tidal scour caused by the tidegates, this sediment settles out on-site, primarily within the McDaniel Slough channel. Consequently, there has been more than 2 feet of deposition within the channel and riparian vegetation has colonized parts of the channel. Sedimentation and vegetation limit the flow conveyance of McDaniel Slough and further exacerbate the flood hazards described above. Occasionally, accumulated sediment has been dredged from the channel and side-cast on-site in mounds along the channel banks.

Erosion and sedimentation processes occur naturally in Humboldt Bay. Over the last century, the marsh edge in Arcata Bay outboard of the Bayfront levee have eroded back by about 70 feet in wave-exposed areas and accreted by up to 650 feet in sheltered areas (PWA, 2002). Mudflats within the Humboldt Bay estuary provide an important source of sediments for the natural processes of estuarine sedimentation and marsh accretion. During periods of high wind-waves, turbulence at the sediment bed causes the re-suspension of fine cohesive sediment particles (i.e. mud and silt) into the water column. Suspended estuarine sediments are redistributed by tidal flows to various areas of the estuary and are deposited on marsh plain surfaces during the slack water of the flood tide. Suspended sediment concentrations in an estuarine system vary greatly with monthly tidal and seasonal cycles. No data on suspended sediment concentrations in Humboldt Bay is available, however PWA estimated an approximate average annual concentration of 125 mg/L from rates of accretion observed in adjacent Humboldt Bay marshes (PWA, 2002).

Surface Water Quality

Surface water quality in Janes Creek and surrounding drainage ditches is poor during winter months due to a high-suspended sediment load. During the summer months, agricultural runoff and livestock grazing can contribute to poor water quality. The tidegates inhibit circulation of water between the project site and Humboldt Bay, which also effects water quality.

In Humboldt Bay, the water is naturally very muddy due to high estuarine suspended sediment concentrations. Concentrations vary seasonally and in response to the tide cycle and wind wave conditions. As described above, PWA estimated an average annual concentration of 125 mg/L of sediment.

Groundwater

Important ground water resources in Arcata include several aquifers under the part of the Mad River delta that is now the Arcata Bottom. The City investigated groundwater during its search for a backup water supply (Phase I Groundwater Investigation, SHN, 1994).

Shallow aquifers in the low areas west and north of downtown Arcata supply numerous wells that are generally less than 100 feet deep. Exploration for a deep, confined (isolated from the surface by an impermeable layer) aquifer as a municipal water source found inadequate flow at a test well on the south end of town. Exploration at the proposed new well site in north Arcata (near Heindon Road), found a shallow aquifer at depths up to 50 feet, a second aquifer at depths of 130-140 feet, and a confined deep aquifer at depths of 150-190 feet.

IMPACTS EVALUATION CRITERIA

Based on the CEQA Guidelines a Hydrology or Water Quality impact is considered significant if the project would:

- Violate any water quality standards or waste discharge requirements.
- Substantially degrade groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on-site or off-site.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate of surface water runoff in a manner that would result in flooding on-site or off-site.
- Create or contribute runoff exceeding the capacity of the existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.
- Otherwise substantially degrade water quality.
- Place structures within the 100-year floodplain, as mapped on the federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.
- Place within the 100-year flood hazard area structures that would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.
- Expose people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow.

U.S. Environmental Protection Agency

The Code of Federal Regulations (CFR) provides definitions of "waters of the United States" and "wetlands" at 40 CFR 122.2(a) through (g). Because wetlands and creeks are included under this definition of waters of the United States, their water quality must be protected to meet the mandate of the Clean Water Act articulated in section 101(a), "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The protection and

enhancement of water quality must address not only the water chemistry, but also the multiple elements, including aquatic life, wildlife, habitat, vegetation, and hydrology, that together make up aquatic systems. Therefore, relevant issues to address with respect to wetlands and creek protection can include the toxicity and bioaccumulation of pollutants, entrapment of pollutants in sediment, and hydrologic changes (U.S. EPA, 1996).

Federal Emergency Management Agency (FEMA)
The Federal Emergency Management Agency (FEMA) is the federal agency charged with regulating and implementing policies related to the National Flood Insurance Program (NFIP) as well as providing guidance floodplain management and the protection of wetlands. The Floodplain Management and Protection of Wetlands section of the Federal Code of Regulations (44 CFR Section 9.2) describes FEMA's environmental review policy. FEMA is responsible for reducing loss due to flooding, enhancement of wetlands, preserving the natural and beneficial uses of floodplains, and minimizing the impacts of floods on health and safety.

Water Quality Control Plan, North Coast Region (Basin Plan)
The Basin Plan, which was adopted by the California Regional Water Quality Control Board, North Coast Region, establishes a number of policies regarding discharges of wastewater and includes water quality objectives for the Arcata Plain Hydrologic Unit (which includes the preferred and alternative project sites). The Basin Plan also includes a 'Water Quality Control Plan for the Enclosed Bays and Estuaries of California', and a specific 'Action Plan for Humboldt Bay' (Water Quality Control Plan for the North Coast, 1996). The Action Plan for Humboldt Bay requires surveillance and monitoring, review and assessment of land use activities, and Regional Board coordination with other state and local agencies with regard to protecting water quality in Humboldt Bay. In order to assure protection of waters in the Arcata Plain Hydrologic Unit and Humboldt Bay, the Regional Board closely monitors construction and industrial activities that could potentially impact water quality.

City of Arcata's General Plan Goals, Objectives, and Policies
The City of Arcata General Plan, adopted in 1985, and its Land Use and Development Guide adopted in 1994 set the land use and development standards for the proposed project. An impact is considered to be significant if it is determined that the project may:

1. Result in a net increase in stormwater runoff;
2. Result in stormwater discharges that contain significant quantities of pollutants or endanger aquatic habitats;
3. Result in discharges that cause groundwater pollution or interferes with groundwater recharge; or
4. Result in discharges to the City of Arcata sanitary sewer systems that cause or contribute to exceeding the waste discharge requirements for the City of Arcata wastewater treatment plant.

Land Use Development Guide
More specifically the City of Arcata's Land Use Development Guide (LUDG) states that stormwater run-off shall be managed using best available management practices so that development would not adversely affect water quality or habitat values in the creek zone, and so

that development will not adversely affect wetland functions. LUDG also requires that the flood carrying capacity of watercourses be maintained within any development. LUDG requires that encroachments, including fill, new construction, substantial improvements, and other development be certified by a registered professional engineer or architect to demonstrate that encroachment shall not result in any increase in flood levels during the occurrence of the base flood discharge.

Arcata General Plan
There are multiple references to water quality, hydrology and floodplain management polices in the 1985 General Plan. These policies address Conservation of Natural Resources, Flood Control, and Drainage.

City of Arcata Pesticide Ordinance
In addition to requiring a variety of best management practices to protect water quality, the City of Arcata Ordinance No. 1300, Title V: Sanitation and Health, Chapter 4.5: Pest Control where Section 5490, prohibits the use of pesticides on all City Property.

Current Citywide Flooding Concerns
Traditionally only the 100-year, 24-hour storm event was considered significant. However, in recent years storms as small as the 5-year, 24-hour event have caused significant property damage. The City is also now finding significant traffic related health and safety concerns caused by 2-year 24-hour events (pers. comm. Mark Andre, Arcata Environmental Services, 2000.) For the purposes of this EIR, 10 and 100-year storm events are considered.

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

3.1.1 Drainage Impacts

Discussion
Removing the existing tidegates and breaching the Bayfront levee will improve drainage from McDaniel Slough to Humboldt Bay. As discussed in the Flood Hazards Impact section below, this change in drainage will decrease flooding on-site and in lower Janes Creek by increasing the capacity of the McDaniel Slough channel. The construction of new levees around the perimeter of the project site will alter drainage to the project site. Culverts equipped with tidegates will be installed in eight locations in the newly constructed levees to maintain adequate drainage patterns from adjacent properties to Humboldt Bay.

The construction of the new perimeter levee along the western site boundary may have a small negative potential impact on the drainage of the Arcata Bottom. The new levee will isolate runoff from the 4.5 square mile Janes Creek watershed from runoff originating in the 8 square mile area of the flatlands of the Arcata Bottom to the west. It would eliminate 240 acres of runoff storage area from approximately 1,500 acres of diked former marshland remaining. Isolating the Arcata Bottom flatlands would prevent runoff from this area from being able to discharge through McDaniel Slough. To ameliorate this potential impact, a new culvert and tidegate will be installed through the new levee at the southwest corner of the project site, where

the existing borrow ditch flows along the north side of the Bayfront Levee. The project will also include the construction of a drainage ditch along the outside of the new levee along the western site boundary. Both the existing borrow ditch and the new drainage ditch will drain through the culvert and tidegate at the southwest corner of the project site.

A new system of tributary slough channels will drain the restored marsh plain on the project site to McDaniel Slough and Humboldt Bay. These tidal channels will evolve in response to natural tidal scouring caused by the ebb tide drainage of the marsh plain. 'Pilot' channel networks will be excavated in the site interior to encourage the development of an appropriate tidal channel network within the project site. The tidal channel network will accommodate drainage from the culverts in the new perimeter levee to McDaniel Slough and Humboldt Bay. Natural erosional and depositional processes guide channel evolution toward a long-term equilibrium state. Channel grading speeds up this evolutionary process.

The new drainage pattern would include construction of freshwater wetland ponds on the northeast side of the project to collect and detain stormwater runoff from adjacent parcels, Samoa Blvd, and portions of the railroad right of way. The freshwater ponds would help reduce upslope flooding in the localized area by providing increased capacity for stormwater retention. The new drainage system will allow for more rapid drainage to Humboldt Bay during outgoing and low tide cycles. In addition, a brackish water pond would be constructed on the site adjacent to the freshwater ponds. Water for the brackish pond would be obtained by mixing treated wastewater from the Arcata wastewater treatment plant with bay water.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

3.1.1a A culvert and tidegate will be installed in the newly constructed western levee at the location of the existing borrow ditch north of the Bayfront levee. This culvert and tidegate will mitigate the potential negative impact of isolating runoff from the Arcata Bottom from being able to discharge through McDaniel Slough. The culvert will be designed to preserve the existing capacity of the borrow ditch.

3.1.2 Flood Hazard Impacts

Discussion

Breaching the existing Bayfront levee at the mouth of McDaniel Slough and constructing a new perimeter levee around the project boundary will reduce existing flood hazards due to coastal flooding and to high flood flows in Janes Creek. The construction of a new perimeter levee around the west, north, and east boundaries of the site will improve protection against coastal flooding. Removing the tidegates and breaching the Bayfront levee will reduce the flood hazard in lower Janes Creek caused by both the limited capacity and elevations of the existing culverts and tidegates that convey flood flows. Breaching the levee will increase channel capacity, allowing the Slough to downcut, which will eventually lead to the scour of accumulated sediment and vegetation upstream in the McDaniel Slough. Upstream flooding in Janes Creek

caused by local creek constrictions and culverts that are not related to the project will not change due to the project.

Coastal Flooding

A new perimeter levee around the west, north, and east site boundaries will be constructed to protect against extreme high tide storm surge events that pose an existing flood hazard. The levee will be constructed with a crest elevation of 8.0 ft NGVD to allow for one foot of freeboard above the 100-yr high tide (6.5 ft NGVD; FEMA, 1997) and 0.5 ft of subsidence. The higher crest elevation of the new perimeter levee will protect areas to the east of McDaniel Slough that are now susceptible to flooding during a storm surge event that overtops the bayfront levee.

The project will not affect coastal flood hazards for areas to the west of project site. These areas will still be susceptible to storm surge flooding due to the deteriorated condition of the remaining bayfront levee located to the west of the site. However, if this levee is rebuilt, the new levee that is part of the McDaniel Slough project will help provide protection to low lying areas to the west.

Janes Creek Flood Flows

Janes Creek flows are currently limited by the tidegates. The tidegates are at an elevation that is higher than the natural elevation of the slough/creek. When the culverts and tidegates are removed, the slough/creek will cut down to the natural elevation, increasing channel depth and capacity. The inundation of saltwater will kill the vegetation in the channel that currently hider flows.

Removing the tidesgates and breaching the bayfront levee will reduce the existing flood hazards in lower Janes Creek caused by the backwater effect behind the tidegates in McDaniel Slough. The scouring of the sediment that has accumulated in McDaniel Slough behind the tidegates will increase the channel capacity and further reduce flood hazards. These project benefits are supported by hydrodynamic modeling results. Model results do not define the upstream limit of project benefits, however the project will not impact upstream flood hazards that are due to local constrictions in Janes Creek rather than the backwater effect in McDaniel Slough.

During project planning, PWA used a one-dimensional, MIKE 11, hydrodynamic model to simulate the hydraulic response of McDaniel Slough and the surrounding marsh plain upon removal of the tidegates and to determine the potential project impact on flood hazards (PWA, 2002). The model extends from the Bay channel outboard of the levee and tidegates to approximately 400 feet upstream of Samoa Blvd. Lateral to the McDaniel Slough channel, the model includes a channel network to characterize the slough channels and floodplain (i.e. existing pasture and future restored marsh plain). The borrow ditch inboard of the Bayfront levee was modeled within the project boundary. The model does not include the Arcata Bottom to the west of the project site, which are drained by the borrow ditch under existing conditions. Model topography was developed from 1-foot contour maps (Geonex, 1995) of the project site and available cross-sections of lower Janes Creek (FEMA, 1997 and Klein and Anderson, 2000b).

The 10 and 100-year return period extreme Janes Creek flood flow events were analyzed to evaluate the affect of the McDaniel Slough project on flood hazards. The extreme Janes Creek flood flow events were modeled with a coincident diurnal high tide in Humboldt Bay occurring at peak flood flow. The coincident 100-year peak flood flow and diurnal high tide event represents a 'worst case' flood scenario. Both flood events were modeled for existing conditions, restored project conditions with a breached levee and the existing silted in channel, and for expected eventual restored project conditions with accumulated sediment scoured from the McDaniel Slough channel. Restored project conditions with the existing silted in channel represent flood hazard conditions immediately after restoration. The McDaniel Slough channel is expected to scour and widen when tidal action is restored to the site, which will increase channel conveyance. The extent and rate of channel erosion is discussed in the Sedimentation and Erosion section below.

Available data for model boundary conditions were limited to flood hydrographs on Janes Creek upstream of the Samoa Road Bridge and tidal conditions for Humboldt Bay. It was assumed that all other localized runoff tributary to the restored marsh would not be significant when compared to the volume and discharge of water conveyed through the site during extreme events and thus tributary flows were not considered.

The exchange of flood flows from Janes Creek and runoff from the Arcata Bottom to the north and west of the project boundary through the borrow ditch was not modeled for existing or restored conditions. The potential for runoff from Janes Creek to discharge towards the west through the Bayfront levee borrow ditch under existing conditions was approximated for the 10-year flood event only. The volume of exchange is not likely to be significant compared to the 100-year return period Janes Creek flood flow. Under existing conditions, the Arcata Bottom are likely to be flooded to a level similar to the project site during 100-year extreme flood flow event and the potential for exchange will therefore be small. For restored project conditions, the culvert and tidegate that will be installed in the southwest corner of the site will be closed during high tides when the site is flooded.

Table 3.1-2 summarizes the model results for existing and restored conditions. Appendix- M shows the longitudinal flood profiles for McDaniel Slough/Janes Creek under existing conditions, restored project conditions immediately after restoration, and restored project conditions after expected channel scour. For restored project conditions with McDaniel Slough enlarged by natural scouring, the flood stage just above Samoa Boulevard would be 1 foot lower than for existing conditions for both the 10 and 100-year flood events. The period of high stage would also be significantly reduced for restored project conditions with expected channel scour.

For the 10-year extreme event, flood stages and periods above Somoa Boulevard were not significantly changed immediately after restoration. The approximation of flood overflow to the west through the borrow ditch in existing conditions model runs indicate that this potential flow path reduces water levels in downstream portions of McDaniel Slough, but does not change peak flood levels in lower Janes Creek upstream of Samoa Boulevard for the 10-year event. This result indicates that for less extreme flood events, flooding in lower Janes Creek is due to the limited capacity of the McDaniel Slough channel rather than the backwater effect caused by the tidegates.

Existing conditions model results for the 100-year flood flow event confirm that the limited capacity of the McDaniel Slough culverts caused backwater on the site and eventual overflow of the levee. Model results for the 100-year event show that immediately after restoration peak flood stages in lower Janes Creek were reduced by 0.4 feet. The period of high stage for the 100-year event was significantly reduced immediately after restoration.

TABLE 3.1-2 MODEL RESULTS: UPSTREAM WATER SURFACE ELEVATIONS

	Peak Flood Water Surface Elevation above Samoa Blvd. (ft NGVD)		***Period of Flooding above 5 ft NGVD (hours)***	
Project Alternative	***10-year Event***	***100-year Event***	***10-year Event***	***100-year Event***
Existing Conditions	*5.8*	*7.0*	*16*	*36*
Project Conditions (Immediately after restoration)	*5.8*	*6.6*	*15*	*20*
Project Conditions (After expected channel scour)	*4.8*	*6.0*	*0*	*8*

The upstream extent of beneficial flood hazard reductions beyond the model limits has not been determined. The project will reduce flood hazards in lower Janes Creek due to the backwater effect behind the existing tidegate and the limited capacity of the McDaniel Slough, however the project will not affect flood problems due to local conditions farther upstream.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

3.1.3 Sedimentation and Erosion Impacts

Discussion

Accumulated sediment is expected to erode from the aggraded channel in McDaniel Slough channel when the tidegates are removed, the levee is breached, and water flows without obstruction from Janes Creek to Humboldt Bay. The impact of channel erosion is not anticipated to be significant. The restored marsh will serve as a net sediment sink with a capacity to store much more sediment than the expected volume of eroded material. As discussed in Section 3.1.2, erosion of the silted channel will reduce existing flood hazards.

The McDaniel Slough channel will scour after restoration due to a combination of tidal flows and flows from the Janes Creek watershed. Fine-grained material and cohesive Bay mud will

readily erode from the channel within the site and the Bay channel downstream of the site. Vegetation in the slough channel, which is concentrated in upstream portions of McDaniel Slough, will tend to stabilize sediments and slow erosion. Salt intolerant vegetation will eventually die off due to increased salinity in the restored marsh and thus will be more readily eroded by flows in the channel.

The estimated volume of sediment that will erode from the McDaniel Slough channel is approximately 25 acre-feet (40,000 cubic yards). This estimate is based on the difference between the existing channel dimensions and expected long-term equilibrium channel dimension for restored project conditions. The expected equilibrium dimensions were predicted during restoration planning from empirical relationships between tidal channel dimensions and drainage areas for mature marshes in the San Francisco Estuary and Humboldt Bay (PWA, 2002 and Williams et al, 2002). Additional erosion may occur from borrow ditch and levee parallel to the McDaniel Slough channel and from tributary slough channels. The volume of additional erosion is not anticipated to be significant compared to the volume of sediment expected to erode from the main slough channel.

The erosion of sediment from the McDaniel Slough channel is expected to occur over a number of years. Sediment will erode more rapidly from the portions of the channel near the mouth and outboard of the bayfront levee that are not vegetated and less rapidly from vegetated portions of the channel upstream. The erosion rate of channel vegetation has not been determined because no data on the shear stress tolerance of the vegetation is available. Vegetation erosion is likely to occur over many years during high flow events. In the absence of vegetation, the erosion of sediment from the channel is expected to occur over approximately 3 years, but may range from 1.5 to 7 years. This rate of erosion was estimated from modeled bed shear stress using an analytical equation for mass erosion flux above an assumed critical shear stress for erosion (Partheniades 1965).

Bed shear stress was modeled over the course of one year using the MIKE11 hydrodynamic model. The model simulation used mean monthly flows for Janes Creek (adapted from Terrascan, 1979) and measured tide data from 1997 (Klein and Anderson, 2000a). A rate of channel cross-section erosion was calculated from the mass erosion flux by assuming a sediment density. The time for the channel to erode from existing dimensions to expected long-term equilibrium dimensions was calculated from the erosion rate, assuming the rate decreased linearly to zero for equilibrium dimensions. The estimated time frame for channel erosion ranged from 1.5 to 7 years when varying assumptions for sediment density (400 to 550 kg/m3) and the critical shear stress for erosion (0.8 to 1.3 Pa).

The transport and deposition of sediment eroded from the McDaniel Slough channel will be governed by the sediment dynamics within the site and in Humboldt Bay. The project site has subsided by one to two feet below the equilibrium marsh plain elevation (MHHW). The site will therefore capture sediment as the marsh plain evolves towards equilibrium and accumulates sediment to builds up its elevation. A portion of the sediment eroded from the McDaniel Slough channel and material excavated from the proposed brackish and freshwater ponds will deposited on the restored marsh plain (approximately 23 acres) within the project site to expedite site evolution. The volume of sediment expected to erode from the McDaniel Slough channel (25

acre-feet) is approximately 5% of the total volume of sediment that is expected to accumulate on the restored marsh plain as the site evolves. The site will therefore capture more sediment than is eroded from the channel and will be a net sink for sediment. Some of the sediment eroded from the channel will be transported out of the site as suspended sediment and deposited on intertidal mudflats and subtidal channels in Humboldt Bay. The total volume of sediment expected to erode from the McDaniel Slough channel would be equivalent to 0.1 inch of sediment deposited over the subtidal area of Arcata Bay (2,940 acres, Barnhart et al, 1992). The potential impact of eroded sediment on suspended sediment concentrations in Humboldt Bay, discussed in Section 3.1.4, is not expected to be significant.

Wind-wave erosion of levees is a potential that will be minimized by:

1. Construction and retention of islands and vegetated high marsh areas to buffer levees.
2. Planting of native plants to protect levee faces.
3. Retaining the large existing saltmarsh complex south of the bayfront levee to buffer the restoration area from wind fetch.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

3.1.4 Surface Water Quality Impacts

Construction Related Impacts

Discussion

The project may potentially result in changes to water quality due to construction activities and to natural adjustments in the drainage system as the site returns to a new equilibrium. The project also has the potential to improve water quality by providing floodplain areas and constructed stormwater detention ponds for the deposition of suspended sediments in runoff.

Construction related impacts of the project would include the movement of soil material by heavy equipment and exposing soil to rain drop impact and sheet erosion during construction. Construction equipment would include bulldozers, excavators, loaders, scrapers, and transport vehicles. Heavy equipment would operate outside of stream channels and wetlands. Only the bucket of the excavator would be used to remove material from streams and wetlands. Eliminating grazing animals from close proximately to Janes Creek will reduce the amount of pollution from livestock such as fecal coliform from entering receiving waters.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

The project design would incorporate the following measures to mitigate impacts due to construction related soil erosion:

- Construction work would occur during the dry season from May 15th thru November 15th to prevent ground disturbance during rainstorms.
- In the event of unseasonable rainfall, construction would not occur during periods when any surface runoff occurs on exposed soil due to rainfall.
- All exposed soil that could erode to a channel leading to Janes Creek would be mulched with weed-free straw mulch.
- Bare soil surfaces from grading activity, will be allowed to vegetate prior to the breach of the bayfront levee which will be the final task to complete.
- All vehicles and construction equipment shall be parked, and equipment refueling and maintenance shall take place only in designated areas where potential spills of fuel, lubricants, or coolants can be contained and cleaned up without impacts to aquatic habitats.

The City will require a grading permit, and it will adhere to the City's Water Quality Ordinance No. 1319 and Grading Ordinance No. 1355. City and DFG staff will develop an erosion control plan. Mitigation measures include seeding and mulching of exposed bare soil including new drainage swales prior to Nov. 15th. Seeding with native grasses will occur. Watering for dust control may be required especially at construction entrance and exit points.

Project-Related Impacts

Discussion

The project will result in improved circulation between the site and Humboldt Bay and an increase in suspended sediment concentrations in tidal outflows from the site, which is not expected to be a significant impact. Removing the tidegates and breaching the levee will improve drainage from the site to Humboldt Bay (Section 3.1.1). The improved drainage will allow water that is stored behind the tidegates under existing conditions to flow freely to Humboldt Bay and tidal flows from Humboldt Bay to flush the site on each tide cycle, resulting in improved circulation between the site and Humboldt Bay.

Accumulated sediment will erode from the silted in McDaniel Slough channel (see Section 3.1.3) and increase suspended sediment concentrations in the vicinity of the project site, however the increase is not expected to be significant compared to the sediment budget for Humboldt Bay. Approximately 25 acre-feet (40,000 cubic yards) of sediment are expected to erode from the slough channel during high flows over a number of years. This volume would have an equivalent annual average suspended sediment concentration of approximately 100 mg/L in water leaving the site on an outgoing tide (assuming erosion occurs over 5 years, a sediment density of 500 mg/L, and a tidal prism of 300 acre-feet). The annual average suspended sediment concentration in Humboldt Bay is estimated to be 125 mg/L (PWA, 2002). A portion of the sediment carried into the site from Humboldt Bay on a flood tide will drop out of suspension and deposit on the restored marsh plain, while sediment eroded from the channel will be carried out of the site in suspension on the ebb tide. The resulting balance will cause a net increase in suspended sediment concentration in water leaving the site that will be less than 100 mg/L. However, as suspended sediment concentrations in estuaries are typically highly variable over seasonal and monthly cycles (ranging in magnitude from 10 to 1,000 mg/L), the magnitude

of the increase in suspended sediment concentration is expected to be within the natural variability of concentrations in the Bay.

The risk of contamination from stormwater runoff is considered less than significant, as all drainage leading to the site will be buffered by flowing through grassy swales, bilofiltration forebays and other natural type Best Management Practices before reaching ponds channels and other receiving waters. The proposed freshwater wetlands are designed to provide freshwater habitat but will also provide wetland treatment type water quality improvement by default.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

3.1.4a The Erosion and Sediment Control Plan shall include storm water pollution prevention measures applicable to the scope of construction activities proposed and shall include Best Management Practices (BMPs) as provided in the CalTrans *Storm Water Quality Handbook* or an equivalent approved by the City.

3.1.4b A Stormwater Pollution Prevention Plan (SWPPP) would be prepared as required by the Regional Water Quality Control Board.

3.1.5 Ground Water Impacts

Discussion

The project would expand the existing brackish wetlands into areas that have been developed as agricultural land. During most of 2004, one of the four existing 48" diameter tidegates was missing. Therefore, tidal influence occurred on much of the project site. No observed negative groundwater impacts were observed or documented during this period with in the project area.

The re-introduction of tidal influence associated with the preferred alternative is not expected to affect groundwater or private wells in the project vicinity. Tidal influence is limited to groundwater near the ground surface, and typically does not extend below 20 feet in depth.

Most wells in the project vicinity tap into a groundwater discharge zone 20 feet or more below the surface. This regional aquifer is discharging from depth towards sea level, that is, it has a hydraulic head. This water is, in essence, "under pressure" that would prevent the intrusion of brackish water from the surface. For wells outside of the zone of tidal influence (i.e., outside of the immediate project area), brackish water intrusion into the groundwater becomes even less of an issue.

Only shallow wells if located within the project area would be likely to be affected by the intrusion of brackish water.

Treated wastewater and stormwater could contain unknown chemicals due to accidental spills or drainage from industrial sites. Allowing this water to remain in ponds could allow chemicals to enter into the groundwater. Accidental oil spills in Humboldt Bay could also enter the project site and cause contamination of groundwater.

By moving the bay levees back from their existing location, and allowing the project site to be inundated by tidal action, the water table elevation in areas adjacent to the project could be altered. Changes in water table could cause septic systems to become saturated and that would prevent drainage of wastewater. Wells adjacent to the site could be negatively affected if the water table elevation dropped and could benefit if the water table elevation increased.

The proposed change is a return to the natural condition that existed before the circa 1940's installation of tidegates on Janes Creek. The change would have numerous benefits to natural systems, and would not result in impacts to developments adjacent to the site.

The change in water table level is considered to be a less than significant impact because the area already has a high water table due to the current proximity to the bay, and due to freshwater flooding and rainfall. Allowing the site to be connected to the natural tidal action would allow for sufficient drainage to prevent the adjacent groundwater table from increasing substantially. There are no domestic water supply wells or buildings within or directly adjacent to the project area.

The risk of contamination from stormwater runoff is considered less than significant, as all drainage leading to the site will be buffered by flowing through grassy swales, bilofiltration forebays and other natural type BMP's before reaching ponds channels and other receiving waters. Domestic and irrigation wells are not known to exist within the project area or adjacent to the project area. According to well log data supplied by the Department of Water Resources, most irrigation wells in the Arcata Bottom are approximately 30-feet in depth.

Determination

Less than significant adverse impact.

Mitigation

No mitigation necessary.

IMPACTS AND MITIGATION FOR PROJECT ALTERNATIVES

Alternative 1 – The No-Action Alternative

Drainage and Flood Impacts

Discussion

The no action alternative would result in the continued deterioration of existing conditions and the least benefits to hydrology, drainage, and water quality. The Bayfront levee is currently in a poor state of repair and has subsided since construction. If no action is taken, the Bayfront levee will continue to settle and erode and will be overtopped more frequently by less severe high tide storm surge events in Humboldt Bay. Inland properties may be at a greater risk of coastal flooding. The existing tidegates are in need of repair and will result in saltwater intrusion to the site without maintenance. If the tidegates are not removed, watershed-derived fine sediments will continue to accumulate in the McDaniel Slough channel. This will further limit the capacity of McDaniel Slough to convey flood flows and exacerbate flooding in lower Janes Creek. These

problems are likely to worsen with accelerated sea level rise. Recent studies have indicated this could be of the order of 0.2 to 0.9 ft in the next 50 years (IPCC, 2001). These processes will combine over the medium to long-term to worsen conditions for continued use of the site for cattle grazing or other agricultural use.

Determination

The no action alternative maintains the existing flood hazard to the City and the surrounding lands.

Mitigation

No mitigation is necessary.

Surface Water Quality Impacts

Discussion

The current situation would remain unchanged.

Determination

Less than significant.

Mitigation

No mitigation is necessary.

Ground Water Impacts

Discussion

No change from the current situation. There are no known domestic water sources from wells located within or adjacent to the project area

Determination

Less than significant.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Drainage and Flood Impacts

Discussion

This alternative would restore tidal action to the entire site by removing the existing tidegates and excavating a breach in the levee. Managed freshwater and brackish ponds would not be constructed. Estimates of breach sizing indicate that a long span of 100 feet or more may be required. New perimeter levees would be constructed around the site perimeter and culverts would be installed in the levees in the same manner as specified for the Preferred Alternative.

The Full Tidal Restoration with Bayfront Levee Trail Alternative would result in flood hazard reductions similar to those described for the Proposed Project. Impacts and benefits related to the area of restored tidal marsh, including changes to drainage, flood hazards, sedimentation and erosion, and water quality, will be the same as for the Proposed Project.

Determination

Less than significant adverse effect.

Mitigation

No mitigation is necessary.

Surface Water Quality Impacts

Construction Related Impacts

Discussion

This alternative will result in improved circulation between the site and Humboldt Bay and an increase in suspended sediment concentrations in tidal outflows from the site, which is not expected to be a significant impact. Removing the tidegates and breaching the levee will improve drainage from the site to Humboldt Bay (Section 3.1.1). The improved drainage will allow water that is stored behind the tidegates under existing conditions to flow freely to Humboldt Bay and tidal flows from Humboldt Bay to flush the site on each tide cycle, resulting in improved circulation between the site and Humboldt Bay.

The risk of contamination from stormwater runoff is considered less than significant, as all drainage leading to the site will be buffered by flowing through grassy swales, bilofiltration forebays and other natural type BMP's before reaching ponds channels and other receiving waters.

Determination

Less than significant adverse impact.

Mitigation

Mitigation measures would be the same as for the Proposed Project.

Alternative Related Impacts

The project will result in improved circulation between the site and Humboldt Bay and an increase in suspended sediment concentrations in tidal outflows from the site, which is not expected to be a significant impact. Removing the tidegates and breaching the levee will improve drainage from the site to Humboldt Bay (Section 3.1.1). The improved drainage will allow water that is stored behind the tidegates under existing conditions to flow freely to Humboldt Bay and tidal flows from Humboldt Bay to flush the site on each tide cycle, resulting in improved circulation between the site and Humboldt Bay.

Accumulated sediment will erode from the silted in McDaniel Slough channel (see Section 3.1.3) and increase suspended sediment concentrations in the vicinity of the project site, however the

increase is not expected to be significant compared to the sediment budget for Humboldt Bay. Approximately 25 acre-feet (40,000 cubic yards) of sediment are expected to erode from the slough channel during high flows over a number of years. This volume would have an equivalent annual average suspended sediment concentration of approximately 100 mg/L in water leaving the site on an outgoing tide (assuming erosion occurs over 5 years, a sediment density of 500 mg/L, and a tidal prism of 300 acre-feet). The annual average suspended sediment concentration in Humboldt Bay is estimated to be 125 mg/L (PWA, 2002). A portion of the sediment carried into the site from Humboldt Bay on a flood tide will drop out of suspension and deposit on the restored marsh plain, while sediment eroded from the channel will be carried out of the site in suspension on the ebb tide. The resulting balance will cause a net increase in suspended sediment concentration in water leaving the site that will be less than 100 mg/L. However, as suspended sediment concentrations in estuaries are typically highly variable over seasonal and monthly cycles (ranging in magnitude from 10 to 1,000 mg/L), the magnitude of the increase in suspended sediment concentration is expected to be within the natural variability of concentrations in the Bay.

Discussion

The proposed change is a return to the natural condition that existed before construction of the Humboldt bayfront levees and tidegate installation. The change would have numerous benefits to natural systems, and would not likely result in negative impacts to developments adjacent to the site.

The change in water table level is considered to be a less than significant impact because the area already has a high water table due to the current proximity to the bay, and due to freshwater flooding and rainfall. Allowing the site to be connected to the natural tidal action would allow for sufficient drainage to prevent the adjacent groundwater table from increasing substantially.

Treated wastewater and stormwater could contain unknown chemicals due to accidental spills or drainage from industrial sites. Accidental oil spills in Humboldt Bay could also enter the project site and cause contamination of groundwater.

Determination

Less than significant impact.

Mitigation

No mitigation necessary.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Drainage and Flood Impacts

Discussion

This alternative would be similar to Alternative 2, but would require the complete removal of the Bayfront levee and selective filling of the levee borrow ditch in order to provide complete

ecologic connectivity between the Bay and restored marsh. Tidal connector channels and additional levee breaches would be designed according to the respective drainage areas. This alternative is based on restoring, where possible, the historic tidal drainage system. Removing the levee would allow for deposition of a woody debris wrackline during spring tides that creates natural disturbance and colonization opportunities for rare plants. This alternative would incorporate a trail along the new flood control levees shown, and is also intended to minimize human disturbance to wetland wildlife use near the existing bayfront levee/Arcata Bay portion of the project area.

The Full Tidal Restoration with Bayfront Levee Removal alternative would result in hydrologic impacts and benefits similar to those for the Alternative 2.

Determination

Less than significant.

Mitigation

No mitigation is necessary.

Surface Water Quality Impacts

Construction Related Impacts

Discussion

Surface water quality impacts would be the same as the Proposed Project.

Determination

Less than significant adverse impact.

Mitigation

Mitigation measures would be the same as for the proposed project.

Alternative Related Impacts

Discussion

Surface water quality impacts would be the same as the proposed project.

Determination

Less than significant adverse impact.

Mitigation

Mitigation measures would be the same as for the proposed project.

Ground Water Impacts

Discussion

Treated wastewater and stormwater could contain unknown chemicals due to accidental spills or drainage from industrial sites. Accidental oil spills in Humboldt Bay could also enter the project site and cause contamination of groundwater.

Moving the bay levees back from their existing location, and allowing the project site to be inundated by normal tidal action could alter the water table elevation in areas adjacent to the project. Changes in water table could cause septic systems to become saturated, which would prevent drainage of wastewater. Wells adjacent to the site could be negatively affected if the water table elevation dropped and could benefit if the water table elevation increased.

The proposed change is a return to the natural condition that existed before the installation of tidegates on Janes Creek. The change would have numerous benefits to natural systems, and would not likely result in negative impacts to developments adjacent to the site.

The change in water table level is considered to be a less than significant impact because the area already has a high water table due to the current proximity to the bay, and due to freshwater flooding and rainfall. Allowing the site to be connected to the natural tidal action would allow for sufficient drainage to prevent the adjacent groundwater table from increasing substantially. The re-introduction of tidal influence associated with the preferred alternative is not expected to affect groundwater or private wells in the project vicinity. Tidal influence is limited to groundwater near the ground surface, and typically does not extend below 20 feet in depth. Most wells in the project vicinity tap into a groundwater discharge zone 20 feet or more below the surface. This regional aquifer is discharging from depth towards sea level, that is, it has a hydraulic head. This water is, in essence, "under pressure" that would prevent the intrusion of brackish water from the surface. For wells outside of the zone of tidal influence (i.e., outside of the immediate project area), brackish water intrusion into the groundwater becomes even less of an issue.

Determination

Less than significant impact.

Mitigation

No mitigation is necessary.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Drainage and Flood Impacts

Discussion

This alternative maintains the existing flood hazard to the City and the surrounding lands. Accumulated sediment would remain in the main Janes Creek channel. This alternative involves

excavation of shallow areas of approximately eight acres. Repair of levee would reduce the potential for future levee failure and raising the levee to a higher elevation to mitigate for anticipated high water from large storm events and future sea level rise.

Determination

Less than significant.

Mitigation

An additional tidegate and pipe could be installed to allow for in increased flood flow capacity.

Sedimentation and Erosion Impacts

Discussion

Sediment routing would continue to be less than optimal leading to chronic channel capacity problems for lower Janes Creek.

Determination

Less than significant.

Mitigation

The alternative design would incorporate the following measures to mitigate impacts due to construction related soil erosion:
Construction work would occur during the dry season from May 15th thru November 15th to prevent ground disturbance during rainstorms.
In the event of unseasonable rainfall, construction would not occur during periods when any surface runoff occurs on exposed soil due to rainfall.
All exposed soil on the levees will be mulched with a weed-free straw mulch
The City will require a grading permit, and it will adhere to the City's Water Quality Ordinance 1319 and Grading Ordinance. City and DFG staff will develop an erosion control plan. Mitigation measures include seeding and mulching of exposed bare soil including new drainage swales prior to Nov. 15th. Seeding with native grasses will occur. Watering for dust control may be required especially at construction entrance and exit points.

Surface Water Quality Impacts

Construction Related Impacts

Discussion

Construction related impacts of the project would include the movement of soil material by heavy equipment and exposing soil to rain drop impact and sheet erosion during construction. Construction equipment would include bulldozers, excavators, loaders, scrapers, and transport vehicles. Heavy equipment would operate outside of stream channels and wetlands.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

Mitigation measures would be the same as for the proposed project.

Alternative Related Impacts

Discussion

This alternative, like the proposed project, would allow for a portion of existing urban storm water runoff to be routed to the freshwater ponds. This would provide water quality buffering of runoff prior to reaching receiving waters such as Janes Creek and Humboldt Bay.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

Mitigation measures would be the same as for the proposed project.

Ground Water Impacts

Discussion

This alternative would not change the current situation significantly except for the freshwater ponds in the northwest. These ponds would be fed primarily by groundwater sources.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

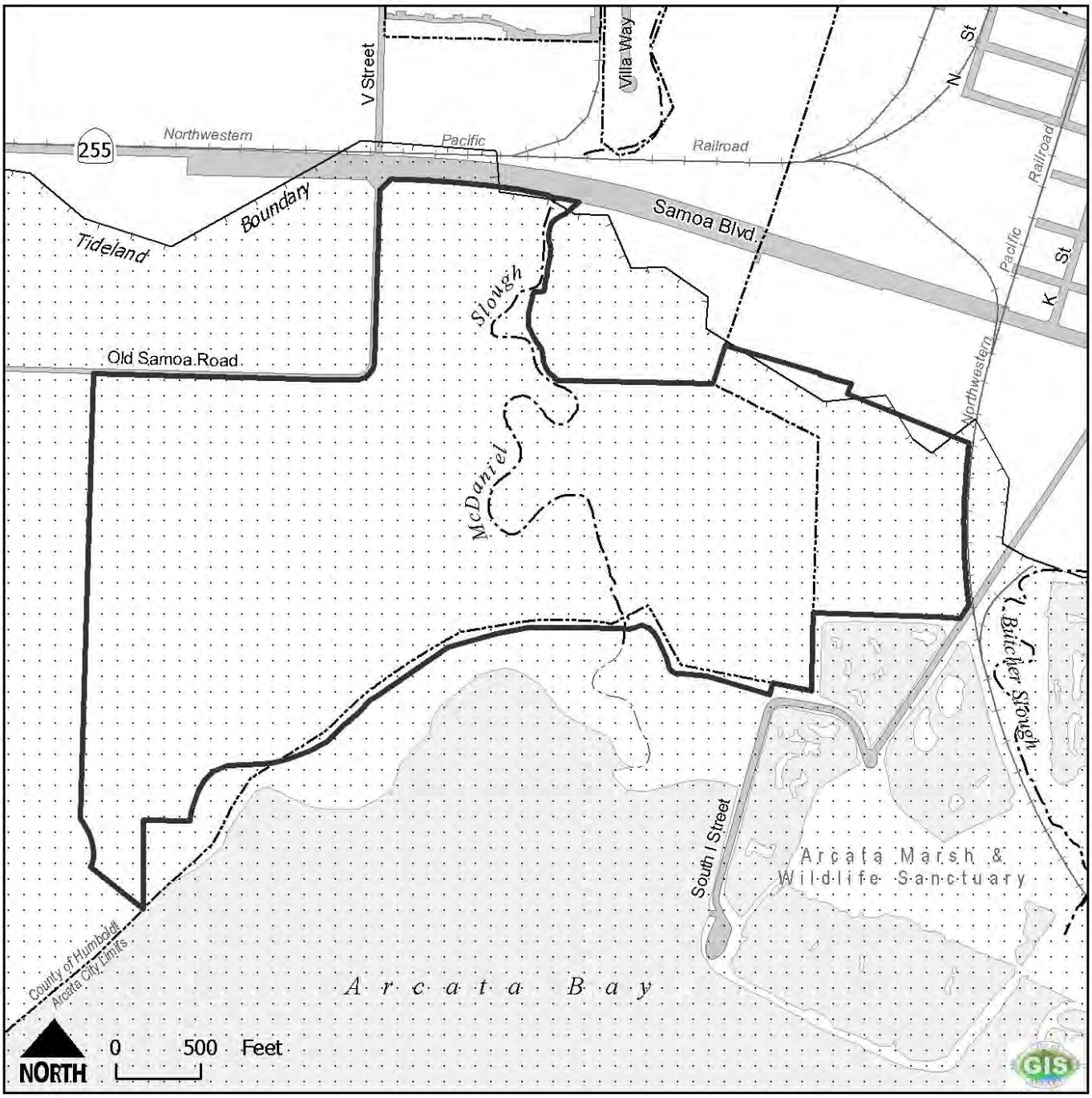


Figure 3.1 - 2
McDaniel Slough EIR

HISTORIC TIDELANDS

Boundaries
- Project Boundary
- Arcata City Limits

Water Features
- Streams
- Waterbody

Transportation
- Railroad
- Streets

Historic Tidelands*

*Source: W.H.Pratt, Swamp & Overflowed Lands, 1890-1891

3.2 BIOLOGICAL RESOURCES

The Biological Resources section describes the existing setting, and the impacts associated with implementation of the proposed Marsh Enhancement project on wetlands, fish, special status plants, avian species, amphibian species and other wildlife.

ENVIRONMENTAL SETTING

The McDaniel Slough Enhancement Project proposes to restore tidal hydrology and to enhance a mixture of associated habitat types to the approximately 240-acre project area. The project area was originally part of the extensive salt and brackish marshes that fringed all of Humboldt Bay. In the late 1800's, the area was diked and drained for agricultural purposes. Tidegates were installed in the 1940's in an effort to prevent salt water from intruding onto adjacent farmland upstream. Removing tidal action (and associated scour) has blocked fish passage, caused channel aggradation from sediment deposition, and has contributed to upstream flooding.

Historically Humboldt Bay may have covered an area of 27,000 acres, but due to land reclamation of salt marshes and intertidal flats, it has been reduced to approximately 17,000 acres. The original saltmarsh was estimated at 7,000 acres prior to reclamation. Most of the agricultural lands in the Arcata bottom, Jacoby Creek, Eureka Slough, Elk River, and Beatrice Flats were saltmarsh prior to reclamation.

Table 3.2-1 Summary of Current Habitat Types with in Project Area

Habitat Type	Acres	Percent of Total
1. Ruderal/Upland	9.6	4 .0%
2. Agricultural Field	76	31.7 %
3. Perennial Grassland	141.9	59.2%
4. Freshwater Marsh	5.7	2.4%
5. Brackish Marsh	0.8	0.3%
6. Willow Riparian	1.0	0.4%
7. Aquatic	4.3	1.8%
8. Developed	0.3	0.1%
Total =	239.6	100%

Restoration Overview

Tidal Marsh Habitat: Rapid colonization of the intertidal areas is expected within the site for the restoration alternatives, probably within the first ten years, because the site has suitable elevations for colonization and a nearby source of estuarine sediment. Also, approximately 23 acres (only applies to the proposed project) low-lying areas will be raised to suitable elevations with borrow material from the freshwater pond sites. After 50 years, a mature marsh plain is expected to have developed throughout the area below MHHW (Mean Higher High Water), with initial colonization of *Salicornia* in the lower elevations and *Spartina* in the higher areas. The ultimate dominant vegetation type cannot be predicted, as this would depend on the effectiveness of control measures on the undesired species such as *Spartina*. The proposed project will involve planting of desired tidal marsh species in order to speed up the restoration process.

Gradation of wetland habitats from riparian to salt marsh: In nature, there is not generally a sharp demarcation between tidally influenced wetlands and adjacent non-tidal wetlands or uplands, but rather a transition zone of diminishing tidal influence with increasing elevation. All of the restoration alternatives allow the opportunity for future development of a natural transition of habitats at the mouth of Janes Creek. This would occur over 50 years as alluvial sedimentation builds up a natural delta, which would cause the marsh plain to rise to a slightly higher elevation, allowing establishment of riparian vegetation, while brackish tidal marsh species would become established near the mouth of Janes Creek.

Unimpeded access for fish migration: All of the restoration alternatives except for #1 and #4 would improve fish passage by removal of the tidegates at McDaniel Slough. However, because the bed of the Samoa Boulevard Culvert is at –0.7 ft NGVD (National Geodetic Vertical Datum), which is several feet higher than the natural channel bed, there would still remain a possible barrier to fish passage on Janes Creek. The NGVD is a vertical geodetic datum formerly called "Sea Level Datum of 1929" or "mean sea level". The datum was found by averaging the sea level over a period of many years at 26 tide stations along the coasts of the US and Canada. Because it is an average, it does not represent the local mean sea level at any particular place.

Connectivity of habitats between wetlands and uplands: There are limited opportunities to accomplish this objective because of the blockage created by Samoa Boulevard and developments to the north and east. Nevertheless, the design of the benched levees and the adjacent higher elevation areas of the Arcata Marsh do allow for establishment of a vegetation transition zone from wetland to upland for the restoration alternatives.

Achievement of wetland functions as rapidly as possible: Taking into account the adjacent wetland vegetation seed source as well as the limited amount of subsidence, rapid vegetation colonization would be expected within a decade. The first few years prior to colonization, the areas downstream from the site of the tidal gates would mainly consist of mudflats, which are important habitat for shorebirds.

Habitat

Eight habitat types were identified on the project site (Figure 3.2-31), including 1.) ruderal/upland, 2.) agricultural field, 3.) perennial grassland, 4.) freshwater marsh, 5.) brackish

marsh, 6.) willow riparian, 7.) aquatic and 8.) developed. Detailed descriptions of the types of vegetation and wildlife found in these habitat areas follow. Table 3.2-1 summarizes the relative size of the habitats found within the project site.

Ruderal/Upland

Vegetation

The ruderal/upland species, which mainly occur along the levees adjoining and within the project site, totals 9.6 acres. Coyote brush (*Baccharis pilularis*) and Himalayan blackberry *(Rubus discolor*) compose the shrub layer. Himalayan blackberry forms dense thickets on the sides of the dike and along fence lines. Sitka spruce (*Picea sitchensis*) occurs in small numbers on the dike. Dominant herbaceous vegetation includes wild radish *(Raphnus sativa*), velvet grass (*Holcus lanatus*), bird's foot trefoil (*Lotus corniculatus*), Aaster (*Aster chilensis*) and English plantain (*Plantago lanceolata*).

Wildlife

Mammals found in this type of habitat include the house mouse (*Mus musculus*), black rat *(Rattus rattus*), deer mouse (*Peromyscus maniculatus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), opossum *(Didelphis virginiana*), and feral cat (*Felis catus*). Bird species include the European starling (*Sturnis vulgaris*), song sparrow (*Melospiza melodia*), white-crowned sparrow (*Zonotrichia leucophrys*), and American goldfinch (*Carduelis tristis*). Pacific tree frogs (*Hyla regilla*), rough skinned newts (*Taricha granulosa*), and northern alligator lizards (*Elgaria coeruleus*) also forage in ruderal habitats.

Agricultural Fields

Vegetation

Approximately 76 acres support vegetation that is characteristic of farm fields. The vegetation consists primarily of introduced grasses, such as perennial rye *(Lolium perenne*), fescue (*Festuca andurdinaceae*) and velvet grass *(Holcus lanatus*). The major forbs are Canada thistle (*Cirsium vulgare*), bird's foot trefoil (*Lotus corniculatus*) and curly dock (*Rumex crispus*). Salt grass (*Distichilus spicatatus*) occurs along the slough channels.

Portions of these agricultural fields exhibit wetland characteristics typical of agricultural lands with level topography and heavy-textured soils. Observed evidence of wetland hydrology includes sediment cracks and algal mat formation in depressions, and vegetation associated with saturated soils. Obligate wetland plants such as manna grass (*Glyceria occidentale*) and water foxtail (*Aleopecurus genticulatus*) dominate these areas.

Wildlife

This habitat supports many species utilizing regular agricultural lands in addition to those that utilize seasonal standing water. Mammals that typically use such fields include the California

vole (*Microtus californicus*), vagrant shrew (*Sorex vagrans*) and coast mole (*Scapanus orarius*), as well as many of the same mammals as listed for ruderal habitat. Common bird species using the fallow fields include the barn swallow (*Hirundo rustica*), common ravens (*Corvus corax*), long-billed curlew (*Numenius americanus*), and killdeer (*Charadrius vociferous*). These fields provide foraging habitat for a number of raptor species including the northern harrier (*Circus cyaneus*), white-tailed kite (*Elaneus leucurus*) and turkey vulture (*Cathartes aura*). Western terrestrial garter snakes (*Thamnophis elegans*) are common in this habitat. When flooded, grebes, cormorants, and shorebirds would use this area.

Perennial Grassland

Vegetation

The perennial grassland occupies approximately 141.9 acres on the project site and is found immediately west of McDaniels Slough on the Department of Fish and Game parcel. This perennial grassland is a result of agricultural pasture that has been allowed to mature (16 years). This grassland is water saturated through the wet winter months reflected in the water-tolerant plants. The perennial grassland is dominated by fescue, velvet grass, and sedges (*Carex spp*) interspersed with yarrow (*Achillea millefolium*) and dock (*Rumex spp*). Along the channels are found salt grass, slough sedge (*Carex obnupta*) and water parsley (*Oenanthe sarmentosa*). Patches of Himalaya berry (*Rubus discolor*) scattered through this area covers 1.5 acres providing roosting habitat for raptors.

Wildlife

The thatched condition of the older grass provides foraging habitat and cover for California voles, western harvest mice (*Reithrodontomys megalotis*), deer mice, and vagrant shrews. Mammalian predators include gray fox (*Urocyon cineroargentus*) and long-tailed weasels (*Mustela erminea*). Foraging habitat is provided for raptors such as white-tailed kites, northern harriers, red-shouldered hawks (*Buteo lineatus*), and barn owls (*Tyto alba*). The grasses provide habitat for western meadowlarks (*Sturnella neglecta*) and savannah sparrows (*Passerculus sandwichensis*). California quail *(Lophortyx californicus*), dark-eyed juncos (*Junco hyemalis*), and white-crowned sparrows are common in the blackberry patches. Western terrestrial garter snakes (*Thamnophis elegans*) and western toads (*Bufo boreas*) are typically found in perennial grassland.

Freshwater Marsh

Vegetation

The freshwater marsh habitat occupies approximately 5.7 acres on the project site and is found within the McDaniel Slough channel, a small borrow ditch east of the slough and at a former stock pond in the southern portion of the project (Figure 2). The freshwater marsh habitat is dominated by cattail (*Typha latifolia*) and bulrush, (*Scripus acutus)* with slough sedge, (*Carex obnupta*) being found in the deeper portions of the channel. Low growing wetland plants dominate the borders of the channel and the shallower portions of this habitat type. Among these

are soft rush (*Juncus effusus*), tufted hairgrass (*Deschampsia ceaspitosa*), Pacific silverweed (*Potentilla anserina*), water foxtail (*Aleopecurus genticulatus*), and water parsley (*Oenanthe sarmentosa*).

Wildlife

The freshwater marsh attracts many bird species that use the freshwater marsh habitats in the adjacent wildlife refuge. Example species include the American bittern (*Botaurus lentiginosus*), red-winged blackbird (*Agelaius phoeniceus*), marsh wren (*Cistothorus palustris*), pied-billed grebe (*Podilymbus podiceps*), American coot (*Fulica americana*), great-blue heron, great egret (*Ardea alba*), snowy egret *(Egretta thula*) and cinnamon teal (*Anas cyanoptera*). River otters (*Lutra canadensis*) are expected but uncommon. Red-legged frogs (*Rana aurora*), and northwestern salamanders (*Ambystoma gracile*) have been encountered in McDaniels Slough.

Brackish Marsh

Vegetation

Brackish marsh habitat represents about 0.8 acres of the entire project site, limited to inside (north of) the levee and along the two remnant slough channels in the southwest portion of the project area. This habitat type is dominated by alkali bulrush (*Scripus robustus*), arrow grass (*Triglochin maritima*) and salt rush (*Juncus lesueurii*). Other plants present along the margins of the brackish marsh include soft rush (*Juncus effusus*) and Lyngby's Sedge (*Carex lyngbyei).* Lyngby's Sedge is a CNPS List II and is found along the edges of the brackish parts of McDaniels Slough.

Wildlife

Most wildlife species using the brackish marsh are those that also use the freshwater marsh and/or the adjacent ruderal or agricultural areas. These channels provide foraging opportunities for herons and egrets, as well as some dabbling ducks such as the mallard (*Anas platyrhynchos*), American green-winged teal (*Anas crecca carolinensis*), and gadwall (*A. strepera*). The vegetation along these channels also provides habitat for marsh wrens, red-winged blackbirds and Pacific tree frogs.

Willow Riparian

Vegetation

Willow-riparian habitat occupies about 1.0 acres on the project site. Although it provides high quality riparian habitat, it only occurs in four small patches along the edges of McDaniel Slough. This habitat consists primarily of arroyo willow (*Salix lasiolepsis*), with other plants present including Sitka willow (*Salix sitchensis*), Himalayan blackberry *(Rubus discolor*) and California blackberry *(Rubus ursinus*).

Wildlife

The willow-riparian habitat provides tree canopy and understory, which provides cover for both birds and mammals. Species that may nest or forage here include Anna's hummingbird *(Calypte anna*), American goldfinch, black phoebe (*Sayornis nigricans*), Bewick's wren (*Thryomanes bewickii*), green heron (*Butorides virescens*), and American kestrel (*Falco sparverius*). Other species occurring here include the white-crowned sparrow, chestnut-backed chickadee (*Parus rufescens*), ruby-crowned kinglet (*Regulus calendula*), and winter wren (*Troglodytes troglodytes*). Small mammals such as brush rabbits (*Sylvilagus bachmani*) and striped skunks use these areas to seek shelter and access to water. Riparian habitats are important for migrating songbirds during the fall and spring providing food and resting places for many of these species of birds, including the rufous hummingbird (*Selasphorus rufus*), yellow warbler (*Dendroica petechia),* yellow-rumped warbler (*Dendroica coronata*), orange-crowned warbler (*Vermivora celata*), Wilson's warbler (*Wilsonia pusilla*), Pacific-slope flycatcher (*Empidonax difficilis*), Cassin's vireo (*Vireo cassinii*), and cedar waxwing (*Bombycilla cedrorum*).

Aquatic

Approximately 4.3 acres of aquatic habitat exist within the project boundary. McDaniel Slough, which bisects the project area, is largely freshwater at the northern section of the site and become progressively more brackish as it moves closer to Humboldt Bay. On an outgoing tide freshwater can occur there near the existing water control structures adjacent to Humboldt Bay. . These former tidal slough channels, remain hydrologically connected to McDaniel Slough via the borrow ditch on the north side of the southern levee.

Wildlife

The aquatic area on site mainly provides habitat for duck species such as mallard, green-winged teal, canvasback (*Aythya valisineria*), bufflehead (*Bucephala albeola*), and ruddy duck (*Oxyura jamaicensis*), as well as other water birds such as American coots and pied-billed grebes (*Podilymbus podiceps*). These areas also provide drinking water for mammals living in adjacent habitats, such as striped skunk and feral cats. There are few fish species likely to occur in the aquatic areas; however, Janes Creek is known to support a population of coastal cutthroat trout and stickleback.

Developed

There are no structures on the project site. There is a small parking area located in the western portion of the project area and accessible from Old Samoa Road. These areas total approximately 0.3 acres.

REGULATED HABITATS

Potential jurisdictional waters, including tributary waters, other waters, wetlands and farmed wetlands, occur throughout the entire project area. Areas not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially

irrigated areas, artificial lakes and ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water filled depressions (33 CFR, Part 328). The only waters within the project area that do not appear to be potential jurisdictional waters are those occurring in areas mapped as ruderal/upland and developed (Figure 2).

Table 3.2-2 Summary of Regulatory Setting for Aquatic and Plant Resources

Project-Related Activity	Regulatory Authority
Construction activities that could adversely affect water quality.	Regional Water Quality Control Board (RWQCB), permitting authority under Section 401 of the Clean Water Act
Construction activities within jurisdictional waters of the United States	U.S. Army Corps of Engineers (USACE) permitting authority under Section 404 of the Clean Water Act (1972) and Section 10 of the Rivers and Harbors Act (1899),
Alteration of stream channel, bed, or bank, including dredging or discharge of fill	Dept. of Fish and Game (DFG) , permitting authority under Section 1601 (Lake or Streambed Alteration Agreement) of the California Fish and Game Code
Effects on species or the habitat of species listed or candidates for listing under Endangered Species Act (ESA)	US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) formal consultation and permitting authority under Sec. 7 of ESA
Effects on species or the habitat of species listed or candidates for listing under Ca. Endangered Species Act (CSA)	Dept. of Fish and Game, consultation and permitting authority under Sec. 2081 of CESA
Effects on other special-status species, including species of concern and Ca. Native Plant Society (CNPS)- listed plants	DFG and USFWS, responsible agencies to review EIR
Effects on species or the habitat of commercially viable fish	National Marie Fisheries Service (NMFS) consultation under Essential Fish Habitat

Table 3.2-3 Summary of Regulatory Setting for Wildlife Resources

Project-Related Activity	Regulatory Authority
Alteration of stream channel, bed, or bank, including dredging or discharge of fill	DFG, permitting authority under Section 1601 (Lake or Streambed Alteration Agreement) of the California Fish and Game Code
Effects on species or the habitat of species listed or candidates for listing under Endangered Species Act (ESA)	US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) formal consultation and permitting authority under Sec. 7 of ESA
Effects on species or the habitat of species listed or candidates for listing under Ca. Endangered Species Act (CSA)	Dept. of Fish and Game, consultation and permitting authority under Sec. 2081 of CESA

SPECIAL-STATUS PLANT SPECIES

The special-status plant species that occur in regional habitats similar to those found in or adjacent to the project area include dwarf alkali grass *(Puccinellia pumila*), Point Reyes bird's-beak (*Cordylanthus maritimus ssp. palustris*), Humboldt Bay owl's-clover (*Castilleja ambigua ssp. humboldtiensis*), marsh pea (*Lathyrus palustris*), running-pine (*Lycopodium clavatum*), Western lily (*Lilium occidentale*), marsh violet (*Viola palustris*) Lyngby's sedge (*Carex lyngbyei)* and flaccid sedge (*Carex leptalea*) (CNDDB 2000). Only Point Reyes bird's-beak and Humboldt Bay owl's clover and Lyngby's sedge have been found in the vicinity of the project area, and are therefore the only special-status plant species considered. Prior to the site survey, information concerning the known distribution of threatened, endangered, or other special-status and significant plant and animal species possibly occurring 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 2000), miscellaneous information available through the U.S. Fish and Wildlife Service (USFWS) and CDFG, and various technical publications.

Point Reyes Bird's-Beak (*Cordylanthus maritimus ssp. palustris*)
Federal listing status: Species of Concern
State listing status: None
CNPS List 1B.

This annual hemi-parasitic herb occurs in coastal salt marsh. The blooming period extends from June to October. The range of this species includes 5 counties in California, extending north into southwestern Oregon. Point Reyes bird's-beak has been found in the salt marshes adjacent to project area.

Humboldt Bay owl's clover (*Castilleja ambigua ssp. humboldtiensis*)
Federal listing status: Species of Concern
State listing status: None
CNPS List 1B.

This annual plant occurs in coastal saltmarsh habitats. Its range is restricted to Humboldt Bay and Point Reyes. The blooming period occurs from May through August. Humboldt Bay owl's clover has been found in the salt marshes adjacent to the project area.

Lynby's Sedge *(Carex lyngbii)*
Federal listing status: None
State listing status: None
CNPS List 2.
This perennial plant occurs in coastal brackish habitats. Its range is from Alaska to Marin County. The blooming period occurs from May through August. Lyngby's sedge has been found in brackish habitat in the project area.

SPECIAL-STATUS WILDLIFE SPECIES

The special-status animal species that occur in the vicinity of the project area are described below. Expanded descriptions are included only for those species for which suitable habitat exists in the project area.

There are several special-status species known to occur in habitats that are present on the site or that may forage in the project area, including the, ferruginous hawk (*Buteo regalis*) (Fall/Winter), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*) (Fall/Winter), merlin (*Falco columbarius*), California gull (*Larus californicus*), short-eared owl (*Asio flammeus*) (Fall/Winter), Vaux's swift *(Chaetura vauxi*), purple martin (*Progne subis*), black-capped chickadee (*Parus atricapillus*), and yellow warbler (*Dendroica petechia*).

Some special-status species are known to occur in the general local area but are thought to be absent from the project site due to lack of habitat, or occur only rarely as stray migrants or transients. These include golden eagle (*Aquila chrysaetos*), ferruginous hawk, *(Buteo regalis*), burrowing owl (*Athene cunicularia*), and bank swallow (*Riparia riparia*).

Other species expected to breed or forage on the site infrequently include the double-crested cormorant *(Phalacrocorax auritus*), osprey (*Pandion haliaetus*), and American peregrine falcon (*Falco peregrinus anatum*). Bald eagles (*Haliaeetus leucocephalus*) may occasionally perch on the project site while foraging within the project site and in adjacent water during the winter; however, there is no breeding habitat for bald eagles on the site. Yellow-headed blackbirds (*Xanthocophalus xanthocephalus*) forage at the nearby Moxon Dairy and at Arcata Marsh, so may be present but are not known to nest locally.

A few special-status species for which there is no habitat on the site are found in the vicinity of the site, or may be washed downstream into the site. These include the western pond turtle (*Clemmys marmorata*), tailed frogs (*Ascaphus truei*), and southern torrent salamanders (*Rhyacotriton variegatus*). Other special-status species that are found outside the tidal gates include longfin smelt (*Spirinchus thaleichthys*) and brown pelican (*Pelecanus occidentalis*).

The following species are likely to be found on the project site, and may be affected by the proposed restoration:

Northern red-legged frog (*Rana aurora aurora*)
Federal Listing Status: None
State Listing Status: Species of Special Concern
The northern red-legged frog is found in humid habitats including grasslands and streamsides in northwestern California. There are records of frogs in the vicinity of the project site and there is suitable habitat found on the site, therefore it is assumed that the northern red-legged frog occurs on the project site.

Rana aurora reaches from 2 to 5.25 inches in length. It is reddish brown to gray and contains many poorly defined dark specks and blotches, which are absent on the back and top of its head. A light stripe on its jaw borders its dark mask. Folds are present on its back and sides, and the underside is yellow with red on the lower abdomen and hind legs. Its toes are not fully webbed. Females grow larger than males. Males, however, have enlarged forearms and swollen thumbs. The Red legged frog has very smooth and thin skin and an unspotted dorsal surface. Northern red-legged frogs have no vocal sacs.

Red-legged frogs have a highly variable diet, probably taking any prey they can subdue that is not distasteful (Hayes and Tennant 1985). Other amphibians and small mammals may form a significant portion of their diet. California red-legged frogs breed from late November to early April (Jennings and Hayes 1989). This timing is probably to ensure that water is cool enough for embryonic survival and that sufficient water exists for larval growth to metamorphosis.

As they continue their transition to adulthood, the froglets move from shallow water to knee-deep water to hide from larger predators.

Adult frogs must have emergent riparian vegetation near deep, still or slow-moving ponds or intermittent streams. These well-vegetated areas are needed for escaping from predators, shade to maintain cool water temperatures, and as shelter, especially during the winter. Red Legged Frog has the lowest upper and lower embryonic temperatures of any North American ranid frog, ranging from 4 to 21 degrees Celsius. In addition to water depth and temperature, salinity may also be an important factor. Jennings and Hayes (1989) reported that exposure of pre-hatching embryos to salinity greater than 4.5 percent causes 100% mortality.

Northern harrier (*Circus cyaneus*)
Federal Listing Status: None
State Listing Status: Species of Special Concern
Northern Harriers are found in open grasslands, agricultural fields, and marshes throughout much of North America. They perch and fly low, hunting for a variety of prey such as mice, birds, frogs, reptiles, and insects. This species was observed foraging on the site during the reconnaissance survey, and may nest on the site.

The northern harrier, formerly known as the marsh hawk, is a slim, long-winged, long-tailed, raptor of open country. They measure from 17-1/2 to 24 inches long, with a wingspan of 39 to 48 inches. In all of the various plumages, a white rump patch is exhibited. The males are usually pale gray above and whitish below with black wing tips and a gray hood. Females are brown

above and whitish below, with heavy streaks on the breast and flanks; and the immatures are a russet or cinnamon below and streaked only on the breast. An owl type facial disk is distinctive in all ages and both sexes, as is the slender, cross-barred tail. When overhead, the wing tips of the pale male seem to have a "dipped-in-ink" appearance and there is a black border on the tailing edge of each wing.

This hawk nests on the ground in shrubby vegetation, usually at the edge of a marsh. The nest is built out of a large mound of sticks in wet areas, and a smaller cup of grasses on dry sites. Most of the nests are found in emergent wetlands or along rivers or lakes, but it may also nest in grasslands, grain fields, or on sagebrush flats that are several miles from water. Harriers usually perch on the ground but occasionally use low trees, fence posts or other low perches (Peterson 1990).

Breeding commences during the months of April through September, and peak activity occurs during June and July. The most common number of eggs is five, but four or six are frequently found and occasionally as many as seven, eight, or even nine, are seen in a harrier's nest (Bent 1961). Most commonly the female incubates the eggs while the male provides her with food, but cases have been noted where both parents shared the duties of incubation. Both adults care for the young. The nesting period lasts approximately 53 days. After the young gain the ability to fly, they are often fed by their parents while in flight. The breeding pair and juveniles may roost communally in the late autumn and winter.

Northern harriers can be locally abundant where suitable habitat remains free of disturbance, especially that from intensive agriculture and other human activities. They rely on the use of tall grasses and forbs in wetlands or at wetland/field borders for suitable cover. These borders or edges are especially important for nesting, feeding and cover. Their home range usually includes a freshwater site. They are very defensive of their territory and will attack other birds of prey and humans during breeding season.

White-tailed kite (*Elanus caeruleus*)
Federal listing status: None
State Listing Status: Protected
The White-tailed Kite is found in brushy grasslands and agricultural areas with low ground cover, as well as grassy foothills, marsh, riparian, woodland, and savanna. This species requires tall alders, willows, or other broad-leaved deciduous trees for nesting. Locally, they are also known to nest in conifers. Prey items comprise primarily rodents and insects, although they will also take reptiles, amphibians, and small birds. Kites are quite common on and around the project area and nest on an abandoned log pond adjacent to the site, but optimal nesting trees are lacking on site. There are foraging areas adjacent to the project site, and it is more likely that kites use this area primarily for foraging.

The white-tailed kite is whitish in appearance. It is falcon-shaped with long, pointed wings and a long white tail. It measures 15 to 17 inches in length and has a 42-inch wingspan. The adults are a pale gray with white head, underparts, and tail. Sexes are almost identical in plumage and size but the immatures have a rusty breast, a brown back, and a narrow dark band near the tip of their pale, grayish tail.

Nesting by white-tailed kites in California has been reported to occur from February through August with peak activity noted in March, April, and May (Waian 1973). Nesting habitats are best described as oak woodlands or trees along marsh edges. White-tailed kites have been reported to nest in any suitable tree that is of moderate height, such as eucalyptus, cottonwood, and even coyote bush, with the nests placed near the tops of these shrubs or trees. Nest trees range from single isolated trees to being within large stands (Dunk 1995).

Occasionally, the kite rears two broods per season with each brood ranging from three to six eggs. The female alone incubates the eggs for about 28 days. The young fledge in approximately 35 to 40 days. During the incubation and nestling period, the male feeds the female and young.

Erichsen (1995) found that riparian corridors represent preferred nesting sites for kites. As preferred kite habitats (riparian woodlands, wetlands and native wooded grasslands) have diminished, kites must compete with larger raptors for nesting sites in remaining woodlands and agricultural settings. Any projects affecting the riparian corridor or open areas could impact the species.

Vaux's swift (*Chaetura vauxi*)
Federal Listing Status: None
State Listing Status: Species of Special Concern
The Vaux's Swift is a common summer resident and breeder in the vicinity of the project site. They use hollow trees and chimneys for nests and roosts, and there is habitat on the site for these birds to forage but not nest.

The Vaux's swift is a small (4 3/4"; 11 cm) aerially foraging bird, with typical swift proportions (long, narrow wings, short bill with large gape, very short and weak legs), and a wingspan averaging 273 mm (M. Marin, unpubl. data). The tail is short and slightly rounded, with spines projecting at the tip of each rectrix. Flight is rapid and "twinkling", consisting of rapid series of shallow wing beats alternated with short looping glides. Easily distinguished from swallows by narrower wings with wrist joint closer to body, by rapid stiff wing beats, and overall gray-brown coloration.

In coastal northern and central California, where the state's highest breeding densities occur, preferred nesting habitat is old-growth redwood (Sequoia sempervirens) forests. In the spring, large numbers of swifts concentrate over lakes and marshes, often mixed with flocks of migrant swallows. Breeding Bird Survey data show sharp declines over much of the breeding range of this species (Bull and Collins 1993). These declines, and the restriction of most of the California breeding population to old-growth forests, led to the placement of this species on the California Bird Species of Special Concern list. A potential threat to migrants is the loss of important, traditional roost sites. Old growth habitat does not occur on site or adjacent to the project site.

Coastal cutthroat trout (*Oncorhynchus clarki clarki*)
Federal Listing Status: None
State Listing Status: Species of Special Concern

Coastal cutthroat trout are often found in small, coastal streams as opposed to larger channels. They require watercourses with shaded areas, cool water, and small-grained gravel for spawning. Generally, these fish are threatened by water diversion, siltation, and marsh and tideland reclamation. There are records of cutthroat trout in Janes Creek upstream of the project site. Although coastal cutthroat trout could occur within the project area, the tidegates present at the downstream end of McDaniel Slough restrict any potential passage of the fish to and from Humboldt Bay.

The coastal cutthroat trout is greenish blue on its back and silvery on the sides. They are distinguished from other trout and salmon species by bright red streaks located on the lower jaw, and the dense patterns of spots across the body and completely covering the tail. Adult cutthroat average 1 to 4 pounds, and can reach 20 inches in length.

The coastal cutthroat trout is unlike most of the other salmon species, because it may spawn more than once. Adults commonly enter streams during the fall and feed on the eggs from other salmons' spawn. Like other salmon, the female cutthroat digs a nest (or redd), and the male fertilizes the eggs. Spawning can occur from December through May, dependent upon the water conditions. The female cutthroat can lay from 200 to 4,400 eggs, which hatch in about 1 month. The young spend 1 to 2 weeks in the gravel before emerging. Young cutthroat can spend 1 to 9 years in fresh water before they migrate to the estuaries and ocean in the spring, most commonly three years from emergence. Coastal cutthroat trout usually spend less than 1 year in salt water before returning to spawn. The age of adults can range from 2 to age 10, with first time spawners usually being 3 or 4 years old. After spawning, the 'spent' or spawned adults, now called 'kelts', often return to salt water in late March or early April. Juveniles and adults are carnivorous, feeding mostly on insects, crustaceans, and other fish throughout their lives.

Large woody debris and in-stream structures play an important role in providing habitat for coastal cutthroat trout. In freshwater, adult cutthroat typically reside in large pools while the young reside in riffles, most commonly in upper tributaries of small rivers. Coastal cutthroat trout utilize a wide variety of habitat types during their complex life cycle. They spawn in small tributary streams, and utilize slow flowing backwater areas, low velocity pools, and side channels for rearing of young. Good forest canopy cover, in-stream woody debris, and abundant supplies of insects are crucial for the young cutthroat's survival.

During the estuarine or ocean phase of life, the cutthroat trout utilizes tidal sloughs, marshes, and swamps as holding areas and feeding grounds. These tidal areas are also very important for the survival of the prey fishes that the cutthroat depends on for food. Healthy estuaries with abundant supplies of small schooling fishes and young crustaceans are necessary for the cutthroat's survival

Other Salmonids

Three special-status fish species, Coho salmon (*Oncorhynchus kisutch*), steelhead trout (*Oncorhynchus mykiss*), and Chinook salmon (*Oncorhynchus tshawytscha*) occur outside the tidegates in Humboldt Bay. Since they use other tributaries in Humboldt Bay to spawn, it is likely that restoration of Janes Creek as an accessible tributary would allow these fish to spawn in the creek and may help to increase their overall populations.

Tidewater goby *(Eucylogobius newberryi)*
Federal Listing Status: Endangered
State Listing Status: Species of Special Concern

The tidewater goby is a small fish, rarely exceeding 50 millimeters (2 inches) standard length, and is characterized by large pectoral fins and a ventral sucker-like disk formed by the complete fusion of the pelvic fins. The tidewater goby occurs in tidal streams associated with coastal wetlands in California. Since 1900, the tidewater goby has disappeared from nearly 50 percent of the coastal lagoons within its historic range, including 74 percent of the lagoons south of Morro Bay in central California. The tidewater goby is the only species in the genus Eucylogobius and, in its restriction to low salinity water in California's coastal wetlands, is almost unique among fishes of the Pacific coast of the United States. Since there are records of – tidewater goby in Arcata Bay, it is assumed that the proposed project provides habitat for this species although this species was surveyed for by USFWS in 2003 and not found on the project site (McDaniel Slough or in the nearby Butcher Slough and the mouth of Jacoby Creek.

Townsend's big-eared bat (*Corynorhinus Plecotus townsendii*)
Federal Listing Status: None
State Listing Status: Species of Special Concern
The Townsend's big-eared bat was once common in California, but now is considered uncommon to rare. This species frequents rural buildings, woodlands, and xeric environments, but is extremely sensitive to human disturbance and will quickly abandon roosting sites if disturbed. This species may forage on the project site.
Townsend's big-eared bat has a body length of approximately 10 cm and prominent ears. By night this species roosts and feeds on small moths and other insects. Townsend's big-eared bat is considered sedentary; it is not known to migrate more than 15 km over a lifetime of up to 16 years. The bats mate in the late fall and early winter. Females form maternity colonies of up to 200 individuals in spring and give birth in late spring to early summer, while males remain solitary. Young begin to fly at three weeks and are weaned at six weeks. These bats are thought to eat mainly moths. Townsend's big-eared bats hibernate when wintering in cold areas, and may share hibernation locations with other bat species.

This species is common throughout western North America, especially at upper elevations. The wide environmental tolerance of Townsend's big-eared bat is reflected in its wide geographic range. Townsend's big-eared bat prefers mesic habitats, in particular coniferous and deciduous forests. Townsend's big-eared bat is a cave roosting species but will inhabit human-built caves such as mines, tunnels, bridges, and buildings. The bat is sensitive to human intrusion. This sensitivity to human disturbance is possibly the cause of the species' population decline.

Pallid Bat (*Antrozous pallidus pacificus*)
Federal Listing Status: None
State Listing Status: Species of Special Concern
Pallid bats are large bats, and the Pacific race represents one of the largest bats in California. Colonies of this species generally roost in rocky outcroppings, in buildings, under bridges, and in

hollow trees, ranging from a few to over a hundred individuals in any given roost. Pallid bats forage on terrestrial arthropods, and frequent dry, open grasslands near water. This species may forage in the open fields on the project site.

The pallid bat has large eyes compared to many other North American bats, and its ears are pale and wide. Its fur varies from a pale cream color to light brown dorsally, and is white on the ventral. The skull is large and the teeth are heavy and robust. The snout of the pallid bat is square and has a ridge on the top. The bat has a total length of 36 - 53 inches, a wingspan of 13 - 15 inches and a forearm length of 1.9 to 2.3 inches.

Pallid bats leave the day roost to forage about an hour after sunset, and can consume up to half its weight in insects every night. It rarely catches flying insects; instead, pallid bats usually capture their prey on foliage or the ground. In addition to using its echolocation, the pallid bat listens for sounds made by the prey, and also has visual abilities. After catching prey, the bats return to their night roost, which is usually in an open area, to eat their catch. They feed on insects such as the ten-lined beetle, and also on crickets and scorpions.

The mating season lasts from October through February. Sometime during the first two weeks in April, ovulation and fertilization take place. The female bat usually gives birth to twins. Birth takes place during the first half of June. In four to five weeks young bats are capable of short flights, and by eight weeks they attain full adult size.

In the summer, bachelor and nursery colonies separate. Female bats roost with their young, males remain separate until the newborn bats are weaned. Communication between colony members is largely by a number of vocalizations. These calls are used for territorial disputes. Pallid bats also emit a skunk-like odor that may be used as a defense mechanism.

IMPACT EVALUATION CRITERIA

Based on the CEQA Guidelines a biological impact is considered significant if the project would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community in local or regional plans, polices, or regulations, or by the CDFG or USFWS.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

In general, federal, state and local agencies all have, in one form or another, policies and/or ordinances addressing the loss of wetland and 'wetted' lands. In general, these call for a "no net loss" of wetlands. When wetlands are to be lost and/or filled as result of project implementation, the loss needs to be mitigated by creation of habitat of equal or greater value. In particular, the City of Arcata's (1989) General Plan supports a "no net loss" policy with respect to wetlands and wetland values, encourages enhancement of wetlands, and is in favor of wetland mitigation, including enhancing or replacing wetlands, if the wetland values lost to development can be replaced (City of Arcata, 1989). These activities are subject to permit approvals from other agencies, and the permit applications will be required to include project-specific mitigation proposals.

IMPACTS AND MITIGATIONS FOR THE PROPOSED PROJECT

The objectives of the project include restoring tidal hydrology to the estuary, thereby connecting McDaniel Slough and Humboldt Bay for anadromous fish and re-establishment of saltmarsh dominated by pickleweed *(Salicornia virginica*). The proposed restoration would impact some existing habitats that are regionally abundant and whose loss is therefore not considered significant. These habitats include developed land, agricultural/pasture land, perennial grassland and ruderal habitat. Restoration of the area would also likely impact freshwater and brackish marsh, agricultural land and perennial grassland with wetland characteristics, and willow riparian habitat.

3.2.1 Impacts to Wetlands

Discussion

The project would result in impacts to US Army Corps of Engineers jurisdictional wetlands, and California Coastal Commission EHSA – wetlands. The project would involve removal of sediment deposits from wetlands and stream channels, and placement of fill into existing wetlands and drainage ditches. In addition, heavy equipment would be required to operate within areas defined as wetlands.

New levees in the project area constitute 6.5 acres of "fill" onto wetlands. On site, 3.0 acres of old levee areas and other filled "uplands" will be removed and restored to wetlands. No additional mitigation is proposed for this project as it is a tidal restoration project that is not subject to compensatory mitigation per The California Guidance For Evaluating Wetland Mitigation Projects in California's Coastal Zone - Chapter 8 – Evaluating the Performance of noncompensatory Wetland Restoration Projects, paragraph 2 – "Wetland restoration undertaken for reasons other than satisfying mitigation requirements should be guided by the desire to achieve functional equivalency with historic conditions or with reference wetlands." Paragraph 3 states that "wetland restoration is defined here as an activity that reestablishes the habitats and functions of a former wetland". This project will reestablish historic tidal function and

eventually salt marsh habitat. Paragraph 5 states that "there are other important distinctions between restoration projects completed for mitigation and restoration projects completed for other reasons. For example, there is no need to consider the various mitigation attributes. In particular it is not necessary to consider project location and mitigation ratios in designing a restoration project, since habitat compensation is not an issue."

The 200 acres of wetland restored through excavation, new and enhanced channel configurations, and the re-introduction of a natural tidal regime will fully compensate for the 6.5 acres wetland area impacted by the project and provide substantial qualitative enhancement for the future 240 acre site. The project represents a net gain in wetland restoration of the site's existing wetland values.

The project would also remove soil material from other existing channels to deepen or enhance drainage and flood capacity. The channels would not "drain" a wetland; they would become an extension of the Bay saltwater wetland system. The enhanced channels and surrounding areas would be allowed to function as saltwater wetlands and, in time, would develop into a natural functioning system. This removal of materials would have a net increase in wetland habitat and improve wetland biotic potential.

The project would also involve filling of some existing drainage channels and areas defined as wetlands. The project would require the construction of new levees around the perimeter of the project site. These levees would be constructed across low-lying areas that serve as wetland habitat during portions of the year when flooding and high rainfall occurs. Because of the low elevation of the site, much of the area has wetland soil and vegetation.

The project would involve operation of heavy equipment within wetlands. The construction of levees, wetlands, levee breaching, installation of tidegates and drainage pipes would involve extensive work with a large excavator, bulldozer, loader, scraper, and transport vehicles. Heavy equipment would have a short-term impact of wetland vegetation and soils that currently exist at the site.

The new brackish pond would be filled with a mix of treated wastewater and tidal water from Humboldt Bay. The inflow would range from 1 -6 cubic feet per second depending upon the season. This new discharge point must be amended into the City's permit with the California Regional Water Quality Control Board.

Routing a portion of the marsh system treated wastewater to the project site would create additional brackish conditions in a portion of the project area. Thereby additional habitat enhancement value would be derived from treated wastewater.

Utilizing McDaniel Slough as an additional discharge point for treated wastewater will not impact the existing freshwater marshes at the AMWS. There will be a decrease in freshwater discharge to Humboldt Bay south of Butcher Slough. Impacts to fish and wildlife at this location are not expected to be significant.

- Anadromous fish access Butcher Slough/ Jolly Giant Creek during high stream flow periods. The wastewater discharge point is not likely a key attractant flow for fish as it is not in the main entrance to Butcher Slough and fish migrate during winter runoff periods. .
- The current wastewater discharge during low tide is onto mudflat areas that do not support terrestrial vegetation.

The impacts to wetlands due to construction activities are minor and not able to be mitigated on site. Generally, the majority of the project site would be returned to its previous condition as tidal wetland habitat by removal of a portion of the Bayfront levee. In addition, higher elevation sites adjacent to the Arcata Wildlife Sanctuary would be converted to freshwater wetlands.

Under the proposed project there will be a decreased probability of non-native species invasion because of the accelerated tidal marsh habitat creation by raising the lowest elevation areas and by planting native-saltmarsh plants such as pickleweed.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

The following measures will mitigate impacts to a less than significant level:
3.2.1a The locations of habitats and species to be avoided will be clearly identified in the contract documents (plans and specifications).
3.2.1b Construction activities in wetlands will be restricted to the dry season.
3.2.1c Before clearing and grubbing commences; construction and staging areas will be flagged to clearly define the limits of the work area. These areas will be clearly identified on the contract documents (plans and specifications).
3.2.1d Sensitive areas outside of the construction corridor will be so labeled on construction documents (plans and specifications) as "Sensitive Biological Resources—Do Not Disturb."
3.2.1e Watering of exposed earth will be conducted consistent with good construction practices to minimize dust production.
3.2.1f A qualified biologist will be on-site to observe construction activities as appropriate when construction in or adjacent to sensitive habitat occurs.
3.2.1g Contractors awarded contract packages will sign a document stating that they have read, agree to, and understand the required resource avoidance measures, and will have construction crews participate in a training session on sensitive area resources.
3.21h All haul roads and portions of construction staging areas that are no longer required for construction and maintenance of the restoration project and have not been converted to a new use shall be restored to pre-project conditions.

3.2.2 Impacts to Fish and Associated Habitat

Discussion

Access to the Janes Creek watershed for anadromous salmonids would be improved after implementation of the project. The project would remove the Janes Creek tidegates, which are a partial barrier to fish passage, depending on the flow volume and velocity through the pipes. Removal of these pipes and tidegates would allow fish to pass upstream, especially during high tides or moderate flood flows.

The wetland and channel enhancement would improve conditions for downstream migrant juvenile salmonids. High quality estuary habitat plays a crucial role in the survival of downstream migrating salmonids, providing a resting place and opportunity to adjust to saltwater conditions. The project would cause the development of deep channels and pools, and would allow for a diversity of habitat characteristics. The new treated wastewater discharge point at the brackish marsh will increase the area estuarine conditions in McDaniel Slough that may result in an increase in food sources for fish. The brackish marsh area will be controlled with tidal inlet/outlet structures that provide for a muted tidal exchange. Low summer discharge to the brackish marsh will be equivalent to the natural discharge of nearby Jolly Giant Creek. The pipes will be installed to create conditions that provide shallow water fish habitat.

The current wastewater discharge point to Humboldt Bay south of Butcher Slough will be maintained although there will be a decrease in the amount of treated wastewater discharged at that point.

Determination

If properly mitigated, tidegate removal would result in less than significant impacts to fish and fish habitat.

Mitigation

The following design features would be incorporated into the project design to mitigate the impacts of construction to a less than significant impact:

3.2.2a Construction activities occurring within the watercourse would occur following recommendations from qualified California Department of Fish and Game biologists.

3.2.2b In stream work will be done during the dry season at low tide with a fish biologist on site during in stream operations to monitor for the presence of anadromous fish and other wildlife species.

3.2.2c Tidegates would be removed from the pipes one year prior to breaching the levee and removing the pipes. This will allow for development of erosion control vegetation on the levees prior to the breach thus minimizing sediment inputs. The breach would occur during low flow and low tide.

3.2.2d Consult with the U.S Fish and Wildlife Service regarding Tidewater Goby.

3.2.2e Consult with the NOAA Fisheries regarding salmonids.

3.2.2f Install outlets from brackish pond that allow for controlling outflow to adjust for optimal salinity ranges and to prevent entrapment of fish.

3.2.3 Impacts to Special Status Plants and Associated Habitat

Discussion

The project would result in a less than significant impact to special status plant species because the project does not propose activities in the existing salt marsh habitat where Point Reye's bird-beak and Humboldt Bay owl's clover are found. Lyngby's sedge is abundant along McDaniel Slough. In addition, the project will create additional saltmarsh and brackish habitat, which could be colonized by the sensitive plants found in the area. Areas of high saltmarsh would be created with material generated from excavation from the freshwater and brackish ponds. In other areas, marsh plain elevational development would accrue at a rate of 1/3 inch per year according to Prichard.

Of the 19 special status plant species known to occur within the vicinity, only 8 are associated with the habitat type found on the site. A special status plant survey located Lyngby's sedge in the project site. Point Reye's bird-beak and Humboldt Bay owl's clover were found in adjacent saltmarsh habitat. Both species are on the CNPS List 1B and are not State or Federally listed as threatened or endangered. Lyngby's sedge is on the CNPS List 2 and is not State or federally listed as threatened or endangered.

Determination

Beneficial impact.

Mitigation

No mitigation is necessary.

3.2.4 Impacts to Avian Species and Associated Habitat

Discussion

The project would result in a beneficial impact to waterfowl and shorebirds by including construction of freshwater ponds, and restoration/enhancement of brackish and salt marsh habitat. The brackish marsh will provide for increased aquatic invertebrates that serve as a food source. During construction, the project would include design features to mitigate any impacts to a less than significant level. The project would include operation of heavy equipment within wetland habitat where avian species are known to occur.

Habitat for three special status avian species exists on the project site and all three have been documented as occurring in the vicinity. The site contains both nesting and foraging habitat for the Northern Harrier and foraging habitat for the Vaux's Swift and White-tailed Kite. The project will result in a loss of perennial grassland habitat utilized by these three species. Impacts to White-tailed Kites will be less than that of the other two species since the White-tailed Kite is known to forage in salt marsh habitat as well as grasslands. The loss of perennial grassland habitat will be less than significant for all three species of concern because there is an abundance of this type of habitat in the northern Humboldt Bay area. In addition, the project proposes to increase habitat values for foraging Vaux's swift and White-tailed kite by enhancing riparian habitat through the planting of willow, red alder and native conifers along Janes Creek. Near the

freshwater ponds, large logs suitable for roosting will be buried upright to serve as snags. (See Existing Conditions above for more detailed description of avian species). Heavy equipment operations and vegetation disturbance on the site could result in temporay impacts to these three bird species foraging within the project area. In addition, there may be the potential to significantly impact nesting Nothern harrier.

Determination

Less than significant adverse impact.

Mitigation

The following design features would be incorporated into the project design to mitigate the impacts of construction to a less than significant impact:

3.2.4a Construction activities would occur during the breeding and nesting season only following pre-construction site-specific surveys that find an absence of nesting Northern harrier.
3.2.4b Following pre-construction surveys, work would begin following recommendations of a qualified biologist.
3.2.4c Riparian habitat will be enhanced by planting willow, alder and native conifers along Janes Creek. Near the freshwater ponds, large logs suitable for roosting will be buried upright to serve as snags.

3.2.5 Impacts to Amphibian Species and Associated Habitat

Discussion

The project would result in a beneficial impact to amphibian species because it includes the construction of freshwater ponds and enhancement of the Janes Creek channel. During construction, the project would result in a less than significant impact to amphibians. A survey of the site in 2002 by a HSU class found northwestern salamanders, red-legged frogs along Janes Creek-McDaniels Slough, and rough-skinned newts on the bayfront dike. With the exception of the portions of dike removed, there would likely be no impact on the rough-skinned newts; however the muted tide cycle will affect the red-legged frogs and northwestern salamanders found along Janes Creek. These species probably did not occur here prior to the diking of Humboldt Bay. Sufficient freshwater habitat may be created by the ponds adjacent to the AMWS to offset the loss of habitat along McDaniel Slough.

For a period of seven months in 2003 and again in for 4 months in 2005, one of the 48-inch tidegates was missing and the slough experienced tidal action. Prior to that, salinity measurements showed that the inboard ditch has similar salinity to Humboldt Bay due to significant tidegate leakage.

The project includes the construction of freshwater ponds adjacent to the Arcata Marsh and Wildlife Sanctuary. These ponds would be suitable habitat for red legged frog and other amphibian species. In addition, enhancements to the Janes Creek channel would provide deeper pools and improve in stream habitat for amphibians in areas where saltwater intrusion does not occur.

Because saltwater intrusion will occur at the project site, these areas would no longer continue to support red legged frog. Some completely freshwater habitat could exist in the upstream extent of the project area, and this area could support amphibians. However, the majority of the construction is outside of this area, therefore impacts due to construction would be minimal.

Determination

For a period of seven months in 2003/04, one of the 48-inch tidegates was missing and the slough experienced tidal action. Currently, three of the four tidegates are leaking significantly. As some degree of salt water has and is currently entering the slough, overall impacts to amphibians is expected to be less than significant within the Janes Creek channel (estuary).

Mitigation

No mitigation is necessary for impacts to amphibian species.

3.2.6 Impacts to Mammal Species

Discussion

The proposed project would not negatively affect a state or federally listed or special status mammalian species. Common small mammals such as the California vole, Botta's pocket gopher, and vagrant shew would be negatively affected. Habitat values for bats in general would be positively affected from the additional freshwater and brackish ponds and the placed snags, new forest areas and bat boxes. The total area of upland post-project, which is not subject to tidal or freshwater flooding, will be equal to the current area although this area that is currently agricultural wetland (area currently subject to grazing) will be lost. These upland areas include islands; retained Janes Creek parallel levee sections, new levees and areas between ponds that will be protected from tidewater.

Marine mammals including the harbor seal would be positively affected by the new estuary habitat and increased prey base.

Determination

Less than significant adverse impacts with incorporation of mitigation measures.

Mitigation

3.2.6a Installation of snags, bat boxes and retention of some tall grass perennial uplands on City property landward of the dikes with a mosaic of new upland forest areas.

IMPACTS AND MITIGATION FOR PROJECT ALTERNATIVES

Alternative 1 – The No-Action Alternative

Discussion

For the no-action alternative it is assumed the levees and tidegates would continue to be maintained, precluding tidal saltmarsh development. Under this alternative, the site would remain as primarily open grasslands with a narrow riparian zone and small areas of freshwater marsh. This alternative would have the least benefit to biological systems and diversity because it would cause continuing decline in anadromous fish species due to the existing barriers and would retain habitats that are relatively common around Humboldt Bay.

The no-action alternative would result in retention of the existing vegetation and wildlife resources on the project site in the current condition. This alternative would have minimal benefit over the restoration alternatives. The no action alternative would not result in any impact on species of plants and/or wildlife relating to the removal of the levee. The No Action Alternative would not alter existing water and sediment quality conditions. Thus, these conditions would continue to reflect the effects of limited circulation within the estuary, urban runoff, and other watershed influences, including inputs and accumulation of sediments, nutrients, and contaminants. Potential benefits detailed for the action alternatives would not be realized under this alternative.

The no project alternative would maintain the restriction for fish access to the Janes Creek watershed. Bird, amphibian and mammal species present would not be affected.

The No-Project Alternative would result in direct impacts on vegetation in the event of a levee failure and during emergency repairs. Levee failure and related repair activities would remove vegetation in the failed section and in adjacent areas used for construction-related repair actions. Vegetation types that may be affected include lower, middle, and upper tidal marsh on the outboard sides of levees and common vegetation types on the levee structures. Slough channel scouring and erosion because of levee failure may indirectly affect tidal marsh vegetation and populations for several special-status plant species that may occur in outboard levee habitats. The no project alternative would also maintain suitable habitat conditions for invasive reed canary grass, *Phalaris arundinacea*.

Birds that depend upon the perennial tall grassland and pasture habitats (upland), western meadowlark, savannah sparrows, white tailed kites, northern harriers, red shouldered hawks and barn owls would be negatively affected by loss of this habitat type by all alternatives expect for the no-project alternative.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 2 –Tidal Restoration with Bayfront Levee Breach

Discussion

The project would result in impacts to jurisdictional wetlands regulated by the U.S. Army Corps of Engineers, and Environmentally Sensitive Habitat Areas (wetlands) under the authority of the California Coastal Commission. The project would involve removal of sediment deposits from wetlands and stream channels, and placement of fill into existing wetlands and drainage ditches. In addition, heavy equipment would be required to operate within areas defined as wetlands. Basically, this alternative would change wetland types from seasonal freshwater agricultural wetlands to saltmarsh and mud flat habitats.

Alternative 2 would improve access for fish as well as increase the estuary food production capacity, thus benefiting anadromous fish.

Special status plants are located in the project vicinity. Habitat for special status species known to exist in close proximity to the project area will be increased under this alternative as saltmarsh habitat will be restored.

Habitat for three special status avian species exists on the project site and all three have been documented as occurring in the vicinity. The site contains both nesting and foraging habitat for the Northern Harrier and foraging habitat for the Vaux's Swift, and the White-tailed Kite. (See Existing Conditions above for more detailed description of avian species) Heavy equipment operations and vegetation disturbance on the site could result in impacts to the birds.

The proposed project and Alternative 2 provide additional habitat to shorebirds while negatively affecting the upland and raptors bird guilds. The proposed project also benefits waterfowl while Alternative 2 would negatively impact them.
The proposed project would not negatively affect a listed mammal species. Small rodents such as the California vole and Botta's pocket gopher would be negatively affected by the loss of upland/grassland habitat.

Determination

Less than significant adverse impact.

Mitigation

Mitigation would be the same as for the proposed project.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

The Bayfront levee removal alternative is similar to Alternative 2 in its benefits to biological resources; however it has the highest construction related impacts due to the larger area of earth moving activity. The complete levee removal would have minimal additional benefits to vegetation and wildlife above those expected to occur in Alternative 2.

The project would result in impacts to jurisdictional wetlands regulated by the U.S. Army Corps of Engineers, and Environmentally Sensitive Habitat Areas (wetlands) under the authority of the California Coastal Commission. The project would involve removal of sediment deposits from wetlands and stream channels, and placement of fill into existing wetlands and drainage ditches. In addition, heavy equipment would be required to operate within areas defined as wetlands.

The marsh plain could be raised with fill in order to provide suitable habitat for saltmarsh species. Fill would need to be hauled to the site which would be an expensive mitigation measure.
This alternative would displace most amphibian populations on the site. This alternative would not negatively affect a state or federally listed mammal species. Small rodents such as the California vole and Botta's pocket gopher would be negatively affected.

Determination

Less than significant with the incorporation of mitigation measures.

Mitigation

Mitigation measures would be the same as for proposed project.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Restoration

Discussion

Under this alternative, the site would remain as primarily open grasslands with a narrow riparian zone and small areas of freshwater marsh. This alternative would have the least benefit to biological systems and diversity because it would cause continuing decline in anadromous fish species due to the existing barriers and would retain habitats that are relatively common around Humboldt Bay.

A portion of agricultural field wetlands would be converted to open water type wetlands. This alternative maintains a barrier for anadromous fish and constricts the brackish estuary thus minimizing aquatic invertebrate food (for fish) production.

The special status plant species found in the area occur in adjacent salt marshes. This alternative would not provide appropriate habitat for these species.

The special status avian species known to occur on the site will likely benefit from retaining the agricultural fields. Waterfowl species will likely benefit from the freshwater ponds and associated edge habitat. Shorebirds would not be positively affected by this alternative.
This alternative would likely have the least short term and long term impacts to amphibian species. New wetland pond areas would provide additional habitat with the area under tidal influence being similar to the current situation.

This alternative would provide similar impacts and affects to terrestrial mammals as the No Project Alternative. Marine mammals would not experience new impacts.

Determination
Less than significant adverse impact.

Mitigation
Mitigation would be the same as for the proposed project.

Biological Resources Appendix

United States Army Corps of Engineers Jurisdiction Regulatory Overview.

Areas meeting the regulatory definition of 'Waters of the United States' (jurisdictional waters) are subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE). The USACE, under provisions of Section 404 of the Clean Water Act (1972) and Section 10 of the Rivers and Harbors Act (1899), has jurisdiction over 'Waters of the United States.' These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, and all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), as well as all impoundments of waters otherwise defined as "Waters of the U. S.," tributaries of waters otherwise defined as "Waters of the U. S.," the territorial seas, and wetlands adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3).

Construction activities within jurisdictional waters are regulated by the USACE. The placement of fill into such waters must be in compliance with permit requirements of the USACE. No USACE permit would be approved in the absence of state water quality certification pursuant to Section 401 of the Clean Water Act. The State Water Resources Control Board is the state agency charged with implementing water quality certification in California.

The habitats with wetland indicators were identified utilizing regulations and statutes currently in effect as well as guidance at a reconnaissance level provided in two federal technical field manuals [the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the National Food Security Act Manual, third edition, titled "Making Wetland Determinations on Agricultural Land"].

California Department of Fish and Game (CDFG) Jurisdiction
Areas potentially subject to the jurisdiction of CDFG, under Section 1600 of the California Fish and Game Code, were identified during a survey along McDaniel Slough.

REFERENCES
California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California (Skinner and Pavlik 1994) and The Jepson Manual (Hickman 1993) supplied information regarding the distribution and habitats of vascular plants in the vicinity. Sources for information on local wildlife include the California's Wildlife series (Zeiner et al. 1988).

Clifford, Patti M., 2002. Dense –Flowered cordgrass (Spartina densiflora) in Humboldt Bay, Summary and Literature Review

Freshwater Fishes of California (McGinnis 1984), and Northwestern California Birds (Harris 1991). Contacts with local biologists were also made (e.g., Dr. Terry Roelofs of HSU, and Jamie Bettaso of Redwood Sciences Lab).

Johnson, M. and the Upland Wildlife Habitat Ecology Class, Spring 2002 Dept. of Wildlife Humboldt State University

Prichard, Chad. May 2004. Late Holocene Relative Sea-Level Changes, Arcata Bay, California: evaluation of Freshwater Syncline Movement Using Coseismically Buried Soil Horizons. Humboldt State University thesis in Geology.

A search of published accounts of special-status species was conducted within the Arcata South United Stages Geographic Survey (USGS) quadrangle map in which the project occurs, and for 7 surrounding quadrangles including Arcata North, Blue Lake, Iaqua Buttes, Fortuna, Field's Landing, Eureka, and Tyee City using CNDDB Rarefind reports (CNDDB 2000).

California Coastal Commission

Section of the California Coastal Act defines 'wetlands' as:

> Wetland means lands within the coastal zone that may be covered periodically or permanently with shallow water and include saltwater marsh, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.

For coastal development permits issued by the California Coastal Commission involving wetlands and environmentally sensitive habitat areas, Section 13577 of the Commission's administrative regulations (14 CCR 13000 et seq.) defines 'wetlands' as extending 100 feet landward of the upland limit of:

> "Land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent and drastic fluctuations of surface water levels, wave action, water flow, turbidity or high concentrations of salts or other substances in the substrate. Such wetlands can be recognized by the presence of surface water or saturated substrate at some time during each year and their location within, or adjacent to, vegetated wetlands or deep water habitats." The upland limit of a wetland is defined as:
>
> 1. The boundary between land with predominantly hydrophytic cover and land with predominantly mesophytic or xerophytic cover;
> 2. The boundary between soil that is predominantly hydric and soil that is predominantly nonhydric; or
> 3. In the case of wetlands without vegetation or soils, the boundary between land that is flooded or saturated at some time during years of normal precipitation, and land that is not.

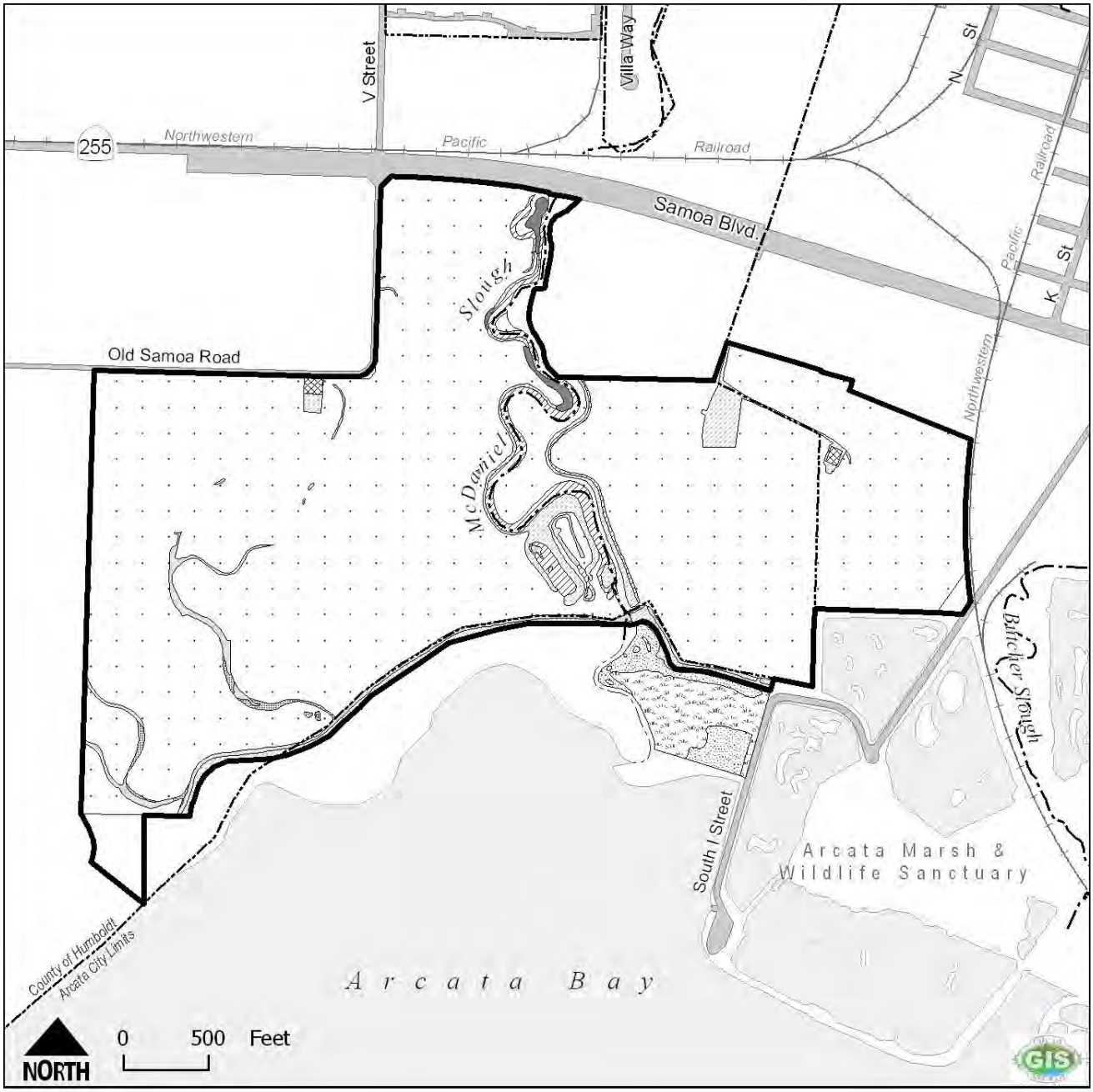


Figure 3.2 - 1
McDaniel Slough EIR

HABITAT CONDITIONS

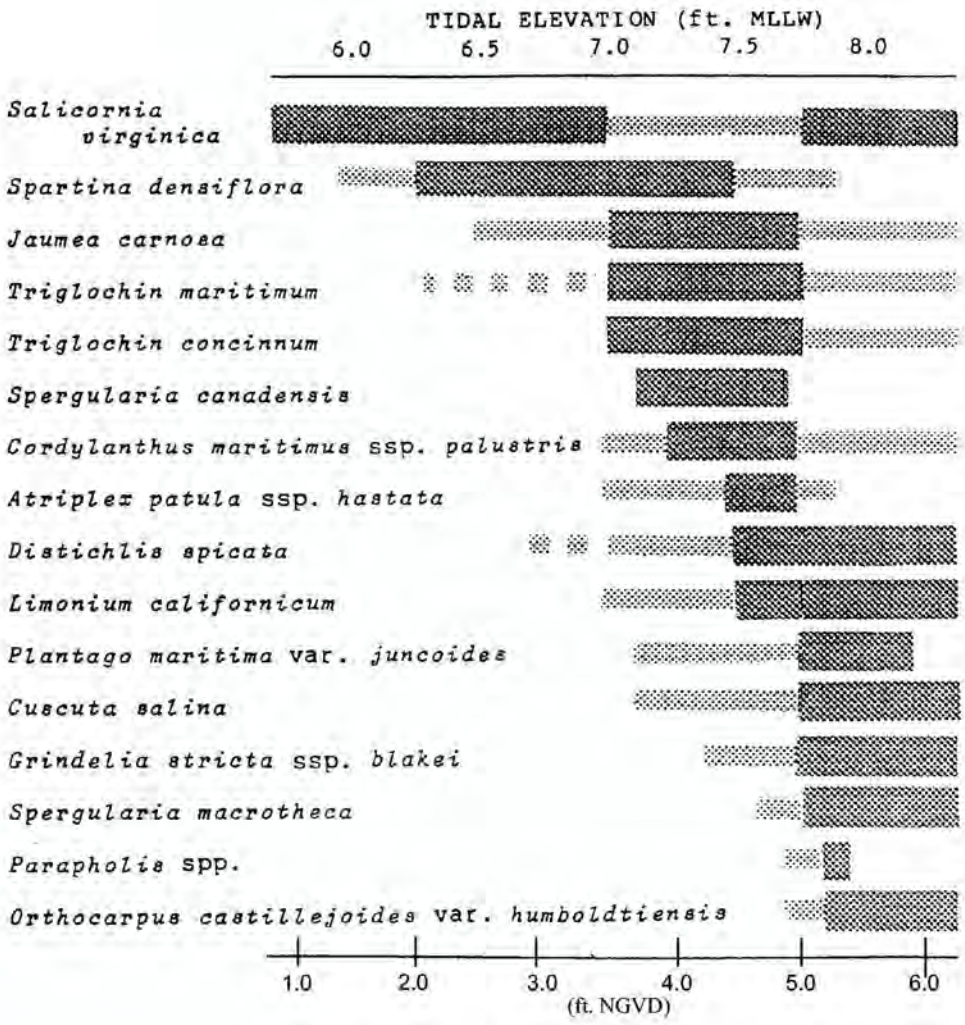
Boundaries
- Project Boundary
- Arcata City Limits

Water Features
- Streams
- Waterbody

Transportation
- Railroad
- Streets

Habitat Types
- Agricultural Field/ Perennial Grassland
- Aquatic
- Brackish Marsh
- Developed
- Freshwater Marsh
- Mudflat
- Ruderal/Upland
- Salt Marsh
- Willow/Riparian

Source: H.T. Harvey & Associates, 6/2000 field survey



Distribution of major salt marsh plant species across the tidal elevation gradient in North Humboldt Bay, California. Wider bands indicate the range in which each species had its peak cover, as assessed within 0.25-foot elevation classes. Broken bands indicate sporadic occurrence.
(Eicher, 1987)

Figure 3.2 - 2

McDaniel Slough

Plant Distribution

Source: Eicher 1987

PWA

1424 Plants.cdr

3.3 GEOLOGY AND SOILS

The Geology and Soils section describes the impacts associated with implementation of the proposed Marsh Enhancement project on soil erosion, tsunami inundation, and geologic hazards.

SHN Consulting Engineers and Geologists, Inc. conducted a survey of the McDaniel Slough Marsh Enhancement Project area to evaluate the geotechnical characteristics of the site. Tasks that were performed during this survey included:

- Evaluation of levee side-slope stability,
- Development of settlement/consolidation criteria for levees and roadways,
- Assessment of saltwater intrusion potential of the proposed levees,
- Assessment of tsunami run-up potential,
- Field review of existing levees, and
- Qualitative assessment of liquefaction potential.

Complete methodology used by SHN in their evaluation can be found in *Geotechnical Evaluation of McDaniel Slough Marsh Enhancement Project 2003.*

ENVIRONMENTAL SETTING

Seismicity

The City of Arcata is located in a very active seismic setting. The north coast of California has experienced over 60 earthquakes that have caused noticeable damage since the 1850s (Dengler et al. 1992). The sources of earthquakes that have caused damage in the region include: the Gorda Plate; the Mendocino Triple Junction and Mendocino fault; the faults within the North American Plate (contains the Mad River Fault zone); the San Andreas fault; and the Cascadia subduction zone (Dengler et al. 1992).

The most common source of seismic shaking in the area is the Gorda Plate. Seismicity in this zone is thought to be from internal deformation of the subducted oceanic crustal plate beneath and west of the coastal Humboldt County region. Moderate to strong levels of seismic shaking, as experienced during the November 8, 1980 and April 26, 1992 earthquakes, can be expected from this source.

Two other common sources of earthquake shaking are the Mendocino fault zone and the Mendocino Triple Junction located approximately 40 miles to the southwest of the project site. Earthquake events that are of large magnitude that can potentially produce strong levels of seismic shaking at the project site can be anticipated from these sources.

The Cascadia subduction zone, extending from the Cape Mendocino area northward to the Queen Charlotte Islands, has been less active until recently when the April 25, 1992 earthquake is thought to have originated from this source. Recent research indicates great earthquakes have been produced along this zone every 300 to 700 years (Clarke and Carver 1992). This source could produce a large magnitude event generating very strong ground shaking of long duration and tsunami inundation in low lying areas of the north coast region.

Available tsunami inundation modeling for the Humboldt Bay region (Bernard et al., 1994) is based on a scenario earthquake on the southern Cascadia subduction zone, as well as historical tsunami observations. Based on these models, it appears the most significant tsunami hazard is posed by seismically-induced submarine slumps, which can generate large tsunamis. Based on the size of recent tsunamis, Bernard et al. (1994) conclude that a 33-foot (10 meter) incident wave (i.e., the size of the wave that strikes the coastline) represents a reasonable estimate for inundation modeling. There is ample reason to assume that a 33 foot (10 meter), or larger, tsunami wave can be generated along the southern Cascadia subduction zone.

Studies of late Holocene stratigraphy in northern Humboldt Bay have not identified tsunami deposits, which suggests that tsunamis have not over-topped the northern Samoa Peninsula. Tsunami deposits were not observed in test pits at the site. The more significant hazard appears to be associated with tsunami run-up inside the bay, as water pushes into the bay entrance with no means to retreat. This effect may result in extensive flooding of low-lying areas around the margins of the bay, including the project site. The dynamics of tsunami run-up inside Humboldt Bay are not well understood, but the inundation model suggests that run–up may locally reach 10 feet (3 m).

The numerous earthquake sources in the north coast region present hazards to the project site. Strong ground shaking is probably the greatest seismically induced hazard to the site. Most earthquake associated damage and injuries are caused by ground shaking. Regarding ground shaking, the Arcata General Plan Seismic Safety Element (SSE) dated May 1987 explained "...the most severe damage typically occurs in areas underlain by thick, soft, water-saturated sediments ... Parameters that affect the severity of ground shaking include the shock wave amplitude, shock wave frequency, duration of shaking, geologic/soils conditions, and site configuration. Ground motion effects are commonly expressed as a measure of the acceleration of a point on or attached to the ground surface. To estimate potential future ground acceleration values for the study area, the magnitude of the maximum credible earthquake must be known..."(SSE,1987). According to theCalifornia Division of Mines and Geology (CDMG),1996, "the Fickle Hill fault is considered active and capable of generating a maximum credible earthquake with a moment magnitude (Mw) of 6.9. A preliminary estimate of the peak ground accelerations, which may occur at the Arcata City Hall in response to the maximum credible and design basis earthquakes, is 1.02g and 0.81g (102% and 81% of the acceleration due to gravity). These accelerations were determined by the CDMG... The maximum moment magnitude earthquake (Mw 6.9) has an estimated characteristic return interval of 1785 years (CDMG, 1996)."

Secondary ground failures occurring during ground shaking commonly are liquefaction, lateral spreading, settlement and landsliding. See Figure 3.3-A for a geologic hazards map of the proposed project site.

Soils

The soils found within the levees of the project site belong to the Bayside series (Ba). Two soil types within that series are present: Bayside silty clay loam, poorly drained, 0 to 3 percent slopes

(Ba2) and Bayside silty clay loam, imperfectly drained, 0 to 3 percent slopes (Ba3). Bayside soils are fine-textured basin soils developed in sedimentary alluvium from small streams, and are generally found in reclaimed tidal marsh areas adjacent to Humboldt Bay (McLaughlin and Harradine, 1965). Figure 3.3-1 & 2 shows soil types occurring within the proposed project area. Figure 3.3-2 Shows that no prime agricultural soils exist in the project area.

Test pit (TP–1 through TP–6) exposures throughout the project area exposed primarily fine-grained soils consisting of varying amounts of silt and clay, to depths of about 8 feet. The material was field classified as medium stiff to stiff, and generally fell from the backhoe bucket in a single cohesive block. Below about 8 feet, sediments transition to gravels (TP-1) or sandy silts. At most exploration sites, soils lack significant amounts of organics, either as organic muds or discrete peat layers. In TP-3, three thin, buried peat layers were encountered. Some or all of these horizons are interpreted as being possible evidence of coseismic subsidence events.

Geology

The site consists primarily of alluvial and floodplain deposits from the Mad River as well as Janes Creek overbank (flood) deposits. The project area is mapped as Quaternary deposits, which consist of Holocene age (less than 11,000 years old) and Pleistocene age (over 11,000 and under 1.8 million years old).

The basement rocks in the area are comprised of the Franciscan Complex and are overlain by the Plio-Pleistocene Falor Formation. Deposition of the Falor Formation ended about the time major deformation in the region, caused by southwest-northeast compression, began. This compression was caused by the convergence of the Gorda Plate with the North American Plate. The site is near the axis of the northwest trending Fickle Hill Anticline that was produced and continues to form as a result of this compression. The Fickle Hill Anticline is bounded by thrust faults consisting of the Mad River fault on the northeast and by the Fickle Hill fault on the southwest.

The site is located in the southern portion of the Mad River fault zone (MRfz), which is an approximately 25 kilometer (km) wide zone of imbricate, northwest trending, northeast dipping thrust faults located between Arcata and Big Lagoon (Carver and others, 1983). The principal faults are spaced from two to five kilometers apart. They include the Big Lagoon, Trinidad, McKinleyville, Blue Lake, Mad River, and Fickle Hill faults (Carver and others, 1983). Each principal fault has accrued between 0.7 to 2.2 kilometers of dip slip displacement in the last 700 to 1 million years (Carver, 1987). The estimated late Quaternary slip rate for the Fickle Hill fault is 1.2 mm/yr. The Fickle Hill fault has vertically displaced early Pleistocene sediments approximately 1100 feet (Carver and Burke, 1992).

IMPACT EVALUATION CRITERIA

Based on the *CEQA Guidelines* (Appendix F 1998) a geological impact is considered significant if the project would:

- Expose people or structures to potential substantial adverse seismic effects, including the risk of loss, injury, or death involving :

1) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
2) Strong seismic ground shaking; or
3) Seismic-related ground failure, including liquefaction.

- Allow new development on strata or soil that is unstable, or that would become unstable, and potentially result in liquefaction.
- Expose people to injury or death from inundation by seiche or tsunami.
- Result in substantial soil erosion or the loss of topsoil.

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

3.3.1 Impacts Due to Tsunami Inundation

Discussion

Because the proposed project site is located in a low-lying coastal area in a seismically active region, it is subject to tsunami inundation. The hazard associated with tsunami inundation is increased in the Humboldt County area due to the proximity of the Cascadia subduction zone and other active offshore seismic sources that are capable of generating very large earthquakes. According to the Arcata general plan geologic resources map the project site is approximately one mile east of a mapped tsunami runup zone for Arcata Bay.

Determination

Less than significant impact with incorporation of mitigation.

Mitigation

The following measures would be taken to mitigate the impacts of the project to a less than significant impact:

3.3.1a Place tsunami warning and evacuation route signs on trails within the project area.

3.3.2 Impacts Due to Soil Stability and Erosion

Discussion

The proposed project would result in potentially substantial soil erosion as the proposed drainage methods for the project are designed to change current drainage from its original pattern. The project would result in a potentially significant impact due to soil erosion. (See Section 3.1.4)

Based on soil conditions at the site, it has been recommended that the levees and roadbeds be constructed with the upper clay/ silt soil. In order to limit the amount of saltwater intrusion, the sandy material below the clay should be mixed with the clay at a minimum ratio of 1 part sand to 1 part clay, if the borrow areas reach beneath the upper fine grained soils. The sandy material may be used without mixing for the upper 1 foot of the levees or roads. The clay should be compacted at a moisture content between 0 to 4 percent over the optimum moisture content to a

minimum of 90 percent of the maximum density determined through ASTM D1557. The levees and roadbeds should be raised in lifts not exceeding 8 inches.

The native clay soils are suitable for construction of the levees and should provide adequate resistance to saltwater intrusion through the embankments due to the low permeability of the clay soil. A permeability of less than lX10-7centimeters per second is likely to be achieved through proper compaction of the embankments (see Construction Criteria above).

A stability analysis was conducted, and used the following assumptions:

- The side slopes of the levees will vary, with a maximum slope angle of 10 horizontal to 1 vertical (10H:lV)on the ecolevees. The eco-levees will have an approximate 2.5:1 outboard slope and an approximate 10:1 inboard side slope. The eco-levees will have a 2.5:1 side slope down to 4.5 ft NGVD and a 10:1 side slope on the inboard side between 4.5 and 3.5 feet NGVD. The flood levees will be constructed with a straight 2.5:1 side slope down to existing grade. The pond perimeter levees would be similar to the flood levee; however, they would be designed to permanently contain pond water.
- The maximum total height of the levees will be approximately 8 feet above the existing ground surface.
- The most critical cross section has side slopes of 2.5H:1V up to a height of 8 feet.

The stability analyses of the typical levee cross section were performed using the computer program GEOSLOPE (Geocomp Corp., 1985). The stability was evaluated utilizing the modified Bishop limit equilibrium slope stability method. Two different conditions were evaluated - the first for undrained conditions immediately following construction, and the second for long-term stability with a saturated embankment.

The typical levee cross section was analyzed for stability. The factor of safety for failure of the levee under undrained conditions immediately following construction was 1.9. For long-term conditions, the factor of safety increased to 2.5.

A pseudo-static analysis was also performed. Pseudo-static analyses subject the two-dimensional sliding mass to a horizontal acceleration equal to an earthquake coefficient multiplied by the acceleration of gravity. The earthquake coefficient, or pseudo-static coefficient, is dependant upon the magnitude of the earthquake event, and is typically equal to a percentage of the maximum design acceleration in bedrock beneath the site. For the current analyses, a screen analysis procedure was performed to determine if a seismic stability hazard is likely to exist at the site. The screen analysis procedure developed by Seed (1979) was used in the analyses. A pseudo-static coefficient of 0.15 was used in accordance with Seed's (1979) recommendations for an earthquake magnitude up to 8.25. In this screening procedure, if the resulting factor of safety is greater than 1.2, a seismic stability hazard is considered unlikely. If the resulting factor of safety were less than 1.2, further displacement analyses would be performed. The factor of safety under pseudo-static conditions was 1.5 for the typical levee cross section under long-term conditions, and further seismic analyses were considered unnecessary.

Based on the results of the analyses, the risk of levee instability is low for the proposed project, with a minimum factor of safety of 1.9 under static conditions.

Determination

When mitigated, the project would result in a less than significant impact due to soil stability and erosion.

Mitigation

3.3.2a The City will use California Best Management Practices to minimize erosion during construction of the project. Table 3-1 lists erosion control practices that could be used.

Table 3-1 Erosion Control BMPs

BMP#	BMP Name
EC-1	Scheduling
EC-2	Preservation of Existing Vegetation
EC-3	Hydraulic Mulch
EC-4	Hydroseeding
EC-5	Soil Binders
EC-6	Straw Mulch
EC-7	Geotextiles & Mats
EC-8	Wood Mulching
EC-9	Earth Dikes and Drainage Swales
EC-10	Velocity Dissipation Devices
EC-11	Slope Drains
EC-12	Streambank Stabilization

Source: California BMP Handbook

3.3.2b A geotechnical report would be prepared to describe options for levee construction. The report would describe the conditions at the site that could affect levee stability. The report would include design recommendations for levee construction to reduce the potential impacts due to levee failure to a less than significant level.

3.3.3 Impacts Due to Geologic Hazards

Discussion

The project site is subject to seismic ground shaking, as is much of California. The constructed levees could experience adverse effects involving strong seismic ground shaking. The subject site is not included on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the Department of Mines and Geology.

Hazards maps prepared for the Arcata General Plan 2020 show that the subject parcels are located on slopes of less than 15%. The project site is near level, with a gradual slope (<4%). The potential for landslides to affect the subject site is remote, as there are no steep or unstable slopes located on or adjacent to the site. The proposed project would not cause the ground to

become unstable, nor is it in an area that is considered unstable. No impact on the environment due to landslides is anticipated.

Sediments encountered in test pits at the site were predominantly fine–grained, cohesive materials that are not susceptible to liquefaction. Liquefaction is the transformation of a granular material from a solid to a liquefied state as a consequence of increased pore–water pressure and reduced effective stress. Increased pore–water pressure is induced by the tendency of granular materials to compact when subjected to cyclic shear deformation, which, in the natural environment, is most commonly associated with earthquake shaking. This process generally does not occur in fine–grained sediments with sufficient cohesion to resist reduction in effective stresses.

The only materials encountered in the test pits with liquefaction potential are the sandy deposits below 8-foot depth in pits TP–1, TP–2, and TP–3. At these locations, loose medium- to coarse–grained sand with abundant rounded pebbles and cobbles (TP-1) and silty sands (TP-2, TP–3) was encountered. These materials were either saturated at the time of investigation, or are susceptible to seasonal saturation. As such, there appears to be a limited liquefaction potential at the site, confined to sediments below 8 feet depth. Visual evidence of past liquefaction in the test pit exposures (e.g., vents, etc.) was not observed.

The project does not include facilities requiring wastewater disposal facilities. The project would have no impact on the environment with respect to soils incapable of supporting the use of septic tanks or alternative wastewater disposal system. The proposed project is not in an area identified as having expansive soils. As such, the project would have no impact on the environment by being located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code.

Coseismic subsidence has been documented throughout the Humboldt Bay region, and is correlated to great Cascadia Subduction Zone earthquakes. Studies at the Mad River Slough, west of the site, reveal evidence for several such subsidence events. As such, there is presumably potential at the project site for land level changes (on the order of 1 + meter) during large magnitude Cascadia Subduction Zone events. Paleoseismic studies indicate recurrence intervals for subduction earthquakes on the order of 300 to 500 years; the most recent event occurred in 1700. Evidence for potential subsidence events was exposed in TP-3, where three buried organic horizons were observed.

Determination

The project would result in a less than significant impact due to geologic hazards by including design features to mitigate potential hazards.

Mitigation

The following design features would mitigate potential geologic hazards impacts to a less than significant level:

- Levees and roadbeds should be constructed with upper clay/silt soil.
- In order to limit the amount of saltwater intrusion, sandy material below the clay should be mixed with the clay at a minimum ratio of 1:1.

- Levees and roadbeds should be raised in lifts not exceeding eight inches.
- A geotechnical report would be prepared to describe options for levee construction. The report would describe the conditions at the site that could affect levee stability. The report would include design recommendations for levee construction to reduce the potential impacts due to levee failure to a less than significant level.

IMPACTS AND MITIGATION FOR PROJECT ALTERNATIVES

Alternative 1 – The No-Action Alternative

Discussion

The no action alternative would retain the existing levee and flood control system at the McDaniel Slough site. Because of the deteriorating levees and floodgates at the site, the no action alternative would continue to expose people and property on adjacent sites to geologic hazards from tsunami inundation.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 2 –Tidal Restoration with Bayfront Levee Breach

Discussion

The tidal restoration with bay front levee breach would result in a beneficial affect by providing improved protection against tsunami inundation by construction of an improved levee system around the project site.

This alternative would include trail access along the improved levees where none currently exists.

This alternative would improve stormwater runoff and reduce flooding and saturation of soils along Janes Creek. Reducing soil saturation helps to reduce impacts related to seismic activity.

Determination

Alternative 2 would result in a less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

Mitigation measures for Alternative 2 would be the same as those for the proposed project (see impacts 3.3.1-3.3.3).

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

The impacts related to geology and soils for Alternative 3 are similar to those of Alternative 2.

Determination

Alternative 3 would result in a less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

Mitigation measures for Alternative 3 would be the same as those for the proposed project (see impacts 3.3.1-3.3.3).

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Restoration

Discussion

Alternative 4 would involve repairing the bay front levee. Repair would mainly consist of raising the height of the levee and compacting fill material in areas where the levee has been eroded by wave action on the bay front side. Due to its age, the repaired levee would require more long-term maintenance than any of the other alternatives excepting the No Project Alternative.

Determination

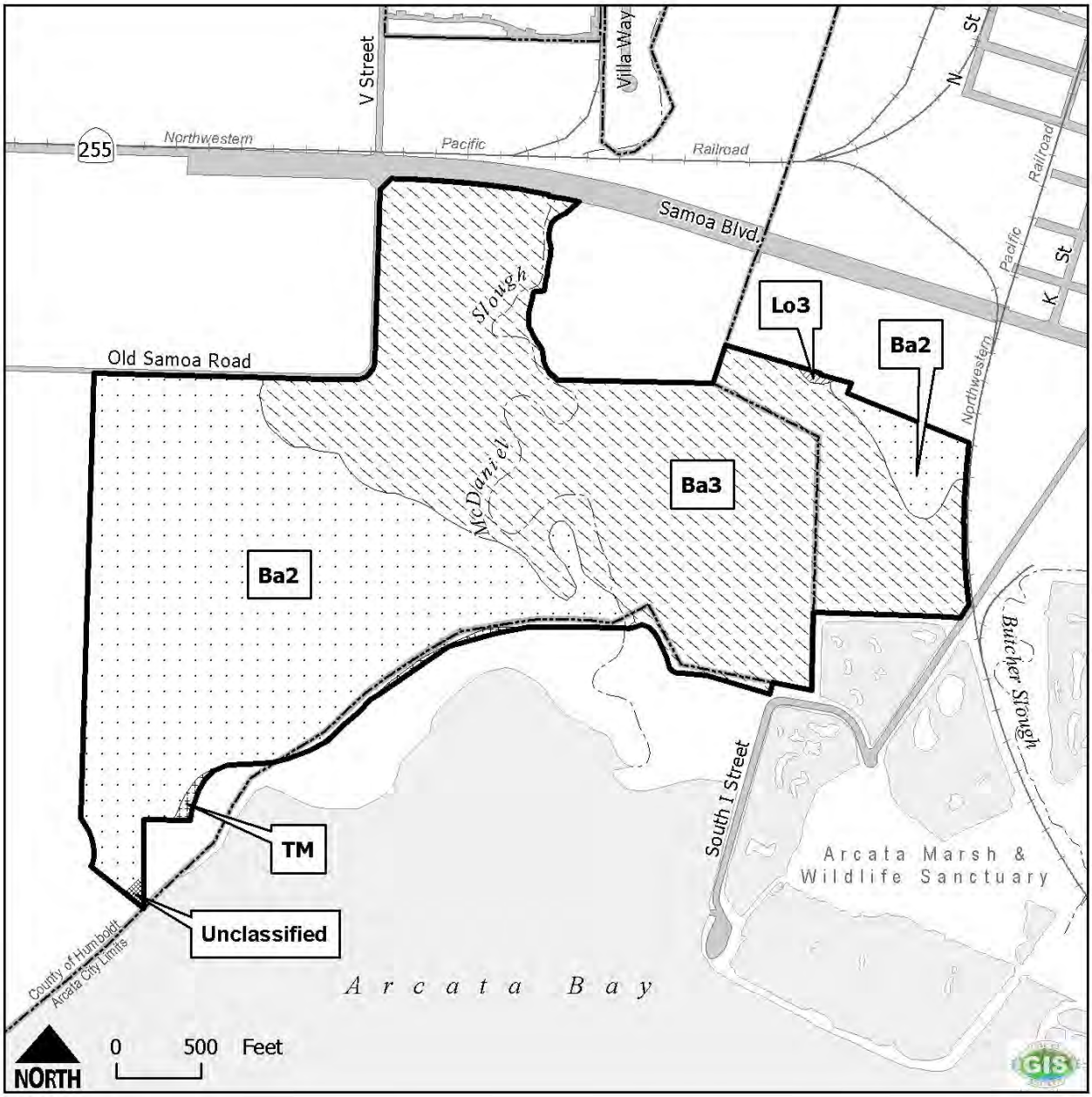
Alternative 4 would result in a less than significant impact with the incorporation of mitigation measures.

Mitigation

Mitigation measures for Alternative 4 would be the same as for the proposed project (see impacts 3.3.1-3.3.3).

References:

SHN, Geotechnical Evaluation of McDaniel Slough Marsh Enhancement Project 2003



Boundaries
- Project Boundary
- Arcata City Limits

Water Features
- Streams
- Waterbody

Transportation
- Railroad
- Streets

Soil types and summary of soils within project area

- Ba2-Bayside silty clay loam, (poorly drained); 113.7 Acres
- Ba3-Bayside silty clay loam (imperfectly drained); 130.4 Acres
- Lo3-Loleta silt loam (0 to 3 percent slopes); .2 Acres
- TM-Tidal Marsh; 1.3 Acres
- Unclassified(Arcata Bay); .3 Acres

Source: Soils of Western Humboldt County, Ca.

Figure 3.3 - 1
McDaniel Slough EIR
SOILS

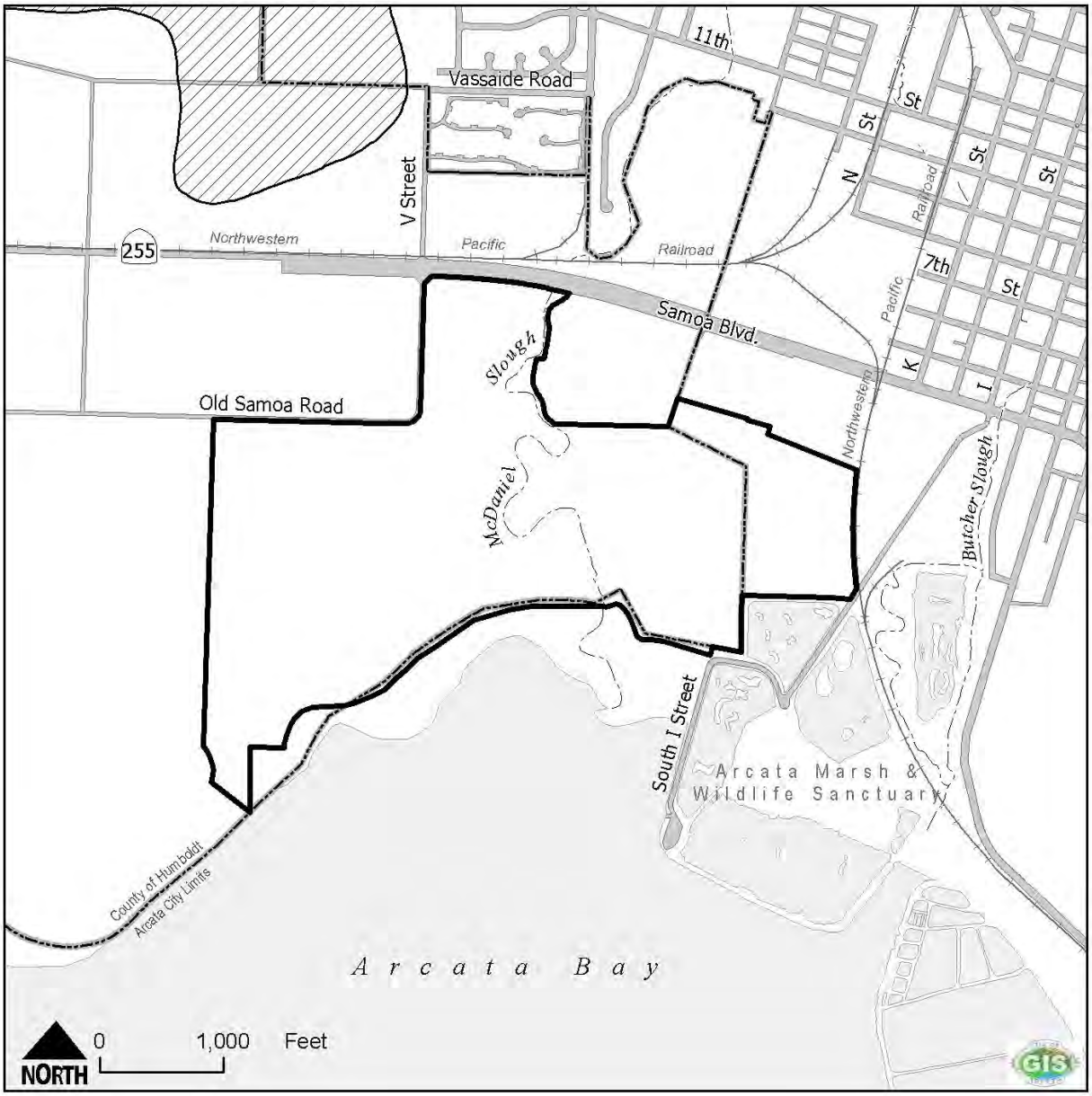


Figure 3.3 - 2
McDaniel Slough EIR

PRIME AGRICULTURAL SOILS

Boundaries
- Project Boundary
- Arcata City Limits

Water Features
- Streams
- Waterbody

Transportation
- Railroad
- Streets

Prime Agricultural Soils
- Prime Agricultural Soils (Storie grade Index of 1)

Source: Soils of Western Humboldt County, Ca.

3.4 Air Quality

The Air Quality section describes the impacts on air quality associated with implementation of the proposed Marsh Enhancement project.

ENVIRONMENTAL SETTING

North Coast Air Basin

The project site is located within the North Coast Air Basin, which is comprised of Del Norte, Humboldt, Mendocino, and Trinity Counties as well as the northern and western portion of Sonoma County (as defined by the California Code of Regulations). The local climates, or sub-climates, within the Basin are affected by elevation and proximity to the Pacific Ocean.

Humboldt County, like the North Coast Air Basin, contains sub-climates that are created by local topography and proximity to the ocean. The City of Arcata and the project site are located in the Humboldt Bay Area, the most densely populated area of Humboldt County, which also contains Eureka and McKinleyville. Weather in the Humboldt Bay Area is dominated by a cold upwelling of seawater to the ocean surface off the Humboldt Coast. This cold ocean water in turn cools the surface air. During the summer, winds flowing from the Pacific Ocean are drawn on shore by the difference in surface temperatures, resulting in daytime northwesterly winds. In winter, this temperature differential is less, and surface winds may blow from many directions depending on storm patterns or periods of calm. These periods of calm can amount to 30 percent of the total annual hours.

Wind helps disperse pollution; whereas calm periods allow it to build up to potentially unhealthful levels. Temperature inversions, which occur when a layer of warm air traps cool air near the surface creating a lid, inhibit the vertical dispersion of pollutant emissions. Inversions occur most commonly in the Arcata area during winter months and trap emissions of all types near the surface. Dispersion usually occurs when a frontal system, often bringing strong winds, passes over the area disturbing the temperature inversion, which allows pollutants to disperse vertically and horizontally.

Regulatory Environment

Pursuant to the Federal Clean Air Act, the U.S. Environmental Protection Agency sets Federal ambient air quality standards and oversees and approves State air quality programs. The California Environmental Protection Agency, through the California Air Resources Board, sets State ambient air quality standards (pursuant to the California Clean Air Act). The mission of the Air Resources Board is to protect the public health and regulates mobile sources (e.g., cars, trucks, and buses), fuels, consumer products, and air toxics. In addition, the Air Resources Board oversees and assists local air pollution control districts.

Air quality in Humboldt County, as well as the City of Arcata, is regulated by the North Coast Unified Air Quality Management District (NCUAQMD). The NCUAQMD's primary

3.4 Air Quality

The Air Quality section describes the impacts on air quality associated with implementation of the proposed Marsh Enhancement project.

ENVIRONMENTAL SETTING

North Coast Air Basin

The project site is located within the North Coast Air Basin, which is comprised of Del Norte, Humboldt, Mendocino, and Trinity Counties as well as the northern and western portion of Sonoma County (as defined by the California Code of Regulations). The local climates, or sub-climates, within the Basin are affected by elevation and proximity to the Pacific Ocean.

Humboldt County, like the North Coast Air Basin, contains sub-climates that are created by local topography and proximity to the ocean. The City of Arcata and the project site are located in the Humboldt Bay Area, the most densely populated area of Humboldt County, which also contains Eureka and McKinleyville. Weather in the Humboldt Bay Area is dominated by a cold upwelling of seawater to the ocean surface off the Humboldt Coast. This cold ocean water in turn cools the surface air. During the summer, winds flowing from the Pacific Ocean are drawn on shore by the difference in surface temperatures, resulting in daytime northwesterly winds. In winter, this temperature differential is less, and surface winds may blow from many directions depending on storm patterns or periods of calm. These periods of calm can amount to 30 percent of the total annual hours.

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Air quality in Humboldt County, as well as the City of Arcata, is regulated by the North Coast Unified Air Quality Management District (NCUAQMD). The NCUAQMD's primary responsibility is to achieve and maintain Federal and State air quality standards, subject to the powers and duties of the California Air Resources Board.

Air Pollutants of Concern

Air pollution is regulated by two types of standards: emission standards and ambient air quality standards. Emission standards establish the levels of air pollutants that a particular source is allowed to release into the air, and ambient air quality standards establish the maximum concentration of air pollutants within the air of an area such as a city or county. The Federal government currently sets ambient air quality standards for six pollutants and California sets ambient air quality standards for nine pollutants. Pollutants for which ambient air quality standards set are known as criteria pollutants.

Table 3.4-1 lists State and Federal criteria pollutants and the status of these pollutants on the North Coast. As Table 3.4-1 indicates, the North Coast mostly meets, or achieves "attainment" of, State and Federal air quality standards. Attainment means that the values for a particular criteria pollutant that are set by Federal and State regulators are not exceeded in the local area. "Non-attainment" means that the concentration of a criteria pollutant in the local air basin exceeds Federal or State standards.

TABLE 3.4-1 STATUS OF CRITERIA POLLUTANTS IN THE NORTH COAST AIR BASIN

Criteria Pollutant	North Coast Air Basin Status	
	Federal Standards	**State Standards**
Sulfur Dioxide	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Particulate PM10	Attainment	Nonattainment
Carbon Monoxide	Attainment	Attainment
Sulfates	No Standard	Attainment
Lead	Attainment	Attainment
Hydrogen Sulfide	No Standard	Attainment
Vinyl Chloride	No Standard	Attainment

Source: North Coast Air Quality Facts, NCUAQMD.

The most significant criteria pollutants for the North Coast are further described below.

Ozone Smog

There are two main pollutants that cause health and welfare problems in California. The first is ozone smog. Smog is formed near the earth's surface when two classes of chemicals, Reactive Organic Gasses (ROG) and Oxides of Nitrogen (NO_x), react in the presence of sunlight to form a third compound, ozone. Ozone is comprised of three oxygen atoms, and is a highly reactive, and sometimes destructive, gas. Substantial research documents that crop yields are reduced when ozone levels exceed 0.06 parts per million.

Ozone has not been measured by State or local agencies within the City of Arcata. However the local ozone air quality summary is representative of air quality along coastal Humboldt County, as shown in Table 3.4-2.

TABLE 3.4-2 OZONE AIR QUALITY DATA SUMMARIES 1993-1996

Location	Year	Highest 1-Hr.	4th Highest 8-Hr.	Number of Days Exceeding Std. State 1-Hr.	Federal 8-Hr.
Eureka - Ft. Humboldt	1992	0.040	0.040	0	0
Requa (Redwood NP)	1993	0.050	0.050	0	0
Requa	1994	0.051	0.049	0	0
Requa	1995	0.052	0.048	0	0

Source: Arcata General Plan: 2020 EIR

PM10 and PM2.5

Respirable Particulate Matter that is 10 microns or less in diameter (abbreviated as PM10). PM10 consists of tiny solid or liquid particles of soot, dust, smoke, fumes, or mists. The size of the particles (about 0.0004 inches or less) allows them to enter the air sacs deep in the lungs, where they may be deposited, resulting in adverse health effects. PM10 includes a subgroup of finer particles called PM2.5. These fine particles pose an increased health risk because they can deposit deep in the lungs and contain substances that are particularly harmful to human health. The EPA promulgated national PM2.5 standards in 1997. However, the transition to the PM2.5 standards is just beginning and, therefore, enforcement of PM10 standards is still the primary focus of state and local officials.

PM10 is harmful to human health and is regulated by both State and Federal standards. PM10 can be formed directly, as in dust from driving on a dirt road, or it can be formed by secondary combination of other pollutants such as nitrogen oxides or ammonia. (Ammonia is a primary emission from feedlots and dairies). Major PM10 sources include motor vehicles, wood burning stoves and fireplaces, dust from construction, landfills and agriculture, wildfires and waste/brush burning, industry, and windblown dust from open lands.

PM10 levels tend to be high in summer months because auto traffic is about 20% higher than average, farm activities raise dust, and little rainfall occurs to wash pollutants out of the air. In the winter, temperature inversions trap emissions very close to the ground. Emissions from agricultural burning, wood stoves and fireplaces, and motor vehicles are all important sources that contribute to high levels of wintertime PM10. State and federal standards for PM10 are shown in Table 3.4-3.

TABLE 3.4-3 PM10 AIR QUALITY DATA SUMMARIES 1993-1996

Location	Year	PM10 Concentration in ug/m3		Exceeds Annual Standard?	
		Max 24-Hr.	AGM	State	Federal
Arcata	1990	43	30.1	No	No
Arcata	1985	75	32.7	Yes	N/A
Eureka	1994	87	21.1	No	No
Eureka	1995	68	16.9	No	No
Eureka	1996	77	15.9	No	No

Source: Arcata General Plan: 2020 EIR

Notes: The Eureka PM10 air sampler is located on the County Health Department roof, 6th and I Streets.

The Max 24-Hr. value is the highest annual 24-hour concentration.

The AGM is the Annual Geometric Mean of all 24-Hour average concentrations at a given monitoring site.

Table 3.4-4 below shows the relative contribution of each of the three major categories of PM10 emissions; wood burning, stationary sources, and mobile sources. The relative contribution of wood burning increases, while stationary sources become relatively less significant. On-road cars and trucks contribute a relatively small portion of the total pollutant level in the air basin surrounding Arcata.

TABLE 3.4-4 RELATIVE % OF TOTAL DAILY EMISSIONS DURING COOL MONTHS

WOOD BURNING			**STATIONARY SOURCES**		**MOBILE SOURCES**	
1991	1998	2020	1991	2020	1991	2020
59 %	59 %	63 %	40 %	36 %	1%	1%

Source: Arcata General Plan: 2020 EIR

Almost all violations of the state PM10 standard (50 $\mu g/m^3$) occur in the 6-month period from October through March (cool months). About 8% of all days during the year exceed the standard; therefore about 16% (or one day in 6) violates the standard during the cool months. Needed rollback from current emissions levels (1998) to meet PM10 standard is about 50%.

The most significant source of PM10 emissions during the cool months is residential wood combustion. These emissions occur primarily during the evening hours, and peak hourly levels may exceed the state daily standard by 400% (i.e. 200 $\mu g/m^3$on a day that reaches 50 $\mu g/m^3$ for 24 hours). However, with the mixing in of cleaner air during the late evening and early part of the day, the average level comes down significantly.

Odors

Natural and created wetlands can be a source of natural odors that may be objectionable to some portions of the population. The existing condition at the site includes natural odors associated with wetlands, bay mud flats, and animal grazing.

IMPACT EVALUATION CRITERIA

Based on the *CEQA Guidelines* an air quality impact is considered significant if the project would:

- Conflict with or obstruct implementation of applicable air quality plans;
- Violate air quality standards or substantially contribute to an existing or projected air quality violation;
- Expose sensitive receptors to substantial pollutant concentrations;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;
- Expose workers or the public to hazardous toxic emissions or substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

IMPACTS AND MITIGATIONS FOR THE PROPOSED PROJECT

Impact 3.4.1 Release of Particulate Matter During Construction Activities

Discussion

Existing levels of particulates in the North Coast Air Basin exceed State ambient air quality standards, and the entire Air Basin is designated non-attainment for PM10. Point and area sources of air pollution include wood burning, grading and construction activities, and particulate matter on roadways. Currently, about 8 percent of all days during the year exceed the air quality standard. According to the NCUAQMD Particulate Matter Attainment Plan, Humboldt County must reduce PM10 emissions by nearly 50 percent (based on Humboldt County's proportionate share of North Coast Air Basin PM10 emissions) from 1991 levels to meet State standards.

Grading and construction of the proposed ponds represents a potential source of fugitive dust. A portion of this dust has particle sizes small enough to be considered PM10. It is estimated that approximately 93,700 cubic yards of earth will be excavated as part of the proposed project. In order to minimize potential pollution resulting from project related construction activities, dust control measures should be implemented.

The project has the potential to create objectionable odors. Odors can be created during the initial die-off of pastureland when the levee is breached and low tide periods expose the decaying vegetation to air. The potential odor impact will likely be temporary, and limited to

low-tide conditions. However, this project is not expected to result in substantial odor emissions or affect a substantial number of people when compared to existing conditions.

The open water areas that will make up the brackish pond and freshwater wetlands are not expected to generate objectionable odors. The water that will feed the brackish pond will be treated wastewater from the Arcata Marsh and Wildlife Sanctuary that is mixed with bay water. The freshwater wetlands are supplied by upland stormwater runoff and exposed groundwater due to the depth of excavation of the pond area. Neither pond is expected to generate objectionable odors. Both the freshwater and brackish ponds will result in year-round open water and will generate wildlife habitat.

Determination

The impact of PM10 emissions during grading activities is less than significant with implementation of mitigation measures.

The impact of marsh wetland related objectionable odors during low tide periods is less than significant. No mitigation is required.

Mitigation

Implementation of the following mitigation measures would reduce the impact of construction related particulates to a less than significant level:

3.4.1a All active construction areas shall be watered at a rate sufficient to keep soil moist and prevent formation of wind-blown dust.
3.4.1b 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.
3.4.1c All unpaved access roads, parking areas, and construction staging areas shall be paved, watered daily, or treated with non-toxic soil stabilizers during construction.
3.4.1d All paved access roads, parking areas, and construction staging areas shall be cleaned daily with water sweepers during construction.
3.4.1e If visible soil is carried out onto adjacent streets, the area shall be washed with water or by a water sweeper truck.
3.4.1f Hydroseeding or non-toxic soil stabilizers shall be applied to inactive construction areas (previously graded areas inactive for ten days or more).
3.4.1g Exposed stockpiles of dirt, sand, and similar material shall be enclosed, covered, watered daily, or treated with non-toxic soil binders.
3.4.1h Traffic speeds on unpaved roads shall be limited to 15 miles per hour.
3.4.1i Sandbags, hay bales, or other erosion control measures shall be installed to prevent silt runoff to public roadways.
3.4.1j Vegetation in disturbed areas shall be replanted as quickly as possible.
3.4.1k Outdoor dust-producing activities shall be suspended when high winds create visible dust plumes in spite of control measures.

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1: The No Action Alternative

Discussion

Under the no action alternative, existing conditions would not be modified; therefore there would be no impact to air quality.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

Alternative 2 would result in similar air quality and odor related impacts to those identified in the proposed project. The restored saltmarsh could potentially have a stronger odor than the existing slough, especially during the initial plant die-off stage.

Determination

The impact of PM10 emissions during grading activities is less than significant with implementation of mitigation measures.

The impact of marsh wetland related objectionable odors during low tide periods is less than significant. No mitigation is required.

Mitigation

Construction mitigation would be the same as for the proposed project.

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Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

Alternative 3 would result in similar construction related air quality and odor related impacts to those identified in the proposed project. The restored saltmarsh could potentially have a stronger odor than the existing slough, especially during the initial plant die-off stage.

Determination

The impact of PM10 emissions during grading activities is less than significant with implementation of mitigation measures.

The impact of marsh wetland related objectionable odors during low tide periods is less than significant. No mitigation is required.

Mitigation

Construction mitigation would be the same as for the proposed project.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

The PM10 impacts associated with Alternative 4 are the same as for the proposed project. No odor impacts will occur under this alternative.

Determination

The impact of PM10 emissions during grading activities is less than significant with implementation of mitigation measures.

Mitigation

Construction mitigation would be the same as for the proposed project.

3.5 Public Health, Hazards, and Hazardous Materials

The Public Health, Hazards, and Hazardous Materials section describes the impacts associated with implementation of the proposed Marsh Enhancement project.

ENVIRONMENTAL SETTING

The existing hazards at the project site include those associated with natural features such as creeks, wetlands, irrigation channels, and tidal mudflats. In addition, barbed wire fencing and wood fencing with exposed nails exists throughout the site.

Existing hazardous materials that could impact the project site include materials transported on Samoa Blvd. and materials used in adjacent commercial and industrial properties. In addition, the City of Arcata wastewater facility is located near the project site and chlorine is used at the facility to disinfect treated wastewater.

Mosquitoes are both pests and vectors of disease to humans and animals. Mosquito populations can increase rapidly, especially during the warmer summer months. Several species have the potential to breed and to reproduce as a result of the construction and operation of project components (e.g., ponds and wetlands). The California Health and Safety Code provides authority for mosquito abatement districts to advise and control mosquito production on private and public lands and to assess the landowner for the cost of that control. The districts also have the authority to hold hearings and assess civil penalties to abate nuisance and potential health threats to the general public (California Health and Safety Code, Sections 2270-2294). The Vector Biology and Control Branch of the California Department of Health Services are responsible for overseeing the mosquito prevention program within the project area, as Humboldt County has not established a Mosquito Abatement District.

IMPACTS EVALUATION CRITERIA

Hazards to human health and safety associated with the proposed project were examined by reviewing files from the County Division of Environmental Health's Proposition 65 Right to Know Program and LOP regarding adjacent properties. These hazards as well as the CEQA guidelines checklist were considered in the development of the Impact Evaluation Criteria.

Based on the *CEQA Guidelines* a hazards impact is considered significant if the project would:

- Release, during assessment and clean-up of pre-existing environmental contaminants, hazardous constituents into the air, water and soil at a site and expose the general public and/or the environment to health and safety hazards;
- Create a health and safety hazard to the public, construction workers at the restoration site, or to the environment through the routine operation of the facility;
- Expose the public to pathogenic viruses, bacteria, or other disease organisms at concentrations detrimental to public health;

- Create a health and safety hazard to the public or the environment through reasonably foreseeable accidents involving the release of waste or waste constituents into the environment; or
- Release hazardous air emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter (1/4) of a mile of an existing or proposed school.

IMPACTS AND MITIGATIONS FOR THE PROPOSED PROJECT

3.5.1 Accidental Release of Hazardous Materials During Construction or Ongoing Maintenance.

Discussion

The primary chemical hazard would be the use of ordinary equipment fuels and fluids during construction. In the unlikely event of a spill, fuels would be controlled and cleaned up in accordance with County and State regulations, with minimal environmental impact. Hazardous materials would not be routinely transported, stored, or disposed of on site. Therefore, the project would have a less than significant impact with regards to the above referenced hazards and hazardous materials. In addition, the site is not included on any listing of hazardous materials sites compiled pursuant to Government Code Section 65962.5.

The site is not located within an airport land use plan or within two miles of a public airport or public use airport and thus would not expose people to a safety hazard related to aircraft. The closest airport, Murray Field, is located southeast of the project about 5 miles. The project would have no impact on hazards related to airports.

Determination

Less than significant adverse impact.

Mitigations

No mitigation necessary.

3.52 Expose the Public to Disease Vectors (e.g. mosquitoes).

Discussion

The impoundment of water would create potential habitat for mosquitoes. Shallow freshwater wetlands with a large surface area to volume ratio would be more likely to create mosquito habitat than the deeper ponds. Irregular shorelines would also be more likely to create mosquito habitat. The cool weather patterns associated with Arcata inhibit mosquito growth and breeding during all but the summer months.

As with any open water system, mosquitoes will be looking for opportunities to breed. Design elements and management techniques can be used to control mosquito populations so that they are not a public health or nuisance hazard. Design techniques such as creating open water areas and reducing dead zones (stagnant water) are important. Water levels can be controlled to discourage breeding and increase predation opportunities. Mosquito-eating fish such as the native three spined stickelback as well as other native predators – (dragon fly larvae, diving beetles) can also likely be introduced into the system.

Determination

Less than significant adverse impact.

Mitigation

Bat boxes and swallow nesting boards will be mounted on the "snags" logs placed vertically in the ground for bird roosting platforms. In time, when the planted trees are large enough, additional bat boxes and swallow nesting structure can be mounted on trees.

3.5.3 Impacts Due to an Increased Risk to Public Safety from Design, Implementation, and Construction Activity

Discussion

The project would not increase the public safety risk during the long term; however, construction related activities are potentially dangerous and could increase safety related hazards during the construction phase. Public safety hazards exist due to the use of heavy equipment operating at the site during construction. The majority of the equipment work would take place away from areas typically visited by the public.

Equipment and vehicles would not impact the public in the vicinity of South I Street to a great degree as vehicles would enter the project site from Samoa Blvd and V Street for the bulk of the restoration/enhancement project.

In addition, traffic control would occur during construction adjacent to the roadway and could be a safety threat to visitors. Construction activities closest to South I Street and the railroad grade could potentially cause short-term, temporary disruptions of recreational activity due to noise and the need to keep AMWS visitors away from operations due to safety concerns. Some construction activity would be spread out over a few years, such as maintenance and minor alterations to the breach site.

Determination

The project would result in less than significant impacts with incorporation of the following mitigation measures.

Mitigation

Due to the potential hazards related to operation of heavy equipment at the site and on public roads, the following mitigation measures would be incorporated into project implementation:

3.5.3a Laminated informational signs would be placed at major public access points, such as trails and roads, to the project informing the public of the safety hazards related to heavy equipment, and requesting that no trespassing occur.

3.5.3b During operation of heavy equipment, the construction manager would ensure that someone is on site at all times to monitor for approaching visitors. On-site personnel would be responsible for maintaining safe working conditions at the site.

3.5.3c Because of the recreational use of the AMWS, all loaded vehicles would be required to travel a maximum of 15 mph on South I Street.

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1 – The No-Action Alternative

Discussion

Under Alternative 1 there would be no new construction, therefore there would be no increase in potential release of hazardous materials.

Determination

No impact.

Mitigation

No mitigation necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

Impacts with respect to hazards would be the same as under the Proposed Project. There would be less mosquito habitat as compared to the proposed project or the no- project alternative.

Determination

Less than significant adverse impact.

Mitigation

No mitigation necessary.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

Impacts with respect to hazards would be the same as under the proposed project. There would be less mosquito habitat as compared to the proposed project or the no-project alternative and similar impacts as the proposed project.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

Mitigation measures would be the same as for the proposed project.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

Impacts with respect to hazards would be the same as under the proposed project.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

Mitigation measures would be the same as for the proposed project.

Figure 3.5 - 1
McDaniel Slough EIR

GEOLOGIC HAZARDS

Boundaries
- Project Boundary
- Arcata City Limits

Transportation
- Railroad
- Streets

Seismic
- Alquist-Priolo Special Fault Hazard Zone
- Fault

Water Features
- Streams
- Waterbody

Source: City of Arcata General Plan 2020

CHAPTER 4
COMMUNITY ENVIRONMENT

4.0 OVERVIEW

Community environment includes components, apart from natural resources, that contribute to the formation and character of a community. The project area of the McDaniel Slough Marsh Enhancement Project is an important part of Arcata's community environment.

The McDaniel Slough area is situated along the edge of Humboldt Bay, in the Arcata Bottom. The distinguishing characteristics of this southwestern portion of the city are marshes, tidal flats, mud flats, riparian habitat, wetlands, and agricultural fields dotted with rural barns, roads, and an occasional home. This area contributes to the city's aesthetic features of open space, bayfront views, and rural agricultural fields.

This area is part of the ethnographic territory of the Wiyot Indians who lived almost exclusively in villages along the protected shores of Humboldt Bay and near the mouths of the Eel and Mad Rivers. After European settlement, this area adjacent to Humboldt Bay started to be developed for agricultural use. Around 1870, settlers began to alter the bayfront and salt marshes with dikes and floodgates to facilitate farming and grazing uses on the land. By 1895, McDaniel Slough was diked, and levees were created. Related agricultural structures were built, including a barn (blew down on December 31, 2005), livestock holding pens, and pasture fencing. Currently the McDaniel Slough functions as a degraded seasonal agricultural wetland.

McDaniel Slough is adjacent to the California Department of Fish and Game Mad River Slough Wildlife area and to one of the city's major recreational and open space facilities, the Arcata Marsh and Wildlife Sanctuary (AMWS). The AMWS integrates public recreation and coastal access with public facilities: it is a marsh recreation area as well as part of the City's constructed wetland wastewater treatment system. The AMWS offers picnicking; fishing; bicycling; hiking/jogging trails; boat launching, and wildlife viewing – the Arcata Marsh offers viewing of over 160 different bird species, including ducks, waterfowl, and migratory birds. The AMWS is also an educational resource for students of all ages. Adjacent to the AMWS is another community asset, the Arcata Marsh Interpretive Center, which provides educational interpretive displays about the Arcata Marsh and Humboldt Bay.

The McDaniel Slough Marsh Enhancement Project would potentially affect the community environment of Arcata. This chapter describes those potential effects, addressed under the following topics:

4.1 Cultural and Historic Resources describes the Cultural Resources Investigation that was conducted by James Roscoe and Associates which includes a detailed account of the historic uses of the project site.

4.2 Land Use describes the General Plan policies and the Land Use Development Guide (LUDG) regulations that address the allowable uses of the land in the project area.

Applicable policies set forth in the Arcata General Plan, Humboldt County General Plan, and California Coastal Act are described and used to analyze potential impacts.

4.3 Aesthetics & Visual Resources describes the visual character of the site and the changes that would occur as a result of project implementation.

4.4 Public Facilities & Services describes the project's effects on public utilities, fire protection, police protection, schools, and other public services.

4.5 Recreation & Open Space describes the current recreation opportunities at the site and the project's proposed improvements.

4.6 Circulation describes the existing road system in the area surrounding the project, the public transportation system, and pedestrian and bicycle uses in the area.

4.7 Population & Housing describes the potential population effects based on the City of Arcata 2000 Census data.

4.8 Agricultural Resources & Land Conservation describes the impacts associated with converting the site from agricultural to natural resources uses.

4.9 Noise analyzes the potential noise impacts resulting from the implementation of the proposed Marsh Enhancement Project.

For each of these topics, the chapter describes the environmental setting, the evaluation criteria for impacts, potential environmental impacts, mitigation measures, and the analysis of the four identified alternatives.

4.1 CULTURAL AND HISTORIC RESOURCES

This section describes the impacts associated with implementation of the proposed Marsh Enhancement Project on possible excavation of unknown archaeological material and removal of portions of the existing levee system.

ENVIRONMENTAL SETTING

The project area is located within the ethnographic territory of the Wiyot Indians who had an original population of 1,000 to 3,300 prior to European settlement. The Wiyot lived almost exclusively in villages along the protected shores of Humboldt Bay and near the mouths of the Eel and Mad Rivers. Villages consisted of dwellings that were rectangular in shape and made from split redwood planks. The Wiyot utilized a wide range of plant and animal resources gathered within their territory, including mollusks, sea lions, stranded whales, deer, elk, and acorns. The most important food source was anadromous fish from coastal streams such as the Mad and Eel Rivers and small creeks such as Janes Creek.

After the start of the California Gold Rush, from 1850 to 1860, Wiyot territory became the center for the largest concentrations of European settlers in California north of San Francisco. The settlers utilized Humboldt Bay as a major shipping point for supplies to the gold mines on the Trinity, Klamath, and Upper Sacramento Rivers. In addition, the establishment of the redwood timber industry, and homesteading of the Eel River and Arcata Bottom for ranching and farming purposes, brought more people into the area. The influx of new settlers included violence that nearly destroyed the entire Wiyot population.

The cultural landscape of the project site includes a levee system that was constructed over 100 years ago, the associated drainage canals, and livestock corrals and fencing. The first reclamation efforts in the area surrounding Arcata began in 1892 with the construction of 1.56-miles of levee. The following year numerous additional reclamation efforts began with the use of a steam ditching machine that constructed a broad canal and placed the material along the canal to form a dike. By 1895 the dike up the east bank of the McDaniels Slough was constructed resulting in the completion of reclamation efforts around Arcata consisting of about 1800-acres of marshland. By 1896, the barn located on the project site had been constructed and fresh water was being supplied for livestock, homes, and farming activity. Holding pens and pasture fencing were constructed for livestock operations.

Cultural Resources Investigation

A cultural resources records search was conducted at the North Coastal Information Center in December 2002 to determine whether culturally important sites exist within the potential impact area of the project. Several sites were determined to exist in the vicinity and a formal archaeological survey was recommended. During the months of February, March, and April 2003, a Cultural Resource Investigation was conducted at the project site. James Roscoe and

Associates conducted the investigation and prepared a report with Susie Van Kirk, Historic Resources Consultant.

The Cultural Resources Investigation included a background research of the archaeological site records, an oral history completed by Suzie Van Kirk, and a field reconnaissance of the project area. The background research included a formal examination of the site records, maps, and survey files of the Northwest Coastal Information Center of the Historic Resources Information System, located at the Yurok Tribal Offices, Klamath, California. The background research focused on the project area and land within one-mile of the project. The review of the oral history collected by Suzie Van Kirk provided background information on the historic uses on the project site. The field reconnaissance included multiple day visits to the site to look for prehistoric and historic material. Prehistoric resources include chert or obsidian flakes or tools, projectile points, mortars and pestles, groundstone artifacts, deposits of shell, dietary bone, locally darkened midden (dark friable soil containing shell and bone dietary debris), heat-affected rock, or human burials. Historic material includes machinery, buildings, vehicles, tools, or other items that has distinctive characteristics or artistic value, may yield information about history, or is associated with significant events or people from the past.

IMPACTS EVALUATION CRITERIA

The California Environmental Quality Act (CEQA) (Section 15064.5) includes provisions for significance criteria related to archaeological and historical resources. A significant archaeological or historical resource is defined as one that meets the criteria of the California Register of Historical Resources. A significant impact is characterized as a "substantial adverse change in the significance of a historical resource."

Public Resource Code (Section 5024.1) authorizes the establishment of the California Register of Historical Resources. Any identified cultural resources must, therefore, be evaluated against the California Register criteria. In order to be determined eligible to the California Register, a property must be significant at the local, state, or national level under one or more of the following four criteria (modeled after the National Register criteria):

1) It is associated with events or patterns of events that have made a significant contribution to the broad patterns of the history and cultural heritage of California and the US;
2) It is associated with the lives of persons important to the nation's or California's past;
3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4) It has yielded, or may be likely to yield, information important to the prehistory or history of the state and the nation.

In addition to meeting one of the above criteria, a significant property must exhibit a measure of integrity. Properties eligible for listing on the California Register must retain enough of their historic character or appearance to be recognizable as historic properties and to convey the reasons for their significance. Integrity is judged in relation to location, design, setting,

materials, workmanship, feeling, and association. It must also be judged with reference to the particular criteria under which a property is thought to be eligible.

Based on the CEQA Guidelines a proposed project's cultural impact is considered significant if the project would:

- Disturb known or unknown prehistoric or historic cultural resources; or
- Disturb buried, unknown prehistoric or historic archaeological resources.

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

4.1.1 Impacts to Archaeological and Paleontogical Resources

Discussion

This area has been previously recorded as an archaeological site of significance; however, the recent field investigation did not locate any site indicators. It is possible that the location was not accurately plotted during the transfer of information to the new maps, or that any archaeological deposit present in the area has subsided or been obscured by historic grading activity and is now not visible on the ground.

The proposed construction in this area would create a substantial ground disturbance from pond excavation and levee construction that could expose buried archaeological material, paleontogical resources, or human remains. Ponds would be excavated using scrapers, and/or excavators loading dump trucks. Levee construction would include removing organic material and topsoil from the site where the levees would be located, and then placement and compaction of soil in layers until the desired elevation is obtained.

Determination

The project would result in a less than significant impact with the incorporation of the following mitigation measures.

Mitigation

4.1.1a Should concentrations of archaeological materials, paleontogical resources, or human remains be encountered during construction, all ground-disturbing work would be temporarily halted in that area. Work near the archaeological finds would not be resumed until a qualified archaeologist has evaluated the materials and offered recommendations for further action. Project personnel shall not collect cultural resources. In the event human remains are discovered, the County Coroner shall be contacted immediately and all work would cease until further instruction from qualified personnel.

4.1.1b. A representative from the Wiyot Tribe or a trained archaeological monitor would be on site to oversee excavations of the ponds and levees in the eastern most portion of the project. A cultural resources monitor would ensure that any significant subsurface cultural deposits are quickly recognized and recorded.

4.1.2 Impacts to Historic Resources

Discussion

Restoring portions of the project area to salt marsh would require removal of several small portions of the levees that were constructed in the 1890s. Numerous miles of similar levees, built during the same time period, exist along the margins of Humboldt Bay; therefore, the removal of a small percentage of the total would not be significant. In addition, levees would be removed to the grade of the surrounding soil surface, and only previously disturbed materials would be excavated.

The fencing and livestock holding pens located to the west of the barn would be removed as part of the project. The holding pens were constructed for loading livestock into truck trailers. These features were not identified in the Cultural Resources Investigation as being significant resources and will be removed prior to project implementation.

The barn site that exists on site would not be impacted by the proposed project. The barn has been burned in the past by transients, damaging it to the extent that is considered by the Arcata Fire Department (AFD) to be unsafe. The AFD has requested its deconstruction and it recently blew down. Therefore, it is likely that the barn rubble will be removed prior to project implementation through a separate action.

A view-shed analysis was conducted prior to the barn collapsing in order to model levee impacts to viewing the barn structure from public viewing points. A 3D model was created that showed that views of the barn will not be impacted by constructing the levees. The entire barn (if remaining) would have been visible from Highway 255, the mouth of McDaniel Slough and from South I Street at the Arcata Marsh and Wildlife Sanctuary.

Determination

The removal of portions of the project area levees would result in a less than significant impact with incorporation of the following mitigation measure.

Mitigation

4.1.2a The City shall officially record the levee sections proposed for removal (for example, as recorded in the Cultural Resources Investigation).

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1 – The No Action Alternative

Discussion

There would be no new development under the No Action Alternative; therefore, there would be no impacts to known historic or cultural resources.

Determination

No impact.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

Alternative 2 would include construction and excavation activities related to removal of the existing tidegates and excavating a breach in the levee. Such construction activities in this area could create a substantial ground disturbance, potentially exposing buried archaeological material, palenotogical resources, or human remains.

Determination

Alternative 2 would result in a less than significant impact with the incorporation of the following mitigation measures.

Mitigation

Mitigation measures 4.1.1a, 4.1.1b, and 4.1.2a as described above under the Proposed Project.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

Alternative 3's excavation and ground-moving activities would be similar to the proposed project, although more extensive due to the complete removal of the bayfront levee. The potential impacts to archaeological, palenotogical, and historic resources are the same as discussed under the Proposed Project.

Determination

Alternative 3 would result in a less than significant impact with the incorporation of the following mitigation measures.

Mitigation

Mitigation measures 4.1.1a, 4.1.1b, and 4.1.2a as described above under the proposed project.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

Alternative 4 would not include a new levee system thus the levees would remain intact. Excavation of the freshwater ponds could create a substantial ground disturbance, potentially exposing buried archaeological material, palenotogical resources, or human remains.

Determination

Alternative 4 would result in a less than significant impact with the incorporation of the following mitigation measures.

Mitigation

Mitigation measures 4.1.1a, 4.1.1b, and 4.1.2a as described above under the proposed project.

4.2 LAND USE

This section describes the policies and regulations that set allowable uses of the land in the project area. The Arcata General Plan, the Humboldt County General Plan, and the California Coastal Act provide the primary policies regulating land use activities in the project area. In addition, other state and federal regulations exist which control activity at the project site.

ENVIRONMENTAL SETTING

Existing Land Use

The existing zoning and Arcata General Plan designation for the site is Agricultural Exclusive (AE) from the City of Arcata 1985 General Plan. While the City has updated its General Plan (GP2020), it has not yet been submitted for certification by the California Coastal Commission as an update to the Land Use Plan portion of its LCP. Therefore, this section will consider impacts related to the zoning designation Agricultural Exclusive (A-E) under the previous General Plan and Zoning.

The Humboldt County General Plan also has an A-E zoning designation for the remainder of the site. The County and City General Plan both allow wetland restoration, fish and wildlife management, and resource-related recreation as conditionally permitted uses under the A-E classification.

Adjacent lands to the east and north include Industrial Limited (I-L), Industrial General (I-G), Agricultural Exclusive (A-E), and Residential Low Density (R-L) general plan and zoning designations. There industrial uses along Samoa Boulevard, including a wood products mill and light manufacturing. The adjacent land to the southeast is the Arcata Marsh, which is zoned as Natural Resources (N-R). To the south are the mudflats of Humboldt Bay (N-R). To the west are agricultural fields zoned A-E.

Other existing land uses at the site include recreation activities such as hiking, birding and waterfowl hunting. The City's site is not currently a public hiking area, and the access point adjacent to the Arcata Marsh, owned and managed by Reclamation District #768, has a gate and "no trespassing" sign. The west side of the site is managed by CDFG as a wildlife area which allows compatible public uses such as hiking, birding, and waterfowl hunting; there is a day use only parking area off the south side of the Old Samoa Road loop with information signs.

Coastal Act Policy

The proposed project is within the Coastal Zone and therefore Coastal Act policies are applicable to analyze potential impacts. There are multiple Coastal Act policies governing land and marine resources that are related to this project.

Coastal Act Sections 30230 and 30231 require the protection of marine and biological resources. Section 30230 provides that:

> Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters, and will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Other applicable Coastal Act Policies include:

30001.5. The Legislature further finds and declares that the basic goals of the state for the coastal zone are to:

(a) Protect, maintain, and, where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources.
(b) Assure orderly, balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of the people of the state.
(c) Maximize public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resources conservation principles and constitutionally protected rights of private property owners.
(d) Assure priority for coastal-dependent and coastal-related development over other development on the coast.
(e) Encourage state and local initiatives and cooperation in preparing procedures to implement coordinated planning and development for mutually beneficial uses, including educational uses, in the coastal zone.

30230. Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

30233. (a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.
(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.
(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained

as a biologically productive wetland. The size of the wetland area used for boating facilities, including berthing space, turning basins, necessary navigation channels, and any necessary support service facilities shall not exceed 25 percent of the degraded wetland.

(4) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.

(5) Incidental public service purposes, including, but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource-dependent activities.

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable longshore current systems. (c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the 19 coastal wetlands identified in its report entitled, "Acquisition Priorities for the Coastal Wetlands of California", shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, if otherwise in accordance with this division. For the purposes of this section, "commercial fishing facilities in Bodega Bay" means that not less than 80 percent of all boating facilities proposed to be developed or improved, where such improvement would create additional berths in Bodega Bay shall be designed and used for commercial fishing activities. (d) Erosion control and flood control facilities constructed on watercourses can impede the movement of sediment and nutrients which would otherwise be carried by storm runoff into coastal waters. To facilitate the continued delivery of these sediments to the littoral zone, whenever feasible, the material removed from these facilities may be placed at appropriate points on the shoreline in accordance with other applicable provisions of this division, where feasible mitigation measures have been provided to minimize adverse environmental effects. Aspects that shall be considered before issuing a coastal development permit for such purposes are the method of placement, time of year of placement, and sensitivity of the placement area.

Public Resource Code §30241 seeks to maintain the maximum amount of prime agriculture land to assure the protection of the area's agricultural economy and minimize conflicts between agricultural and urban land uses. (See Section 4.8, Agricultural Resources and Land Conservation below) Public Resource Code §30230 seeks to maintain, enhance, and, where feasible, restore marine resources. The California Coastal Commission, which has permit jurisdiction over the project site, will have to balance these policies when considering the Coastal Development Permit for this project.

Applicable Land Use Plans, Zoning, and Ordinances

The City of Arcata General Plan, adopted in 1985, and the Land Use and Development Guide (LUDG), adopted in 1994, establish the land use, zoning, and development standards for development in the City. The project site is located within the Wetlands and Creeks Protection (WCP) Zone as defined by LUDG (see below), and therefore must comply with applicable General Plan, LUDG, and related regulations which establish and restrict development activities in the WCP Zone. Other City plans applicable to the proposed project include the Creeks Management Plan (adopted in 1991) and the Arcata Stormwater Master Plan (1997).

Applicable City regulations for land use follow:

Arcata General Plan (1985):

Conservation of Open Space – Contains policies requiring land to be used for the purpose which it is most suited by virtue of its inherent natural characteristics such as floodplains for agriculture and recreation, and streams or wetlands for wildlife habitat. The conservation chapter describes areas to be protected as open space such as wetlands and agricultural land.

Conservation of Natural Resource – Contains policy to protect streams by promoting flood protection on a watershed scale, enhancing creeks by making them self cleaning, removing culverts, restoring fish habitat, and creating a continuous riparian corridor.

Flood Control and Drainage – Contains policy to improve drainage and minimize potential flooding hazards and allows development in a wetland if the development is in the form of a fully approved restoration project.

Arcata Land Use and Development Guide (1994):

Wetlands and Creeks Protection (WCP) Zone – LUDG defines the WCP zone as:

> …the area that is 25 feet outward from the top of the creek bank, or the area bounded by the FEMA Flood Zone A line, whichever is greater, except that in no case will the creek zone on either side of a creek be wider than 100 feet from the average low flow line of that creek.

Arcata Creeks Management Plan (1991):

Beneficial Uses **-** The purpose of the Arcata Creeks Management Plan is to provide guidance for management of creeks that flow through Arcata in order to provide the fullest realization of the creeks' beneficial uses. The beneficial uses of Arcata's creeks include flood control, fresh water habitat, riparian habitat, scenic enjoyment, water quality, education, public safety, fish habitat (fish spawning, fish migration), open space, recreation, marine habitat, and ground water recharge.

Creek Zone **–** Includes policy to minimize risks from flood hazards while maximizing the benefits to the natural environment.

Flood Hazard Management – Includes an implementation measure requiring that the Planning Commission review in a public hearing forum any major modification or maintenance of channel capacity.

Sedimentation – Contains policy to reduce the need for dredging and to protect in-stream habitat. Includes implementation measures to modify creeks to improve sediment routing, encourage reestablishment of a dense mature tree canopy, and exclude livestock from all creek sides.

Riparian Vegetation – Contains policy to minimize the disturbance and promote restoration of riparian vegetation. Contains implementation measures to promote and encourage reestablishment and protection of native riparian species.

Recreation and Public Access – Contains policy for the City to make optimum use of Creek Zones for recreation and public access.

Additionally, there are Federal regulations that apply to land use in areas considered to be wetlands and floodplains; such regulations may apply to this project.

Department of Fish and Game Mad River Slough Wildlife Area

Pursuant to the *Charles Brown Fish and Game Reorganization Act of 1951* (Statutes of 1951, chapter 715), the Department was created within the Resources Agency (Fish and Game Code, § 700) from the Division of Fish and Game within the former Department of Natural Resources. The legislative delegations to the Department are codified in division 2 of the Fish and Game Code, which concerns the organization and general functions of the Department. The Director administers the Department (FGC § 700), and is appointed by the Governor (FGC § 701); the Department also administers and enforces the provisions of the Fish and Game Code (FGC § 702). Consistent with section 702, the Attorney General has found that it was the intent of the Legislature to leave the Department in full control of the execution and enforcement of fish and game laws (17 Ops. Cal. Atty. Gen. 72 (1951)).

The Department has broad program responsibilities for fish and wildlife. Fish and Game Code § 2701 (c) vests in the Department: "…the principal responsibility for protecting, conserving, and perpetuating native fish, plants, and wildlife, including endangered species and game animals, for their aesthetic, intrinsic, ecological, educational, and economic values." The Department is designated natural resource trustee with jurisdiction "over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species" (FGC § 1802).

Purpose of the Mad River Slough Wildlife Area Acquisition

The Department acquired the Mad River Slough Wildlife Area in order to protect, enhance, and restore coastal wetlands within Humboldt Bay.

Monies used to purchase the MRSWA were secured from Proposition 19 (1984) coastal wetland acquisition funds. Use of these funds required that the primary emphasis in management be directed towards wetland protection, restoration, and enhancement.

Functions of wetlands include:

- critical habitat for fish and wildlife species,
- flood control by muting flood peaks,
- groundwater recharge,
- biofiltration of pollutants, which improves water quality, and
- rearing and spawning grounds for commercial fisheries.

Purpose of the MRSWA Management Plan (draft October 1993)

The management plan was prepared with the support of the Mad River Slough Management Plan Advisory Team which included members of North Coast Waterfowl Association, City of Arcata, Livestock Operators, Agricultural Extension Service, Audubon Society and Humboldt County.

The major management objective for the MRSWA include restoration, enhancement, and protection of remaining coastal wetlands in Humboldt Bay.

The ultimate management intent will be to provide the optimum diversity of habitat types in order to achieve the highest biological productivity. Featured biological elements are identified: waterfowl, shorebirds, wading birds, raptors, riparian habitat, and salt marsh.

IMPACTS EVALUATION CRITERIA

Based on the CEQA Guidelines a proposed project's land use impact is considered significant if the project would:

Physically divide an established community;

Conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the adopted (1985) Arcata General Plan, specific plan, local coastal program, zoning ordinance, or the Arcata Land Use and Development Guide adopted for the purpose of avoiding or mitigating an environmental effect;

Conflict or is not compatible with surrounding land uses;

Conflict with any applicable conservation plan or natural community conservation plan; or

Result in a substantial alteration of the present or planned use of an area.

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

4.2.1 Impacts That Would Physically Divide an Established Community

Discussion

The project does not include design features that would divide the existing established community. The project would not result in an impact of dividing an established community because it is located on the edge of Arcata.

Determination

No significant impact.

Mitigation

No mitigation is necessary.

4.2.2 Impacts Due to Conflicts with an Applicable Land Use Plan, Policy, or Regulation of an Agency with Jurisdiction over the Project

Discussion

The project would convert agricultural land to non-agricultural uses, which is considered a potentially adverse impact. However, the project's proposed habitat restoration is considered an allowable use of agricultural land and therefore does not conflict with this land use policy. These impacts are addressed in more detail in Section 4.8 – Agricultural Conversion, of this Chapter.

All agency consultations, technical assistance, and permits would be completed prior to project implementation. The McDaniel Slough Marsh Enhancement Project is consistent with the land use policy set fourth in the Arcata General Plan. In addition the project is consistent with the natural resource protection requirements of the California Coastal Act and has been designed to mitigate any potential impacts related to land use.

Determination

The project would result in less than significant impacts from conflicts with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the project.

Mitigation

No mitigation is necessary.

4.2.3 Impacts Due to Compatibility with Surrounding Land Uses

Discussion

The proposed construction of fresh water ponds to receive storm water runoff is compatible with surrounding uses because they would help reduce flooding impacts during large storm events. In addition, the Arcata Marsh and Wildlife Sanctuary to the east, Humboldt Bay to the south, and the CDFG Mad River Slough Wildlife Areas to the west all have land uses that are compatible with the proposed project.

The agricultural parcel to the north of the project site would be separated from the project site by construction of a flood levee. The change would create a smaller area of contiguous agricultural area, which would become separated from other agricultural areas to the south.

Determination

The project would have a less than significant impact on land use compatibility with surrounding uses.

Mitigation

No mitigation is necessary.

4.2.4 Impacts Due to Conflicts with Any Applicable Conservation Plan or Natural Community Conservation Plan

Discussion

The project site is not included in any Habitat Conservation Plan or Natural Resource Conservation Plan.

Determination

The project would result in no impacts due to conflicts with any applicable conservation plan or natural community conservation plan.

Mitigation

No mitigation is necessary.

4.2.5 Impacts Due to Substantial Alteration of the Present or Planned Use of an Area

Discussion

The City's property in the project site is currently zoned Agricultural Exclusive. Permitted uses in Agricultural Exclusive zones include "private and public non-vehicular recreational activities." The project would require the termination of the present agricultural use (seasonal

livestock grazing). Although the project would alter this present agricultural use, the proposed use is consistent with the Agriculture-Exclusive zoning of the site.

The City's General Plan (1985) policy is to "restore and maintain the physical and biological integrity of publicly-owned former tidelands (farmed wetlands) subject to the Public Trust easement, to a diversity of tidal, freshwater, and riparian habitats" (Environmental Quality Chapter, Goal E). Thus, part of the City's long-term land use plan is to biologically diversify these former tidelands. These goals are also consistent with updated goals currently under consideration for the General Plan: 2020.

Determination

Implementation of the proposed project would result in a less than significant impact to land use because the proposed use is consistent with the Agriculture Exclusive zoning.

Mitigation

No mitigation is necessary.

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1 – The No Action Alternative

Discussion

Under the No Action Alternative, the existing land uses at the site would not change.

Determination

The No Action Alternative would result in no impact to the existing land use.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

The potential land use impacts from Alternative 2 would be similar to those identified under the proposed project.

Determination

Implementation of Alternative 2 would result in a less than significant impact to land use.

Mitigation

No mitigation is necessary.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

The potential land use impacts from Alternative 3 would be similar to those identified under the proposed project.

Determination

Implementation of Alternative 3 would result in a less than significant impact to land use.

Mitigation

No mitigation is necessary.

Alternative 4 – Bayfront Levee Repair With Freshwater Marsh Enhancement

Discussion

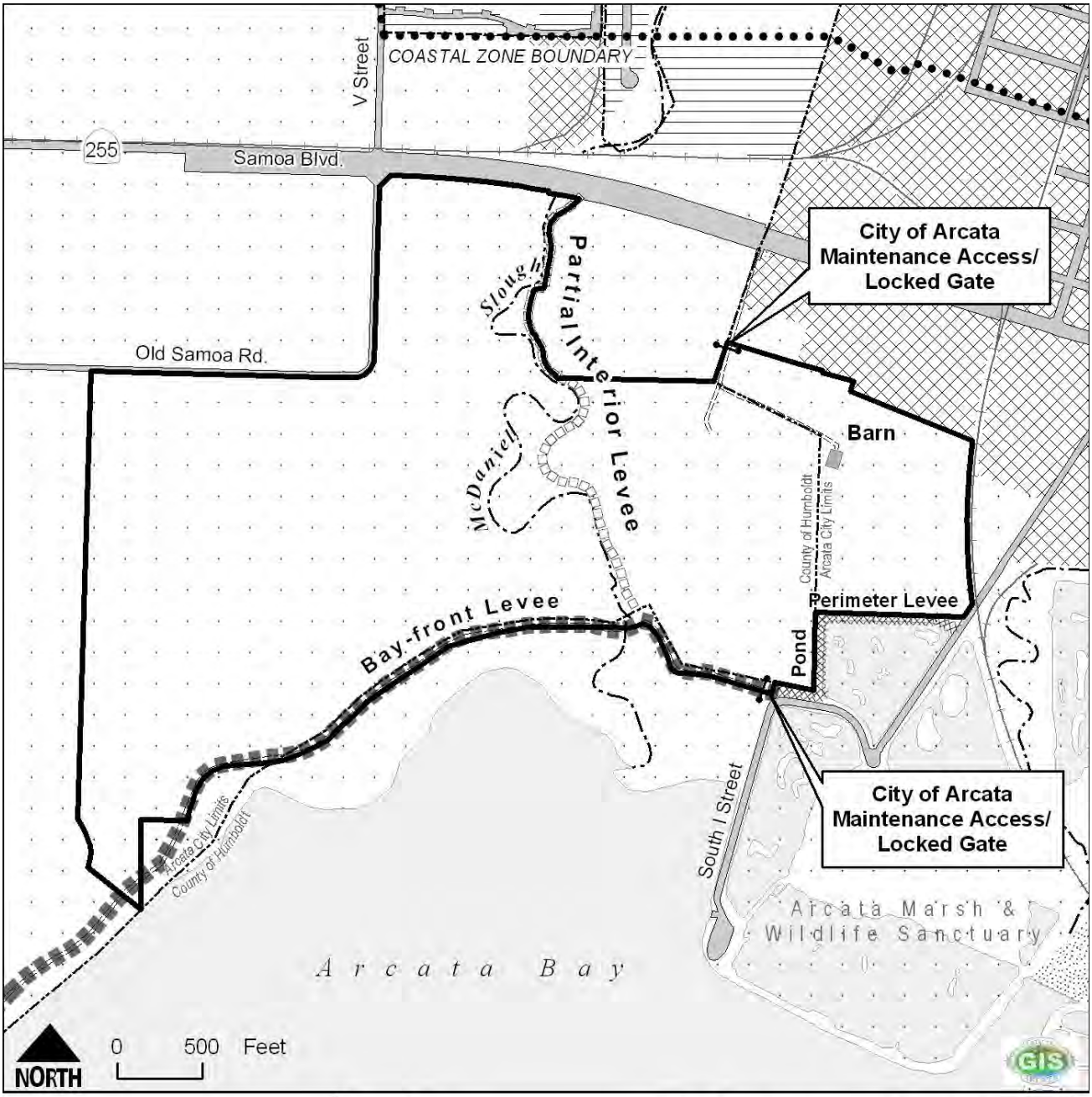
The potential land use impacts from Alternative 4 would be similar as those identified under the proposed project except that more area could remain in agricultural use.

Determination

Implementation of Alternative 4 would result in a less than significant impact to land use.

Mitigation

No mitigation is necessary.



Boundaries
- Project Boundary
- Arcata City Limits
- Coastal Zone Boundary

Water Features
- Streams
- Waterbody

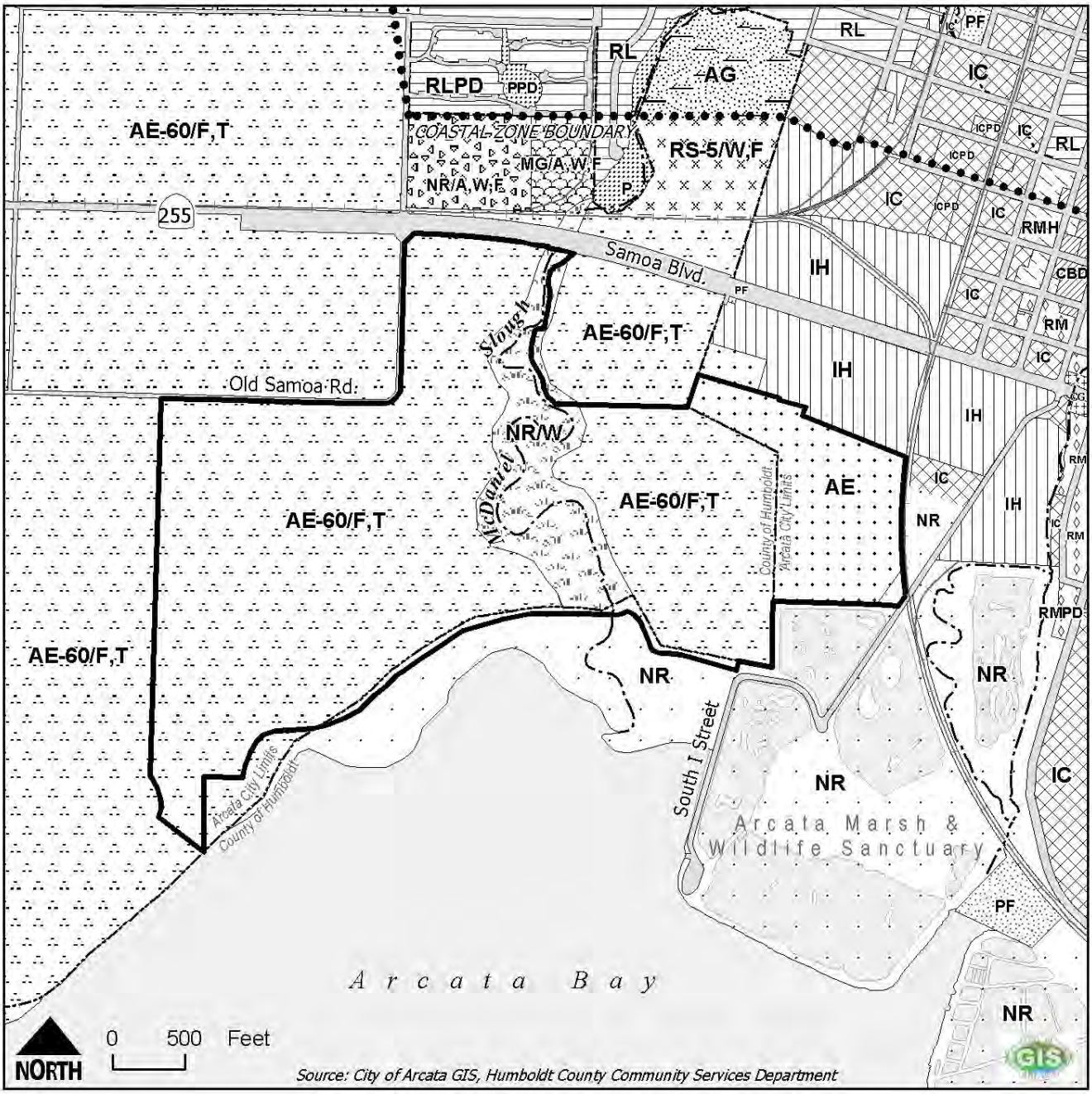
Transportation
- Railroad
- Streets
- Access Road

Existing Land Use
- Residential
- Agriculture-Open Space
- Industrial
- Public Facility

Source: City of Arcata, Humboldt County Community Development

Levee Types
- Pond Perimeter Levee
- Partial Interior Levee
- Bay-front Levee

Figure 4.2 - 1
McDaniel Slough EIR
Existing Land Uses



Boundaries
- Project Boundary
- Arcata City Limits
- Coastal Zone Boundary

Water Features
- Streams
- Waterbody

Transportation
- Streams
- Railroad

City of Arcata General Plan Designations
- Heavy Industrial [I-H]
- Industrial Commercial[I-C], [I-C-PD]
- Public Facility [P-F], [P-F-PD]
- Public Facility-Parks [P]
- General Commercial [C-G]
- Residential-Medium Density [R-M]; [R-M-PD]
- Residential-Medium High Density [R-MH], [R-MH-PD]
- Residential-Low Density [R-L]; [R-L-PD]
- Natural Resource [NR]
- Agriculture-Exclusive [A-E]

County Zoning Designations
- Agriculture Exclusive-AE-60/F,T
- Natural Resource-NR/A,W,F
- Natural Resource-NR/W
- Agriculture General-AG
- Industrial General-MG/A,W,F
- Residential Surburan-RS-5/W,F

Figure 4.2 - 2
McDaniel Slough EIR
ZONING DESIGNATIONS

4.3 AESTHETICS AND VISUAL RESOURCES

The McDaniel Slough Marsh Enhancement Project would include both short-term adverse effects and long-term beneficial effects to the aesthetic and visual resources of the project site. This section describes the existing aesthetic and visual resource conditions at the site, and the project's potential short-term and the long-term impacts on those resources.

The City of Arcata has completed a viewshed analysis of the project utilizing GIS mapping technology. (Appendix D1-D-3). The analysis was conducted to determine the effect of levee construction on viewsheds that could be affected by the project. This section includes the results of the viewshed analysis.

ENVIRONMENTAL SETTING

Visual Character of Arcata and Surrounding Area

The Humboldt Bay area is surrounded by mountains to the north, east, and south, and by the Pacific Ocean on the west. The City of Arcata is situated on a coastal terrace at the north end of Humboldt Bay and is sheltered from the open sea by the coastal dunes and forest. The City is bordered by the Mad River to the north, Arcata Bay to the south, the Pacific Ocean to the west, and Fickle Ridge to the east. These features form distinctive natural edges to the City's planning area and are some of its most important aesthetic resources.

Arcata's surrounding vistas include forested hillsides to the east; a river corridor to the north; and flat bottomlands, forested coastal dunes, bayfront, and tidelands to the west and south.

Arcata has several distinct viewsheds including the forested slopes of the Fickle Hill Ridge, the Arcata Bottom, the Arcata-Humboldt Bay, and the urban areas of the city. Grassy pasturelands, picturesque farms, and rural roads characterize the Arcata Bottom landscape, with the backdrop of the Lanphere-Christensen dunes in views to the west.

Existing Visual Character of the Project Site

The project site includes sweeping views of agricultural fields adjacent to the west and north; with Samoa Boulevard and industrial businesses further north and northeast. There are views of Humboldt Bay wetlands and mudflats to the south, and the Arcata Marsh and Wildlife Sanctuary to the southeast. In the distance, the vista includes forested hillsides to the north and east.

The project site is flat land that has been used for hay production and livestock grazing. The area includes the lowest reaches of Janes Creek (McDaniel Slough) and a network of smaller slough channels and drainage ditches. The project site is designated as a "Coastal Scenic Area" in the current Arcata General Plan (1985), which identifies (a) Arcata Bay tideland and water areas; and (b) All land on the western Arcata plain designated A-E on the Land Use Map. [1]

[1] Section IV-14, Arcata Coastal Land Use Element, revised in Resolution 878-18, October 21, 1987.

The Arcata General Plan identifies Samoa Boulevard (State Route 255) from Sunny Brae to Manila as a "Scenic Route."[2] The views from Samoa Boulevard (SR 255) in the vicinity of the project are of the wetlands and riparian vegetation surrounding Janes Creek, and distant views of Humboldt Bay and the Samoa Peninsula. From SR 255, the existing bayfront levee and the levee along both sides of Janes Creek block the view of the closest part of the bay. The levees are well vegetated and blend in with the surrounding fields and wetlands. The transmission line and towers are also visible from Samoa Blvd. and reduce the visual quality of the site.

The Arcata General Plan also designates as a Scenic Route the State Route 101 corridor from the Bayside Cut-off to the Mad River.[3] State Route 101 parallels the bay coastline south of Arcata, and provides the main southern entry route to Arcata. Travelers using the 101 south of Arcata may briefly glimpse the project site.

The views from Old Samoa Road, which runs parallel south of SR 255, are of open green fields, redwood forests above the city, and the wetland vegetation along the banks of Janes Creek. Because Old Samoa Road is built only slightly higher than the elevation of the surrounding land, and because of the existing bayfront levee system, there are no views of the bay from Old Samoa Road.

The views from South I Street are of wetlands, ponds, riparian vegetation, Humboldt Bay mudflats and wetlands, redwood forests, and some open agricultural lands. South I Street continues south/southwest to the parking and boat launch in the Arcata Marsh and Wildlife Sanctuary. Along South I Street, approximately 1500 feet before the parking area, there are extensive views of the project area to the west.

IMPACTS EVALUATION CRITERIA

While degrees of visual changes and exposure can be objectively described, evaluation of impacts involves a subjective element reflected in the viewer response. The CEQA Guidelines (Appendix F) criteria of significance for aesthetics are used here to evaluate potential project effects on visual resources.

Based on the CEQA Guidelines, a proposed project's aesthetics impact is considered significant if the project would:

- Have substantial adverse effect on a scenic vista or damage to scenic resources including, but not limited to, trees, rock outcroppings, and historic buildings;
- Have a substantial adverse effect on a state scenic highway;
- Cause substantial degradation of the existing visual character or quality of the site and its surroundings; or

[2] Section IV-16, ibid.
[3] Appendix K, Arcata Coastal Land Use Plan Amendments, Resolution 945-26, November 16, 1994.

- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

IMPACTS AND MITIGATIONS FOR THE PROPOSED PROJECT

4.3.1 Impacts Due to Short-Term Effects on the Existing Visual Character or Quality of the Site During Construction

Discussion

The project would have short-term impacts to aesthetic and visual resources due to construction-related activities. Short-term impacts to the visual character of the site would result from the presence of heavy equipment, soil excavation/exposed soil, temporary roads for transporting construction material, removal of vegetation and potential damage to the existing vegetation.

Determination

Impacts to the visual character of the site would be less than significant with the incorporation of the following mitigation measures.

Mitigation

4.3.1a All temporary roads or routes used for transportation of levee construction fill material would be de-compacted with rippers or tilling equipment prior to completion of the project to allow for rapid revegetation to cover over vehicle tracks.

4.3.1b Exposed soil would be mulched with a weed-free straw or planted with native materials to disguise areas of disturbance.

4.3.1c Any sites affected by heavy equipment that do not have natural vegetation recovery one year following construction would be seeded or planted with vegetation that would blend with the surrounding features.

4.3.2 Impacts Due to Potential Long-term Effects on Scenic Vistas, Highways, or Scenic Resources

Discussion

The project would involve increasing the total length of the levee system at the site. The visual character of the site would change from flat agricultural land to a marsh/tidal area. The conversion of the site from grazing to marsh would be a significant change in appearance. Grasslands covering much of the site (including the exotic Reed Canary grass) would be converted to salt tolerant species. Past grazing activities (presence of cows) would cease. There is the potential for many types of wildlife to utilize the site, most notably avian species, which would contribute to a change in visual character of the site. The visual character of the site would also be altered by the removal of the tidegates, which would result in an open waterway.

Views of the project area from Highway 101, SR 255, Old Samoa Road, and South I Street would be modified as a result of levee construction. The project would include the construction of three types of new levees including flood levees, eco-levees with benched slopes, and pond perimeter levees. The proposed levees in the project are designed to meander and avoid straight lines. The proposed design of these levees is described in the following:

- Eco-levees would have an approximate 2.5:1 slope on the outside and an approximate 10:1 slope on the inboard side. The eco-levee would be constructed to the same height as flood levees but would have a larger mass due to the gentle slope on one side. The eco-levees are intended to provide a band of transitional high marsh habitat by development of a gentle side slope facing the enhancement project. The eco-levees are designed to support a wider range of vegetation and provide a more diverse range of wildlife habitat than standard flood levees. The eco-levee is designed to curve and blend in with the natural environment.

- Flood levees would be constructed with a 2.5:1 side slope on both sides with flat tops using standard levee construction specifications. Flood levees would be constructed in locations where possible future restoration of adjacent property could occur. Straight lines will be avoided as much as possible

- Pond perimeter levees would be similar to the flood levee, and would be constructed with the capacity to contain the brackish marsh water up to the high tide line. The pond perimeter levee would be constructed surrounding the north and east sides of the brackish pond. The pond perimeter levee would curve with a minimal amount or straight lines.

The viewshed of Highway 101 from the Bayside Cut-off to the Mad River is protected as a Scenic Route (Arcata General Plan, 1985). The project site is a part of the western viewshed from Highway 101, which offers a distant view of Humboldt Bay and the Arcata Bottom. No details of the site can be viewed from Highway 101because the distance is over ½-mile. The project site blends into the viewshed of open pasturelands and wetlands. The project's proposed additional wetlands would be consistent with surrounding natural resource and agricultural land, and would not impact the quality of character of the Scenic Route views.

The views from SR 255 would not be blocked by the project's proposed construction of approximately 800-feet of new levees adjacent to the highway. The elevation of SR 255 is above 10-feet NGVD and the levees would be constructed to an elevation of +8.0 feet NGVD.

The views to the east and south from Old Samoa Road would be altered due to the construction of an eco-levee adjacent to the roadway. The levee would block views of the adjacent agricultural land, wetlands, and vegetation to the east. The levee would not block views of the forested hillsides to the east, or of the open land to the north and west of the road.

The views from South I Street would not be blocked by the levee system. South I Street in the vicinity of the project is located on portions of the existing levee system and is at an elevation that would allow for unobstructed views of Humboldt Bay. Views from South I Street would be enhanced by the project's construction of additional ponds and enhancement of wetland habitat.

Additionally, views to the north from South I Street and the Arcata Marsh and Wildlife Sanctuary will be improved by planting of trees and shrubs on the upland areas around the freshwater ponds. This will provide a visually break from the existing industrial buildings located on Highway 255.

The proposed project's potential long-term benefits to the scenic vista include the creation of new ponds and wetland features that would support riparian vegetation, increase wildlife viewing, and provide additional views, via the new trails, of Humboldt Bay.

Determination

The project would result in a less than significant impact on scenic vistas or resources.

Mitigation

4.3.2a Levees would be graded, curved, and smoothed to blend with the surrounding features. Native vegetation planted on levees will help structures blend in with the natural environment.
4.3.2b The existing bayfront levee from South I Street to the mouth of Janes Creek will be improved visually by removing existing concrete slabs from the levee sides.
4.3.2c The proposed bird blinds will be constructed with weathered barn lumber and will be placed in areas that are planted with heavy vegetation in order obscure them from view. The blinds will be constructed with a low profile as well.

4.3.3 Impacts Due to Creation of a New Source of Light or Glare

Discussion

The project would not include any new lighting or reflective surfaces that would cause glare.

Determination

The project would have no impacts due to creation of a new source of light or glare.

Mitigation Measure

No mitigation is necessary.

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1 – The No Action Alternative

Discussion

Under the No Action Alternative, the existing visual resources at the site would not change.

Determination

The No Action Alternative would have no impact on visual resources at the project site.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

Alternative 2's potential impacts by Alternative 2 on visual resources would be similar to those identified under the proposed project.

Determination

Alternative 2 would result in a less than significant impact on visual resources with the incorporation of the following mitigation measures.

Mitigation

Mitigation measures 4.3.1a through 4.3.1c, as described under the proposed project, above**.**

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

In regards to (1) the potential short-term effects on the existing visual character or quality of the project site during construction, and (2) impacts due to the creation of a new source of light or glare, Alternative 3 would have the same impact as described under the proposed project. Alternative 3's potential long-term effects on scenic vistas, highways, or scenic resources would be similar to those described under the proposed project. However, with Alternative 3's removal of the bayfront levee, the visual characteristics would potentially include more open waterways, seasonal woody debris, and rare plants. These visual characteristics are consistent with the existing viewshed and visual resources. Construction activities could result in temporary visual impacts that could be mitigated.

Determination

Alternative 3 would result in a less than significant impact on visual resources with the incorporation of the following mitigation measures.

Mitigation

Mitigation measures 4.3.1a through 4.3.1c, as described under the proposed project, above**.**

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

Under Alternative 4, the existing bayfront levee would be repaired by replacing the existing tidegates and raising the levee to 6.5 feet NGVC. Freshwater seasonal ponds would also be constructed. Implementation of Alternative 4 would maintain the general visual characteristics

of the levee. The freshwater marsh restoration would potentially improve the visual quality of the site. Construction activities could result in temporary visual impacts that could be mitigated.

Determination

Alternative 4 would result in a less than significant impact on visual resources with the incorporation of the following mitigation measures.

Mitigation

Mitigation measures 4.3.1a through 4.3.1c, as described under the proposed project, above**.**

4.4 PUBLIC FACILITIES AND SERVICES

The Public Facilities and Services section describes the impacts associated with implementation of the proposed Marsh Enhancement project on public facilities and services in the planning area, including water supply and distribution, wastewater treatment, flood control structures, solid waste, law enforcement, fire protection, schools, parks, and public utilities. See Figure 4.4-A for an illustration of existing public facilities. Additional analysis of flood control features of the project is described under Hydrology Chapter 3.1.

The primary public services and facilities that could be impacted by the project are the five PG&E transmission line towers that exist on the site. The towers need occasional maintenance and must be elevated above water from tidal action or flooding to avoid contact with the metal support structure. Since this site is already patrolled by the City it will not impact City Law Enforcement. The areas within the project that are sometimes used for illegal camping will remain accessible to law enforcement vehicles by way of the new levee and trail system. In addition, maintenance of the levee system, which serves as a flood protection facility, will be addressed in this section.

ENVIRONMENTAL SETTING

Public Utilities

Domestic Water Supply

The City of Arcata provides water and wastewater service to residences and businesses for areas of the City and portions of the Urban Services Area. Several small neighborhoods near the city limits are served by private wells and septic tanks.

Arcata's municipal water system currently uses about 2.5 million gallons per day, serving about 5,575 meters. This supply is purchased from the Humboldt Bay Municipal Water District (HBMWD) and distributed by the City. The water is obtained from horizontal collection chambers buried approximately 100 feet below the bed of the Mad River between Blue Lake and Arcata. The HBMWD treats the water by chlorinating it to kill disease organisms. Before distributing the water, the City of Arcata fluoridates it and boosts the chlorine concentration to prevent bacteria growth in distribution pipes. This water supply is of high quality, with all applicable drinking water standards being met consistently. During high flows in the Mad River, when the turbidity of the water increases, HBMWD sends it through a turbidity reduction facility. Arcata's water supply is currently limited by storage capacity, with the city's numerous storage tanks just able to provide the required one-day of firefighting water.

One well and small treatment building in north Arcata (near the intersection of Heindon Road and Giuntoli Lane) are currently providing 500,000 gallons of water per day. A 1998 City review of the water supply system prioritized upgrade projects, with the highest priority projects being to provide a backup tie between the HBMWD source and the City's distribution system,

add or replace pumps, and to add storage capacity (City of Arcata Water System Evaluation, SHN, 1998).

Flood Levees

Reclamation District #768 is responsible for maintenance of five miles of bayfront levee including several tidegates including the four 48-inch tidegates on McDaniel Slough. The District protects 1,483 acres of public and private lands from tidal inundation.

Wastewater Treatment & Disposal

Arcata's wastewater is treated by the City's wastewater treatment facility. The City regulates wastewater disposal, including industrial pretreatment standards, through Chapter 2, Title VII of the Arcata Municipal Code. Wastewater treatment at the Arcata plant includes the following steps (City of Arcata Wastewater Treatment Plant Master Plan Update, SHN & Montgomery Watson, 1996):

- Primary treatment using clarifiers (settling tanks) to remove solids and organic matter,
- Secondary treatment using oxidation ponds to remove additional organic matter,
- Additional organic matter and nutrient removal using treatment marshes,
- Chlorination,
- Mixing with outflow from the marshes at the Arcata Marsh and Wildlife Sanctuary, and
- Chlorination to kill disease organisms, followed by removal of the chlorine (which is toxic to aquatic life).

Eventually, almost all of Arcata's wastewater is discharged into the Humboldt Bay. Under normal conditions, about half of the treated wastewater is discharged to Humboldt Bay and the remainder flows through the Arcata Marsh and Wildlife Sanctuary (AMWS). About half of the AMWS outflow is returned to the treatment plant for mixing, and the rest discharged into Humboldt Bay.

Arcata's wastewater treatment system generally meets the discharge limits in its permit issued by the California Regional Water Quality Control Board. During high flows, the primary clarifiers and treatment marshes may be partly bypassed. Inadequate removal of suspended solids and BOD can result from high flows during wet winter weather. Inflow of storm water into the sewer system causes flows into the treatment plant to be much higher than normal, which dilutes the treatment plant inflow and reduces detention time in the plant. This seasonal condition makes it difficult to remove the required 85% of inflow concentrations. Some treatment stages must also be partially bypassed during high flows. During such events, most discharge limits are still met and no untreated water is released. The discharge pH is occasionally slightly low (acidic) in summer, apparently due to natural biochemistry in the treatment marshes.

To reduce wet weather flows, the City is conducting a program to reduce sewer inflows; the sewer system was inspected for leaks in 1998 and repair and replacement of sewer lines is underway. The City also recently installed new pumps in the treatment plant to reduce bypasses.

During the dry season (defined as any month without measurable rainfall), the treatment plant usually operates at less than 75% of its design flow capacity.

Solid Waste Collection

The City of Arcata has a three part solid waste program including waste reduction, recycling, and solid waste collection and disposal. The City of Arcata actively manages the collection and processing of recyclable materials, composting organic debris from the City's operations, and performance of recycling-related public education. A franchised contractor provides the solid waste collection and disposal.

The waste reduction component of the City's solid waste management includes community education, workshops, and other services available through the City's Environmental Services Department and the dissemination of information through the Arcata Community Recycling Center (ACRC).

Solid waste is currently collected by a franchised contractor and is transported to the Eureka transfer station, after which it is shipped to Dry Creek Landfill in Medford, Oregon. The Eureka transfer station is a publicly -owned facility of the Humboldt Waste Management Authority of which Arcata is a member agency.

Energy transmission

Energy transmission services in the City of Arcata are provided by PG&E. A PG&E transmission line extends across the McDaniel Slough site in an east-west direction. The line includes five towers on the site that require occasional maintenance. One of the towers is inaccessible to vehicle traffic due to the wetland characteristics of the site. The remaining towers are accessible to rubber tire vehicles during the dry season with minor grading work to clear vegetation. Periodic flooding renders all five of the transmission towers inaccessible to ground based equipment.

Public Services

Police Protection

Police protection is provided by the City of Arcata Police Department, based at the main station office at City Hall, 736 F Street, which is approximately one mile from the project site. The Department employs 24 sworn officers, 11 full-time, non-sworn personnel and several part-time, non-sworn community service officers[4]. The Arcata Police Department is part of the multi-agency Standardized Emergency Management System emergency response network.

The Arcata Police Department includes one Park Ranger who has regular patrol duties in the Arcata Marsh including the city-owned portion of the project area, Redwood Park and the Community Forest. The Park Ranger is responsible for Law enforcement in the McDaniel Slough Enhancement project area that includes the city limits and city-owned land.

[4] Personal communication: Pam Vallee cashier/clerk/typist City of Arcata Police Department March 23 2004.

The CDFG wardens provide law enforcement for natural resources for the State of California. The project site is partially owned by CDFG, and wardens would continue law enforcement activity at the site. CDFG wardens and land staff provide regular unscheduled visits to the site. Wardens respond to emergency calls placed on the CALTIP hotline and calls directly to the CDFG office, and 911 calls specific to wildlife.

The existing conditions at the site have resulted in illegal camping and transient use. These areas are somewhat inaccessible to typical law enforcement patrol because no trails exist to the sites.

Fire Response and Suppression

Arcata's fire protection is provided by the Arcata Fire District, which has three fire stations. The proposed project site would be served by the two stations located in Arcata. The first response would come from the main fire hall, 631 9th Street, with back-up provided from the Mad River Station, 3295 Janes Road. The Fire District staff includes one Chief, two Assistant Chiefs, one Administrative Captain, seven paid Firefighters, and approximately 50 volunteer Firefighters[5]. At a minimum, two paid firefighters and one chief are on duty at any given time. The Arcata Fire District is part of the multi-agency Standardized Emergency Management System emergency response network.

Schools

The proposed project site is located within the Arcata School District. School age persons in the area requiring public schooling from kindergarten through fifth grade attend either Sunset School of the Arts (2400 Baldwin) or Bloomfield School of Global Studies (1897 S Street). Grades six through eight are offered at Sunnybrae Middle School (1430 Buttermilk Lane). Public high school students would attend Arcata High School (1720 M Street).

In addition to the schools in the Arcata School District, there are several public and private schools in Arcata serving pre-school, kindergarten, elementary, middle, and high school students. Public schools include: North Coast Charter School Equinox Campus (470 Union), Coastal Grove Charter School (2400 Baldwin), Laurel Tree Charter School (1710 Janes Road), Jacoby Creek Charter School (1617 Old Arcata Rd, Bayside), Mistwood Center for Education (1928 Old Arcata Road, Bayside), and Pacific Union School (3001 Janes Road). (The private schools are: Arcata Christian School (1700 Union), Humboldt Bay Christian School (70 Stephens Lane, Bayside), and St. Mary's Catholic School (1730 Janes Road).

Licensed Child Care

The cities of Arcata and Eureka offer various types of childcare services for children of all ages. The numbers included in this section take into account only childcare providers who have opted to register with the Humboldt Child Care Council. The two cities have a combined total of 65 registered licensed family childcare homes and three center-based childcare programs (including

[5] Personal communication: Fire Chief Dave White, March 17, 2004.

full- and part-day facilities). There are also a combined total of 19 preschool facilities (including head-start programs). The types of childcare offered in Arcata and Eureka include care for infants (age two and under); preschool age children (two to five years); kindergarten children (age six, after school only); and first through sixth grade children (after school only). The majority of this care is provided by a combination of not-for-profit and for-profit private sources.

Medical Services

Medical services are available in Arcata and Eureka. Mad River Community Hospital is an 80-bed, acute care medical facility located on Janes Road in Arcata, approximately two miles from the plan area. St. Joseph Hospital is a full service 140-bed acute care facility located on Dolbeer Street in Eureka, approximately nine miles from the plan area. St. Joseph Hospital maintains 24-hour emergency/trauma services with a physician always on duty. Local physicians and dentists offer other health services in both Eureka and Arcata.

Communications

SBC (formerly Pacific Bell) provides basic telephone service in the plan area. Long-distance service, cellular telephone service, satellite TV, and internet services are available from a variety of companies.

IMPACTS EVALUATION CRITERIA

An impact to public facilities and services is considered to be significant if it meets any of the following criteria:

- The project would result in a the need for construction of new or physically altered police or fire facilities, the addition of personnel, or a decrease below acceptable police service ratios, response times, or other performance objectives.
- The project would create a need for new systems and supplies, or causes substantial alterations to water, wastewater, or power systems; or
- The project would create an additional demand for water, wastewater, solid waste, or electrical services that cannot be supplied by existing or funded facilities; or
- The project would create an additional demand for schools that cannot be met by existing facilities.
- The project would cause substantial disruption in utility service or access to public facilities
- The project would cause substantial damage to utilities, utility service or public facilities within the project area.

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

The project is currently patrolled by City Park Rangers however; the majority of the site is not currently regularly used by the public. The project has the potential to increase citizen calls complaining about hunting activities. This could result in increased patrol by CDFG law enforcement to the project site. Increased public use of the area after the project is completed could generate complaints by local conservation groups or concerned citizens.

The project would result in a less than significant impact to public services.

4.4.1 Impacts to Fire Protection and Emergency Medical Services

Discussion

The project would not increase population growth, therefore it is not anticipated that the project would increase the need for fire protection or emergency medical services or affect service ratios or response times of these public services.

The fire hazard at the site is low because the wetlands, canals, and stream channels provide fuel breaks and keep vegetation moist throughout most of the dry season. The project would further reduce fire hazard by enlarging the slough channel network and maintenance of the trail system which would serve the same purpose as fire breaks. Construction of the ponds would also eliminate some of the grasslands adjacent to the surrounding industrial areas, and replace it with open water and riparian vegetation.

Determination

Less than significant adverse impact.

Mitigation

No mitigation necessary.

4.4.2 Impacts to Police Protection

Discussion

The project site is currently used by hikers, hunters, bird watchers, and transients who utilize the CDFG access, the Bayfront levee illegally, and the areas directly north of the existing Arcata Marsh. The project would increase use on the east side of the site and would increase the area needing regular patrol by the City Ranger. However, the project is currently patrolled by the City Ranger due to illegal camping activity on the site.

The level of use on the west side of the project would change only slightly. Additional patrol by wardens would not be required.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

4.4.3 Impacts to Utility Transmission Systems

Discussion

The City of Arcata Environmental Services staff has been meeting with PG&E to develop project design measures to avoid impacts to transmission line towers. One of the towers would become inaccessible by car or truck due to introduction of tidal influence; however, PG&E staff has indicated that maintenance can be completed using a helicopter. Incorporating the footing into an island will protect this tower. A second tower, located near the existing CDFG access parking area, would become inaccessible to heavy equipment during high tides. If required by PG&E, a short boardwalk would be constructed to provide access to the tower. Access to the two towers located on the east side of Janes creek will be improved due to construction of the bayfront trail, and the eco-levee adjacent to the brackish pond. Tower access roads will be incorporated into the levee footprint. Access to the tower on the west side of the project will be improved by construction of the eco-levee which could be used for vehicle access to the tower.

In addition to access for maintenance, the towers have been constructed to ensure that no standing water makes contact with the metal support structure. Salt water could cause corrosion of the structure and could also cause grounding to occur under some circumstances. The towers' metal supports are anchored onto a concrete foundation that elevates the metal structure approximately six feet above the ground surface. This cement base can be expanded, if needed, to increase the height to protect against extreme high tides or floods. In this case, the elevations of the towers would not be altered.

Undergrounding and or routing the transmission lines around the project area was determined not to be economically feasible.

Determination

Less than significant adverse impact with the incorporation of mitigation measures.

Mitigation

The City will provide access and prevent damage to the towers by:

- **4.4.3a** Developing a soil fill buttress surrounding the tower foundations. The buttress would be composed of material excavated from the pond areas. The buttress would be a circular mound of material surrounding the foundation to provide additional stability to the site, as well as provide a zone above flood elevations from which crews can perform maintenance.
- **4.4.3b** Constructing a boardwalk for pedestrian access to the towers.
- **4.4.3c** Extending the concrete base foundations to a higher elevation to protect against corrosion.

4.4.4 Impacts to Water Supply, Wastewater Treatment, and Solid Waste Disposal

Discussion

The project would not create a new demand or use for water. The project would not create additional wastewater. The project would generate only a minimal amount of solid waste during construction and would not generate solid waste after implementation.

Wastewater from the discharge point at the chlorine contact basin will be released to the brackish pond, and will be adjusted in order to achieve ideal brackish conditions. The water will be piped in the same pipe as currently carries the wastewater to Allen pond. However, the water will have to travel beyond Allen to the inlet for the new brackish pond. This will require a shallow excavation and installation of approximately 150-linear-feet of pipe.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

4.4.5 Impacts to Schools

Discussion

The project would not create an increase in population and therefore would not create a need for new schools or increase any school population. The project would not result in a change in funding availability for schools because funds were allocated for the project from a previous fiscal budget and cannot be reallocated to schools in the current fiscal year. Therefore, the money available for this project would not alter the current school funding. The project would improve access to creeks, wetlands, and Humboldt Bay for class fieldtrips and special educational programs.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

4.4.6 Impacts to Flood Levees

Discussion

The project will facilitate the construction of a perimeter levee system capable of withstanding a 100-year storm. This new system will allow the Reclamation District #768 to abandon maintenance of 0.75 miles of the existing bayfront levee and the associated tidegates on McDaniel Slough. The District will realize a long-term cost savings from the proposed project. The City of Arcata and CDFG will be responsible for maintenance of the new levee system. Maintenance is not expected to be of significant concern for many years following construction.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Impacts and mitigation for project alternatives

Alternative 1 – The No Action Alternative

Discussion

Under the no action alternative, existing conditions would not be modified. The existing bayfront flood control levee would continue to be vulnerable to storm damage;

Determination

Potentially significant adverse impact.

Mitigation

The Reclamation District #768 and other agencies would need to increase level of maintenance to avoid an unwanted levee breach.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

Alternative 2 would result in similar public facility related impacts to those identified in the proposed project.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

Alternative 3 would result in similar public facility related impacts to those identified in the proposed project.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

Alternative 4 would result in similar public facility related impacts to those identified in the proposed project. There would be a need for the Reclamation District #768 to invest in significant bayfront levee repair to ¾-mile of levee that borders the project area that would not occur under the proposed project.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Boundaries
- Project Boundary
- Arcata City Limits

Transportation
- Streets

Facilities
- Boat Launch

Zoning Designations
- Public Facility [P-F]
- Public Facility-Parks [P];[PPD]

Infrastructure
- Sanitary Sewer
- Sewer Manhole
- Sewer Lift Station
- Water Line
- Storm Drains
- PG & E Tower

Water Features
- Streams
- Waterbody

Source: City of Arcata GIS

Figure 4.4-1
McDaniel Slough EIR
PUBLIC FACILITIES

4.5 RECREATION AND OPEN SPACE

The Recreation and Open Space section describes the impacts associated with implementation of the proposed Marsh Enhancement Project on hunting, bird watching, and hiking within the project. In addition, the impacts related to expanding public access from the existing Arcata Marsh are described.

ENVIRONMENTAL SETTING

The project site is located adjacent to the Arcata Marsh and Wildlife Sanctuary (AMWS), which is one of the most popular recreation facilities within the City of Arcata. The project site can be accessed from many of the trails and visitor use areas within the AMWS. Currently, the McDaniel Slough site itself (City owned portion) is undeveloped for recreational facilities. In addition, the access road from the AMWS is overgrown with vegetation and has a rough, uneven walking surface.

California Department of Fish and Game (CDFG) maintain public parking and access on the western portion of the Mad River Slough Wildlife Area. The area accessible from the access point is primarily agricultural wetlands, shallow open water wetlands, and drainage channels. Public trails are limited.

The spruce and shore pine forest located in the northeast portion of the site is also used for recreation. A series of "way" trails exists between South I Street and the Bay. "Way" trails are trails that have formed by repeated use of a route without proper design, layout or construction. The area is used for illegal overnight camping, drinking, and partying activities. These prohibited uses have resulted in improper waste disposal including discarded camping supplies.

IMPACTS EVALUATION CRITERIA

This section lists the thresholds used to assess the potential for the proposed project to result in significant impacts to recreation.

Based on the *CEQA Guidelines, Appendix F* a recreation and open space impact is considered significant if the project would:

- Conflict with the established recreational and educational use of the site;
- Substantially interfere with public access to an established recreational area;
- Substantially degrade the recreational experience of an area;
- Create project-related operational or construction activities that would cause a substantial long-term disruption of any institutionally recognized recreational activities; or
- Create an increase in the use of existing neighborhood and regional parks or other recreational facilities, such that such that substantial physical deterioration of the facility would occur or be accelerated.

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

4.5.1 Impacts Due to Conflicts with Established Recreational and Educational Uses of the Site

Discussion

The Proposed Project includes public recreational facilities related to the project. Proposed recreational features include a pedestrian trail, interpretative sites, picnic tables and benches, and areas for wildlife viewing. The proposed trail would loop around the proposed ponds and a spur would allow walking to the mouth of McDaniel Slough. The loop trail and spur would be approximately 1.3 miles in length, and would connect with existing Arcata Marsh and Wildlife Sanctuary (AMWS) trails (see Figure 4.5-1). The trails are proposed to have an all weather travel surface, such as compacted gravel. To continue to provide wildlife habitat protection from human disturbance, trails on the Department of Fish and Game Mad River Wildlife Area are located to the west of the project site.

The site would be accessible on a year-around basis. Most of the anticipated use would occur during spring, summer, and fall seasons. Winter use would be limited by weather conditions, and restricted access due to flood conditions. Dogs on the City's portion would be permitted only on leashes. On the CDFG portion, dogs would be permitted only during the waterfowl hunting season (generally October 30th through January 30th).

In addition to attracting recreational users, the proposed site would also provide continuing educational opportunities for studying both wildlife and beneficial uses of treated wastewater. Outdoor interpretative sites would inform visitors about the surrounding ecosystem, wildlife species, and habitat restoration. Docent led walks by the Redwood Region Audubon and Friends of Arcata Marsh would be expanded to the McDaniel Slough project area and include wetland enhancement interpretation as well as natural history.

Access to the project's recreational facilities will be from a trailhead on South I Street. Existing parking facilities plus three new parking slots along the road will meet the needs. There are existing parking sites on South I Street (1,200 feet south) and due east (650 feet).

Visitors to the City's portion of the project site would typically arrive in small groups, dispersed throughout the day. Weekend and holiday use would be higher than weekday use. Once on the site, visitors would be expected to disperse along the trails, resulting in a low density of people in any one area. The AMWS personnel have found that their facility is visited year-round; winter visitors are more likely to be bird-watchers; summer visitors are more likely to be tourists. They also found that most visitors were repeat visitors, implying that first-time visitors found their initial visit rewarding enough to want to come back.[6] Recreational use of the project site would be mostly passive (walking, hiking, jogging, and wildlife-viewing). Visitors to the Mad River Slough Wildlife Area would be somewhat consistent with what occurs on the City's AMWS.

[6] Source: Denise Homer, AMIC, phone conversation 2/5/02

However, other users, i.e. waterfowl hunters would be expected on the MRSWA where this activity is permitted.

The project would not conflict with any established recreational or educational sites because current recreational uses at the site will be expanded. The adjacent recreational uses of the AMWS will be enhanced by the project because it would provide additional trails for recreation and environmental education. On the CDFG portion, dogs for hunting purposes only, would be permitted during the waterfowl hunting season (generally October 30th though January 30th).

Determination

The proposed project would have no impacts due to conflicts with established recreational or educational uses of the site.

Mitigation

No mitigation is necessary.

4.5.2 Impacts Due to Interfering with Public Access, Degrading the Recreational Experience, Increasing the Use of Existing Facilities, or Due to Long-Term Disruption to an Established Recreational Area

Discussion

During construction of the project, some traffic control may occur on South I Street, but the AMWS trails and access road would remain open to the public. The MRSWA would remain open during construction including the existing parking lot west of the project area.

Long-term disruption of recreational activities would not occur due to the project's operational or construction related activities, which would take place primarily during the first year of implementation. The proposed project includes elements to construct recreation facilities, such as a walking/hiking trail, informational kiosk, and bird-watching blinds. The project design would incorporate measures to ensure that significant impacts do not occur. Regular maintenance of trails, use of power equipment for vegetation planting and exotic vegetation control, and long-term maintenance of the levee system would occur. These operations would not cause a long-term disruption of recreational activities.

The proposed project may increase recreational use of the adjacent AMWS and MRSWA. However, the increased use is not anticipated to result in a significant impact because the potential visitor increase would be offset by additional recreational facilities (trails, parking, bird blinds). The project would not cause an increase in the use of an existing neighborhood park because the primary access point to the new recreational facilities is within the existing AMWS. The secondary access point on Old Samoa Road is reached via Samoa Boulevard. (SR 255) and does not travel through a neighborhood. In addition, the Old Samoa Road access area is expected to receive only a small increase in visitation.

Visitation to regional parks would not increase due to the project because the existing AMWS already has a high level of marketing and press coverage, and the expansion would most likely

attract visitors who would already or otherwise use the facilities. The project would not cause an increase in use of other regional neighborhood parks.

No permanent degradation of a recreational experience would occur due to implementation of the project. The project would have long-term benefit to the recreational experience by enlarging the existing AMWS, providing additional trails for hiking, establishing habitat for more biological diversity, and adding a diversity of views and environments for visitors to experience. It is possible that by providing additional area for recreational uses will reduce the intensity of use on the existing trail system at the AMWS.

Determination

The proposed project would have a less than significant adverse impact on recreational resources in regard to public access, the quality of an existing recreational experience, use of existing facilities, and long-term disruption to an established recreational area.

Mitigation

No mitigation is necessary.

IMPACTS AND MITIGATION FOR PROJECT ALTERNATIVES

Alternative 1 – The No Action Alternative

Discussion

Under the No Action Alternative, there would be no change to the existing recreational facilities, recreational opportunities, or open space at the site.

Determination

The No Action Alternative would have no impact on recreation and open space resources at the project site.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

Alternative 2's potential recreation and open space impacts are similar to those described under the proposed project. This alternative would create less trail length than the proposed project.

Determination

Alternative 2 would have a less than significant impact on recreation and open space resources at the project site. This alternative would not prevent the use of the bayfront levee as a trail at some point in the future.

Mitigation

No mitigation is necessary.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

Alternative 3's potential recreation and open space impacts are similar to those described under the proposed project. Alternative 3 would include construction of a new flood control levees along the project site boundary, and this levee would be made a designated trail. The replacement of an unofficial recreational trail with a designated recreational trail is considered a beneficial impact of the project. This alternative would prevent any future use of the existing informal bayfront levee as a trail. However the new levees could become a future bayfront trail.

Determination

Alternative 3 would have a less than significant impact on recreation and open space resources at the project site.

Mitigation

No mitigation is necessary.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

Alternative 4's potential recreation and open space impacts would be similar to those described under the proposed project, with the exception that under Alternative 4 the bayfront levee would be repaired and therefore illegal access to the entire informal use of the levee as a trail would continue. This alternative would not include a loop trail system and results in less trail length than all but the No Project Alternative.

Determination

Alternative 4 would have a less than significant impact on recreation and open space resources at the project site.

Mitigation

No mitigation is necessary.

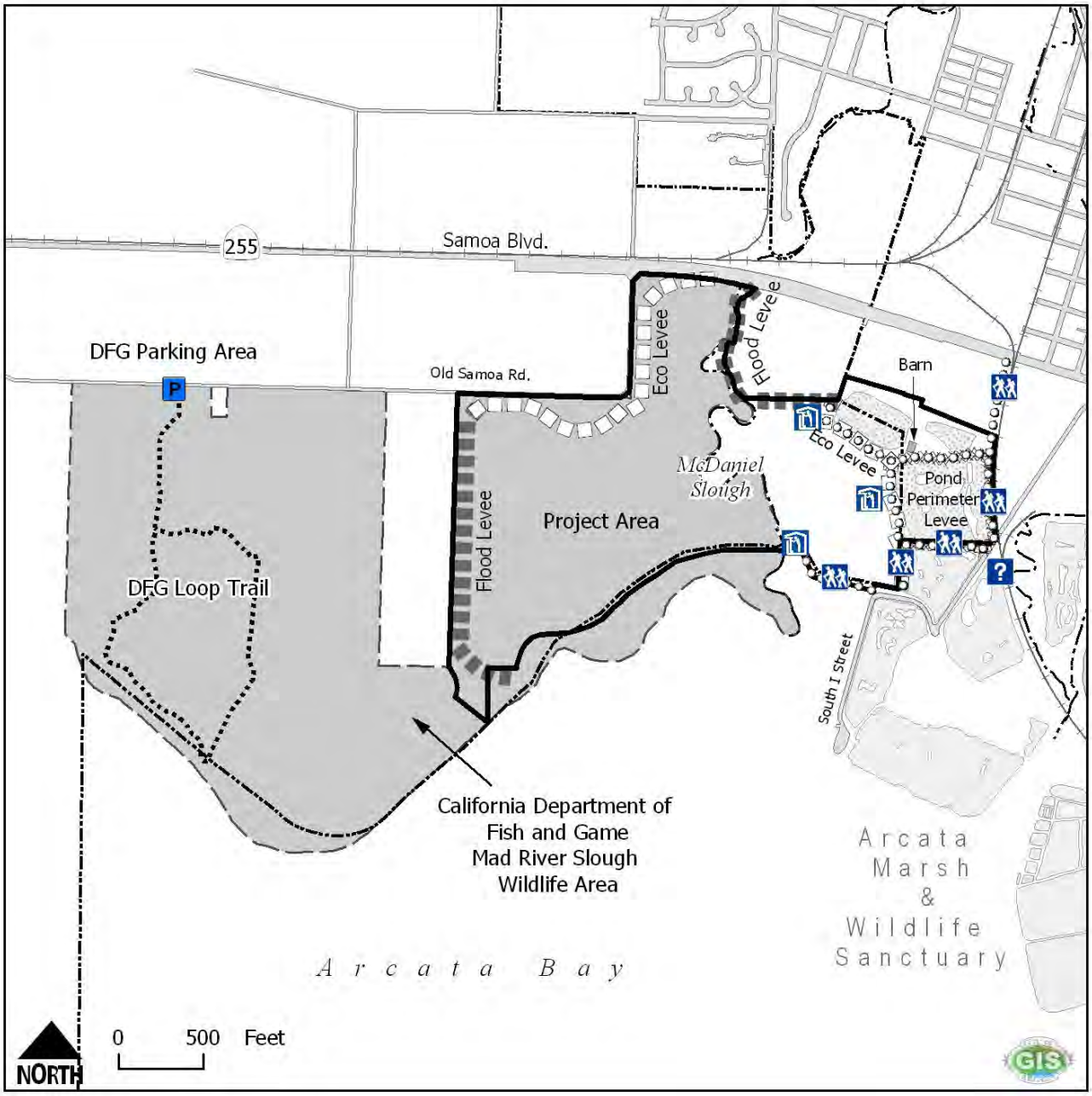


Figure 4-5 - 1
McDaniel Slough EIR

PROPOSED RECREATIONAL FACILITIES

Boundaries
- Project Boundary
- Arcata City Limits

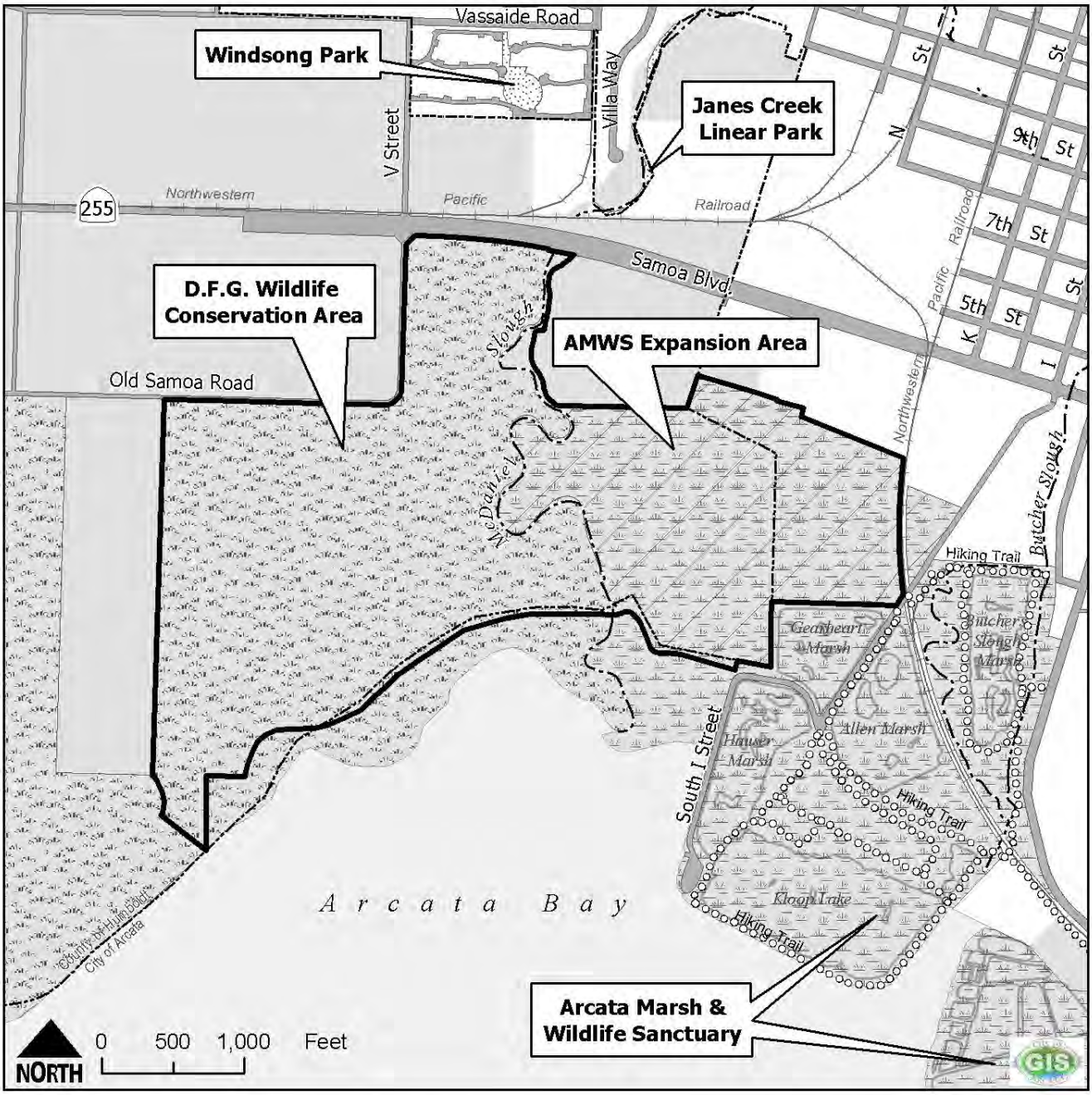
Transportation
- Railroad
- Streets

Water Features
- Streams
- Waterbody

Proposed Recreational Facilities
- Trail
- Bird Blind
- Information Kiosk

Proposed Features
- Flood Levee
- Eco-Levee
- Pond Perimeter Levee
- Proposed Waterbody

Source: City of Arcata



Boundaries
- Project Boundary
- Arcata City Limits

Water Features
- Streams
- Waterbody

Transportation
- Railroad
- Streets
- Hiking Trail

Parks & Open Space
- AMWS Expansion Area
- Arcata Marsh & Wildlife Sanctuary
- DFG-Wildlife Conservation Area
- City Parks
- Zoning Designations: Agriculture/ Agriculture General/NR/Parks

Source: City of Arcata GIS & Humboldt County Community Development Services

Figure 4-7
McDaniel Slough EIR
PARK *4.5 - 2*
OPEN SPACE

4.6 CIRCULATION

The Circulation section describes the proposed Marsh Enhancement Project's potential impacts on roads, public transportation, bicycle, and pedestrian facilities.

ENVIRONMENTAL SETTING

The existing roadway system in Arcata is a system of highways and streets comparable to many similar sized communities. Arcata has three signaled intersections, all of which are located on SR 255 (Samoa Boulevard). Primary streets in the more urban downtown and commercial districts are mostly two-lane streets with gutters, curbs, and sidewalks. Many local streets (primarily in residential and industrial areas) and rural roads often have only road shoulders or non-continuous sidewalks.

The roads adjacent to the project site are Samoa Boulevard, Old Samoa Road, and South I Street. Samoa Boulevard is the main access road to the south end of Arcata. Samoa Boulevard is classified as an arterial street, which has the primary function of providing intra-city mobility as efficiently as possible. Samoa Boulevard is a 4-lane city street and is one of the highest volume streets in Arcata. No bike lane exists on Samoa Blvd in the vicinity of the project; sidewalks exist west of K Street.

Old Samoa Road is a classified rural road with a narrow, variable width, which allows vehicles to pass at low speeds. Old Samoa Road is used to serve isolated farms and residences south of SR 255. Old Samoa Road does not have a bike lane or sidewalks. The road has a low volume of use.

South I Street terminates at the east edge of the project site. It is classified as a local street, which primarily provides low-speed roadway access connecting abutting parcels of various land uses including residential, commercial, and industrial. South I Street is the main access road to the parking lot and boat launch at the Arcata Marsh. South I Street does not have a bike lane or sidewalks. South I Street has low to moderate volumes of use by vehicles, bicyclists, and pedestrians traveling to and from the Arcata Marsh.

Public Transportation

The City of Arcata's existing public transit is provided by the Arcata & Mad River Transit System (A&MRTS) and the Humboldt Transit Authority's Redwood Transit System (RTS). The A&MRTS has two bus routes that serve destinations within the city. The RTS mainline route provides bus service from Trinidad to Scotia along the HIGHWAY 101 corridor, with four stops in Arcata.

The project site is not located directly along the existing RTS or A&MRTS bus routes. The project site is, however, within walking distance (approximately two blocks) to two A&MRTS bus stops: one at H Street and 5th Street, and another at F Street and 6th Street (Uniontown

Square). The closest bus stop for the RTS is at the Arcata Transit Center on F Street between 9th and 10th Streets.

Pedestrian and Bicycle Facilities

Arcata's pedestrian system consists primarily of sidewalks and pedestrian crosswalks on several public streets. The city's bike system consists of bike lanes (Class II facilities) and bike routes (Class III facilities) on designated streets. The City of Arcata supports alternative transportation modes and emphasizes pedestrian and bicycle systems as significant transportation options.

The project site does not currently have any bike or pedestrian facilities. The project site itself has minimal use by pedestrians, although pedestrian use on the adjacent property to the east is very high due to the Arcata Marsh roads and trails. The project site will not be accessible using bike lanes and bike routes, and there is no bicycle use within the project site.

IMPACTS EVALUATION CRITERIA

An impact to the circulation system would be significant if the project conflicted with the City's adopted policies supporting alternative transportation. The City's policies are stated in the Arcata General Plan 1985 as follows:

> The City should support a balanced transportation system which increasingly emphasizes alternative transportation modes and de-emphasizes reliance on the private automobile.[7]

In addition, based on the CEQA Guidelines, a project's circulation impact is considered significant if the project would:

- Causes the level of service (LOS) at local or regional roadway network intersection(s) to drop below LOS C for average daily trips (ADT) and LOS D for peak hour traffic;
- Increase the potential for accidents or otherwise cause safety concerns; or
- Interfere with the emergency response ability of the Fire or Police Departments.

An impact to public transit is considered to be significant if it meets the following criteria:

- An increased demand for public transit services requires the addition of new facilities or resources; or
- Conflict with adopted policies supporting public transportation.

An impact to pedestrian and bicycle systems is considered to be significant if it meets any of the following criteria:

[7] Public Facilities Chapter, Policy 2. General Plan Land Use Designations, Appendix H: Proposed Development. Review Criteria for Urban Expansion Areas.

- An increased demand for pedestrian and/or bicycle facilities requires the addition of new facilities; or
- An increased potential for bicycle or pedestrian accidents and/or safety concerns causes existing facilities to be out of compliance with any adopted policies or regulations.

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

4.6.1 Impacts Due to Project-Related Traffic

Discussion

The proposed March Enhancement project would not cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system. During project construction, the number of construction-related vehicles in the area would increase slightly. Although this type of traffic may be noticeable because it includes large construction vehicles and City vehicles, it would have little effect on street and intersection capacities, and any effect would be temporary (i.e., during the project construction phase). The majority of project traffic would use the access point on Samoa Boulevard, which is the highest capacity street in the project vicinity.

Project-related traffic would include vehicles used by construction crews to access the site during construction, and trucks being used to transport materials and heavy equipment to the site. Materials for levee construction and marsh plain development would be generated by excavation of the brackish and fresh water ponds. Most of the traffic would be internal to the project site using temporary roads. Excavated material will remain on site and therefore will not be transported on public roadways.

Construction crews would use four main access points to the site. Two access points are located on South I Street north of the Arcata Marsh boat launch. Another access point is located off of SR 255 to the west of the Industrial Electric building. This access is an existing driveway with a gate that was used to access the livestock paddocks to the west of the former barn. The last access point is located on Old Samoa Road at the CDFG hunting access parking area.

Traffic on the roads adjacent to the project is light. On Old Samoa Road, traffic is minimal and occurs intermittently throughout the day. Traffic on South I Street is due to recreation access and is low volume during the peak hours when construction vehicles would be using roads. Traffic on Samoa Blvd. (SR 255) is greater than on any of the other access roads. The Level of Service (LOS) for Samoa & G and Samoa & H is A. However the LOS for Samoa and K is F during the afternoon peak. Since trucks will be traveling on site, hauling fill from the pond excavation areas to the levee construction areas traffic increases due to construction related vehicles would be minimal.

Determination

The proposed project would cause a small increase in traffic during construction. The proposed project would have a temporary and less than significant impact on the circulation system.

Mitigation

No mitigation is necessary.

4.6.2 Impacts Due to an Increase in the Potential for Accidents or Safety Concerns on Public Roads

Discussion

The proposed project would result in a less than significant impact to accident potential and safety concerns. The project would generate additional traffic on roads adjacent to the project for transportation of workers and some materials during construction. The majority of the transportation of materials such as rock and earth fill would be gathered and reused on site, and therefore would not be hauled on public roadways. The project does not include any new roads or any new intersections.

The project would not include the permanent closure or alteration of roads. During construction, traffic control would occur during any portions of work when equipment operation is occurring within or immediately adjacent to a road right-of-way. Traffic control would also occur during loading and unloading of equipment from transport vehicles.

Determination

The project would result in less than significant impacts to potential accidents or safety concerns on public roads.

Mitigation

No mitigation is necessary.

4.6.3 Impacts Due to an Increased Demand for Public Transit Services

Discussion

The proposed project would not increase use of the public transit system because the project site is generally not serviced by public transit. The issue of providing transit service to the Arcata Marsh has been investigated in the past, with the City determining that it is not financially feasible. The existing transit system is already under-funded for the existing routes, and no additional routes or extensions to existing routes are currently feasible.

The project would also not induce a demand for additional public transit services because it would not significantly increase use of the Arcata Marsh. The marsh enhancement would disburse visitors using the marsh trails, but would not significantly increase overall use of the area.

Determination

The proposed project would have a less than significant impact on increased demand for public transit services. The project would result in no impacts due to conflicts with adopted policies supporting public transportation, or on adopted policies promoting or supporting alternative transportation.

Mitigation

No mitigation is necessary.

4.6.4 Impacts Due to an Increased Demand for Pedestrian and/or Bicycle Facilities and the Potential for Accidents

Discussion

The project does not involve construction of new bike lanes or routes, and would not require the addition of new facilities. No part of the project construction is within or adjacent to an existing bike lane or route. The project would construct new pedestrian trails on-site; these trails would be closed to bicycles due to wildlife concerns. The proposed pedestrian trails would not generate conflicts between pedestrians and bicycles or motor vehicles and therefore would not increase the potential for accidents.

Determination

The project would result in no impact to bicycle or pedestrian facilities, accidents, or safety concerns.

Mitigation

No mitigation is necessary.

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1 – The No Action Alternative

Discussion

Under the No Action Alternative, the existing circulation environment at the site would not change. The No Action Alternative would not change existing conditions for public transit and bicycle and pedestrian facilities and safety.

Determination

The No Action Alternative would have no impact on circulation at the project site, including traffic, public roads, public transit, bicycle and pedestrian facilities.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

Under Alternative 2, potential circulation impacts would be the same as discussed under the proposed project.

Determination

Alternative 2 would result in less than significant impacts to circulation.

Mitigation

No mitigation is necessary.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

Under Alternative 3, potential circulation impacts would be the same as discussed under the proposed project.

Determination

Alternative 3 would result in a less than significant impact on the circulation system.

Mitigation

No mitigation is necessary.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

Under Alternative 4, potential circulation impacts would be less than the proposed project and Alternative 2 and 3. Less heavy equipment would be involved as the project area perimeter levees would not be constructed.

Determination

Alternative 4 would result in a less than significant impact on the circulation system.

Mitigation

No mitigation is necessary.

Boundaries
- Project Boundary
- Arcata City Limits

Water Features
- Streams
- Waterbody

Street Classifications
- Highway
- Arterial Street
- Collector Street
- Local Street
- Rural Road
- Access Road(Unimproved)

Bicycle Lane
- Bicycle Lane(Class II)

Hiking Trails
- Hiking Trail

Railway Line
- Railroad

Source: City of Arcata General Plan 2020

Figure 4.6 - 1
McDaniel Slough EIR
CIRCULATION

4.7 POPULATION AND HOUSING

The Population and Housing section describes the proposed Marsh Enhancement Project's potential impacts on population growth and displacement of people or potential housing locations. This section describes the Census 2000 population statistics for the City of Arcata.

ENVIRONMENTAL SETTING

The City of Arcata has an estimated population of 16,651 (Census 2000) occupying 7,051 households. The Arcata General Plan: 2020 plans for a population of 20,000 by the year 2020, with majority of the growth taking place within the existing urban services area.

The closest population areas to the project site are north of SR 255 and east of South I Street where there are combinations of industrial, commercial, and residential uses. The closest housing east of the project is 600 feet on H Street. The closest housing north of the project is 1,500 feet away, on K Street. No residences exist on the project site.

IMPACTS EVALUATION CRITERIA

An impact is considered to be significant if the project would result in any of the following effects:

- Induce substantial population growth in the area, either directly (by proposing new homes and businesses) or indirectly (through the extension of roads or other infrastructure); or

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

4.7.1 Impacts That Induce Population Growth

Discussion

The proposed project does not propose to add either new homes or businesses, nor extend or alter any roads. The project would improve the levee system adjacent to McDaniel Slough; this change would not alter growth potential in the surrounding areas. No other infrastructure improvements would be made that would induce growth.

The project would result in no impacts related to displacement of housing or people. The project is located in an area zoned for agriculture and natural resources related land uses. The site is considered to be almost entirely a wetland due to annual flooding, the existence of wetland plants, and wetland soils and therefore would not be eligible for housing development.

Determination

No housing exists on the site and no new housing is proposed. The project would not result in adjacent housing or people being displaced. The proposed project would have no impacts resulting in the displacement of housing or people. The project would result in no impact to population growth because it would not induce population growth.

Mitigation

No mitigation is necessary.

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1 – The No Action Alternative

Discussion

The No Action Alternative would not change the existing availability of housing, or increase the demand for housing in the project site area or vicinity, or induce population growth in the area.

Determination

The No Action Alternative would have no impact on population and housing conditions.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

In regards to environmental impacts on population and housing, Alternative 2 would result in the same effects as described for the proposed project.

Determination

Alternative 2 would have no impact on population and housing conditions.

Mitigation

No mitigation is necessary.

Alternative 3 – Full Tidal Marsh Restoration with Bayfront Levee Removal

Discussion

Alternative 3 would result in the same population and housing effects as described for the proposed project.

Determination

Alternative 3 would have no impact on population and housing conditions.

Mitigation

No mitigation is necessary.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

Alternative 4 would result in the same population and housing effects as described for the proposed project.

Determination

Alternative 4 would have no impact on population and housing conditions.

Mitigation

No mitigation is necessary.

4.8 AGRICULTURAL RESOURCES & LAND CONVERSION

The Agriculture & Land Conversion section describes the impacts associated with converting the site from agricultural to natural resources uses resulting from the implementation of the proposed Marsh Enhancement Project.

ENVIRONMENTAL SETTING

Existing Agricultural Uses

Based on the 1985 Arcata General Plan, most of the project area is designated for agricultural uses (Agricultural Exclusive A-E land use designation), the remainder of the project area is designated Natural Resource Conservation. The project site has been used for agriculture purposes over the past 100 years. This site still has livestock holding pens used for preparing animals for loading onto trucks.

Currently, seasonal livestock grazing occurs on approximately 67 acres of the total 240 acre project site. The current lease agreement allows for unlimited animal units to graze on the site for $100 dollars/year, and the lease comes up for renewal annually. The lease agreement provides for its termination prior to the beginning of the project's construction phase.

Humboldt County LCP/Arcata LCP Applicable Land Use Plans, Zoning, and Ordinances

In general, the classification for determining prime agricultural land is the Storie Index, a classification system based on soil profile, surface texture, slope, and soil limitations. According to the definitions in the Arcata General Plan (1985) and the Humboldt County General Plan, the proposed project site is not considered prime agricultural land. The Arcata General Plan (1985) states, "Agriculturally suitable land (60% and above on the Storie Index) should be preserved for agricultural use, wherever possible. Grade1 and Grade 2 agricultural land shall not be developed" (Conservation and Open Space Policy 3). The Humboldt County General Plan lists the Storie Index of prime agricultural land as 80-100.

According to *Soils of Western Humboldt County*, a soil survey conducted in 1960s, the project site contains Bayside silty clay loam (Ba2 and Ba3) and Loleta loam (Lo3), which are all poorly or imperfectly drained soils with 0-3% slopes. The Ba2 soils have a Storie Index rating of 36 and Ba3 soils have a Storie Index rating of 49. The Storie Index for Lo3 soils is 52; thus, the project area does not qualify as prime agricultural land under either the Arcata General Plan or the Humboldt County General Plan definitions.

The Humboldt County General Plan has definitions for prime agricultural lands based on livestock capacity and agricultural production. The project area does not qualify as prime agricultural land under these definitions either. Due to seasonal, prolonged wet periods, the project area soils are unable to accommodate year-around livestock or agricultural production. These constraints limit the land's viability as prime agricultural land.

IMPACTS EVALUATION CRITERIA

Based on the CEQA Guidelines, a land conversion impact is considered significant if the project would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to non-agricultural use.
- Conflict with existing zoning for agricultural use, or a Williamson Act contract, or
- Involve other changes in the existing environment, which, due to their location or nature, could individually or cumulatively result in loss of farmland to non-agricultural use.

IMPACTS AND MITIGATION FOR THE PROPOSED PROJECT

4.8.1 Impacts Due to Conversion of Agricultural Land

Discussion

This project does not involve a change in land use designation that would conflict with agricultural use or a Williamson Act contract. The Arcata 1985 General Plan land use designation of the project site, Agricultural Exclusive, preserves the land for agricultural purposes. The Arcata General Plan 2020 land use designation for the project site, Natural Resources – NR also allows for continued grazing on this land. However, General Plan 2020 is not applicable in the coastal zone as it has not yet been submitted for certification by the California Coastal Commission.

Based on the Arcata General Plan 1985, the Humboldt County General Plan, and the California Department of Conservation Farmland Mapping and Monitoring Program, none of the land within the project area is considered prime farmland, unique farmland, or farmland of statewide importance. As described previously, a Storie Index rating of 60 to 100 is required for land to be designated prime farmland, and the project area does not meet this test. For farmland of statewide importance, land must have been used for the production of irrigated crops. To qualify as unique farmland, the land must have been used for the production of high economic value crops such as oranges, olives, or cut flowers. The minimum conditions required for designation of the project site as either farmland of statewide importance or unique farmlands are not present.

The project site is currently subject to seasonal flooding and soil saturation and is available for agricultural uses only during the dry season. The proposed project would cause greater saltwater inundation of the project site, resulting in the loss of grazing vegetation and its replacement by salt tolerant vegetation, according to the Restoration Plan for the McDaniel Slough Tidal Marsh,

(PWA Associates, 2002) a vegetative tidal marsh colonized by salt tolerant plants, such as pickleweed or cord grass, is expected to develop within 10 years. Salt tolerant vegetation is not edible by livestock, which would preclude continued grazing on most of the project site.

Upon project commencement, the portion of the project site that is currently used for grazing (approximately 67 acres) will be no longer suitable for agricultural uses. Therefore, once project related construction begins, livestock grazing within the project area will be discontinued. The City of Arcata has stated that CDFG will make portions of its adjacent lands available for agricultural purposes to compensate for the loss of grazing lands as part of the project.

Determination

The impact of converting prime farmland, unique farmland, or farmland of statewide importance to non-agricultural use is less than significant. No mitigation is required

The impact of a conflict with existing zoning for agricultural use, or a Williamson Act contract is less than significant. No mitigation is required.

The project site will be inundated during periods of high tide and will no longer be suitable for grazing. Therefore, the proposed project will result in the loss of farmland to non-agricultural use.

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1 – The No-Action Alternative

Discussion

Under the no action alternative, existing conditions would not be modified; therefore there would be no impact to agricultural resources.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 2 – Full Tidal Restoration with Bayfront Levee Breach

Discussion

Alternative 2 would result in similar impacts related to the conversion of agricultural land to those identified in the proposed project.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

Alternative 3 would result in similar impacts related to the conversion of agricultural land to those identified in the proposed project.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 4 – Bayfront Levee repair with freshwater marsh restoration

Discussion

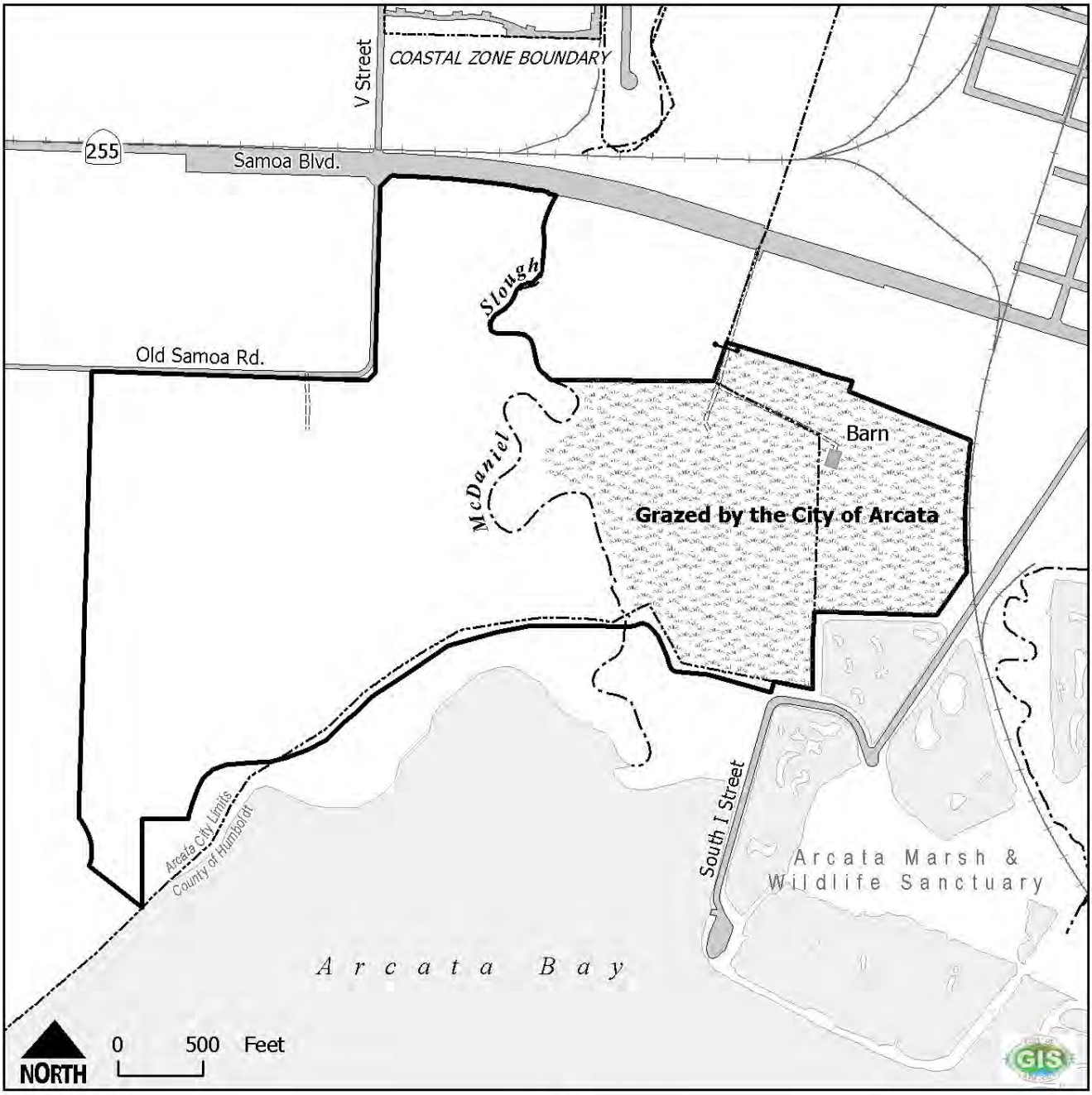
Alternative 4 would result in similar impacts related to the conversion of agricultural land to those identified in the proposed project.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.



Boundaries
- Project Boundary
- Arcata City Limits

Transportation
- Railroad
- Streets
- Access Road

Water Features
- Streams
- Waterbody

Grazing Lands
- Grazed by the City of Arcata

Source: City of Arcata

Figure 4.8-1
McDaniel Slough EIR
GRAZING LANDS

4.9 Noise

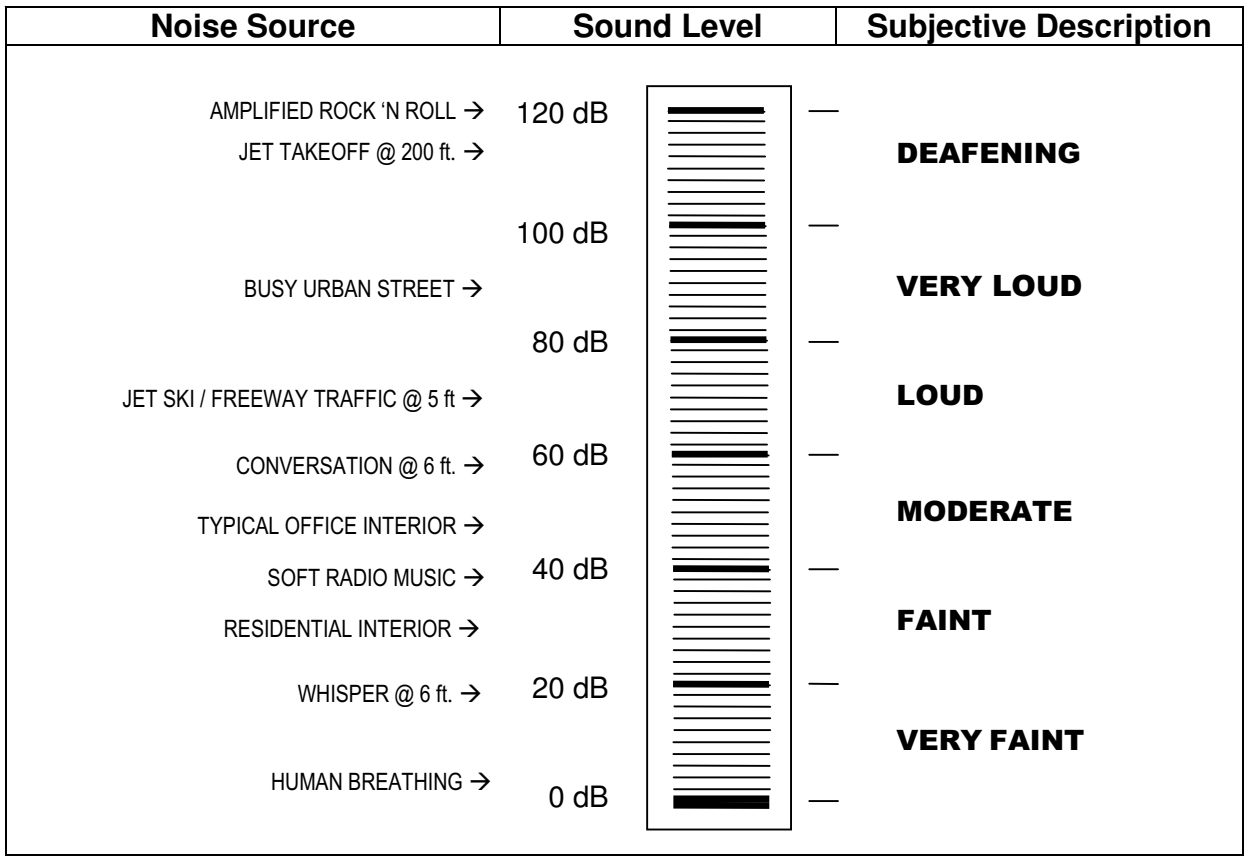
This section analyzes the potential noise impacts resulting from the implementation of the proposed Marsh Enhancement Project.

ENVIRONMENTAL SETTING

Acoustic Terminology

Noise is often defined as unwanted sound, and thus is a subjective reaction to characteristics of a physical phenomenon. Researchers have generally agreed that "A-weighted" sound pressure levels (abbreviated as dBA, A-weighted sound pressure levels are an expression of the relative loudness of sounds in air as perceived by the human ear) are very well correlated with community reaction to noise. The unit of sound level measurement is the decibel. Variations in sound levels over time are represented by statistical descriptors, and by time-weighted composite noise measures such as the Day-Night Average Level (Ldn), or the Community Noise Equivalent Level (CNEL). See Figure 4.9-A for examples of sound levels and subjective description of the response to those sound levels.

FIGURE 4.9-A EXAMPLES OF SOUND LEVELS



The decibel notation used for sound levels describes a logarithmic relationship of acoustical energy, as such; sound levels cannot be added or subtracted in the conventional arithmetic manner. For example, a doubling of acoustical energy results in a change of 3 dBA, which is considered to be barely perceptible. A ten-fold increase in acoustical energy yields a 10 dBA change, which is subjectively like a doubling of loudness.

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (Leq). The Leq measurement corresponds to a steady-state sound level containing the same total foundation of the composite noise descriptors such as Ldn and CNEL, and shows very good correlation with community response to noise.

Noise levels in the vicinity of the project site are related primarily to roadway traffic and some industrial related noise. Roadway traffic on Samoa Boulevard is the most significant generator of noise in the area. However, Figure N-b or the Arcata General Plan: 2020, Project Noise Contours, indicates that the project site is outside of the 55 dBA noise contour that relates to Samoa Boulevard traffic noise. Portions of the project site may fall within the 65dBA noise contour of the NCRA railroad right-of-way that makes up the eastern boundary of the project area. This railroad right-of-way is currently inactive, but it is assumed that it will be operational in the future.

Noise from the project site is limited to incidental noise generated by livestock grazing operations.

IMPACTS EVALUATION CRITERIA

Based on the *CEQA Guidelines*, a noise impact is considered significant if the project would:

- Cause substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- Cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Expose persons to or generate excessive ground borne vibration or ground borne noise levels; or
- Expose persons to or generate noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies.

The City of Arcata's existing General Plan Noise Element establishes two sets of criteria for evaluating noise impacts. The Environmental Protection Agency's land use compatibility table as a guide for establishing acceptable and unacceptable noise environments for various types of land uses. The City of Arcata Noise Element establishes a "Normally Acceptable" exterior noise level standard of 55 dBA L_{dn} for residential uses. A "Conditionally Acceptable" exterior noise level standard of 70 dBA L_{dn} is allowed for new construction only after a detailed analysis of the

noise reduction requirements is made and needed noise insulation features are included in the design.

Section 4.2 of the existing City of Arcata Noise Element (1985) also establishes "Enforcement Limits for Exterior Noise." These are contained within Table 1, Page 12 of the existing Arcata General Plan Noise Element. These criteria are used for evaluating a proposed new commercial or industrial noise source. The proposed project does not include a new commercial or industrial noise source.

Section 4.3 of the Noise Element also states, "The City shall enforce the State Noise Insulation Standards set forth in Title 25 of the California Administrative Code." This code requires that interior noise levels shall not exceed 45 dBA L_{dn}. This project does not involve the construction of structures that would require noise related insulation.

Section 6.5 of the Noise Element identifies construction activity as a source of intrusive noise for Arcata residents and Policy 4.6 establishes limits on the day time hours within which construction activity can take place.

IMPACTS AND MITIGATIONS FOR THE PROPOSED PROJECT

4.9.1 Impacts Due to Increased Noise Levels.

Discussion

The proposed project would not result in a permanent increase in ambient noise levels. Noise increases would be temporary and associated with the use of heavy construction equipment. The ongoing activities that will occur within the project site after construction is complete include hiking, bird watching, and natural resource interpretation. Theses activities will not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project

Temporary increases in sound and vibration levels at the site will occur during the construction period. Construction may involve a significant amount of heavy equipment given the amount of earth to be moved. The project has the potential to expose people offsite to objectionable sound if loud construction activities take place during sensitive night time hours, or if improperly muffled machinery were operating. Otherwise, the temporary elevation of ambient sound and vibration levels will be limited.

Table 4.9-1 illustrates the noise levels produced by various types of construction equipment. Properly maintained equipment would produce noise levels near the middle of the indicated ranges. Activities such as levee and berm construction and offloading and placing dredged materials may occur throughout the project area, depending on the alternative. The types of construction equipment used for earthmoving typically generate noise levels of 70–90 dBA at a distance of 50 feet when the equipment is operating. Electric-powered pumps used to off-load dredged material generate considerably less noise than the 70-82 dBA typically generated by pumps powered by internal combustion engines.

TABLE 4.9-1 CONSTRUCTION EQUIPMENT NOISE RANGES

SOURCE	NOISE RANGE at 50 FEET (dBA)
Compactors	72 – 75
Front Loaders	72 – 83
Backhoes	72 – 93
Tractors	77 – 96
Scrapers Graders	80 – 92
Pavers	86 – 88
Trucks	78 – 90
Concrete Mixers	73 – 88
Concrete Pumps	81 – 83
Cranes (Mobile)	75 – 86
Cranes (Derrick)	85 – 88
Pumps	69 – 71
Generators	71 – 82
Compressors	72 – 88
Pneumatic Wrenches	83 – 89
Jack Hammers, Rock Drills	81 – 99
Pile Drivers (Peaks)	95 – 105
Vibrators	69 – 81
Saws	72 – 81

Source: US EPA, 1971.

Construction equipment operations can vary from intermittent to fairly continuous use, with multiple pieces of equipment operating concurrently. A worst-case construction scenario may consist of concurrent operation of a bulldozer (87 dBA), a backhoe (90 dBA), a grader (90 dBA) and a front loader (82 dBA) in the same general area. Peak construction-period noise from this combination of equipment would be about 94 dBA from the construction site. Episodes of noise levels greater than 60 dBA would occasionally occur at locations within about 1,900 feet of a construction site. Episodes of noise levels greater than 70 dBA would occur at areas within about 750 feet of a construction site.

The closest residential areas to the project site are approximately 600 feet to east and 1,500 feet to north. There are no sensitive receptors adjacent to the site that would be adversely impacted by construction related noise. Wildlife on or near the project site may be disturbed by construction related noise and move away from the immediate area during episodes of intense noise. Upon project completion, it is expected that wildlife will return to the project site and the surrounding area.

Determination

The proposed project would not result in a permanent increase in ambient noise levels. The implementation of Noise Element Policy 4.6 (Construction Activity) which limits the hours within which construction activities can occur will reduce the impact of construction related noise to a less-than-significant level.

Mitigation

Implementation of the following mitigation measures would reduce the short-term noise impact to less than significant:

4.9.1a (1985 Noise Element 4.6) Construction activities that generate noticeable sound offsite would be limited from 7 a.m. to 7 p.m., Monday through Friday, and 9 a.m. to 7 p.m. on Saturday. No work will be allowed on Sunday.
4.9.1b (1985 Noise Element 4.6) Construction equipment would be maintained in proper condition to prevent excessive noise
4.9.1c Backup beepers would be no louder than necessary.

IMPACTS AND MITIGATIONS FOR PROJECT ALTERNATIVES

Alternative 1 – The No-Action Alternative

Discussion

Under the no action alternative, existing conditions would not be modified; therefore there would be no noise related impacts.

Determination

Less than significant adverse impact.

Mitigation

No mitigation is necessary.

Alternative 2 – Tidal Restoration with Bayfront Levee Breach

Discussion

Alternative 2 would result in similar noise related impacts to those identified in the proposed project.

Determination

Less than significant adverse impact similar to the proposed project.

Mitigation

Similar to the proposed project

Alternative 3 – Full Tidal Restoration with Bayfront Levee Removal

Discussion

Alternative 3 would result in similar noise related impacts to those identified in the proposed project.

Determination

Less than significant adverse impact, similar to the proposed project.

Mitigation

Similar to the proposed project.

Alternative 4 – Bayfront Levee Repair with Freshwater Marsh Enhancement

Discussion

Alternative 4 would result in similar noise related impacts to those identified in the proposed project.

Determination

Less than significant adverse impact similar to the proposed project.

Mitigation

Similar to the proposed project.

CHAPTER 5
OTHER CEQA CONSIDERATIONS

This Chapter includes a discussion and analysis of the following required CEQA topics: Cumulative Impacts, Growth Inducing Impacts, the Environmentally Superior Alternative, Effects Found Not to be Significant, Significant Irreversible Effects, and Mitigation Monitoring.

5.1 CUMULATIVE EFFECTS

Cumulative impacts refer to "two or more individual impacts that, when considered together, are considered to compound or increase other environmental impacts." The combined effects of the Restoration Plan and other reasonably foreseeable future projects have been evaluated in terms of potential cumulative effects. The results of consultation with interested parties, field observations, and comparison with similar developments were used as baseline data to identify and evaluate cumulative effects.

CEQA § 15130 DISCUSSION OF CUMULATIVE IMPACTS

EIRs are required by CEQA to describe any cumulative impacts, which could result from the proposed action. The cumulative impact of several projects is the change in the environment that results from the incremental impact of the project when added to other, closely related past, present, or reasonably foreseeable, probable future projects. Cumulative impacts may result from individually minor but collectively significant projects taking place over a period of time. (CEQA Guidelines § 15355.)

In analyzing cumulative impacts for an EIR, a lead agency may create a list of all the past, present, and foreseeable future projects that could contribute to a significant cumulative impact, or may utilize the "projection" approach which bases the analysis upon a summary of projections contained in a prior certified environmental document, an adopted general plan, or a related planning document. (Public Resources Code § 21100(d).)

The EIR for the McDaniel Slough Marsh Enhancement Project considers past, present and foreseeable future projects to assess cumulative impacts. The most significant related project is the Arcata Marsh and Wildlife Sanctuary (AM&WS) located directly adjacent to McDaniel Slough. The proposed marsh enhancement is an extension of the public trust enhancement marsh system already established at AM&WS. The City owned portion of the project area is now part of the AM&WS. Another related project is the ongoing management and enhancement of the Mad River Slough Wildlife Area. Part of this 500-acre state owned area is within the proposed project boundaries. There are other sites surrounding Humboldt Bay that are also suitable for similar restoration projects. They include portions of the Gannon Slough/Jacoby Creek Wildlife Area and Rocky Gulch. Both of these areas are likely to host habitat restoration projects in the future. The City of Arcata is currently constructing a 2.5-acre freshwater pond on South I Street. This pond and associated native plants and trees will be completed prior to the

construction of the proposed project and will serve to buffer the project area from nearby industrial land.
Continued implementation of the City of Arcata Stormwater Master Plan and Stormwater Pollution Reduction Plan is expected within the Janes Creek watershed. Both of these adopted plans provide for net improvements to water quality in the area.

Improvements outlined in the Humboldt Bay Master Plan and the proposed Humboldt Bay Trail are two reasonably foreseeable future projects within the project vicinity. The proposed levee breach associated with the project would limit access along the bayfront levee to the mouth of Janes Creek. A bridge over the breach could be installed in the future if a bay trail was developed. Development of the twelve acre Little Lake Industries site could increase recreational use of the AM&WS and the McDaniel Slough trails. This development would also likely increase traffic on South I Street and influence stormwater runoff to the proposed project. Also considered in the analysis of cumulative effects, is the City of Arcata draft Greenhouse Gas Reduction Plan that lays the foundation for citywide reduction of carbon dioxide emissions.

Public Utilities/Public Facilities
Impacts associated with the restoration project are short term and specific to a particular location and time. They would neither contribute to nor cause a significant cumulative impact since it is unlikely that other projects would impact the same utilities and facilities at the same time.

Geology/Soils
Construction of the McDaniel Slough Restoration project may occur simultaneous with construction and grading of other nearby cumulative projects, however, potential erosion associated with the proposed project will likely not contribute to cumulative erosion impacts due to implementation of standard erosion control measures.

Hydrology/Water Quality
Cars and parking lots are sources for metals and combusted and non-combusted petroleum hydrocarbons. Consequently, urban runoff represents a potentially significant source for watershed inputs of contaminants and excess sediments and nutrients to the McDaniel Slough estuary and wetlands. This can cause progressive impairment to water and sediment quality within the restoration area.
Although some impervious surfaces are proposed by the McDaniel Slough restoration project (i.e. trail staging areas and hardened trail surfaces), the project is expected to produce net beneficial impacts to water and sediment quality. In contrast, impacts from the other planned projects are potentially significant but mitigable to levels of insignificance by requirements for pollution prevention plans, best management practices, herbicide/pesticide and fertilizer use restrictions, effective hazardous waste collection and recycling programs, and frequent street and parking lot cleaning. The project's incremental contribution to these water quality impacts are therefore defined as *de minimis* under CEQA. 37

Biological Resources
Apart from the proposed project, cumulative projects in the lower McDaniel Slough/Arcata South of Samoa area generally involve the residential or commercial development of much of the remaining undeveloped land.

The effects of the proposed restoration project, however, are in contrast with, and in most respects tend to lessen, the adverse effects of cumulative development. Overall, the project would preserve and restore or enhance biologically significant areas. There are however certain aspects of the project that would impact wetlands, including construction of levees and trail construction, and possible disposal of excavated materials. These impacts would be mitigated to reduce impacts to less than significant levels.

Noise
Noise impacts from the proposed project would be short-term and highly localized. A cumulative noise impact only would occur if noise sources from two projects occurred at the same time in the same general area, and this would not necessarily be a significant impact. No cumulative noise impacts would result from implementation of the proposed project.

Cultural Resources
Based on all available evidence, the project is not expected to have an effect on significant cultural resources. Therefore, significant cumulative impacts also are not expected and would meet CEQA's definition of a de minimis impact.

Air Quality
Impacts from construction or operation of the project alternatives, in combination with any reasonably foreseeable future emission source, would not differ substantially from those identified for the project specific impacts in section 3.4

Summary
In summary, the proposed project when viewed cumulatively with other projects will not have a significant impact.

5.2 GROWTH INDUCING IMPACTS

EIRs are required by CEQA to describe any growth inducing impacts that would result from the proposed action. Growth-inducing impacts can be either direct or indirect. The analysis must discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this analysis are projects which would remove obstacles to population growth (a major expansion of a waste water treatment plant might, for example, allow for more construction in service areas).

Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discussed are characteristics, which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little environmental significance (§ 15126.2(d)).

The proposed project, the mixed habitat alternative, does not exceed the development and population projections in the adopted Arcata General Plan and Land Use and Development

Guide. In fact, the proposed project would provide less than the required density for this zoning designation.

The project is located at the edge of the city, mostly beyond the urban services boundary, and would not extend infrastructure or build municipal capacity. The addition of the brackish marsh that will receive a portion of the treated wastewater will provide a beneficial use of treated wastewater and not increase wastewater treatment capacity.

There are no features of this project which cause secondary or growth inducing impacts.

5.3 THE ENVIRONMENTALLY SUPERIOR ALTERNATIVE

This section identifies the environmentally superior alternative that is consistent with maximizing the project objectives, and determined to cause the least damage to the environment and to enhance/protect natural and cultural resources.

The proposed project involves the restoration of the site to more natural conditions. The reversion from farmed wetlands on diked former tidelands to salt marsh would result in more sustainable aspects of the marsh enhancement compared to the maintenance needed to support continued grazing on the property.

There are many environmental benefits associated with the proposed project. The project would remove accumulated silt material from existing channels to deepen or enhance drainage and flood capacity. The enhanced channels and surrounding areas would be allowed to function as estuarine habitat wetlands and, in time, would develop into a natural functioning system. The wetland and channel enhancement would also improve conditions for downstream migrant juvenile salmonids.

Access to the Janes Creek watershed for anadromous salmonids would be improved after implementation of the project. The project would remove the Janes Creek tide gates, which are a barrier to fish passage. The project would result in a beneficial impact to avian and amphibian species by including construction of diverse habitat types including saltmarsh, freshwater ponds, and brackish wetlands. The project will also result in beneficial impacts to salt marsh plants of limited distribution such as Point Reyes birds'-beak and Humboldt Bay owl's clover.

Removing the existing tidegates and breaching the bayfront levee will improve drainage from McDaniel Slough to Humboldt Bay and will reduce existing flood hazards due to coastal flooding and to high flood flows in Janes Creek. Approximately one-mile of existing bayfront levee and the Janes Creek tidegates would no longer need to be maintained by Reclamation District #768.

Public access would be provided to a coastal area that previously was closed to public access.

The alternatives identified in the EIR would not result in environmental impacts significantly lower than the proposed project and still meet identified marsh enhancement objectives identified by the city.

5.4 EFFECTS FOUND NOT TO BE SIGNIFICANT

This section covers those potential effects listed in Appendix F of the CEQA *Guidelines* (Environmental Checklist Form) that were determined to be less than significant effects of the proposed project, and therefore are not discussed previously in this EIR.

Geology and Soils

- The project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.
- The project does not require sewers or waste water disposal.
- The project would not result in the loss of a unique geologic feature.
- The project is not located on expansive soil and therefore would not create substantial risks to life or property.

Public Safety, Hazards, and Hazardous Materials

- The project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- The project would not reasonably be anticipated to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- The project is not located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment.
- The project is not located within the vicinity of a private airstrip, and therefore would not result in a safety hazard for people residing or working in the project area.
- The project would not be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would therefore not result in a safety hazard for people residing or working in the project area.
- The project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- The project would not expose people or structures to the risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Cultural and Historical Resources

- The project would not cause a substantial adverse change in the significance of unique archaeological resources.
- The project would not disturb any human remains, including those interred outside of formal cemeteries.

Public Facilities and Services

- The project would not have solid waste disposal needs.

- The project would comply with federal, state, and local statutes and regulations related to solid waste.

Circulation

- The project would not result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that would result in substantial safety risks.

Population and Housing

- The project would not displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.
- The project would not displace a substantial number of people, necessitating the construction of replacement housing elsewhere.

Noise

- The project would not be within the vicinity of a private airstrip, and therefore would not expose people residing or working in the project area to excessive noise levels.
- The project would not be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would therefore not expose people residing or working in the project area to excessive noise levels.

Mineral Resources

- There are no known mineral resources beneath the project site with economic value, or sources for aggregate or other mineral resources. Therefore, the proposed project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

5.5 SIGNIFICANT EFFECTS THAT CANNOT BE AVOIDED

There is the potential for implementation of the project to have significant impact with relation to the following:

- **Hydrology and Water Quality** There is the potential for impacts to surface water quality during construction activities (impact 3.1.4).
- **Biology** There is the potential for impacts to fish and their habitat during construction activities (impact 3.2.2). There is the potential for impact to avian species and their habitat during construction of the project (impact 3.2.4).
- **Geology and Soils** There is the potential for impacts related to tsunami inundation (impact 3.3.1). There is the potential for impacts related to soils and erosion (impact 3.3.2).
- **Air Quality** There is potential for a significant amount of particulates to be released during project construction (impact 3.4.1).

- **Cultural and Historical Resources** There is the potential for impacts related to archaeological and paleontogical resources during project construction (impact 4.1.1). There is the potential for impacts related to historical resources (impact 4.1.2).
- **Aesthetics** There is the potential for short and long-term impacts related to aesthetics (impacts 4.3.1 and 4.3.2).
- **Land Conversion** There is the potential for impacts related to the conversion of agricultural land (impact 4.8.1).
- **Noise** There is the potential for short-term impacts related to project construction (impact 4.9.1).

The project has the ability to mitigate all potentially significant effects to a less than significant level.

5.6 SIGNIFICANT IRREVERSIBLE EFFECTS

Significant irreversible environmental changes that would result from implementing the Restoration Plan will be described. EIR's are required by CEQA to describe any significant irreversible environmental changes that would result from the proposed action.

Development of the project would irreversibly commit diked former tideland that is currently used as agricultural land back to tidelands. Approval of the proposed marsh enhancement project would indirectly result in irretrievable commitment and use of energy resources for the construction of levees and ponds. The level and amount of commitment of such resources is commensurate with similar restoration projects undertaken in the Humboldt Bay area.

5.7 DRAFT MITIGATION MONITORING PROGRAM

The EIR includes mitigation and monitoring report that summarizes impacts, mitigation, and monitoring in a table format. For each impact and related mitigation, the report will specify the responsible agency, schedule for monitoring, and reporting requirements.

CEQA requires the adoption of a reporting or monitoring program to mitigate or avoid significant effects on the environment.

15126.4 Consideration and Discussion of Mitigation Measures Proposed to Minimize Significant Effects.

(a) Mitigation Measures in General.

(1) An EIR shall describe feasible measures that could minimize significant adverse impacts, including, where relevant, inefficient and unnecessary consumption of energy.

(A) The discussion of mitigation measures shall distinguish between the measures which are proposed by project proponents to be included in the project and other measures proposed by the lead, responsible or trustee agency or other persons which are not included but the lead agency determines could reasonably be expected to reduce adverse impacts if required as conditions of approving the project. This discussion

shall identify mitigation measures for each significant environmental effect identified in the EIR.

(B) Where several measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified. Formulation of mitigation measures should not be deferred until some future time. However, measures may specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way.

(C) Energy conservation measures, as well as other appropriate mitigation measures, shall be discussed when relevant.

(D) If a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed. (Stevens v. City of Glendale (1981) 125 Cal. App.3d 986.)

A Mitigation and Monitoring Plan will be included in the Final EIR for the project.

CEQA section 21081.6 of the Public Resources Code requires all public agencies to adopt reporting or monitoring programs when they approve projects subject to environmental impact reports or mitigated negative declarations. Most of the environmental mitigation measures that have been recommended in this EIR would be subject to effective monitoring through established city monitoring procedures. However, to satisfy CEQA § 21081.6, a documented record of implementation is necessary.

Monitoring Report Organization

While formulation of a final mitigation-monitoring program need not be completed until the EIR is certified, the framework to be followed in finalizing the monitoring program subsequent to project approval can be determined on a preliminary basis at this EIR stage. The attached draft mitigation and monitoring plan/table includes spaces for identifying:

(1) Each mitigation measure included in the EIR;
(2) The party responsible for implementing that mitigation measure and any related requirements with respect to the timing of implementation; and
(3) The party responsible for performing mitigation monitoring plus information on the type and required timing implications of the monitoring procedures.

Draft Monitoring, Mitigation and Adaptive Management Plan

Impact	**Mitigation Measure**	**Significance after Mitigation**	**Responsible Agency**	**schedule**	**Reporting regs**
	HYDROLOGY AND WATER QUALITY		City of Arcata		
3.1.1 Drainage Impacts	3.1.1a A culvert and tidegate will be installed in the newly constructed western levee at the location of the existing borrow ditch north of the Bayfront levee. This culvert and tidegate will mitigate the potential negative impact of preventing runoff from the Arcata Bottom from discharging to McDaniel Slough. The culvert will be designed to preserve the existing capacity of the borrow ditch.	Less than significant with mitigation measures.	City of Arcata		
3.1.4 Surface Water Quality Impacts Construction Related Impacts	• Construction work occurs during the dry season from May 15th thru November 15th to prevent ground disturbance during rainstorms. • In the event of unseasonable rainfall, construction will not occur during periods when any surface runoff occurs on exposed soil due to rainfall. • All exposed soil that could erode to a channel leading to Janes Creek will be mulched with weed-free straw mulch. • Bare soil surfaces will be allowed to vegetate prior to the breach of the bayfront levee. • All vehicles and construction equipment shall be parked, and equipment refueling and maintenance shall take place only in designated areas where potential spills of fuel, lubricants, or coolants can be contained and cleaned up without impacts to aquatic habitats. • Erosion control plan. Will include seeding and mulching of exposed bare soil including new drainage swales prior to Nov. 15th.	Less than significant with mitigation measures.	City of Arcata		
3.1.4 Surface Water Quality Impacts **Project Related impacts**	**3.1.4a** The Erosion and Sediment Control Plan shall include storm water pollution prevention measures applicable to the scope of construction activities proposed and shall include Best Management Practices (BMPs) as provided in the CalTrans *Storm Water Quality Handbook* or an equivalent approved by the City. **3.1.4b** A Stormwater Pollution Prevention Plan (SWPPP) would be prepared as required by the Regional Water Quality Control Board.	Less than significant with mitigation measures	City of Arcata		

BIOLOGY					
3.2.1 Impacts to Wetlands	**3.2.1a** The locations of habitats and species to be avoided will be clearly identified in the contract documents (plans and specifications). **3.2.1b** Construction activities in wetlands will be restricted to the dry season. **3.2.1c** Before clearing and grubbing commences; construction and staging areas will be flagged to clearly define the limits of the work area. These areas will be clearly identified on the contract documents (plans and specifications). **3.2.1d** Sensitive areas outside of the construction corridor will be so labeled on construction documents (plans and specifications) as "Sensitive Biological Resources—Do Not Disturb." **3.2.1e** Watering of exposed earth will be conducted consistent with good construction practices to minimize dust production. **3.2.1f** A qualified biologist will be on-site to observe construction activities as appropriate when construction in or adjacent to sensitive habitat occurs. **3.2.1g** Contractors awarded contract packages will sign a document stating that they have read, agree to, and understand the required resource avoidance measures, and will have construction crews participate in a training session on sensitive area resources. **3.21h** All haul roads and portions of construction staging areas that are no longer required for construction and maintenance of the restoration project and have not been converted to a new use shall be restored to pre-project conditions.	Less than significant with mitigation measures	City of Arcata		
3.2.2 Impacts to Fish and Associated Habitat	**3.2.2a** Construction activities occurring within the watercourse would occur following recommendations from qualified California Department of Fish and Game biologists. **3.2.2b** In stream work will be done during the dry season at low tide with a fish biologist on site during in stream operations to monitor for the presence of anadromous fish and other wildlife species. **3.2.2c** Tidegates would be removed from the pipes one year prior to breaching the levee and removing the pipes. This will allow for development of erosion control vegetation on the levees prior to the breach thus minimizing sediment inputs. The breach would occur during low flow and low tide. **3.2.2d** Consult with the U.S Fish and Wildlife Service regarding Tidewater Goby. **3.2.2e** Consult with the NOAA Fisheries regarding salmonids. **3.2.2f** Install outlets from brackish pond that allow for controlling outflow to adjust for optimal salinity ranges**.**	Less than significant with mitigation measures	City of Arcata		
3.2.4 Impacts to Avian Species and Associated Habitat	**3.2.4a** Construction activities would occur during the breeding and nesting season only following pre-construction site-specific surveys that find an absence of nesting Northern harrier. **3.2.4b** Following pre-construction surveys, work would begin following recommendations of a qualified biologist. **3.2.4c** Riparian habitat will be enhanced by planting willow, alder and native conifers along Janes Creek. Near the freshwater ponds, large logs suitable for roosting will be buried upright to serve as snags.	Less than significant with mitigation measures	City of Arcata		
3.2.6 Impacts to Mammal Species	**3.2.6a** Installation of snags, bat boxes and retention of some tall grass perennial uplands on City property landward of the dikes with a mosaic of new upland forest areas.	Less than significant with mitigation measures.	City of Arcata		
Geology and Soils					
3.3.1 Impacts Due to Tsunami Inundation	**3.3.1a** Place tsunami warning and evacuation route signs on trails within the project area.	Less than significant with mitigation	City of Arcata		

		measures.			
3.3.2 Impacts Due to Soil Stability and Erosion	**3.3.2a** The City will use California Best Management Practices to minimize erosion during construction of the project. Table 3-1 lists erosion control practices that could be used. **Table 3-1 Erosion Control BMPs**	Less than significant with mitigation measures	City of Arcata		

BMP #		**BMP Name**			
EC-1	Scheduling				
EC-2	Preservation of Existing Vegetation				
EC-3	Hydraulic Mulch				
EC-4	Hydroseeding				
EC-5	Soil Binders				
EC-6	Straw Mulch				
EC-7	Geotextiles & Mats				
EC-8	Wood Mulching				
EC-9	Earth Dikes and Drainage Swales				
EC-10	Velocity Dissipation Devices				
EC-11	Slope Drains				
EC-12	Streambank Stabilization				

Source: California BMP Handbook

3.3.2b A geotechnical report would be prepared to describe options for levee construction. The report would describe the conditions at the site that could affect levee stability. The report would include design recommendations for levee construction to reduce the potential impacts due to levee failure to a less than significant level.

3.3.3 Impacts Due to Geologic Hazards	• Levees and roadbeds should be constructed with upper clay/silt soil. • To limit saltwater intrusion, sandy material below the clay should be mixed with the clay at a minimum ratio of 1:1. • Levees and roadbeds should be raised in lifts not exceeding eight inches. A geotechnical report would be prepared to describe options for levee construction. The report would describe the conditions at the site that could affect levee stability. The report would include design recommendations for levee construction to reduce the potential impacts due to levee failure to a less than significant level.	Less than significant with mitigation measures.	City of Arcata		
3.4.1 Release of Particulate Matter During Construction Activities	**3.4.1a** All active construction areas shall be watered at a rate sufficient to keep soil moist and prevent formation of wind-blown dust. **3.4.1b** 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. **3.4.1c** All unpaved access roads, parking areas, and construction staging areas shall be paved, watered daily, or treated with non-toxic soil stabilizers during construction. **3.4.1d** All paved access roads, parking areas, and construction staging areas shall be cleaned daily with water sweepers during construction. **3.4.1e** If visible soil is carried out onto adjacent streets, the area shall be washed with water or by a water sweeper truck. **3.4.1f** Hydroseeding or non-toxic soil stabilizers shall be applied to inactive construction areas (previously graded areas inactive for ten days or more). **3.4.1g** Exposed stockpiles of dirt, sand, and similar material shall be enclosed, covered, watered daily, or treated with non-toxic soil binders. **3.4.1h** Traffic speeds on unpaved roads shall be limited to 15 miles per hour. **3.4.1i** Sandbags, hay bales, or other erosion control measures shall be installed to prevent silt runoff to public roadways. **3.4.1j** Vegetation in disturbed areas shall be replanted as quickly as possible. **3.4.1k** Outdoor dust-producing activities shall be suspended when high winds create visible dust plumes in spite of control measures. •	Less than significant with mitigation measures.	City of Arcata		

AIR QUALITY, PUBLIC HEALTH, HAZARDS, AND HAZARDOUS MATERIALS				
3.5.1 Accidental Release of Hazardous Materials During Construction or Ongoing Maintenance.	**See mitigation measure 3.1.4**	Less than significant with mitigation measures.	City of Arcata	
3.5.2 Expose the Public to Disease Vectors (e.g. mosquitoes).	Bat boxes and swallow nesting boards will be installed and mounted on the "snags" placed vertically in the ground for bird roosting platforms. In time, when the planted trees are large enough, additional bat boxes and swallow nesting structure can be mounted on trees.	Less than significant with mitigation measures.	City of Arcata	
3.5.3 Impacts Due to an Increased Risk to Public Safety from Design, Implementation, and Construction Activity	**3.5.3a** Laminated informational signs would be placed at major public access points, such as trails and roads, to the project informing the public of the safety hazards related to heavy equipment, and requesting that no trespassing occur. **3.5.3b** During operation of heavy equipment, the construction manager would ensure that someone is on site at all times to monitor for approaching visitors. On-site personnel would be responsible for maintaining safe working conditions at the site. **3.5.3c** Because of the recreational use of the AMWS, all loaded vehicles would be required to travel a maximum of 15 mph on South I Street.	Less than significant with mitigation measures.	*City of Arcata*	
Cultural and Historic Resources				
4.1.1 Impacts to archaeological and Paleontogical Resources	**4.1.1a** Should concentrations of archaeological materials, paleontogical resources, or human remains be encountered during construction, all ground-disturbing work would be temporarily halted in that area. Work near the archaeological finds would not be resumed until a qualified archaeologist has evaluated the materials and offered recommendations for further action. Project personnel shall not collect cultural resources. In the event human remains are discovered, the County Coroner shall be contacted immediately and all work would cease until further instruction from qualified personnel. **4.1.1b.** A representative from the Wiyot Tribe or a trained archaeological monitor would be on site to oversee excavations of the ponds and levees in the eastern most portion of the project. A cultural resources monitor would ensure that any significant subsurface cultural deposits are quickly recognized and recorded.	Less than significant impact with mitigation measures.	City of Arcata	
4.1.2 Impacts to Historic Resources	**4.1.2a** The City shall officially record the levee sections proposed for removal (for example, as recorded in the Cultural Resources Investigation).	Less than significant impact with mitigation measure	City of Arcata	

AESTHETICS AND VISUAL RESOURCES				
4.3.1 Impacts Due to Short-Term Effects on Existing Visual Character or Quality of Site During Construction	**4.3.1a** All temporary roads or routes used for transportation of levee construction fill material would be de-compacted with rippers or tilling equipment prior to completion of the project to allow for rapid revegetation to cover over vehicle tracks. **4.3.1b** Exposed soil would be mulched with a weed-free straw or planted with native materials to disguise areas of disturbance. **4.3.1c** Any sites affected by heavy equipment that do not have natural vegetation recovery one year following construction would be seeded or planted with vegetation that would blend with the surrounding features.	***Less than significant with mitigation measures.***	*City of Arcata*	
4.3.2 Impacts Due to Potential Long-term Effects on Scenic Vistas, Highways, or Scenic Resources	**4.3.2a** Levees would be graded, curved, and smoothed to blend with the surrounding features. Native vegetation planted on levees will help structures blend in with the natural environment. **4.3.2b** The existing bayfront levee from South I Street to the mouth of Janes Creek will be improved visually by removing existing concrete slabs from the levee sides. **4.3.2c** The proposed bird blinds will be constructed with weathered barn lumber and will be placed in areas that are planted with heavy vegetation in order obscure them from view. The blinds will be constructed with a low profile as well.	Less than significant with mitigation measures.	City of Arcata	

PUBLIC UTILITIES AND SERVICES				
4.4.3 Impacts to Utility Transmission Systems	The City in cooperation with PG&E, will provide access and prevent damage to towers by: **4.4.3a** Developing a soil fill buttress surrounding the tower foundations. The buttress would be composed of material excavated from the pond areas. The buttress would be a circular mound of material surrounding the foundation to provide additional stability to the site, as well as provide a zone above flood elevations from which crews can perform maintenance. **4.4.3b** Constructing a boardwalk for pedestrian access to the towers. **4.4.3c** Extending the concrete base foundations to a higher elevation to protect against corrosion.	Less than significant with mitigation measures.	City of Arcata	
NOISE				
4.9.1 Impacts Due to Increased Noise Levels.	**4.9.1a** (1985 Noise Element 4.6) Construction activities that generate noticeable sound offsite would be limited from 7 a.m. to 7 p.m., Monday through Friday, and 9 a.m. to 7 p.m. on Saturday. No work will be allowed on Sunday. **4.9.1b** (1985 Noise Element 4.6) Construction equipment would be maintained in proper condition to prevent excessive noise **4.9.1c** Backup beepers would be no louder than necessary.	Less than significant with mitigation measures	City of Arcata	

Adaptive Management (Draft)

Project Uncertainty

Due to the long time frame for tidal marsh evolution, it may be difficult to determine at what point in time project success can be determined. Evolution of the salt marsh for example, is expected to take decades. Scour of sediment from the main channel may also take decades. Therefore the project incorporates post-construction monitoring and adaptive management to assess whether the natural processes can sustain the long-term evolution of the site to the desired conditions. The freshwater ponds are an exception as success of those habitat types should be able to be measured within a 5-year period.

Post Project Success Criteria
Due to the size of the project, success criteria includes establishment of various habitats for wildlife use, but not populations and densities.

Success Criteria

1. Control and management of exotic and invasive plant and animal species
2. Establishment of wildlife habitat for an array of species resulting in an increase (over current conditions) in biological diversity.
3. Success of planting of native plants and tree species

The Adaptive management process consists of the following:

1.) Evaluate field monitoring data and assess the progress of restoration
2.) Identify potential adverse conditions impacting progress of restoration
3.) Determine if adverse conditions can or should be remedied, and
4.) Implement the appropriate adaptive management action, as required

The project team (City of Arcata and Department of Fish and game staff) will confer to assess the results of monitoring data and determine if adaptive management actions are necessary.

Adaptive management would be used to address one of the five scenarios:

1.) Wildlife populations are adversely affected
2.) There are unanticipated consequences of the restoration effort
3.) Salinity control in the managed brackish marsh is more difficult than anticipated
4.) Habitat evolution is slower than predicted
5.) There are adverse impacts to receiving water body or pond area water quality.

Monitoring

Monitoring of the McDaniel Slough Wetland Enhancement Project will be coordinated with the Regional Water Quality Control Board, the City Creeks and Wetlands Committee, DFG and other State and federal agencies. Biological monitoring may be required to satisfy mitigation requirements under the biological opinion (BO) issued to the project by the U.S. Fish and Wildlife Service (USFWS). The objectives of the project monitoring are to:

- Monitor and evaluate the physical evolution of restored habitats including *Spartina* colonization
- Assess water and sediment quality in the channels
- Determine compliance with applicable water quality standards
- Vegetation surveys will be used to assess development of marsh vegetation and success of planting efforts.
- Water quality parameters will be assessed in order to determine the desired salinity, PH, temperature and water depth in the brackish marsh and freshwater ponds.
- Channel cross-sections will be installed to monitor channel scouring on Janes Creek/McDaniel Slough main stem.
- Invertebrates, fish and waterbird surveys will be conducted in the restored habitats.

5.8 CONSISTENCY WITH ADOPTED PLANS, POLICIES AND LEGISLATION

ADOPTED PLANS AND POLICIES AFFECTING THE PROJECT AREA

Relevant Plans and Ordinances of the City of Arcata

City of Arcata General Plan 2020

Policy RC-4a. "Tidal marshes shall be enhanced and maintained especially in the areas of McDaniel Slough……."

Arcata General Plan --Final Program EIR—2000

"Conversion of Agricultural Land (Hunt property)—The City will prepare a resource enhancement plan for the Hunt property, to restore up to 274 acres of former salt marsh, known as the McDaniel Slough, and additional freshwater wetlands adjacent to Humboldt bay. The enhancement plan will have 3 primary goals: restore rare salt marsh habitat; alleviate flooding and restoration of natural hydrologic functions; and create passive recreational opportunities……..The Hunt parcel has been redesignated to Natural Resource zoning from Agricultural Exclusive" page 3-17.

Arcata Creeks Master Plan 1991 -

Arcata Stormwater Master Plan 1997-

Capital Improvement project #J1E)—"Develop plan to alter or remove tidegates at Janes Creek and Humboldt Bay, providing dike protection for private properties. This will restore flushing flows to the lower half-mile of creek as well as provide for anadromous fish access. This plan includes moving the location of existing dike structures and securing maintenance access easements…."

Arcata Open Space Program 2004

Arcata Best Management Practices (BMP) Manual 2004

Arcata Erosion and Sediment Control Ordinance No.1355

Arcata Water Quality Ordinance No. 1319

Arcata Draft Greenhouse Gas Reduction Plan 2005—Requires the City of Arcata to reduce greenhouse gas output City-wide by 20% of the year 2000 levels by the year 2010. The proposed project likely increases carbon sequestration levels by planting trees and shrubs. Converting some existing freshwater wetlands (agricultural fields) to salt marsh also likely increase new carbon sequestration on the site over time. (Ronald M. Thom , Susan L. Blanton , Dana L. Woodruff , Gregory D. Williams Amy B. Borde, Carbon Sinks in Nearshore Marine Vegetated Ecosystems *Pacific Northwest National Laboratory,Marine Sciences Laboratory, 1529 W. Sequim Bay Road Sequim, WA 98382*

California Coastal Act

The entire project site is located within the boundaries of the California Coastal Zone and is therefore subject to the requirements of the California Coastal Act of 1976 (California Public Resources Code Sections 30000 – 30900). The only portion of the project area that is located within an adopted LCP is that portion that occurs within the north east portion of the project area. The CCC retains permitting authority over the remainder of the project site; therefore, the CCC will have final permitting authority for all but the portion of the project that is located within the boundaries of the City of Arcata LCP area. The basic goals of the state for the coastal zone, as described in Section 30001.5 of the Act, are to:

- Protect, maintain, and, where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources.

- Assure orderly, balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of the people of the state.

- Maximize public access to and along the coast and maximize public recreational Opportunities in the coastal zone consistent with sound resource conservation principles and constitutionally protected rights of private property owners.

- Assure priority for coastal-dependent and coastal-related development over other development on the coast.

- Encourage state and local initiatives and cooperation in preparing procedures to implement coordinated planning and development for mutually beneficial uses, including educational uses, in the coastal zone. Applicable sections of the Act include the following:

Section 30210. In carrying out the requirements of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect the public rights, right of private property owners, and natural resource areas from overuse.

Section 30211. Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30212. (a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) It is inconsistent with public safety, military security needs, or the protection of fragile coastal resources; (2) adequate access exists nearby . . .

Section 30213. Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred.

Section 30214. (a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on facts and circumstances in each case including, but not limited, to the following:
(1) Topographic and geologic site characteristics.
(2) The capacity of the site to sustain use and at what level of intensity.
(3) The appropriateness of limiting public access to the right to pass and trespass depending on such factors as the fragility of the natural resources in the area . . .

Section 30230. Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing

adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Section 30233. (a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(7) Restoration purposes,
(8) Nature study, aquaculture, or similar resource-dependent activities.
(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable longshore current systems.
(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the coastal wetlands identified in it report entitled, "Acquisition Priorities for the Coastal Wetlands of California", shall be limited to very minor incidental public facilities, restorative measures, nature study, . . .

Section 30236. Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (1) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the floodplain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.

Section 30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.
(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Section 30241. The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas' agricultural economy . . .

Section 30242. All other lands suitable for agricultural use shall not be converted to nonagricultural uses unless (1) continued or renewed agricultural use is not feasible . . .

Section 30244. Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

Section 30251. The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural landforms, to be visually compatible with the character of surrounding areas, and where feasible, to restore and enhance visual quality in visually degraded areas.

Section 30253. New development shall: (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard . . .

Humboldt Bay Watershed Salmon and Steelhead Conservation Plan- A Humboldt Bay Watershed Advisory Committee (HBWAC) Document –2004

The *Humboldt Bay Watershed Salmon and Steelhead Conservation Plan* contains goals and objectives aimed at protecting and restoring watershed processes in order to preserve and enhance salmon and steelhead habitat in the sub-watersheds of Humboldt Bay.

Draft Humboldt Bay Management Plan (Humboldt Bay Harbor, Recreation and Conservation District, Mar 2005)

The *Draft Humboldt Bay Management Plan* includes the following policies, which the McDaniel Slough Project will carry out or be consistent with: CAE1 – Maintain, restore, and enhance aquatic ecosystem integrity; CAE-2 – Protect and maintain environmentally sensitive habitat areas; CAS-1 – Maintain biological diversity throughout Humboldt Bay; and CEP-1 – Impacts to streams, wetlands, estuaries and coastal waters may be authorized for specific purposes or project types, including habitat restoration or enhancement projects.

Humboldt County General Plan

Department of Fish and Game Mad River Slough Wildlife Area –Draft management Plan

Pursuant to the *Charles Brown Fish and Game Reorganization Act of 1951* (Statutes of 1951, chapter 715), the Department was created within the Resources Agency (Fish and Game Code, § 700) from the Division of Fish and Game within the former Department of Natural Resources. The legislative delegations to the Department are codified in division 2 of the Fish and Game Code, which concerns the organization and general functions of the Department. The Director administers the Department (FGC § 700), and is appointed by the Governor (FGC § 701); the Department also administers and enforces the provisions of the Fish and Game Code (FGC § 702). Consistent with section 702, the Attorney General has found that it was the intent of the Legislature to leave the Department in full control of the execution and enforcement of fish and game laws (17 Ops. Cal. Atty. Gen. 72 (1951)).

The Department has broad program responsibilities for fish and wildlife. Fish and Game Code § 2701 (c) vests in the Department: "…the principal responsibility for protecting, conserving, and perpetuating native fish, plants, and wildlife, including endangered species and game animals, for their aesthetic, intrinsic, ecological, educational, and economic values." The Department is designated natural resource trustee with jurisdiction "over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species" (FGC § 1802).

Purpose of the Mad River Slough Wildlife Area Acquisition

The Department acquired the Mad River Slough Wildlife Area in order to protect, enhance, and restore coastal wetlands within Humboldt Bay.

Monies used to purchase the MRSWA were secured from Proposition 19 (1984) coastal wetland acquisition funds. Use of these funds required that the primary emphasis in management be directed towards wetland protection, restoration, and enhancement.

Purpose of the MRSWA Management Plan (draft October 1993)

The management plan was prepared with the support of the Mad River Slough Management Plan Advisory Team which included members of North Coast Waterfowl Association, City of Arcata, Livestock Operators, Agricultural Extension Service, Audubon Society and Humboldt County.

The major management objective for the MRSWA include restoration, enhancement, and protection of remaining coastal wetlands in Humboldt Bay.

The ultimate management intent will be to provide the optimum diversity of habitat types in order to achieve the highest biological productivity. Featured biological elements are identified: waterfowl, shorebirds, wading birds, raptors, riparian habitat, and salt marsh.

5.9 BALANCE OF SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

Implementation of any of the action alternatives would result in both short- and long-term impacts.

Short-Term Impacts
Short-term impacts would occur to land use, water quality, geology, biological resources, landforms/visual quality, traffic, air quality, public utilities, and noise, although most of these impacts would be reduced to a less than significant level by mitigation. Long-term impacts would occur to land use, hydrology, geology, biological resources, natural resources, landforms/visual quality, traffic, noise, and public safety.

Short-term land use impacts would include restricted public access to the project area (including the DFG lands); incompatibilities with general construction activities, the use of construction staging areas and access roads with nearby industrial/commercial areas; All of these impacts are mitigable to a less than significant level and would cease once constructed was completed. Significant impacts during the construction period would occur to some biological resources in the wetland and upland restoration and disposal areas. These impacts would include alteration of existing habitats and displacement or inadvertent extirpation of some organisms, particularly bottom- and soil-dwelling invertebrates and plants in the immediate project region.
These impacts are generally less than significant or avoidable by mitigation measures identified in section 3.0.

Short-term water quality impacts include potential spills or leaks of oils or fluids onto ground and into aquifers or wetlands.

Construction-related increases in traffic due to short-term movement of large trucks and excavation/grading equipment into project staging and work areas, and work-day use of public streets during worker commutes to the site could be significant during periods of seasonal congestion, but would be mitigable to a less than significant level.

Long Term Impacts
Excavation/dredging and filling of project sites for restoration of wetland and upland habitats and the creation of public access/interpretive areas would permanently, for practical purposes, modify some resources in the project region.

The hydrology changes would involve (1) levee construction to protect private property while protecting restored wetland areas; (2) breaching of the bayfront levee to enhance tidal exchanges to the restored wetland areas; and (3) deepening of small tributary channels to enhance slough channels that vary among the action alternatives. These changes would not cause adverse changes in flooding potential, scour, or sediment delivery and are essential to allow the creation of wetland habitats and the enhancement of long-term productivity of biological resources in the project region.

The loss of some agricultural lands as a result of and habitat restoration in the project area would be an essentially permanent loss of these resources. This conversion would be balanced by the restoration of more natural conditions on these lands, consistent with overall goals of the City's General Plan and the Coastal Act.

BALANCE OF SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

The project would result in a permanent loss of agricultural lands and some long-term visual impacts. On the whole, however, the project would create a net benefit to many resources, as summarized below:

- Helping to restore aquatic functions by opening the tidal channel and maintaining tidal exchange between the bay and wetlands, thereby improving water quality and health of wetland habitat.
- Restoring habitat and improving existing habitat values, thereby benefiting listed species (Pt. Reyes bird's beak, Humboldt Bay owl's clover, tidewater goby, Coho salmon, Chinook salmon).
- Increasing acreage of tidal habitats with beneficial impacts on associated species.
- Improving functions and values of existing tidal habitats with beneficial impacts on associated species.
- Enhancing functions and values of seasonal wetlands with beneficial impacts on associated species.
- Restoring native uplands with beneficial impacts on associated species.
- Enhancing fresh and brackish water marsh and riparian woodland habitats.
- Preserving the site in open space and restoring a number of filled and otherwise degraded areas with native vegetation, thereby improving the overall aesthetic qualities of the site.
- Providing additional recreational opportunities in areas currently not available to public use through the design and implementation of a nature trails system, trail staging areas, and interpretive signage.
- Increasing channel capacity and improving the overall drainage of lower Janes Creek

5.10 FINDINGS

CEQA sets forth certain mandatory findings of significance. The proposed Restoration Plan has been analyzed, and it has been found that it will not:

- Substantially degrade environmental quality;
- Substantially reduce fish or wildlife habitat;
- Cause a fish or wildlife habitat to fall below self-sustaining levels;
- Threaten to eliminate a plant or animal community;
- Reduce the numbers or range of a rare, threatened, or endangered species;
- Eliminate important examples of the major periods of California history or pre-history;
- Achieve short term goals to the disadvantage of long term goals;
- Have possible environmental effects that are individually limited but cumulatively considerable when viewed in connection with past, current, and reasonably anticipated future projects; or
- Have environmental effects that will directly or indirectly cause substantial adverse effects on humans.

6.1 LIST OF PREPARERS

City of Arcata

Mark Andre, Deputy Director Environmental Services- EIR Document/Project Manager
Julie Neander, Resource Specialist-EIR Document and Mitigation Monitoring Plan
Brian Kang, GIS Specialist-Geographic Information Systems (GIS)
Migonne Bivin, Botanist-Botany
Diana Cooper-Administrative Assistant-Editorial, Layout
Arcata Wetlands and Creeks Committee-Technical Review

California Department of Fish and Game

Karen Kovacs—EIR Document, Wildlife

Consultants

George Williamson, Planwest Partners--EIR Document
Erika Morris, Planwest Partners--EIR Document

Jamie Roscoe-- Archeology

Nick Garrity, Philip Williams and Associates Ltd.-- Hydrology and Restoration analysis

Gary Simpson, SHN and Associates--Geology

Misha Schwarz, Winzler & Kelly Consulting Engineers – CEQA Initial Study

H.T. Harvey and Associates—Biology and Widlife

6.2 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

Arcata Wetlands and Creeks Committee
Arcata Open Space and Agriculture Committee
Arcata Planning Commission
Arcata City Council
California Coastal Commission- Eureka Office
California Department of Fish and Game- Eureka Office
California Farm Bureau Federation
CALTRANS-Eureka Office
Humboldt County Planning Department

Humboldt Bay Harbor, Conservation and Recreation District
Humboldt County Farm Bureau
P.G.&E.- Eureka Office
NOAA Fisheries Service- Arcata Office
Reclamation District #768
Dr. Stanley Harris, Humboldt State University (retired).
Charles Roecklein, SHN Consulting Engineers
Tom Dunbar, RWCQB
Emily Dean, RWQCB
US Fish and Wildlife Service- Arcata Office
Wiyot Tribe, Table Bluff Reservation

Appendix A
Notice of Preparation of Draft EIR

McDaniel Slough Marsh Enhancement Project

SCH Number: 2003022091
Type: NOP - Notice of Preparation
Project Description
The City of Arcata, the California Department of Fish and Game (CDFG), and the California Coastal Conservancy plan to restore tidal wetland functions to 205 acres of 240 acres of former tidal salt/brackish marsh and freshwater wetlands adjacent to Humboldt Bay in northern California. The
remaining 35 acres will be managed as freshwater wetlands and brackish ponds. The project area is owned by (AMWS) northwest boundary. This 74 acre, City owned property provides a
critical link from the 154-acre AMWS to the CDFG Mad River Slough Wildlife Area (547 acres) located west of Janes Creek/McDaniel Slough.

Project Lead Agency
Arcata, City of

Contact Information

Primary Contact:
Juli Neander
City of Arcata
707.825.2151
736 F Street
Arcata, CA 95521

Project Location
County: Humboldt
City: Arcata
Parcel No:
Region:
Cross Streets:
Township: 6N
Range: 1E
Section: 31&32
Base: HB&M
Other Location Info:

Proximity To

Highways:
Airports:
Railways:
Waterways:
Schools:
Land Use: City Property: Agriculture Exclusive / City's General Plan: Natural Resource

Development Type

Local Action

Project Issues

Aesthetic/Visual, Agricultural Land, Wildlife, Wetland/Riparian, Archaeologic-Historic, Geologic/Seismic, Soil Erosion/Compaction/Grading, Water Quality, Drainage/Absorption, Landuse, Public Services, Traffic/Circulation, Biological Resources

Reviewing Agencies (Agencies in Bold Type submitted comment letters to the State Clearinghouse)
Resources Agency; California Coastal Commission; Department of Parks and Recreation; Department of Fish and Game, Region 1; Department of Fish and Game, Marine Region; Native American Heritage Commission; State Lands Commission; Caltrans, District 1; Regional Water Quality Control
Board, Region 1

Date Received: 2/19/2003 **Start of Review:** 2/19/2003 **End of Review:** 3/20/2003

Appendix B
Geotechnical Report

Geotechnical Evaluation of McDaniel Slough Marsh Enhancement Project

Prepared for:

City of Arcata
Environmental Services Department

SHN Consulting Engineers & Geologists, Inc.

812 W. Wabash
Eureka, CA 95501-2138
707/441-8855

November 2003
003130

Reference: 003130

Geotechnical Evaluation of McDaniel Slough Marsh Enhancement Project

Prepared for:

City of Arcata
Environmental Services Department

Prepared by:

Consulting Engineers & Geologists, Inc.
812 W. Wabash
Eureka, CA 95501-2138
707/441-8855

November 2003

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4. Levee Stability-Saturated 3

Introduction

This report presents the results of SHN's evaluation of the geotechnical characteristics of the City of Arcata's McDaniel Slough Marsh Enhancement Project. Our understanding of the project goals are based on review of a report titled "A Restoration Plan for the McDaniel Slough Tidal Marsh", prepared by Philip Williams & Associates, dated October 25, 2002, as well as discussions with City of Arcata representatives. In short, the project is intended to restore salt marsh habitat at the site by breach of the existing bay front levee, and construction of new levees along McDaniel Slough. The project area is located on both sides of McDaniel Slough, south of Samoa Boulevard (Figure 1).

Our work scope for this geotechnical evaluation includes the following:

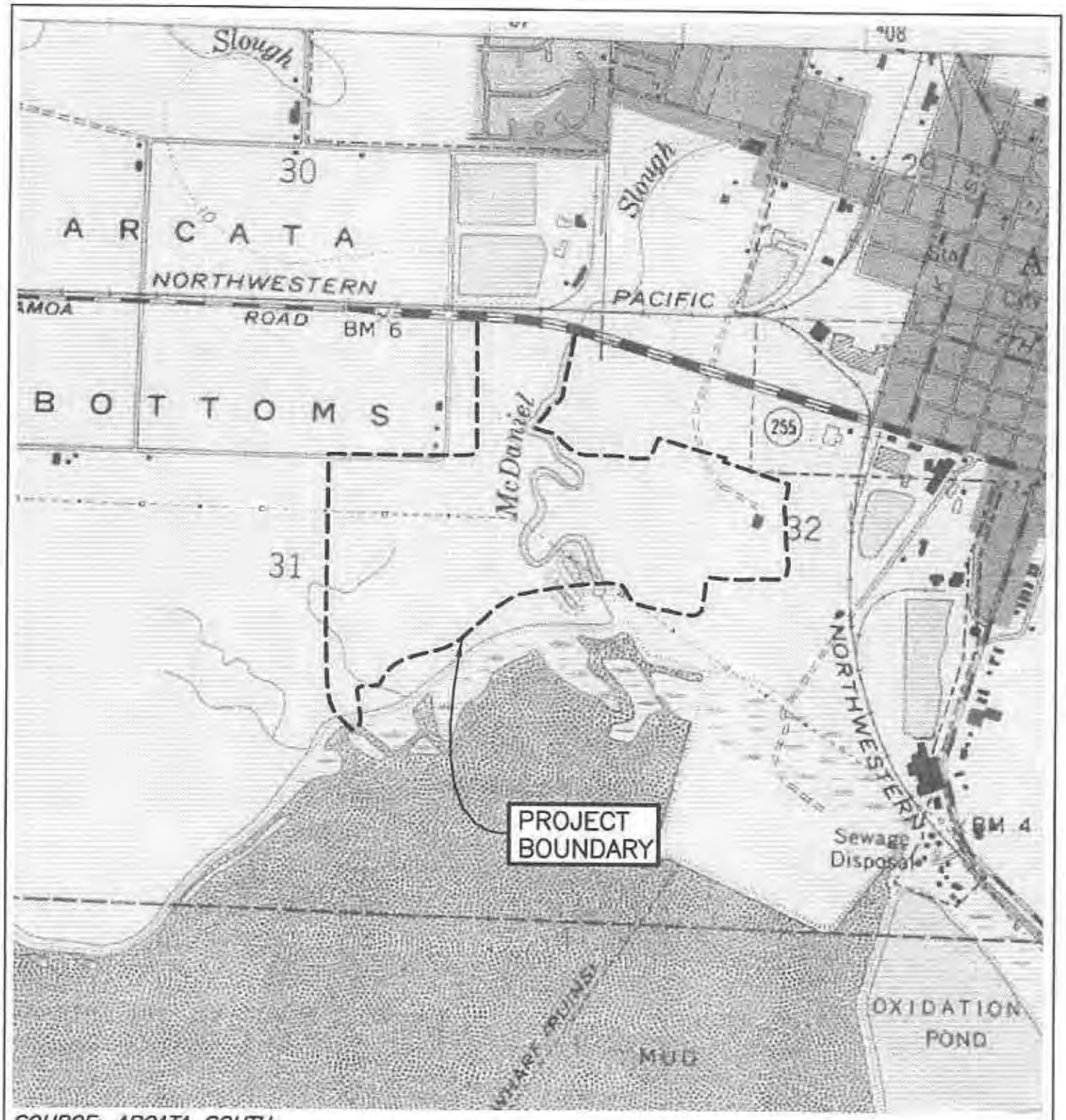
- Evaluation of levee side-slope stability,
- Development of settlement/consolidation criteria for levees and roadways,
- Assessment of saltwater intrusion potential of the proposed levees,
- Assessment of tsunami run-up potential,
- Field review of existing levees, and
- Qualitative assessment of liquefaction potential.

This evaluation is intended to provide engineering geologic and geotechnical information pertinent to application for a County grading permit. Additionally, following the first phase of evaluation of the site, we coordinated an evaluation of microfossil (diatom) assemblages in site subsoils in order to confirm (or refute) the historical interpretation that the entire site was a natural salt marsh. We also met with representatives of the California Department of Fish and Game to assist in the interpretation of strata identified in shallow cores during wetland delineation.

Methods

In order to evaluate the geotechnical conditions of the site, we supervised the excavation of six test pits throughout the project area (TP-1 through TP-6; Figure 2). The exploratory test pits were advanced to a maximum depth of 10 feet below the ground surface. The test pits were logged in general accordance with the Unified Soil Classification System. The test pits were advanced using a backhoe in the approximate locations shown in Figure 2. Detailed soil descriptions are presented on the test pit logs within Appendix A.

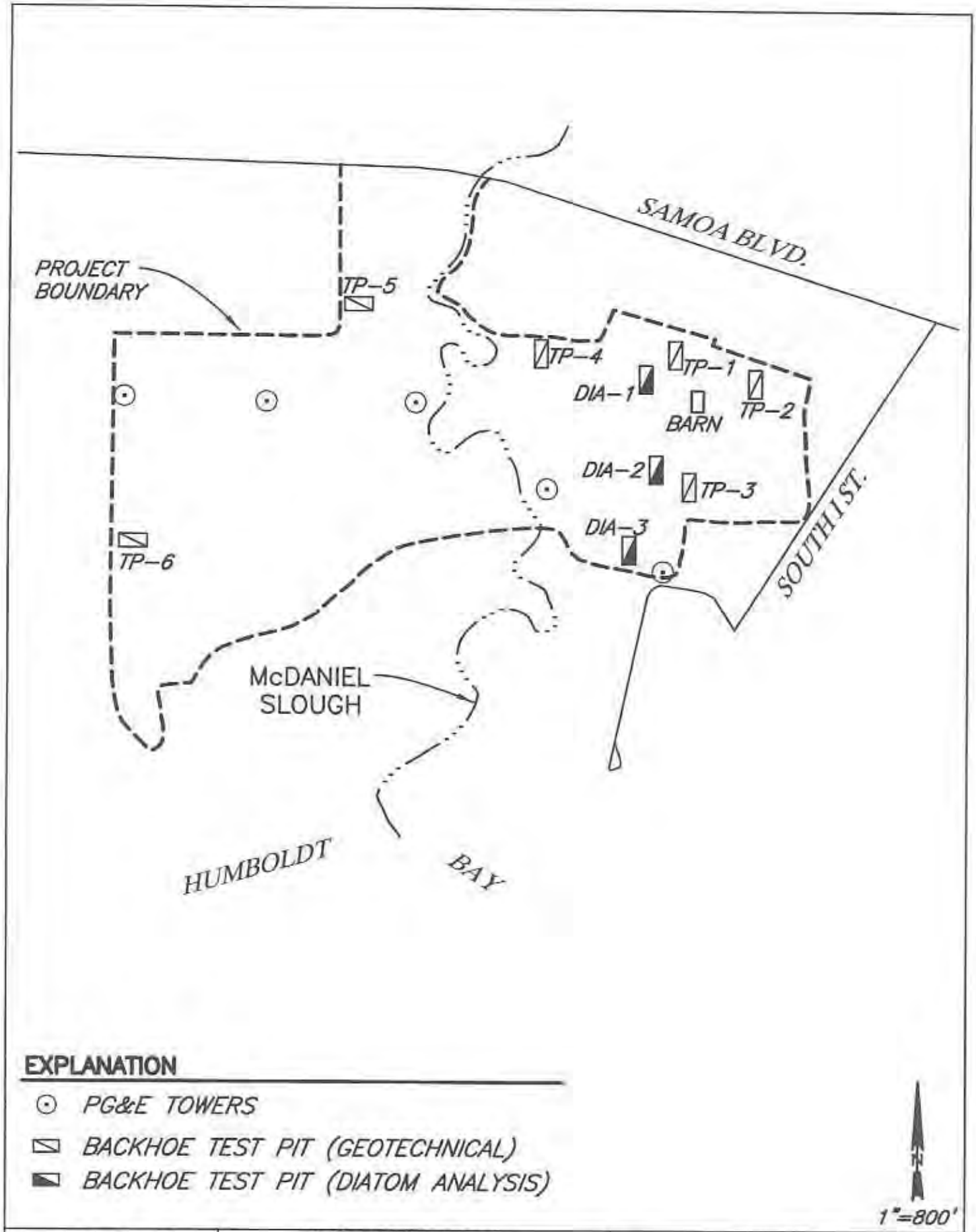
The properties of the soil materials to be used in construction of the levees were determined through laboratory testing. Selected disturbed and undisturbed samples were collected from the test pits for testing. Laboratory testing for index properties included sieve analyses and Atterberg limits. Direct shear tests were performed to determine the drained shear strength parameters. An unconfined compression test was performed to determine the undrained shear strength of the native undisturbed clay. The consolidation characteristics of the native soil were determined through a one-dimensional consolidation test. Soil testing was performed by SHN's soil laboratory in Eureka. Laboratory test results are included within Appendix B.



SOURCE: ARCATA SOUTH
USGS 7.5 MINUTE
QUADRANGLE

1"=1200'±

SHN Consulting Engineers & Geologists, Inc.	McDaniel Slough Project Arcata, California	Site Location Map SHN 003130
	OCTOBER 2003	003130-LOCATION	Figure 1



SHN Consulting Engineers & Geologists, Inc.	McDaniel Slough Project Arcata, California		Site Plan SHN 003130
	OCTOBER 2003	003130-SI1	Figure 2

To evaluate paleoenvironmental conditions of the site, an analysis of microfaunal assemblages was conducted. This analysis was completed because site soils exposed in geotechnical test pits lacked many characteristics typical of bay mud or estuarine soils (e.g., high organic content, marine shells, etc.). Specifically, analysis of diatoms allows interpretation of past environmental conditions at the site (i.e., estuarine/salt marsh, freshwater marsh, upland, etc.). Three test pits were excavated for diatom sampling in an approximate N-S line in the eastern part of the project area (DIA-1 through DIA-3; Figure 2). Diatom analysis was completed by Eileen Hemphill-Haley Consulting Micropaleontology of McKinleyville. Results of that analysis are included herein as Appendix C.

Subsurface Materials

Subsurface conditions across the project area are relatively continuous and uniform. Test pit exposures throughout the project area exposed primarily fine-grained soils consisting of varying amounts of silt and clay, to depths of about 8 feet. The material was field classified as medium stiff to stiff, and generally fell from the backhoe bucket in a single cohesive block. Below about 8 feet, sediments transition to gravels (TP-1) or sandy silts. At most exploration sites, soils lack significant amounts of organics, either as organic muds or discrete peat layers. In TP-3, three thin, buried peat layers were encountered. We infer some or all of these horizons to be possible evidence of coseismic subsidence events.

Construction Criteria

The native soil at the location of the embankments and within the borrow areas consists of clay and silt soils with some sand or gravel layers at depths below 8 feet. It is our understanding that the levees (and road beds) will be constructed using soil borrowed from the future freshwater wetland excavations. Based on material conditions, we recommend that the levees and road beds be constructed with the upper clay/silt soil. In order to limit the amount of saltwater intrusion, the sandy material below the clay should be mixed with the clay at a minimum ratio of 1 part sand to 1 part clay, if the borrow areas reach beneath the upper fine grained soils. The sandy material may be used without mixing for the upper 1 foot of the levees or roads. The clay should be compacted at a moisture content between 0 to 4 percent over the optimum moisture content to a minimum of 90 percent of the maximum density determined through ASTM D1557. The levees and road beds should be raised in lifts not exceeding 8 inches.

Stability Analyses

We understand that the side slopes of the levees will vary, with a maximum slope angle of 4 horizontal to 1 vertical (4H:1V). The maximum total height of the levees will be approximately 8 feet above the existing ground surface. For the stability analyses, the most critical cross section was evaluated with side slopes of 4H:1V up to a height of 8 feet.

The stability analyses of the typical levee cross section were performed using the computer program GEOSLOPE (Geocomp Corp., 1985). The stability was evaluated utilizing the modified Bishop limit equilibrium slope stability method. Two different conditions were evaluated – the first for undrained conditions immediately following construction, and the second for long-term stability with a saturated embankment.

The typical cross section that was analyzed for stability is shown in Figure 3. The factor of safety for failure of the levee under undrained conditions immediately following construction was 1.9. For long-term conditions, the factor of safety increased to 2.5, as shown in Figure 4.

A pseudo-static analysis was also performed. Pseudo-static analyses subject the two-dimensional sliding mass to a horizontal acceleration equal to an earthquake coefficient multiplied by the acceleration of gravity. The earthquake coefficient, or pseudo-static coefficient, is dependant upon the magnitude of the earthquake event, and is typically equal to a percentage of the maximum design acceleration in bedrock beneath the site. For the current analyses, a screen analysis procedure was performed to determine if a seismic stability hazard is likely to exist at the site. The screen analysis procedure developed by Seed (1979) was used in the analyses. A pseudo-static coefficient of 0.15 was used in accordance with Seed's (1979) recommendations for an earthquake magnitude up to 8.25. In this screening procedure, if the resulting factor of safety is greater than 1.2, a seismic stability hazard is considered unlikely. If the resulting factor of safety were less than 1.2, further displacement analyses would be performed. The factor of safety under pseudo-static conditions was 1.5 for the typical levee cross section under long-term conditions, and further seismic analyses were considered unnecessary.

Based on the results of our analyses, the risk of levee instability is low for the proposed project, with a minimum factor of safety of 1.9 under static conditions.

Settlement

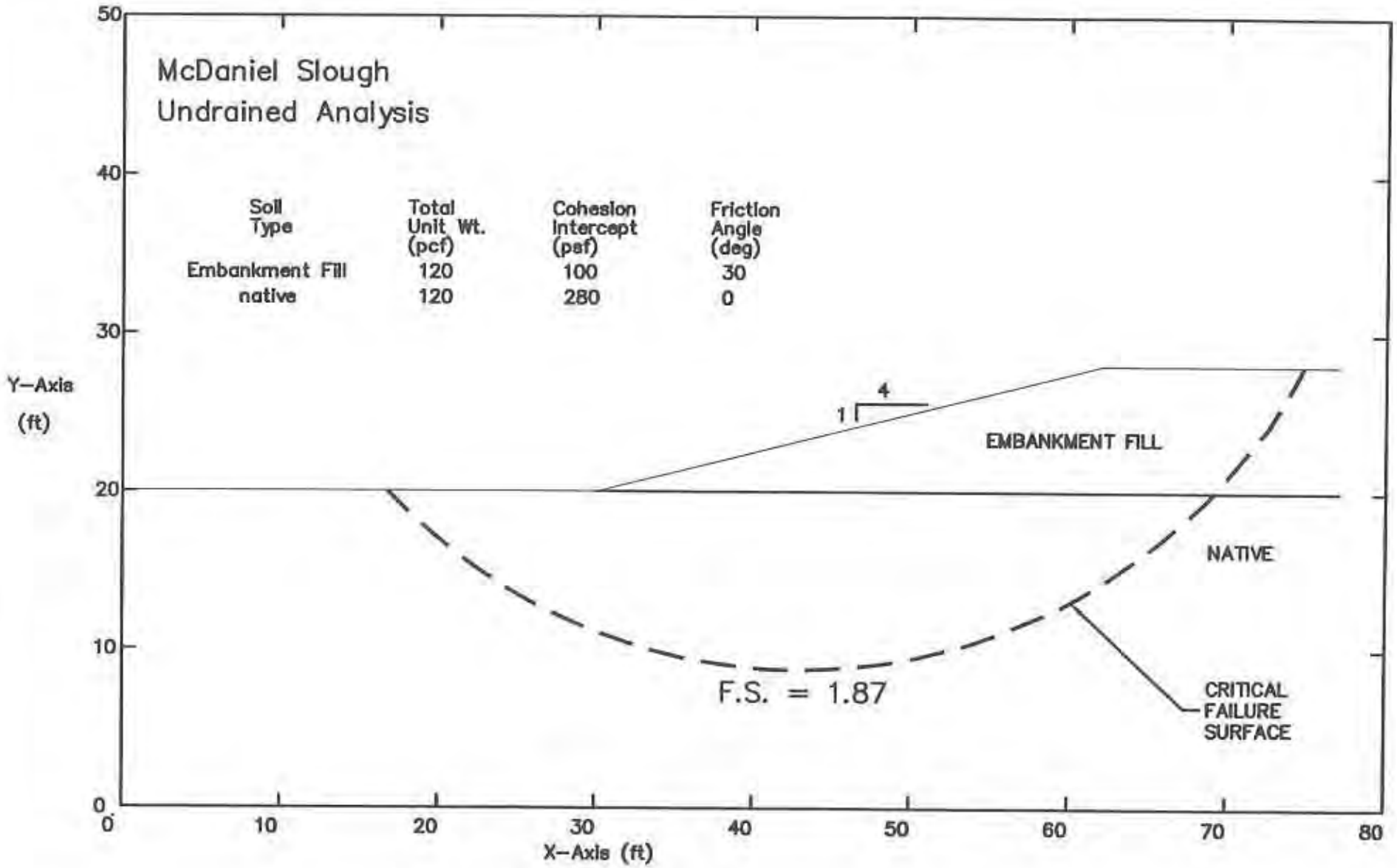
Our settlement analysis was based on an embankment height of 8 feet above the original ground level. The estimated settlement was evaluated using primary consolidation theory. The settlement is greatest beneath the center of embankments where the subsurface stress increase is greatest. The estimated settlement beneath the center of the embankment was about 0.6 feet, following construction of the embankment, assuming that materials similar to those encountered within the test pits are continuous down to about 30 feet. The estimated magnitude of settlement is probably conservative due to the potential that layers of sand may exist within the soil profile that were not included in the consolidation profile. Also, the estimated settlement is based on laboratory testing of the native soil at a depth of 4 feet below the existing ground surface. The degree of consolidation of the fine-grained soil is likely to increase with depth.

The time required for consolidation of the soil was estimated to be approximately 1 to 2 years, based on the consolidation tests performed for the fine-grained material beneath the site.

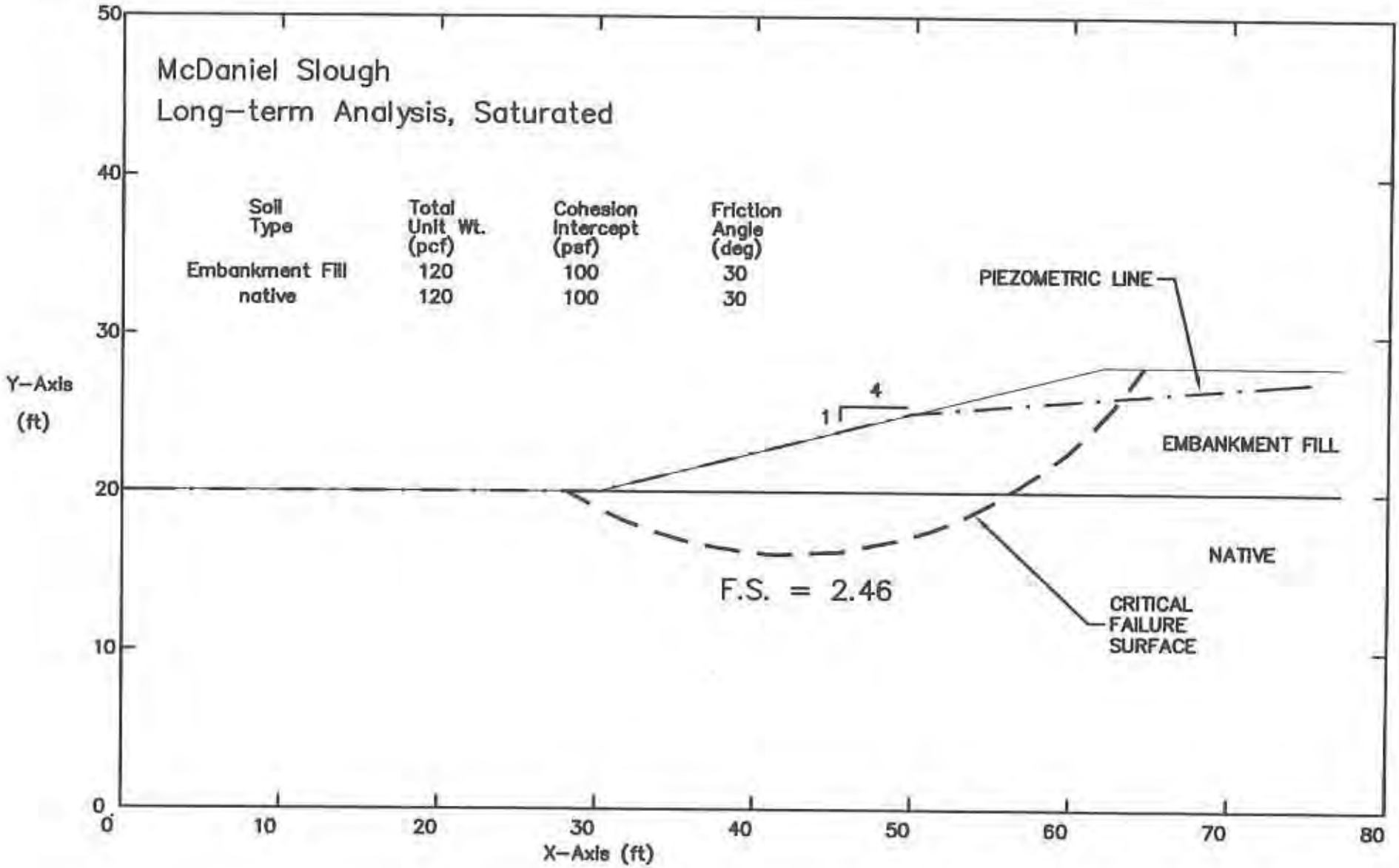
Based on the results of our settlement analyses, the embankment should be overbuilt by approximately ½ foot to allow for lowering of the crest elevation of the levee over time.

Road Design

We understand that a PG&E access road will be constructed across the future marsh area to access one of the existing electric towers. Based on discussion in the design report, we infer that the road prism would have a cross section similar to the levees, with 4H:1V side slopes and a top width of 12 feet. The roadway fill prism may be constructed using compacted on-site borrow material, utilizing similar methods and standards as for levee construction. The overall stability of the roadway



SHN Consulting Engineers & Geologists, Inc.	McDaniel Slough Project Arcata, California		McDaniel Slough Levee Stability SHN 003130
	OCTOBER 2003	003130-LEVEE1	Figure 3



SHN Consulting Engineers & Geologists, Inc.	McDaniel Slough Project Arcata, California		McDaniel Slough Levee Stability SHN 003130
	OCTOBER 2003	003130-LEVEE2	Figure 4

section would be similar to the stability of the levees as described above. We recommend that the roadway be surfaced with a minimum thickness of 10 inches of crushed rock aggregate, overlying a geotextile fabric, placed over the compacted fill material. This recommended unpaved road section is for an assumed maximum loading from vehicles with individual wheel loads less than 2,000 pounds. We recommend that the geotextile be woven, and have a minimum mass of 8 ounces per square yard (e.g. Contech C-300 or equivalent). The geotextile will serve to separate the crushed aggregate from the compacted fill material, which will extend the serviceability of the roadway over a longer time period, and require less maintenance of the roadway surface.

Seepage

The native clay soils are suitable for construction of the levees and should provide adequate resistance to saltwater intrusion through the embankments due to the low permeability of the clay soil. A permeability of less than $1x10^{-7}$ centimeters per second is likely to be achieved through proper compaction of the embankments (see Construction Criteria above).

Liquefaction Potential

Sediments encountered in test pits at the site were predominantly fine-grained, cohesive materials that are not susceptible to liquefaction. Liquefaction is the transformation of a granular material from a solid to a liquefied state as a consequence of increased pore-water pressure and reduced effective stress. Increased pore-water pressure is induced by the tendency of granular materials to compact when subjected to cyclic shear deformation, which, in the natural environment, is most commonly associated with earthquake shaking. This process generally does not occur in fine-grained sediments with sufficient cohesion to resist reduction in effective stresses. The only materials encountered in the test pits with liquefaction potential are the sandy deposits below 8-foot depth in pits TP-1, TP-2, and TP-3. At these locations we encountered loose medium- to coarse-grained sand with abundant rounded pebbles and cobbles (TP-1) and silty sands (TP-2, TP-3). These materials were either saturated at the time of our investigation, or are susceptible to seasonal saturation. As such, there appears to be a limited liquefaction potential at the site, confined to sediments below 8 feet depth. We note that we did not observe visual evidence of past liquefaction in the test pit exposures (e.g., vents, etc.).

Tsunami Inundation Potential

Because the project site is located in a low-lying coastal area in a seismically active region, it is subject to tsunami inundation. The hazard associated with tsunami inundation is increased in the Humboldt County area due to the proximity of the Cascadia subduction zone and other active offshore seismic sources that are capable of generating very large earthquakes.

Tsunamis have been observed along the northern California coastline following large earthquakes in the recent past. The most significant historical tsunami inundation occurred in Crescent City in 1964 following a magnitude 9.2 earthquake in Alaska. Inundation associated with this tsunami generated over $7 million damage in Crescent City and resulted in ten fatalities. The 1964 tsunami resulted in run-up of 6 feet (about 2 meters) in Humboldt Bay, but caused no significant damage. The tsunami resulted in fourteen knot currents near the bay entrance, and the bay was filled with

logs and other debris. A ten-foot-high sea wall was breached at the Eureka Boat Basin. More recently, on April 25, 1992, a series of strong earthquakes occurred near Cape Mendocino. The main shock was magnitude 7.1, and was followed by strong aftershocks with magnitudes of 6.6 and 6.7. The magnitude 7.1 main shock generated a small tsunami that was recorded by tide gauges from Oregon to southern California (Bernard et al., 1994), including at Humboldt Bay. The wave was 0.7 to 1 foot (20 to 30 cm) high at the Humboldt Bay entrance, and caused no damage.

Available tsunami inundation modeling for the Humboldt Bay region (Bernard et al., 1994) is based on a scenario earthquake on the southern Cascadia subduction zone, as well as historical tsunami observations. Based on these models, it appears the most significant tsunami hazard is posed by seismically-induced submarine slumps, which can generate large tsunamis. Based on the size of recent tsunamis, Bernard et al. (1994) conclude that a 33-foot (10 meter) incident wave (i.e., the size of the wave that strikes the coastline) represents a reasonable estimate for inundation modeling. There is ample reason to assume that a 33 foot (10 meter), or larger, tsunami wave can be generated along the southern Cascadia subduction zone. Based on our discussions with the author of the tsunami model (E. Bernard of the National Oceanographic and Atmospheric Administration, personal communication, 1999), coastal Humboldt County contains the necessary elements to generate a large slump-induced tsunami (e.g., nearby seismic sources and sediment-rich rivers feeding the continental shelf).

Studies of late Holocene stratigraphy in northern Humboldt Bay have not identified tsunami deposits, which suggests that tsunamis have not over-topped the northern Samoa Peninsula. We did not observe tsunami deposits in our test pits at the site. The more significant hazard appears to be associated with tsunami run-up inside the bay, as water pushes into the bay entrance with no means to retreat. This effect may result in extensive flooding of low-lying areas around the margins of the bay, including the project site. The dynamics of tsunami run-up inside Humboldt Bay are not well understood, but the inundation model suggests that run-up may locally reach 10 feet (3 m). This 10-foot run-up would presumably be added to the tidal height at the time of the tsunami. Therefore, if the event occurred during a high tide, the bayside run-up may be quite extensive.

Coseismic Subsidence

Coseismic subsidence has been documented throughout the Humboldt Bay region, and is correlated to great Cascadia Subduction Zone earthquakes. Studies at the Mad River Slough, west of the site, reveal evidence for several such subsidence events. As such, there is presumably potential at the project site for land level changes (on the order of 1+ meter) during large magnitude Cascadia Subduction Zone events. Paleoseismic studies indicate recurrence intervals for subduction earthquakes on the order of 300 to 500 years; the most recent event occurred in 1700. Evidence for potential subsidence events was exposed in TP-3, where we observed three buried organic horizons.

Paleoenvironment Analysis – Diatom Study

Because site soils exposed in geotechnical test pits lacked many characteristics typical of estuarine/bay mud soils (e.g., high organic content, abundance of shell fragments, etc.), concern was raised as to the extent of salt marsh that had existed at the site. Design of the marsh restoration appears to have been based solely on the 1870 Coast and Geodetic Survey mapping of the area. To

ensure that the proposed project is indeed restoring a pre-existing environment, an analysis of microfaunal assemblages was completed to evaluate the depositional environment of site soils. Specifically, characterization of diatoms preserved in site soils provide a means to determine the nature of the paleoenvironment of the site (i.e., freshwater vs. estuarine vs. upland). Diatoms were sampled in three test pits excavated in the eastern portion of the project area (DIA-1 through DIA-3 on Figure 2).

Diatom assemblages were evaluated by Eileen Hemphill-Haley. A report describing the results of the diatom analysis is presented in Appendix C. The results indicate that the soils closest to Humboldt Bay, at the locations of pits DIA-2 and DIA-3, contained salt marsh and tidal flat diatoms. North of the existing barn site, however, in pit DIA-1, soils contained few if any diatoms. Absence of diatoms in these soils suggests that tidal deposition had not occurred at this location for a significant period of time.

References

Bernard, E., Mader, C., Curtis, G., and Satake, K. (1994). "Tsunami Inundation Model Study for Eureka and Crescent City, California." National Oceanic and Atmospheric Administration Technical Memorandum ERL PMEL-103. 80 pages, with maps.

Geocomp Corp., 1985, GEOSLOPE computer program, Version 4.20.

Seed, H.B., 1979. Considerations in the earthquake-resistant design of earth and rockfill dams, *Geotechnique*, 29, 215-263.

Appendix A

Test Pit Logs

Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: McDaniel Slough
LOCATION: 325' N34W from NW corner of barn
GROUND SURFACE ELEVATION: –
EXCAVATION METHOD: Backhoe
LOGGED BY: GDS

JOB NUMBER: 003130
DATE DRILLED: 7/16/03
TOTAL DEPTH OF TEST PIT: 10.0 feet
SAMPLER TYPE: Bucket and bag
Note: Potential borrow site.

TEST PIT NUMBER **TP-1**

DEPTH (FT)	BULK SAMPLES SS SAMPLES	SPT BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psi)	U.C. (psi) by P.P.	% Passing 200	REMARKS
0.0			ML		SILT, soft to medium stiff, dry, dark brown, with many roots, prismatic structure.						A/B to B horizon (implies some stripping). Qal (alluvium overbank deposits).
-1.0											
			ML		SILT, clayey, very fine sandy, medium stiff, brown.						
-2.0											
-3.0											
-4.0			CL		CLAY, silty, less sandy than above, medium stiff, dry to moist, mottled blue and brown, no detectable organics (no odor).						
-5.0											
-6.0											
-7.0	X	Bucket									
-8.0 ▽			SW		SAND, medium to coarse, with abundant rounded pebbles, cobbles, loose, wet, blue.						Qal (alluvium).
	X	Bag									
-9.0											Running sands (Qal), rounded clasts in gravel = chert, quartz; lesser graywacke = mature alluvial gravel (Mad River?).
-10.0					Bottom of test pit at 10.0 feet.						
-11.0											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD BORING LOG

Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: McDaniel Slough
LOCATION: ~400' N85E from NE corner of barn
GROUND SURFACE ELEVATION: –
EXCAVATION METHOD: Backhoe
LOGGED BY: GDS

JOB NUMBER: 003130
DATE DRILLED: 7/16/03
TOTAL DEPTH OF TEST PIT: 10.0 feet
SAMPLER TYPE: 2.5" O.D. brass shelby tube; hand hammer drive, bucket and bag

TEST PIT NUMBER **TP-2**

DEPTH (FT)	BULK SAMPLES / SS SAMPLES	SPT BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0			ML		SILT, dry, gray, with abundant grass roots.						Very weak "A" horizon?
-1.0			ML		SILT, clayey, very fine sandy, medium stiff, dry to damp, gray mottled with strong brown and orange.						Qal (alluvium overbank deposits).
-2.0											
-3.0											
-4.0	X	Bag									
-5.0			CL-ML		CLAY, silty to SILT, clayey, with some plasticity, medium stiff to stiff, moist with some seeps, bluish gray.						
-6.0											"Heavy".
-7.0	X	Bucket									
-8.0			ML		SILT, very fine sandy, medium stiff, moist to wet, blue.						Qal (alluvium).
-9.0											No notable organics.
-10.0					Bottom of test pit at 10.0 feet.						
-11.0											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD BORING LOG

Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: McDaniel Slough
LOCATION: ~420' N of NW corner of existing levee
GROUND SURFACE ELEVATION: –
EXCAVATION METHOD: Backhoe
LOGGED BY: GDS

JOB NUMBER: 003130
DATE DRILLED: 7/16/03
TOTAL DEPTH OF TEST PIT: 10.0 feet
SAMPLER TYPE: 2.5" O.D. brass shelby tube; hand hammer drive, bucket and bag

TEST PIT NUMBER
TP-3

DEPTH (FT)	BULK SAMPLES SS SAMPLES	SPT BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0			ML		SILT, soft, dry, grayish brown, with many roots.						Estuarine deposits.
-1.0					With distinct blocky texture.						
-2.0			OL		PEAT, root mat, black.						Buried organic horizon.
			ML		SILT, seeps, perched water, gray.						
-3.0			OL		PEAT, root mat.						Buried organic horizon with sharp upper contact.
			ML		SILT, gray.						
-4.0			OL		PEAT, root mat.						Buried organic horizon.
			ML		SILT, clayey, medium stiff, moist, gray.						
-5.0	▽	Bucket									Water level after ~45 minutes.
-6.0											
-7.0											
-8.0			SM		SAND, very fine, silty, loose, wet, bluish gray.						Qal (alluvium).
-9.0		Bag									No mottling in this hole. Buried organic horizons = earthquakes?
-10.0					Bottom of test pit at 10.0 feet.						
-11.0											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD BORING LOG

Consulting Engineers & Geologists, Inc.
812 West Wabash, Eureka, CA ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: McDaniel Slough
LOCATION: along EW fence E of McDaniel Slough
GROUND SURFACE ELEVATION: –
EXCAVATION METHOD: Backhoe
LOGGED BY: GDS

JOB NUMBER: 003130
DATE DRILLED: 7/16/03
TOTAL DEPTH OF TEST PIT: 10.0 feet
SAMPLER TYPE: 2.5" O.D. brass shelby tube; hand hammer drive and bag

TEST PIT NUMBER
TP-4

DEPTH (FT)	BULK SAMPLES	SS SAMPLES	SPT BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0						Brown silty loam, "A" horizon, dry, root zone.						Topsoil.
-1.0				CL-ML		CLAY, silty, to SILT, clayey, medium stiff, damp, grayish brown mottled with strong brown.						Qal (alluvium overbank deposits).
-2.0												
-3.0												
-4.0												
-5.0												
-6.0												
-7.0			Bag	ML		SILT, very fine sandy, medium stiff, damp to moist, blue.						
-8.0						Bottom of test pit at 8.0 feet. No groundwater observed.						
-9.0												
-10.0												
-11.0												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD BORING LOG

Consulting Engineers & Geologists, Inc.
812 West Wabash, Eureka, CA ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: McDaniel Slough
LOCATION: along fenceline parallel to "Old Samoa Road"
GROUND SURFACE ELEVATION: –
EXCAVATION METHOD: Backhoe
LOGGED BY: GDS

JOB NUMBER: 003130
DATE DRILLED: 7/16/03
TOTAL DEPTH OF TEST PIT: 8.5 feet
SAMPLER TYPE: 2.5" O.D. brass shelby tube; hand hammer drive

TEST PIT NUMBER
TP-5

DEPTH (FT)	BULK SAMPLES / SS SAMPLES	SPT BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0			ML		SILT, very fine sandy, brown with faint strong brown mottles, with roots.						
-1.0			OL		PEAT, roots.						Buried organic horizon.
			ML		SILT, clayey, medium stiff to stiff, dry to moist, gray mottled with strong brown.						Qal (alluvium overbank deposits).
-2.0											
-3.0											"Heavy".
-4.0											Slow seep at 4 feet, perched groundwater.
-5.0											
			ML		SILT, very fine sandy, medium stiff, moist, bluish gray.						
-6.0											
-7.0											
-8.0											
					Bottom of test pit at 8.5 feet. No groundwater observed.						Test pit dry when filled.
-9.0											
-10.0											
-11.0											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD BORING LOG

Consulting Engineers & Geologists, Inc.
812 West Wabash, Eureka, CA ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: McDaniel Slough
LOCATION: along W levee, S of PG&E tower
GROUND SURFACE ELEVATION: –
EXCAVATION METHOD: Backhoe
LOGGED BY: GDS

JOB NUMBER: 003130
DATE DRILLED: 7/16/03
TOTAL DEPTH OF TEST PIT: 6.0 feet
SAMPLER TYPE: –

TEST PIT NUMBER
TP-6

DEPTH (FT)	BULK SAMPLES SS SAMPLES	SPT BLOWS PER 0.5'	USCS	PROFILE	DESCRIPTION	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (psf) by P.P.	% Passing 200	REMARKS
0.0			ML		SILT, clayey, soft to medium stiff, moist to wet, mottled gray brown with strong brown, with roots, pilly texture. No roots.						No "A" horizon. Estuarine deposits.
-1.0											
-2.0											
-3.0 ▽											Abundant water flowing in at 3.0 feet.
-4.0			ML		SILT, clayey, medium stiff to stiff, wet, bluish gray.						
-5.0											Sticks as clump when dumped from backhoe bucket.
-6.0					Bottom of test pit at 6.0 feet.						No samples taken because too much water.
-7.0											
-8.0											
-9.0											
-10.0											
-11.0											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

FIELD BORING LOG

Appendix B

Laboratory Test Results

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash Eureka, CA 95501-2138 Tel: 707/441-8855 FAX: 707/441-8877 E-mail: shninfo@shn-engr.com

MATERIALS TESTING LABORATORY RECEIVING AND SCHEDULING OF TESTS

JOB # 003130

JOB NAME McDaniel Slough DATE COLLECTED July 16, 2003

RETURN RESULTS TO Gary S., Mark T. DATE COMPLETED 8-26-03 DATE RECORDED

TOTAL NUMBER OF SAMPLES BAGS 4 BUCKETS 3 SHELBY TUBES BRASS LINERS 5

SAMPLE CONDITION: INTACT [*] DAMAGED [ ] COMPOSITE [*] UNDISTURBED [*]

SAMPLE NO. & DEPTH	MOISTURE DENSITY	UNCONFINED COMPRESSION	USDA TEXTURAL ANALYSIS	COARSE SIEVE ANALYSIS	FINE SIEVE ANALYSIS	% PASSING 200	SAND EQUIVALENT	SPECIFIC GRAVITY	PLASTICITY INDEX	COMPACTION CURVE (ASTM-155)	CAL TRANS CURVE (CT-216)	COMPACTION CHECK POINT	% ORGANICS	LA RATTLER	DURABILITY	SULFATE SOUNDNESS	RICE SPECIFIC GRAVITY	R VALUE	CONSOLIDATION *		DIRECT SHEAR **		LAB SAMP. #
TP-1 @ 7' (bucket)																							3-682
@8.5' (bag)																							3-683
TP-2 @ 4' (bag)																							3-688
@ 7' (bucket) TP2									X	X											X		3-[illegible]
@8' (tube)	X																						3-[illegible]
TP-3 @ 4.5' (tube)																			X				3-[illegible]
@ 5' (bucket)						X			X														3-[illegible]
@ 5.5' (tube)																					X		3-[illegible]
@ 9' (bag)																							3-694
TP-4 @ 4' (tube)	X					X			X														3-691
@ 7' (bag)																							3-692
TP-5 @ 4' (tube)	X	X																					3-693
TOTAL																							

COMMENTS:

MIX TP2 T1

* Indicate The Following: Consolidation Loads: Saturate, 250, 500, 1000, 2000, 4000, 8000, unload to 2000 Note all points to be saturated

** Indicate The Following: Confining loads: 500, 1000, 2000

Consolidated Drained: [X]
Consolidated Undrained: [ ]
Unconsolidated Undrained: [ ]

Residual Cycles 0

Special Instructions: Soak direct shear samples for a least 24 hours prior to shear.
For Remolded Direct shear test on TP-2 @ 7', compact to 90% at +4%opt.

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DENSITY BY DRIVE- CYLINDER METHOD (ASTM 2937)

Job Name:Mc Daniel Slough
Performed By:JMA
Checked By: GSW
Project Manager: GDS

Job Number: 003130
Date: 8/20/2003
Date: 8-26-03

Lab Sample Number	3-686	3-691	3-693		
Job Sample Number	TP2@8'	TP4@4'	TP5@4'		
A. Diameter of Cylinder (in)	2.38	2.38	2.38		
B. Total Length of Cylinder (in)	7.95	6.00	7.00		
C. Length of Empty Cylinder A (in)	4.92	0.75	2.55		
D. Length of Empty Cylinder B (in)	0.00	0.00	0.00		
E. Length of Cylinder Filled (B-(C+D) (in)	3.03	5.25	4.45	0.00	0.00
F. Volume of Sample (3.14 x $(A/2)^2$ x E) (in^3)	13.48	23.36	19.80	0.00	0.00
G. Volume of Sample in cc (F x 16.387)	220.89	382.74	324.42	0.00	0.00

H. Pan #	ss9	ss15	ss6		
I. Weight of Wet Soil and Pan	652.9	927.7	876.0		
J. Weight of Dry Soil and Pan	569.8	764.8	656.8		
K. Weight of Water	83.1	162.9	219.2	0.0	0.0
L. Weight of Pan	198.2	195.0	196.3		
M. Weight of Dry Soil	371.6	569.8	460.5	0.0	0.0
N. Percent Moisture (K/M)	22.4	28.6	47.6	#DIV/0!	#DIV/0!
O. Dry Density (M/G) (g/cc)	1.68	1.49	1.42	#DIV/0!	#DIV/0!
P. Dry Density (O x 62.428) (lb/ft^3)	105.0	92.9	88.6	#DIV/0!	#DIV/0!

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COMPACTION TEST DATA SHEET

Job Name: **McDaniel Slough**
Job Number: **003130**
Sample Description: **silt**
Initial Gradation: + 3/4"= **0.0** % + 3/8"= **0.0** % + No.4= **0.0** %

Lab Sample Number: **3-685**
Tested By: **T. Micheli** Date Tested: **8/12/03**
Checked By: GW Date Checked: 8-26-03

TEST DATA

Mold + Wet Soil, lb	13.690	13.350	13.465	13.575	13.675
Mold, lbs	9.245	9.245	9.245	9.245	9.245
Moist Soil, lbs	4.445	4.105	4.220	4.330	4.430
Factor (1/Vol. cu. ft)	30.00	30.00	30.00	30.00	30.00
WET DENSITY, pcf	133.3	123.1	126.6	129.9	132.9
Drying Dish No	T2	T4	T1	T12	T6
Wet Soil and Dish	531.5	571.4	538.8	518.7	519.9
Dry Soil and Dish	473.2	533.9	498.7	472.7	465.6
Moisture, g	58.3	37.5	40.1	46.0	54.3
Dish, grams	113.4	113.7	115.8	114.1	110.8
Dry Soil, g	359.8	420.2	382.9	358.6	354.8
MST. CONTENT, %	**16.2**	**8.9**	**10.5**	**12.8**	**15.3**
DRY DENSITY, pcf	**114.7**	**113.1**	**114.6**	**115.1**	**115.3**
% Moist. Added	14	6	8	10	12

TEST METHOD

[ ] STANDARD AASHTO- ASTM D 698
5.5 lb hammer, 12" drop, 3 layers

[X] MODIFIED AASHTO- ASTM D 1557
10 lb hammer, 18" drop, 5 layers

ASTM	Soil	Mold, in.	Blows	Mold Wt.
ASTM		4	25	9.245

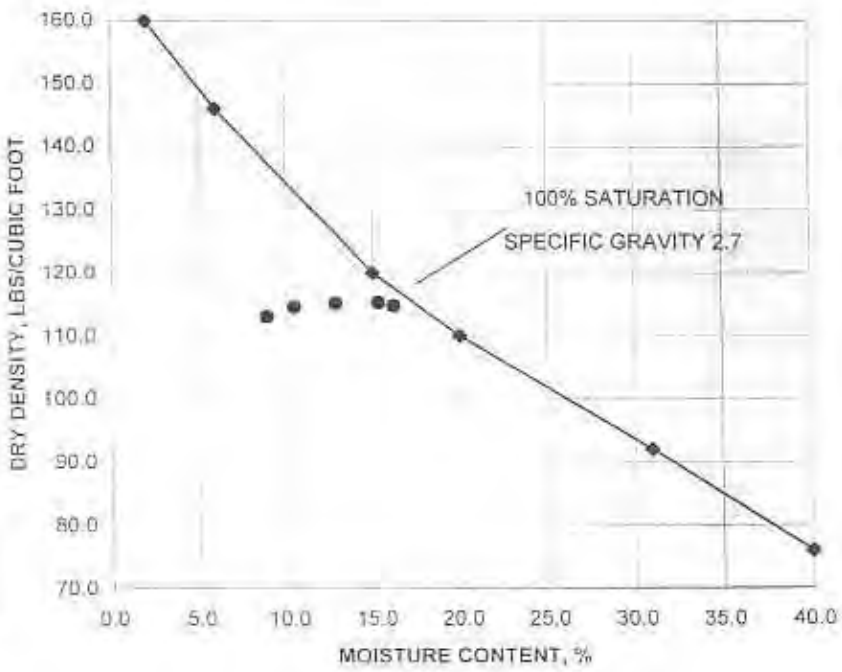
A	No.4= ≤20%	Mold, in.	Old Mold	New Mold
B	No.4=>20% 3/8=≤20%	4"	9.255 lbs	9.345
C	3/8=>20% 3/4=<30%	6"	12.27 lbs	12.53

MAXIMUM DRY DENSITY (pcf)	**115.3**	
OPTIMUM MOISTURE CONTENT (%)	**15.3**	Rock Corr

INITIAL GRADATION

Total Weight (gm)	13486

Screen size	Wt. Screen	Wt. Cumulat
+ 3/4" screen		0
+ 3/8" screen		0
+ No.4 screen		0



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PERCENT PASSING # 200 SIEVE (ASTM - D1140)

Job Name: Mc Daniel Slough
Performed By: JMA
Checked By: GW
Project Manager: GDS

Job Number: 003130
Date: 8/20/2003
Date: 8-26-03

Lab Sample Number	3-688	3-691			
Job Sample Number	TP3@5'	TP4@4'			
A. Pan Number	ss8	ss15			
B. Dry Weight of Soil & Pan	303.3	320.6			
C. Pan Weight	193.1	194.5			
D. Weight of Dry Soil	110.2	126.1	0.0	0.0	0.0
E, Soil Weight Retained on #200&Pan	208.7	202.9			
F. Soil Weight Passing #200	94.6	117.7	0.0	0.0	0.0
G. Percent Passing #200	85.8	93.3	#DIV/0!	#DIV/0!	#DIV/0!

Lab Sample Number					
Job Sample Number					
A. Pan Number					
B. Dry Weight of Soil & Pan					
C. Pan Weight					
D. Weight of Dry Soil	0.0	0.0	0.0	0.0	0.0
E, Soil Weight Retained on #200&Pan					
F. Soil Weight Passing #200	0.0	0.0	0.0	0.0	0.0
G. Percent Passing #200	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

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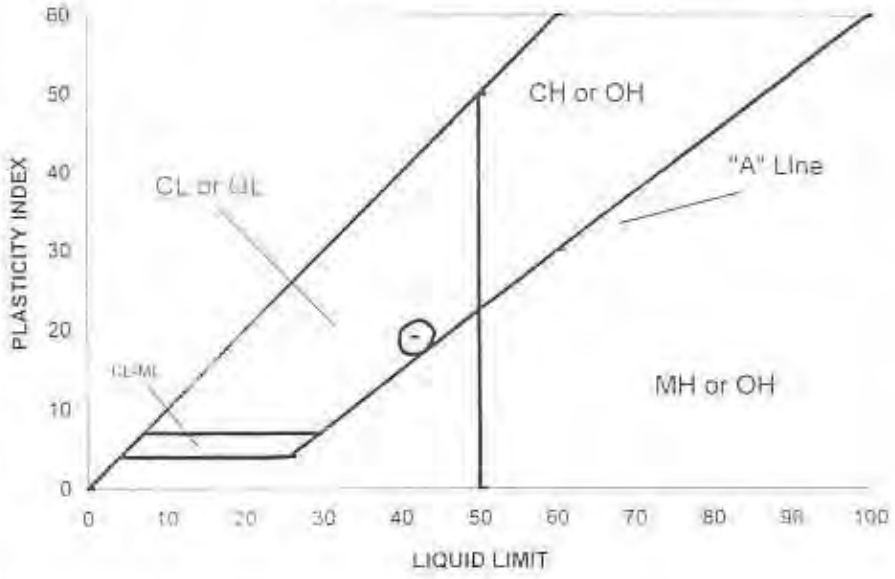
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	Mc Daniel Slough	JOB #:	3130	LAB SAMP. #:	3-691
SAMPLE ID:	TP4@4'	PERFORMED BY:	JMA	DATE:	8/20/2003
PROJECT MANGER:	GSW	CHECKED BY:	GSW	DATE:	8-26-03

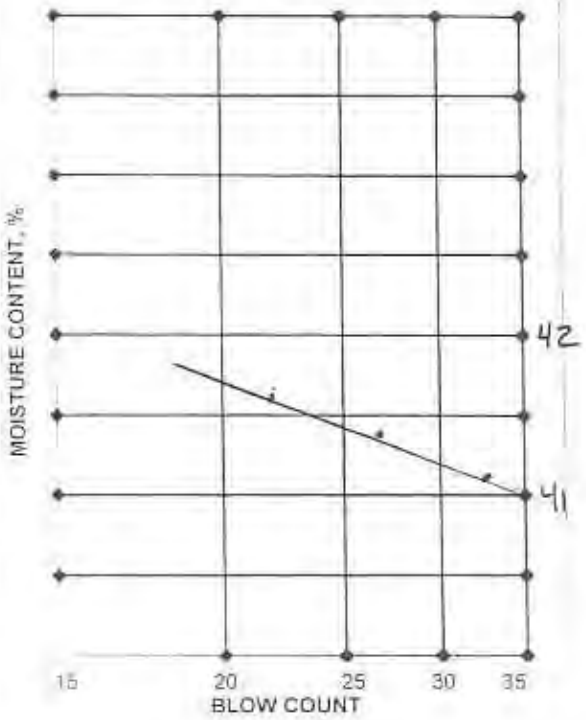
LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	13	14	4	5	6
B	PAN WT. (g)	20.076	22.334	29.548	28.935	29.782
C	WT. WET SOIL & PAN (g)	26.093	28.861	37.074	36.631	38.208
D	WT. DRY SOIL & PAN (g)	24.982	27.680	34.882	34.379	35.733
E	WT. WATER (C-D)	1.111	1.181	2.192	2.252	2.475
F	WT. DRY SOIL (D-B)	4.906	5.346	5.334	5.444	5.951
G	BLOW COUNT	--	--	33	28	22
H	MOISTURE CONTENT (E/F*100)	22.6	22.1	41.1	41.4	41.6

LIQUID LIMIT	PLASTIC INDEX	PLASTIC LIMIT
41.4	19.0	22.4

PLASTICITY CHART



LIQUID LIMIT DETERMINATION



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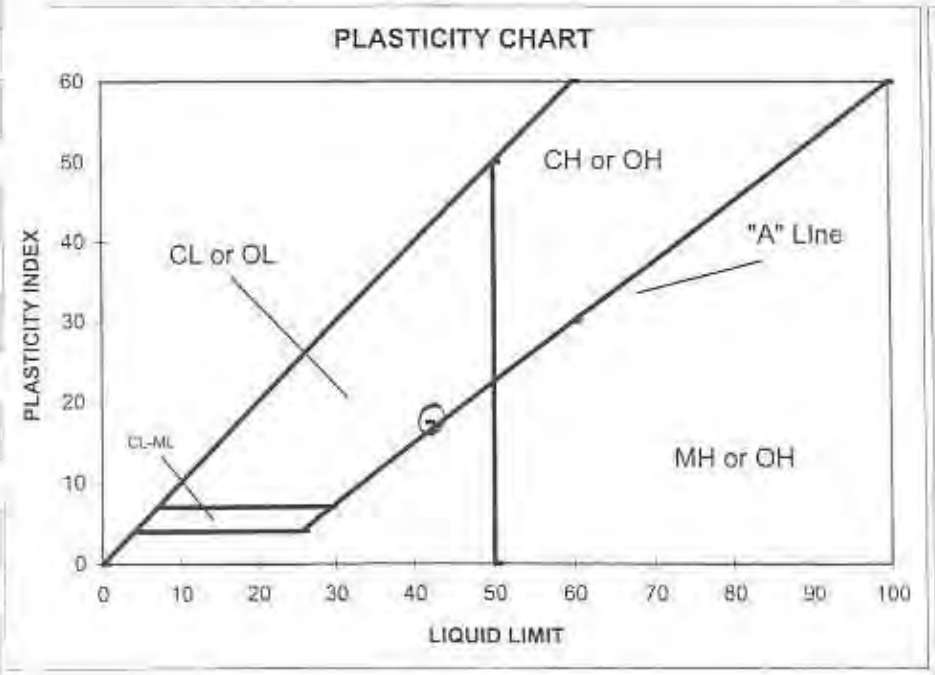
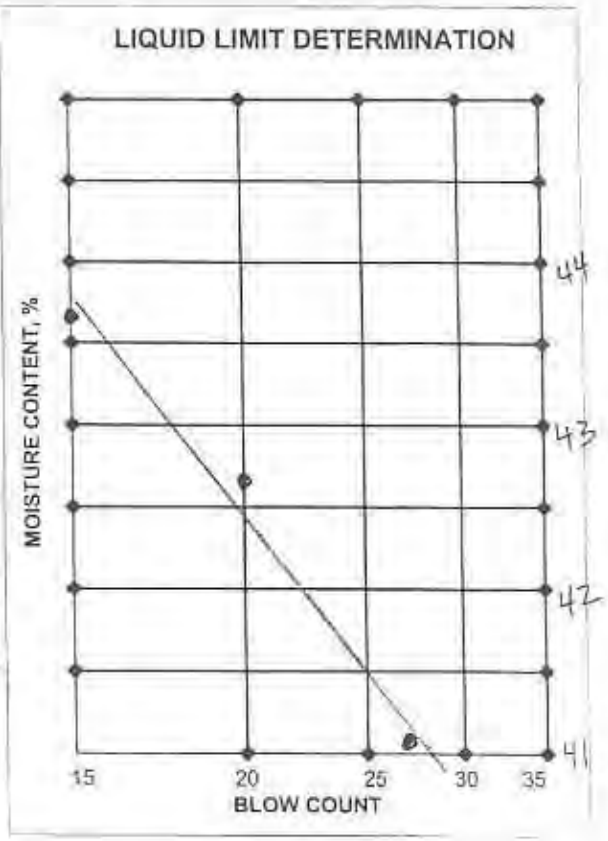
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	Mc Daniel Slough	JOB #:	003130	LAB SAMP. #:	3-685
SAMPLE ID:	TP2@7'	PERFORMED BY:	JMA	DATE:	8/20/03
PROJECT MANGER:	GDS	CHECKED BY:	GSW	DATE:	8-26-03

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	17	18	7	8	9
B	PAN WT. (g)	20.391	20.319	29.054	29.177	28.778
C	WT. WET SOIL & PAN (g)	27.705	27.044	36.338	37.743	36.197
D	WT. DRY SOIL & PAN (g)	26.299	25.727	34.215	35.179	33.941
E	WT. WATER (C-D)	1.406	1.317	2.123	2.564	2.256
F	WT. DRY SOIL (D-B)	5.908	5.408	5.161	6.002	5.163
G	BLOW COUNT	—	--	27	20	15
H	MOISTURE CONTENT (E/F*100)	23.8	24.4	41.1	42.7	43.7

LIQUID LIMIT	PLASTIC INDEX	PLASTIC LIMIT
41.5	17	24.1





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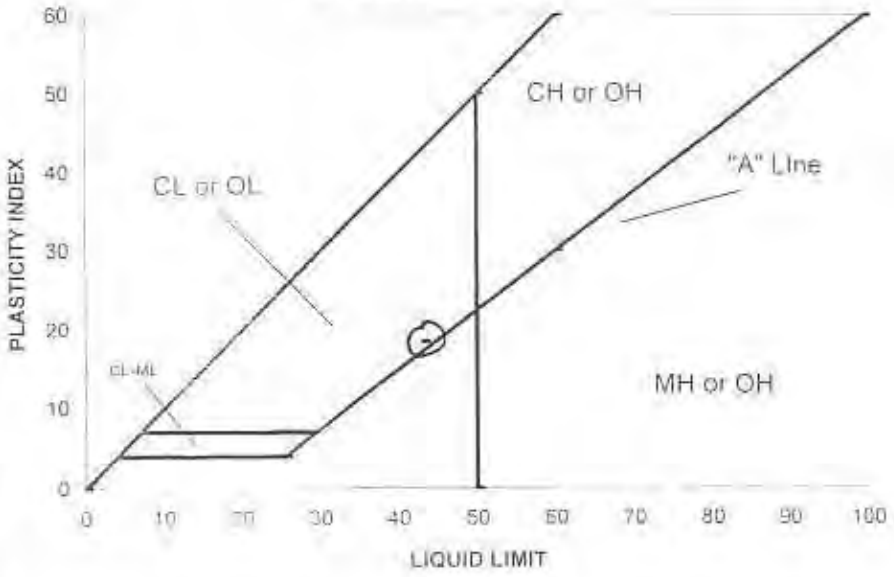
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	McDaniel Slough	JOB #:	003130	LAB SAMP. #:	3-688
SAMPLE ID:	TP3@5' BKT	PERFORMED BY:	JMA	DATE:	8/20/2003
PROJECT MANGER:	GSW	CHECKED BY:	GSW	DATE:	8-23-03

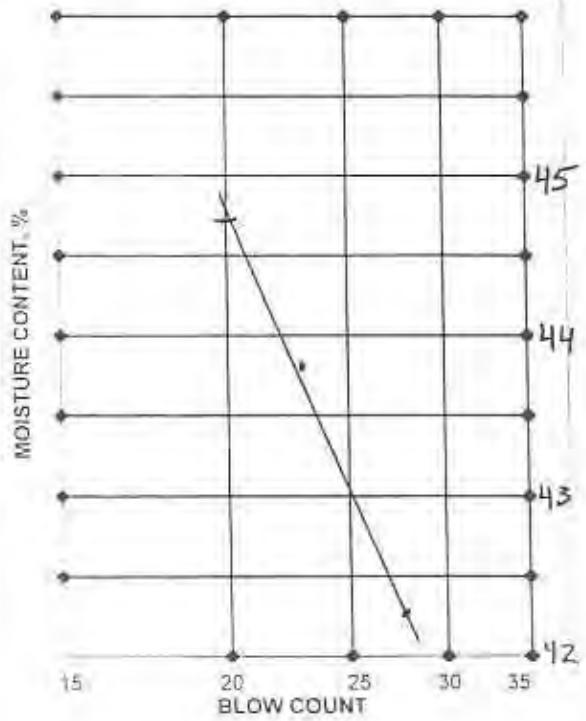
LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	15	16	1	2	3
B	PAN WT. (g)	20.703	21.046	29.828	29.199	29.271
C	WT. WET SOIL & PAN (g)	26.894	27.466	37.854	37.014	37.403
D	WT. DRY SOIL & PAN (g)	25.671	26.200	35.467	34.634	34.890
E	WT. WATER (C-D)	1.223	1.266	2.387	2.380	2.513
F	WT. DRY SOIL (D-B)	4.968	5.154	5.639	5.435	5.619
G	BLOW COUNT	--	--	28	23	20
H	MOISTURE CONTENT (E/F*100)	24.6	24.6	42.3	43.8	44.7

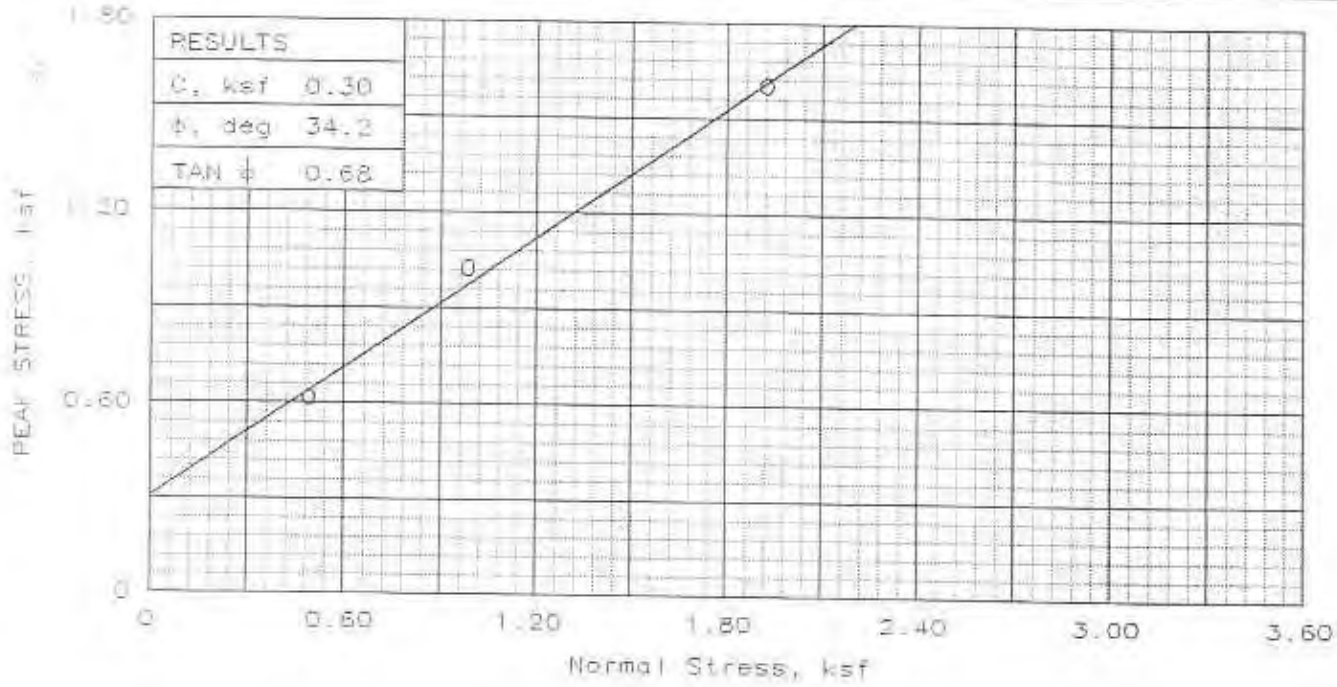
LIQUID LIMIT	PLASTIC INDEX	PLASTIC LIMIT
43.1	19	24.6

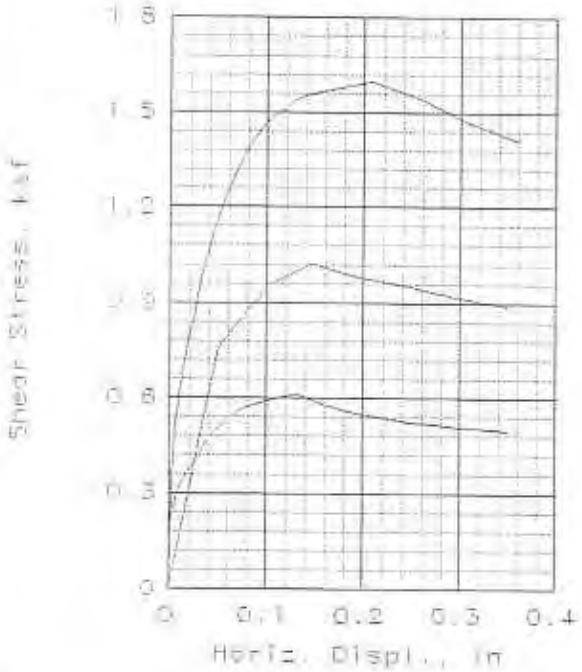
PLASTICITY CHART



LIQUID LIMIT DETERMINATION







SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	30.4	31.6	33.0
	DRY DENSITY, pcf	92.3	94.6	92.9
	SATURATION, %	101.9	111.6	111.9
	VOID RATIO	0.792	0.750	0.781
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	30.7	31.0	31.0
	DRY DENSITY, pcf	95.3	98.7	97.6
	SATURATION, %	110.4	121.6	117.9
	VOID RATIO	0.736	0.675	0.696
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.97	0.96	0.95
NORMAL STRESS, ksf		0.50	0.99	1.94
PEAK STRESS, ksf		0.61	1.02	1.60
DISPLACEMENT, in		0.13	0.15	0.21
RESIDUAL STRESS, ksf		0.50	0.89	1.41
DISPLACEMENT, in		0.35	0.35	0.36
Strain rate, %/min				

SAMPLE TYPE: 2.38 Shelby
DESCRIPTION: Gray Clay

SPECIFIC GRAVITY= 2.65
REMARKS

Fig. No.: _____

CLIENT: City of Arcata

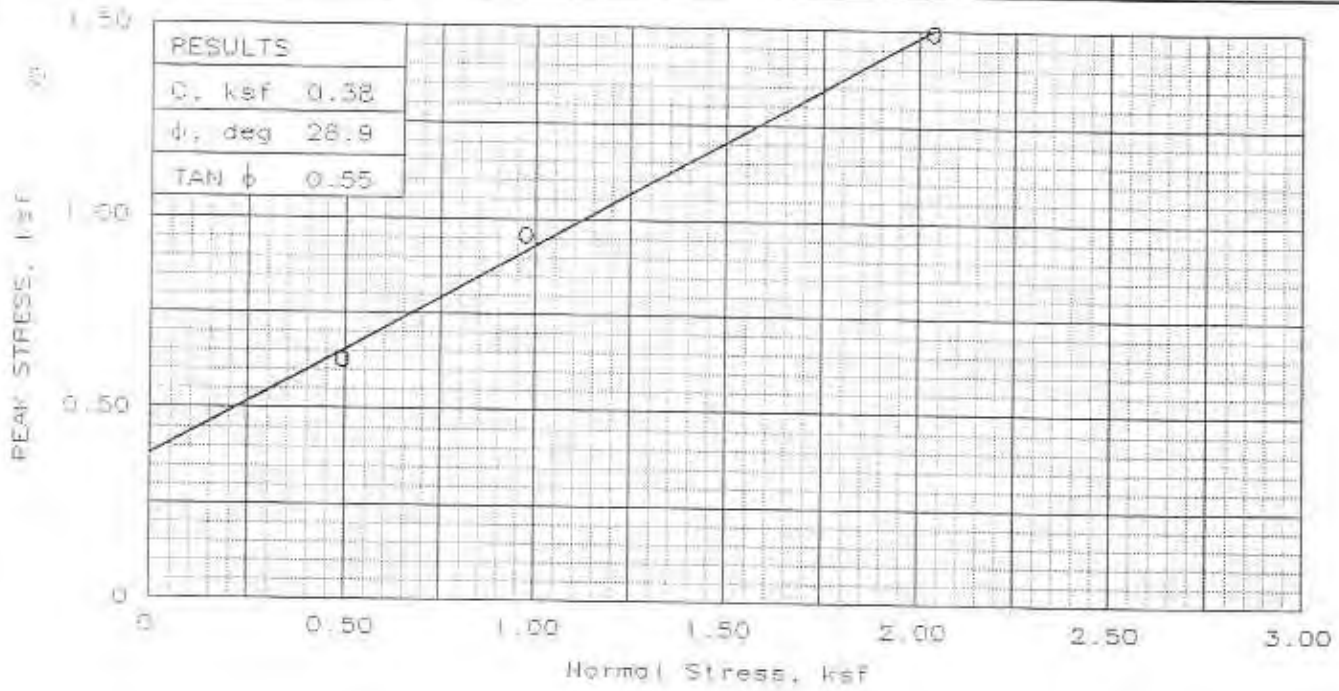
PROJECT: Mc Daniel Slough

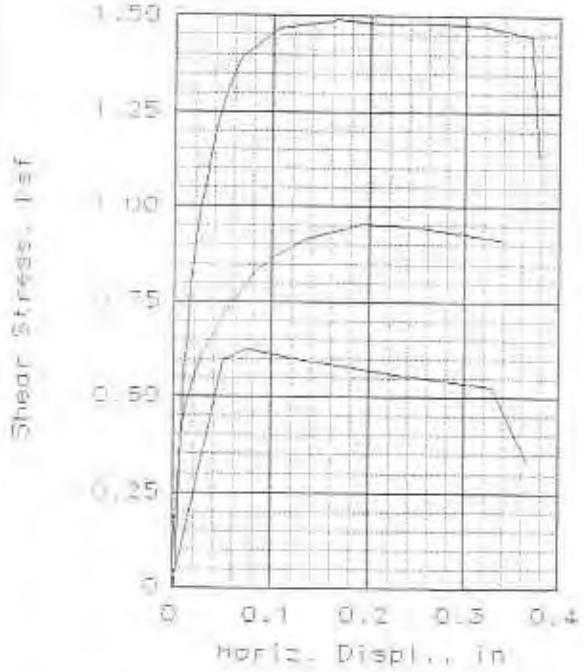
SAMPLE LOCATION: TP3 @ 5'

PROJ. NO.: 003130 DATE: 8/5/03

DIRECT SHEAR TEST REPORT

S H N Consulting Engineers & Geologists





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	18.3	17.5	18.3
	DRY DENSITY, pcf	104.6	105.6	104.6
	SATURATION, %	83.4	82.1	83.4
	VOID RATIO	0.582	0.566	0.582
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	19.8	19.6	18.9
	DRY DENSITY, pcf	105.6	108.1	107.8
	SATURATION, %	92.6	98.2	94.0
	VOID RATIO	0.567	0.530	0.534
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.97
NORMAL STRESS, ksf		0.50	0.98	2.04
PEAK STRESS, ksf		0.63	0.96	1.49
DISPLACEMENT, in		0.07	0.19	0.17
RESIDUAL STRESS, ksf				
DISPLACEMENT, in				
Strain rate, %/min				

SAMPLE TYPE: 2.38" Shelby
DESCRIPTION: Gray Clay

LL= 43 PL= 24 PI= 19
SPECIFIC GRAVITY= 2.65
REMARKS: Assumed SPG.

Fig. No.

CLIENT: City of Arcata

PROJECT: Mc Daniel Slough

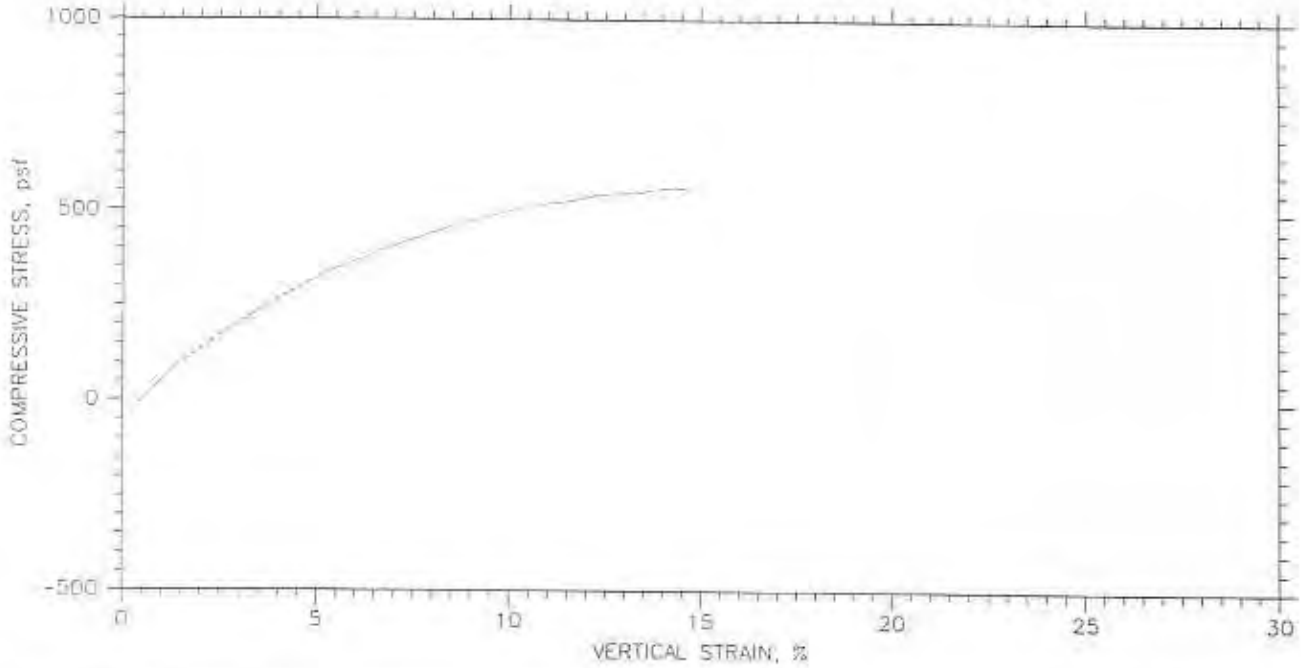
SAMPLE LOCATION: TP2@7'

PROJ. NO.: '003130 DATE: 8/18/03

DIRECT SHEAR TEST REPORT

S H N Consulting Engineers & Geologists

UNCONFINED COMPRESSION TEST REPORT



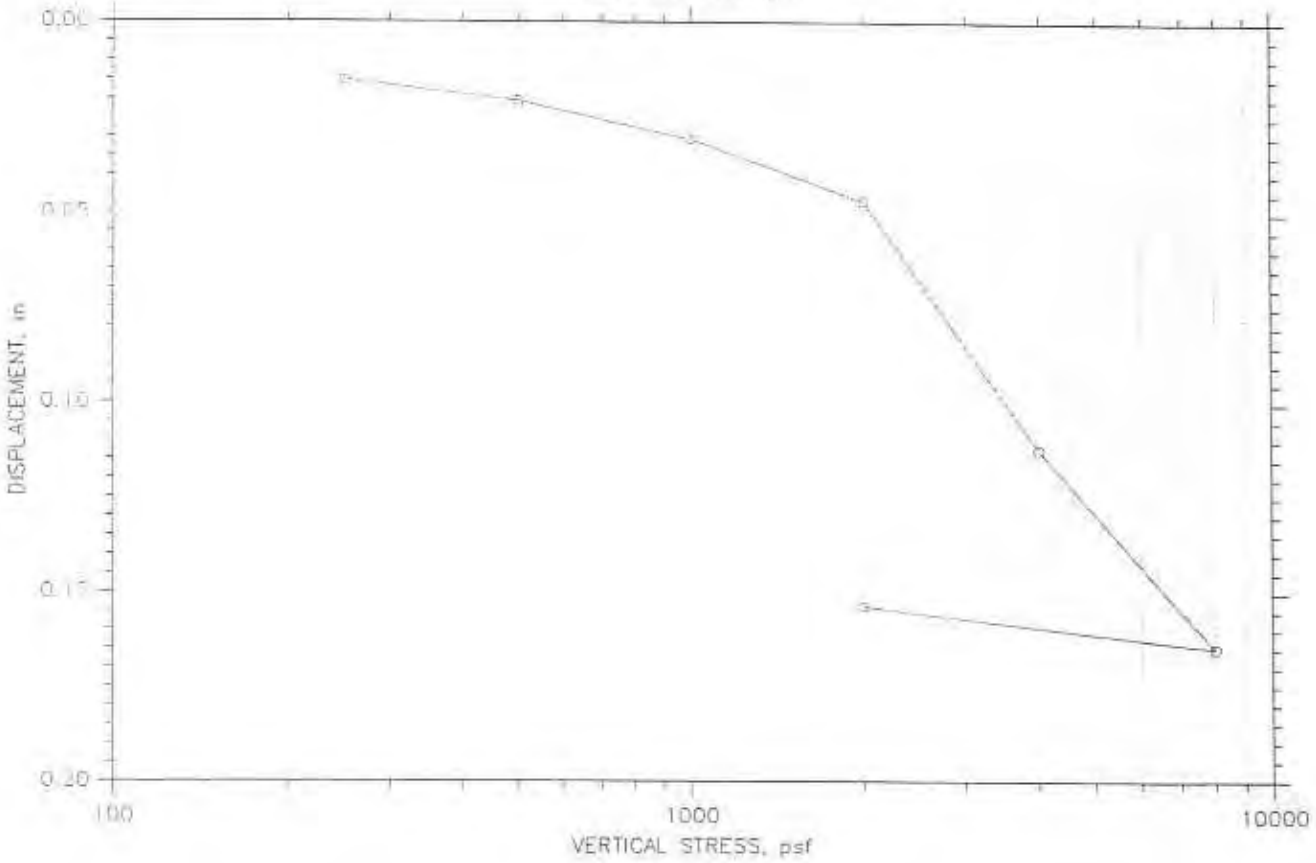
Symbol					
Test No		3-693			
Initial	Diameter, in	2.38			
	Height, in	5.45			
	Water Content, %	47.60			
	Dry Density, pcf	72.334			
	Saturation, %	98.00			
	Void Ratio	1.2871			
Unconfined Compressive Strength, psf		562.46			
Undrained Shear Strength, psf		281.23			
Time to Failure, min		14.653			
Strain Rate, %/min		1			
Specific Gravity		2.65			
Liquid Limit		0			
Plastic Limit		0			
Plasticity Index		0			
Failure Sketch					

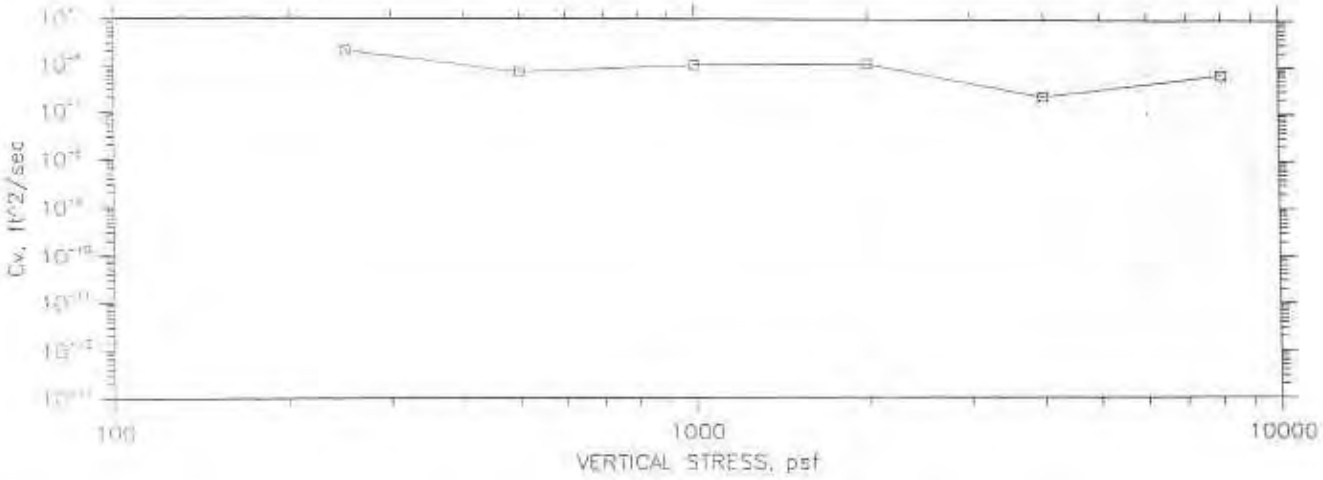
Project: McDaniel Slough
Location:
Project No.: 003130
Boring No.: TP5
Sample Type:
Description:
Remarks: Specific Gravity assumed.

Thu, 21-AUG-2003 17:26:36

CONSOLIDATION TEST DATA

SUMMARY REPORT



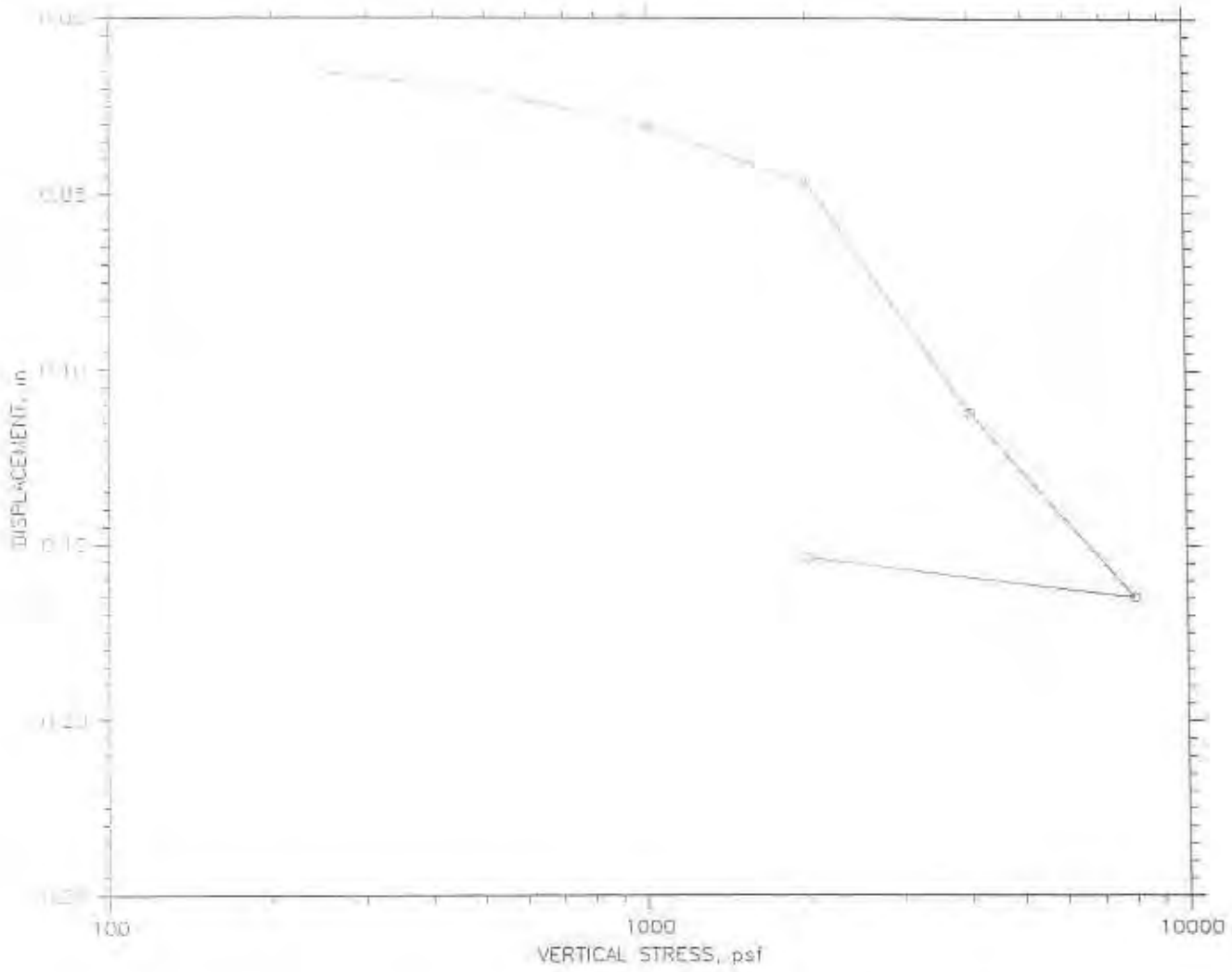


Project: Mc Daniel Slough	Location: Arcata	Project No.: 003130
Boring No.: TP3	Tested By: JMA	Checked By:
Sample No.: 3-687	Test Date: 8-5-03	Depth: 4.0'
Test No.: 3-687	Sample Type: Shelby Tube	Elevation:
Description:		
Remarks: Assumed Specific Gravity		

Tue, 26-AUG-2003 09:00:17

CONSOLIDATION TEST DATA

SUMMARY REPORT



				Before Test	After Test
Overburden Pressure, psf:			Water Content, %	45.51	45.51
Preconsolidation Pressure, psf:			Dry Unit Weight, pcf	75.149	88.789
Compression Index:			Saturation, %	100.39	139.72
Diameter: 2.36 in	Height: 1 in		Void Ratio	1.20	0.86
LL: 0 PL: 0	PI: 0	GS: 2.65			

Project: Mc Daniel Slough	Location: Arcata	Project No: 003130
Boring No: TP2	Tested By: JMA	Checked By:
Sample No: 3-657	Test Date: 8-5-03	Depth: 4.0'
Test No: 3-387	Sample Type: Shelby Tube	Elevation:
Description:		
Remarks: Assumed Specific Gravity		

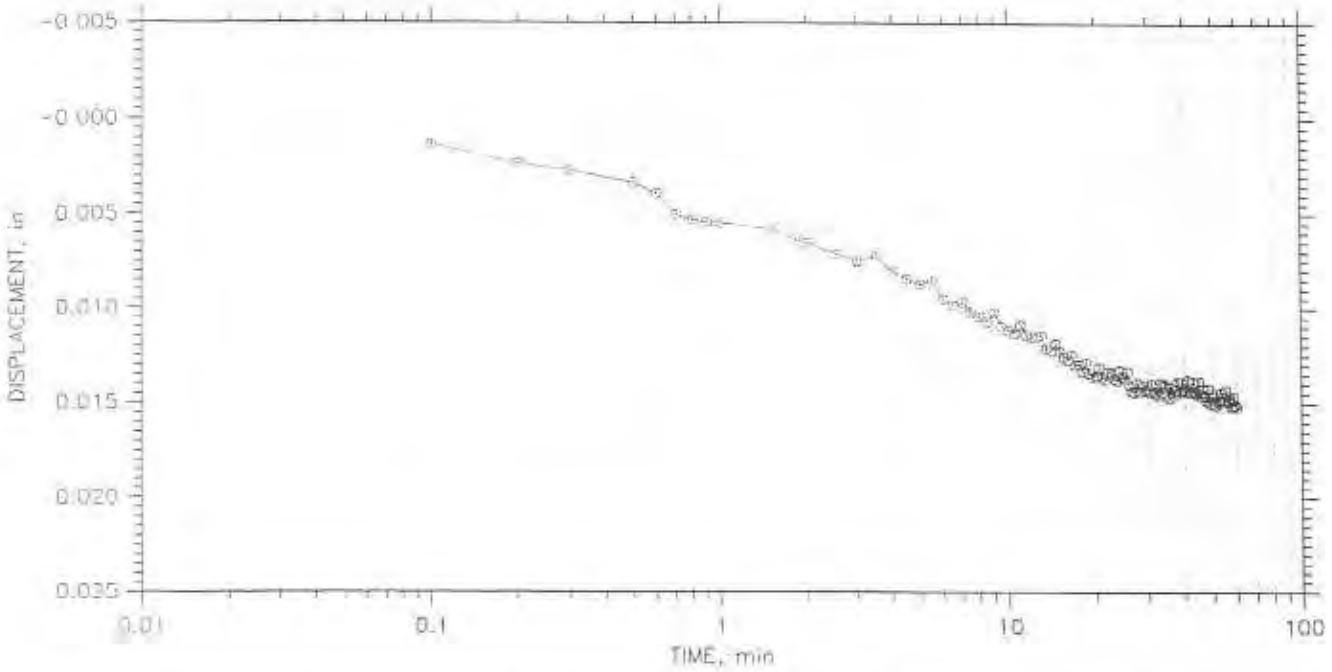
Tue, 26-Aug-2003

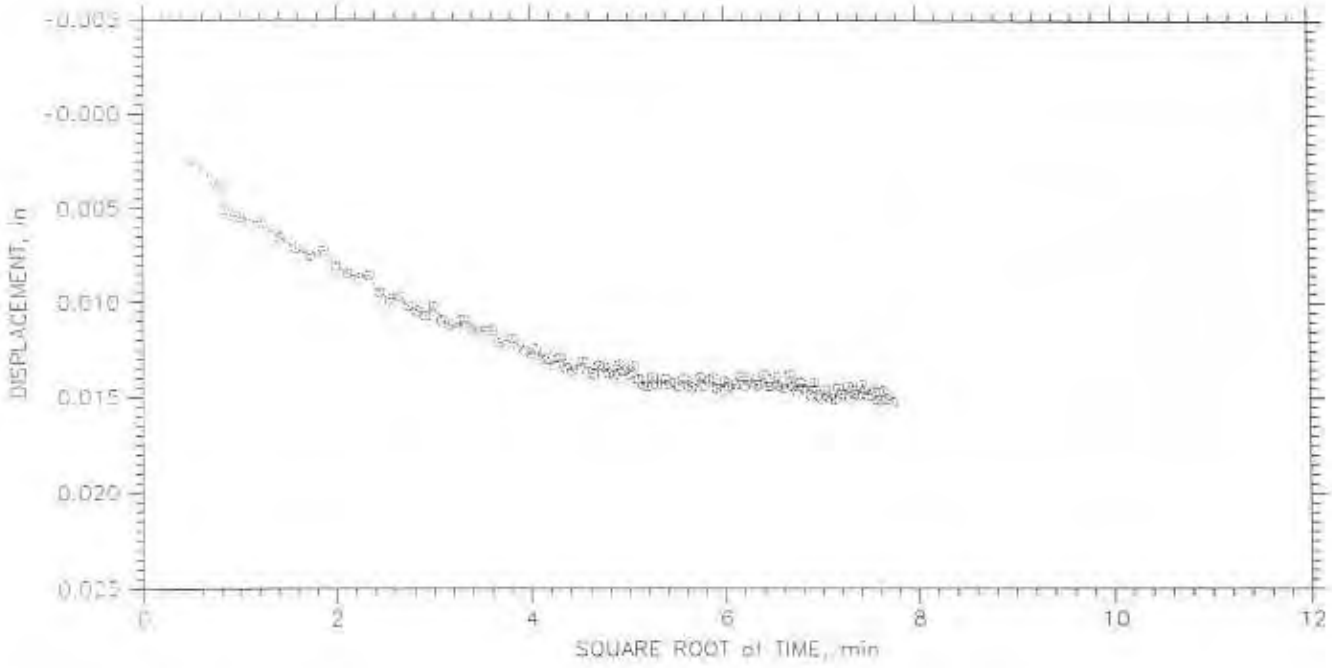
CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 7

Stress: 250. psf





Project: Mc Daniel Slough	Location: Arcata	Project No.: 003130
Boring No.: TP3	Tested By: JMA	Checked By:
Sample No.: 3-687	Test Date: 8-5-03	Depth: 4.0'
Test No.: 3-687	Sample Type: Shelby Tube	Elevation:
Description:		
Remarks: Assumed Specific Gravity		

Tue, 26-AUG-2003 09:00:19

CONSOLIDATION TEST DATA

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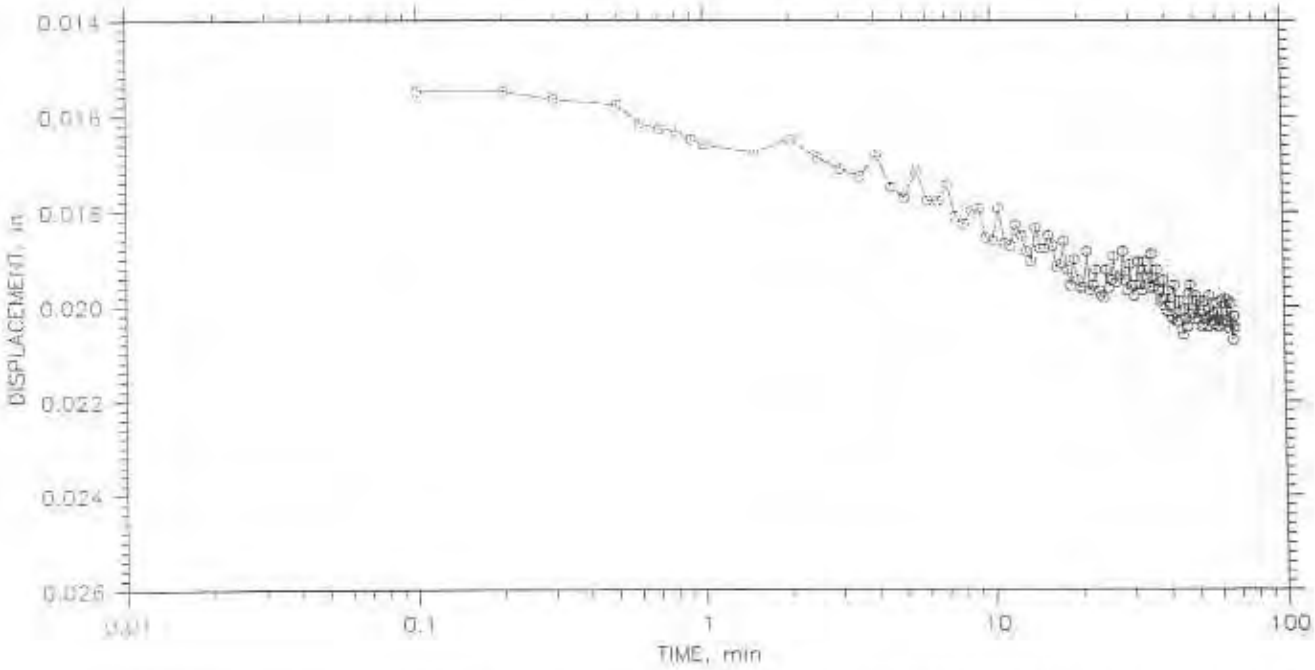

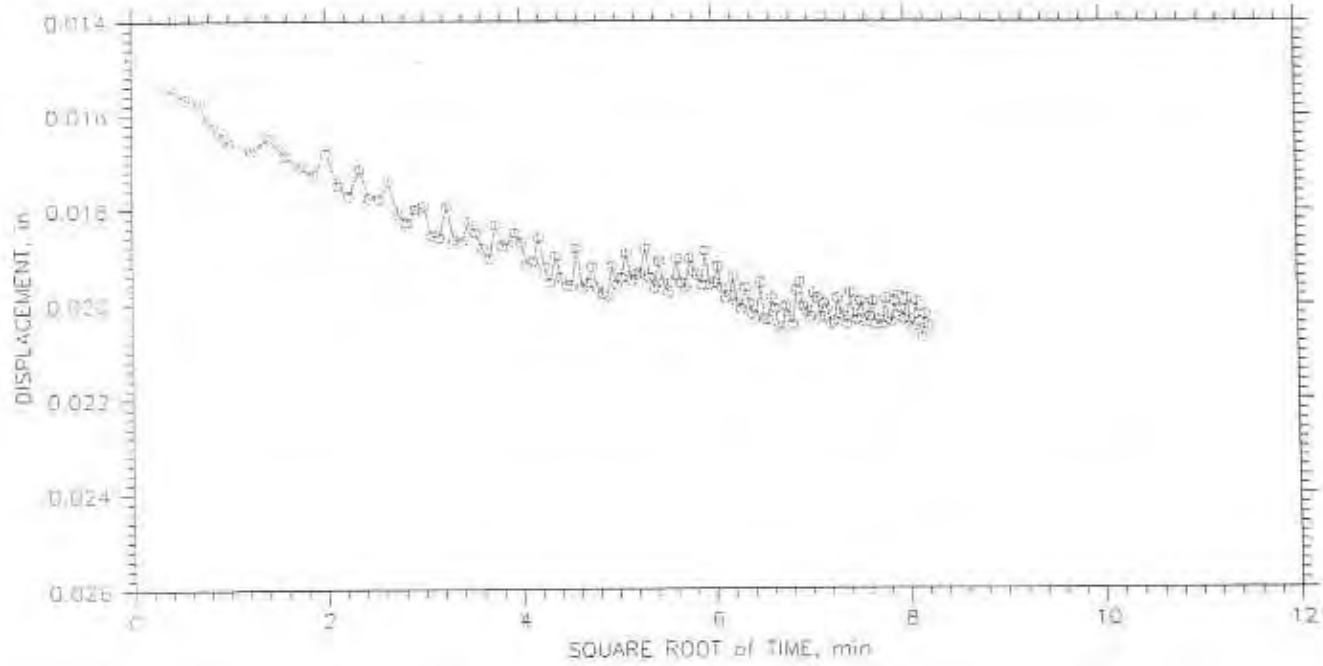

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Test No.: S-687	Sample Type: Shelby Tube	Elevation:
Description:		
Remarks: Assumed Specific Gravity		

Tue, 26-AUG-2003

CONSOLIDATION TEST DATA

TIME CURVES

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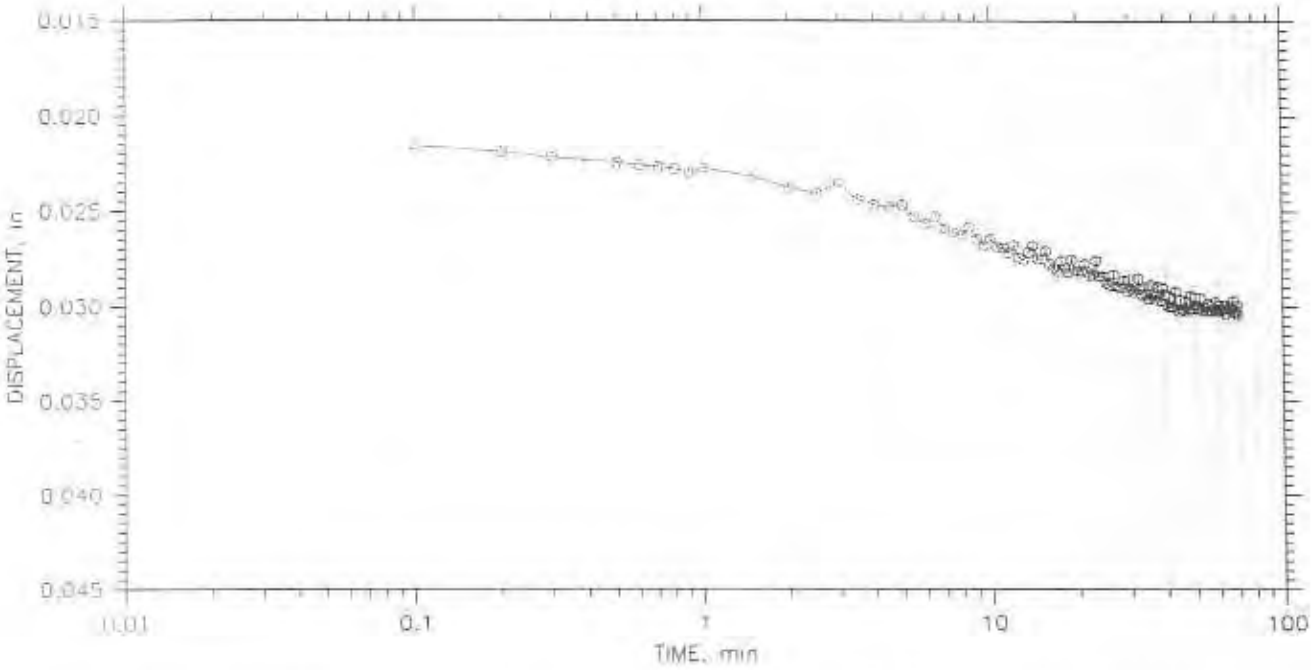

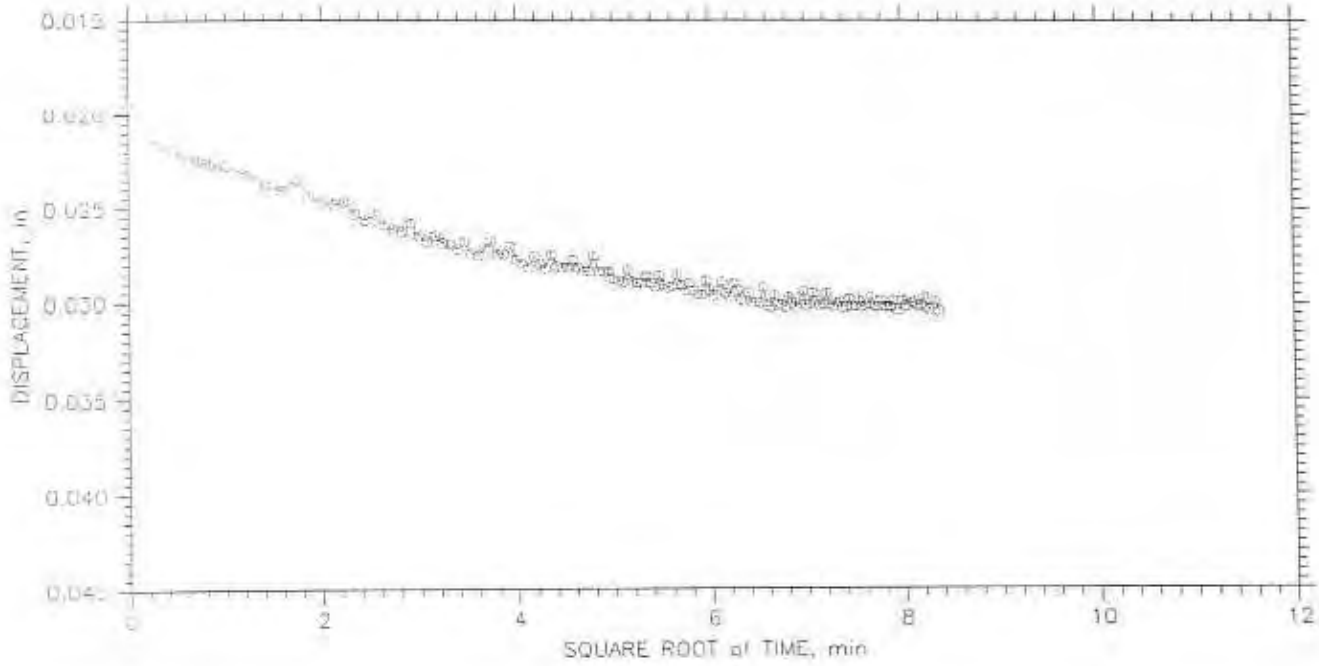

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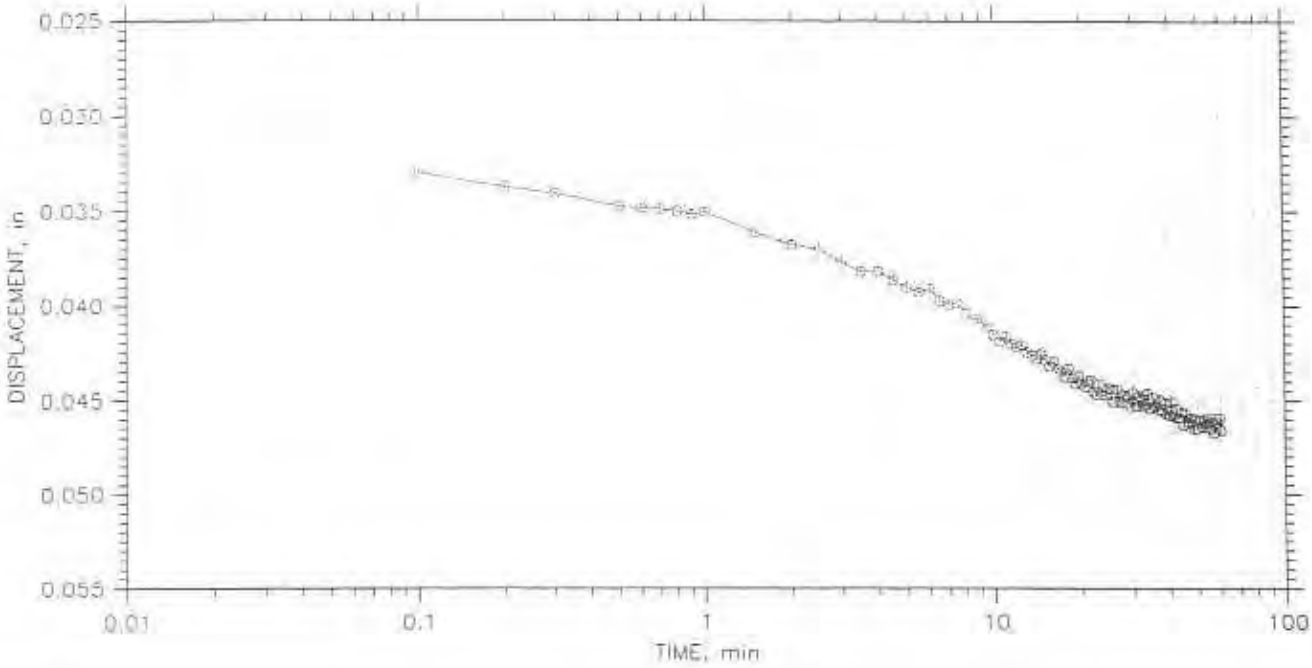

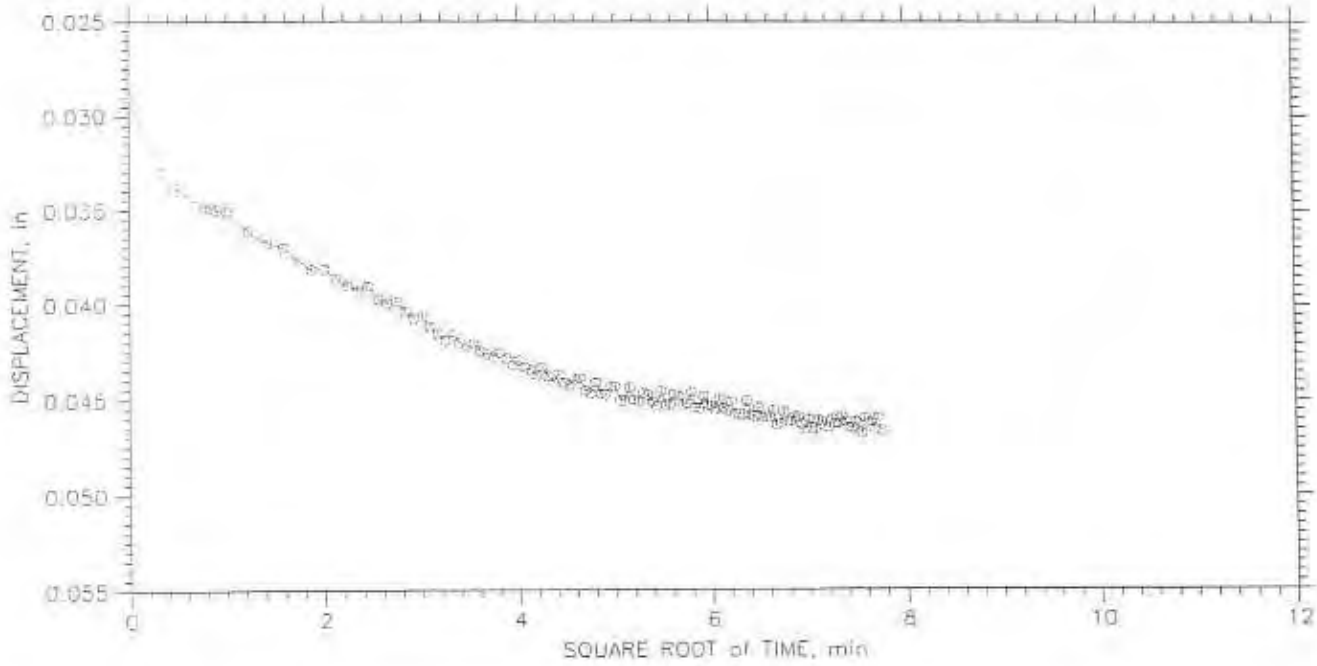

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Remarks: Assumed Specific Gravity		

Tue, 26-AUG-2003 [illegible]

CONSOLIDATION TEST DATA

TIME CURVES

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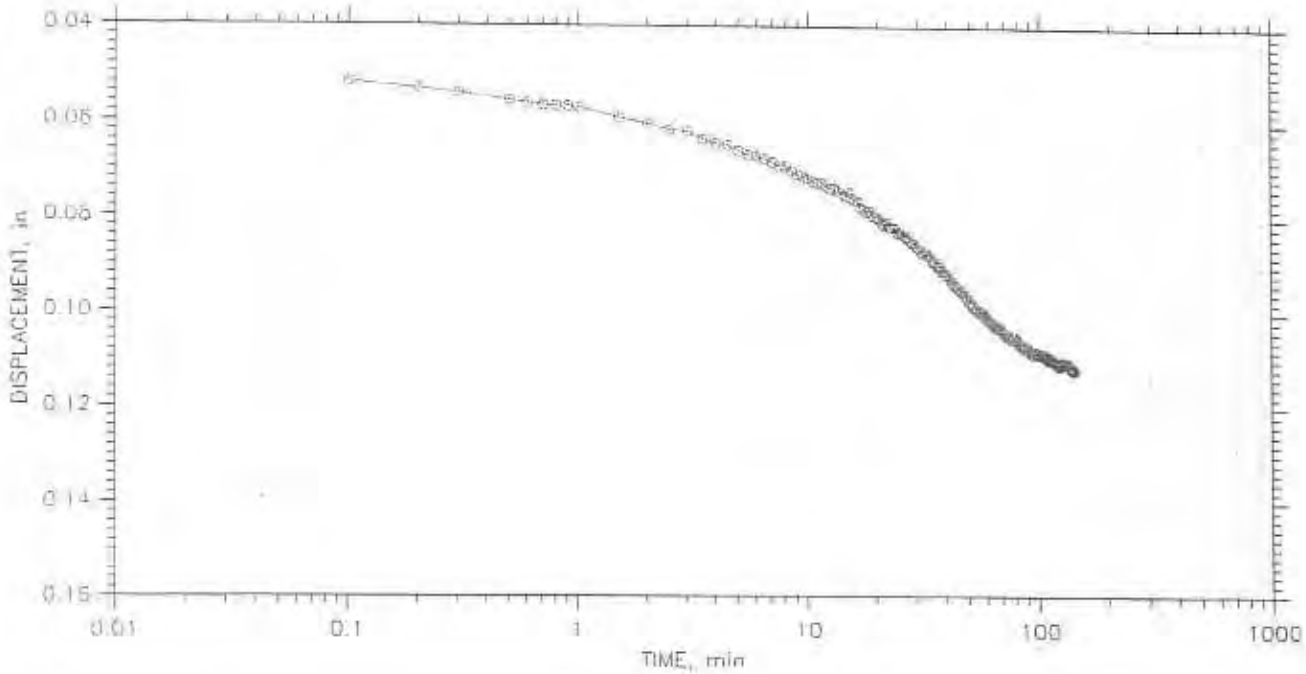

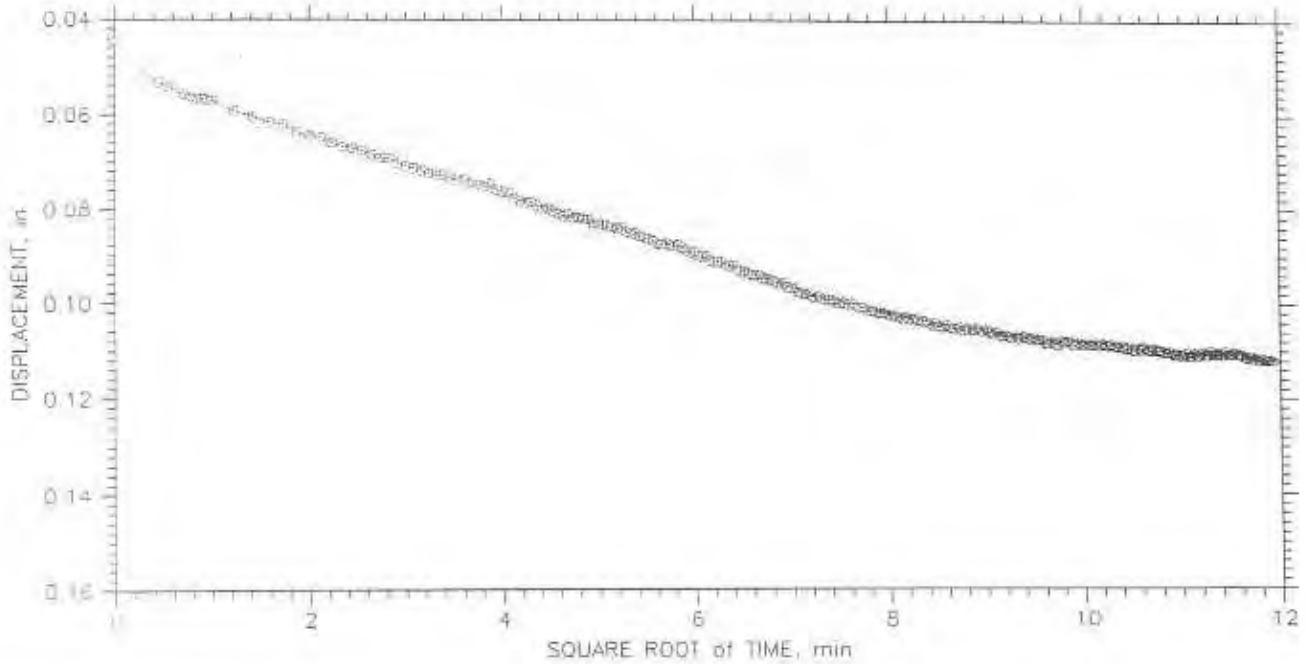

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Test No.: 3-667	Sample Type: Shelby Tube	Elevation:
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Remarks: Assumed Specific Gravity		

Tue, 26-AUG-2003 [illegible]

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 7

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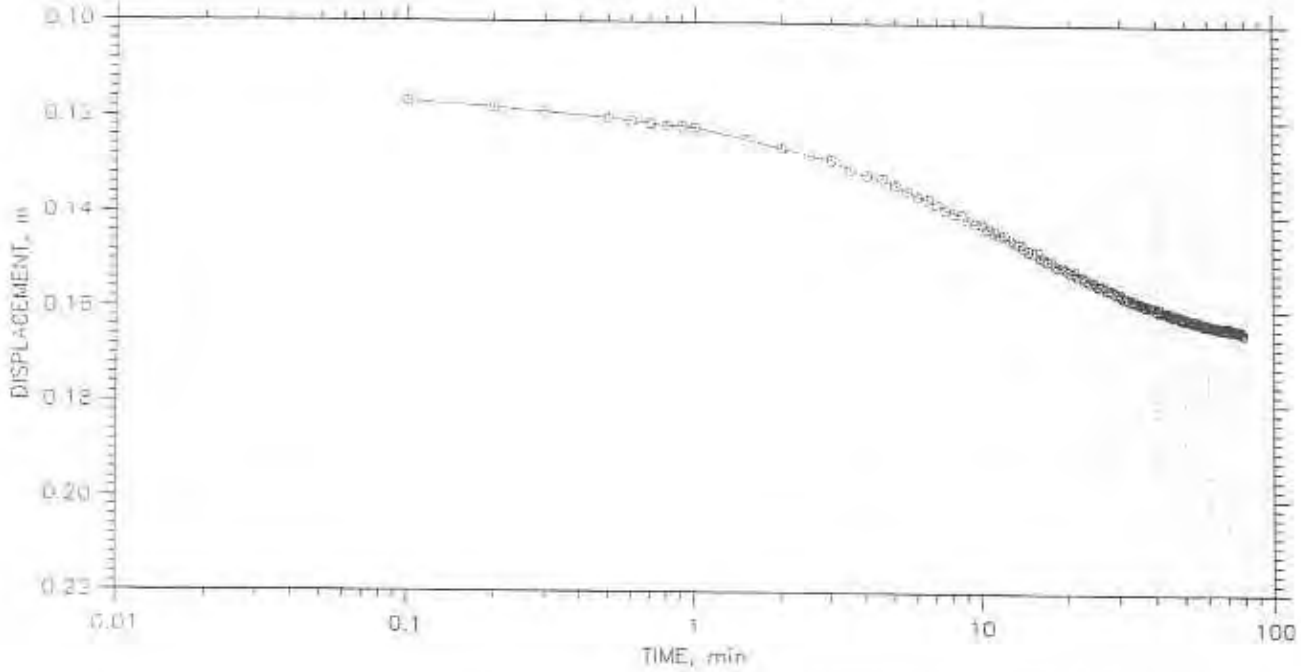

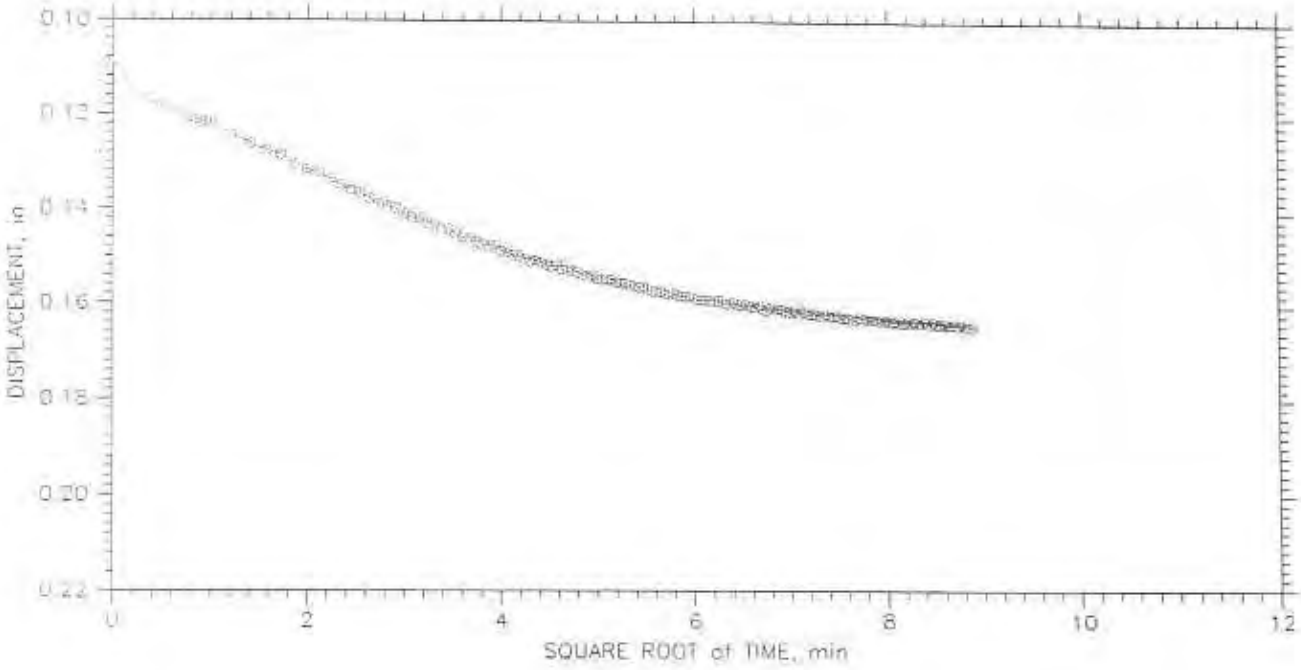

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Boring No.: TP3	Tested By: JMA	Checked By:
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Test No.: 3-687	Sample Type: Shelby Tube	Elevation:
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Remarks: Assumed Specific Gravity		

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TIME CURVES

Constant Load Step: 7 of 7

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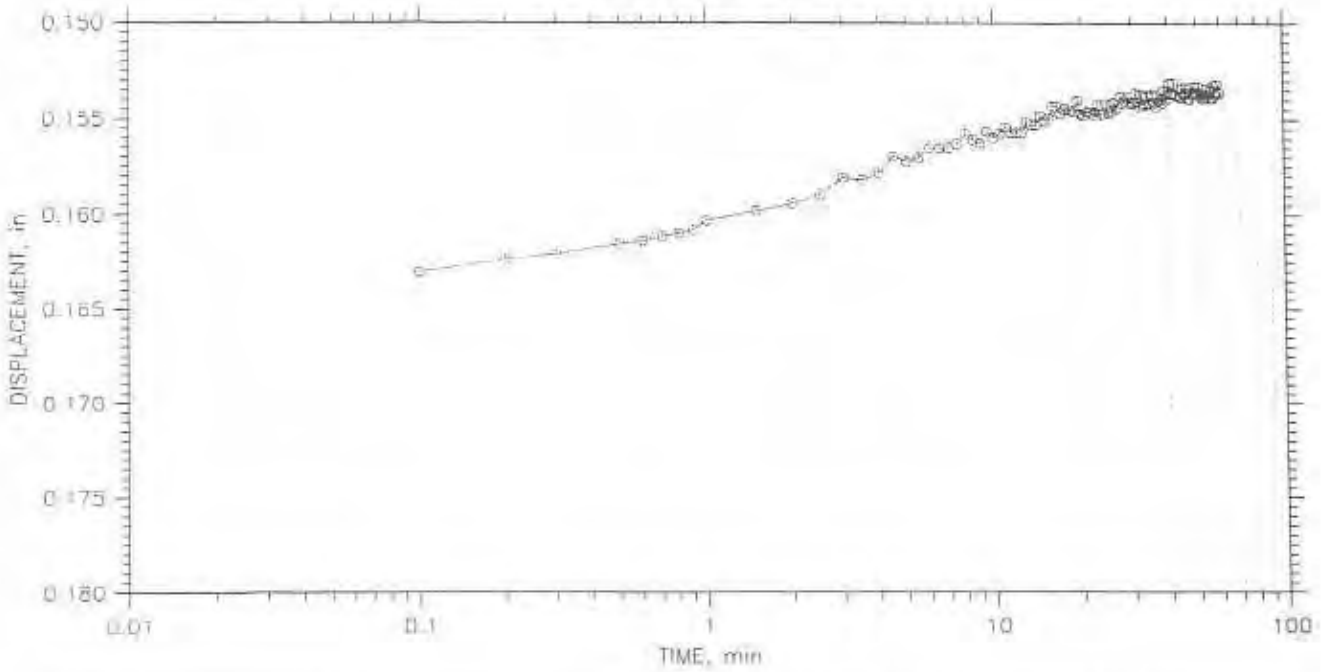

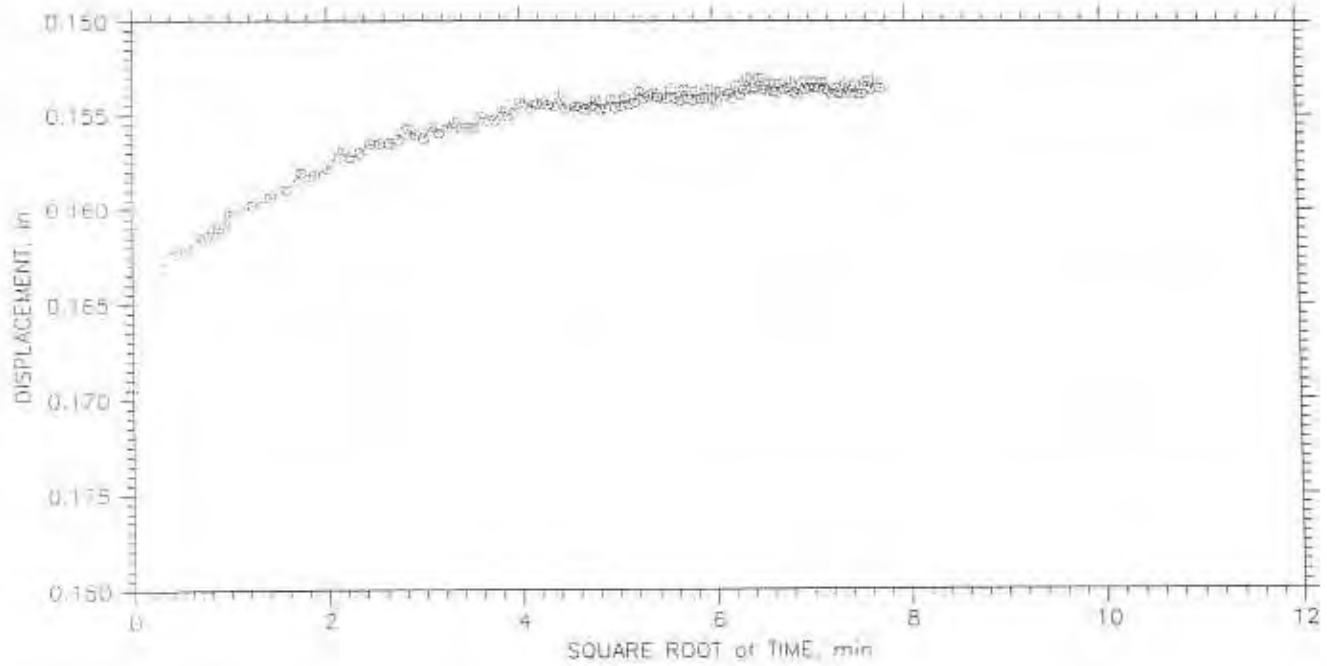

Project: Mc Daniel Slough	Location: Arcata	Project No.: 003130
Boring No.: TP3	Tested By: JMA	Checked By:
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Test No.: 3-687	Sample Type: Shelby Tube	Elevation:
Description:		
Remarks: Assumed Specific Gravity		

Tue, 26-AUG-2003 [illegible]

Appendix C

Diatom Analysis

REC'D AUG 1 9 2003

DIATOM ANALYSES
EILEEN HEMPHILL-HALEY CONSULTING MICROPALEONTOLOGY
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MCDANIEL SLOUGH MARSH RESTORATION

Diatoms from test pits, collected 15 August 2003.

Overall summary: Diatoms samples were collected from three test pits along an approximate north-south line in the McDaniel Slough marsh restoration area. Salt marsh and tidal flat diatoms were recovered in samples from the two pits closest to Humboldt Bay (Pit #3 and Pit #2), showing that salt marshes and intertidal flats previously existed at these localities. A few fragments of estuarine diatoms were identified in one of the three samples collected from Pit #1, located farthest from the bay. The other two samples from Pit #1 did not contain diatoms. This probably indicates that tidal deposition had not occurred as far landward as Pit #1 for some long period of time; that is, that it was not a site of active intertidal deposition at the time the levies were constructed. The diatom evidence suggests that this site was probably an upland out of the reach of tides rather than a freshwater wetland with sustained periods of standing fresh water.

==========

Pit #1:
Most landward pit. Three samples collected.

Sample 030815-1
Pit #1
Depth: 6'
Summary: Pliable blue-gray clay. No diatoms observed.

Sample 030815-2
Pit #1Depth 2'
Summary: Dry, indurated mud. Only a few fragments of estuarine/salt marsh diatoms observed (Nitzschia sigma, Diploneis interrupta). No freshwater diatoms observed.

Sample 030815-3
Pit #1
Depth 4'
Summary: Silty mud in transitional zone between samples #1 and 2. No diatoms observed.

==========
Pit #2:
Midway across meadown. Four samples collected.

Sample 030815-4
Pit #2
Depth: 1'10"
Summary: Sandy silt above peaty mud.
Diatoms diverse and abundant, consisting mainly of species typically found in low salt marshes or estuarine tidal flats, including (amongst many others): Navicula digitoradiata, Paralia sulcata, Gyrosigma wansbeckii, Tryblionella granulata, Nitzschia sigma, Diploneis interrupta, Diploneis didyma, Caloneis westii, Scolipleura tumida.

Sample 030815-5
Pit #2
Depth 2'2"
Summary: Peaty mud probably deposited in well-developed high salt marsh.
Diatoms diverse and abundant, consisting mainly of species commonly found on well-developed salt marshes, including Cosmionies pusilla, Pinnularia lagersteditt, Navicula cincta, Navicula cryptotenella, Lutical mutica, Tryblionella debilis.

Sample 030815-6
Pit #2
Depth: 3'
Summary: Silty mud above peaty horizon.
Diatoms common and diverse, but not as abundant as in samples 4 and 5 (above). Assemblage consists of diatoms commonly found on tidal flats, including Diplonies didyma, Paralia sulcata, Trachyneis aspera, Tryblionella granulata, Scoliopleura tumida, Bacillaria paradoxa.

Sample 030815-7
Pit #2
Depth: 3'2"
Summary: Peaty mud or muddy peat.
Diatoms diverse, but preservation is not good overall, and diatoms are mostly broken. Assemblage contains mostly species found in low and high salt marshes including Caloneis bacillum, Trachyneis aspera, Cosmioneis pusilla, Naviucla cf. Lanceolata, Diploneis pseudovalis, Diploneis ovalis.

==========
Pit #3
Most bayward site, approximately 100 m south of levy.

Sample 030815-8
Pit #3
Depth: 1'6"
Summary: Stiff mud.
Diatoms common and diverse, consisting of species found on estuarine tidal flats, including Gyrosigma balticum, Coliopleura tumida, Tryblionella navicuolaris, Paralia sulcata, Trachyneis aspera, Nitzschia sigma.

Sample 030815-9
Pit #3
Depth: 1'9"
Summary: Very crumbly organic peat.
Diatoms present but not common, and consist of species found in high salt marshes, including Pinnularia lagerstedtii, Cosmioneis pusilla, Tryblionella granulata, Nitzschia dissipata, Paralia sulcata.

Sample 030815-10
Pit #3
Depth: 2' 6"
Summary: Stiff mud.
Diatoms abundant and diverse, and consist of species found in low marshes and marsh-edge tidal flats, including Diploneis didyma, Tryblionella navicularis, Nitzschia sigma, Caloneis westii, Paralia sulcata, Petroneis marina.

Appendix C
Cultural Resource Study

A Cultural Resources Investigation of the Proposed McDaniel Slough Marsh Enhancement Project, Located near Arcata, Humboldt County, California.

Prepared by

William Rich B.A.
&
James Roscoe M.A.

with

Susie Van Kirk
Historic Resources Consultant

Roscoe and Associates
Cultural Resource Consultants
3781Brookwood Drive
Bayside, CA 95524

Prepared for:

City of Arcata

April 2003

Introduction

During the months of February, March, and April 2003, a Cultural Resource Investigation was conducted at the location of the proposed McDaniel Slough Marsh Enhancement Project. McDaniel Slough is a tributary of the north portion of Humboldt Bay located in Humboldt County, California. The investigation was conducted at the request of the City of Arcata. The California Environmental Quality Act requires the lead agency of any action defined as "project" to implement procedures to identify and mitigate potential impacts to significant archaeological resources that may exist within the effected area. James Roscoe of Roscoe and Associates-Cultural Resource Consultants was contracted to conduct the archaeological investigation and to prepare a CEQA document detailing findings and recommendations.

The City of Arcata is proposing the development of a wetlands restoration and enhancement project that will include tidal habitat and a series of interconnected ponds on property straddling McDaniel Slough (also known as Daniels Slough).

The purposes of this investigation were to (1) locate and record any cultural resources that may be adversely impacted by the proposed project; (2) evaluate the significance of study area cultural resources; (3) assess potential impacts to cultural resources resulting from implementation of project plans, and (4) recommend appropriate mitigation measures, if necessary.

The Bull-Hunt Barn, located within the eastern portion of the project area, was included in a historic resources report authored by Suzie Van Kirk in 2001. Mrs. Van Kirk's report concluded that the barn is eligible for the California Register of Historic Places, and is determined to be a historical resource under CEQA. The proposed Marsh Enhancement Project as currently designed will not impact the Bull-Hunt Barn.

Two prehistoric Wiyot village sites which had been previously located near the northern and eastern boundary of the project area were not discovered within the project area during the field investigation. Two historic dikes built during the 1890's were recorded within the project area. Recommendations regarding the above mentioned cultural resources are discussed below.

Project Area Location and Description

The McDaniel Slough Marsh Enhancement Project is located on a 240 acre parcel located approximately one mile southwest from downtown Arcata and is adjacent to the Arcata Marsh Wastewater Treatment Facility. The lower three-fourths mile of McDaniel (Daniels) Slough flows southerly through the project area. The project is bounded on the north by Old Samoa Road and Samoa Road. The east portion of the project area is bounded by the Northwestern

Pacific Railroad, while Humboldt Bay confines the south portion of the project area. The western limit of the project area is defined by a north/ south line running approximately through the center of Section 31. The project area can be found on a portion of the Arcata South, CA. 1959 USGS 7.5 minute Topographic Quadrangle Map (see Map 1). The project area is located in Sections 31 and 32 of Township 6 North, Range 1 East, Humboldt Base and Meridian.

Investigation Methods

The background research for this project included a formal examination of the archaeological site records, maps and survey files of the Northwest Coastal Information Center of the Historical Resources Information System, located at the Yurok Tribal Offices, Klamath, California. The background search focused on the project area and included land within one mile of the project area. William Rich conducted the record search on February 6, 2003 (File Number Roscoe 03-1). The California Office of Historic Preservation established the Regional Information Centers as the local repository for all archaeological reports which are prepared under cultural resource management regulations. The background literature search at the appropriate Regional Information Center is required by state guidelines and current professional standards. Following completion of this archaeological study, a copy of this report must be deposited with the North Coastal Information Center. The literature search is undertaken to determine if there are any previously recorded archaeological resources or historic structures within the project area and whether the area has been included within any previous archaeological research or reconnaissance projects.

Suzie Van Kirk assisted in the investigation by providing documentation of oral histories that she conducted with Harold Hunt in June of 2001during her previous historic investigation of the project area and with Isaac Dias in February of 2003, which she did as part of this investigation. The histories revealed insight into the past land uses of primarily the Hunt dairy barn and surrounding area, located in the eastern portion of the project area. These interviews are included as Appendix A of this report.

Following the pre-field research, an intensive archaeological field reconnaissance of the project area was conducted. James Roscoe, William Rich and Donald Verwayen completed the field reconnaissance on January 25, 26 and February 8, 9, 2003. During this field investigation, the entire project area was inspected. Special attention was directed towards the northern and eastern portions of the project area, where two previously recorded archaeological sites had been located. In most areas ground visibility was extremely poor and obscured by dense grasses and other vegetation. A shovel and hoe where used to clear the vegetation down to mineral soils at regular intervals to look for cultural materials.

Background and Land Use

The project area is located within the ethnographic territory of the Wiyot Indians. At the time of White contact, the Wiyot were divided into three principal groups, speaking a mutually intelligible language which differed markedly from the Athabascan languages to the east and south and the Yurok language to the north. Although Yurok and Wiyot are both considered by linguists to be Algic languages, they are not closely related. The three subdivisions of the Wiyot were (1) the Patawat, who lived in the villages on the lower Mad River, (2) The Wiki on Humboldt Bay, and (3) the Wiyot along the lower Eel River (Elsasser 1978). It is the name of the Eel River division that is now used exclusively in accounts pertaining to the entire group. With a population numbering somewhere between a low estimate of 1,000 by Kroeber (1925) and a high estimate of 3,300 by Cook (1956), the Wiyot lived almost exclusively in villages along the protected shores of Humboldt Bay and near the mouths of the Eel and Mad Rivers. Villages consisted of dwellings, which were rectangular in plan, made from split redwood planks. Associated with most Wiyot villages was a sweathouse used by Wiyot men for sleeping, gambling, and ceremony. With these villages as their base, the Wiyot were able to hunt and gather a wide variety of plant and animal resources within their territory. Mollusks, sea lions and stranded whales were among the resources utilized by the Wiyot, while deer, elk and acorns constituted more important land resources. Perhaps the most important protein source for the Wiyot were the yearly anadromous fish runs on the Eel and Mad Rivers, during which the Wiyot were able to smoke and store enough salmon to last through the winters when other food resources were not as abundant. Although the Wiyot had contacts with White explorers and fur trappers prior to the California Gold Rush, it was this monumental event that was to change the character of Northwestern California forever and lead to the decimation and displacement of the Wiyot in the short course of 15 years. From 1850 to 1865, the territory of the Wiyot became the center for the largest concentration of Whites in California north of San Francisco, due to the use of Humboldt Bay as a shipping point to the mines, the establishment of a redwood timber industry and the homesteading of the Eel River and Arcata bottoms for ranching and farming purposes. The Whites who came into Humboldt County in the 1850's and 1860's were not known for their tolerance toward cultures other than their own, and many came from areas to the east where Indians were feared and hated. Soon after the first White settlements were established on Humboldt Bay, the Wiyot population was decimated by Euro-American violence and introduced diseases. Those who did not die from these causes were displaced from their villages (often located on the best plots of land) and driven to distant reservations or marginal lands within the Humboldt Bay region.

Historic Overview (From Van Kirk, 2001)

Historically Humboldt Bay may have covered an area of 27,000 acres, but due to land reclamation of salt marshes and intertidal flats, it has been reduced to approximately 17,000 acres. The original salt marsh, prior to the reclamation, was estimated at 7,000 acres. Most of the

present agricultural lands in the Arcata bottom, Jacoby Creek, Eureka Slough, Elk River and Beatrice Flats areas were salt marsh prior to reclamation. The estimated remaining salt marsh in 1973 was 600 acres, a reduction of more than 90%. The largest tract of unbroken agricultural land on the Bay is the 2,000 acres of the Arcata bottom (Monroe 1973).

Euro-American settlement on Humboldt Bay began in the spring of 1850 and agricultural use of surrounding lands soon followed with the Arcata bottom area initially cultivated for grains and potatoes. This first settlement of the bottom was concentrated in the Mad river bottom and land directly west of Arcata, as salt marsh constituted a significant portion of the land along the bay and Mad river slough. The Mad river canal was first constructed in 1854 to connect the river and the bay, via Mad river slough (Humboldt *Times* 1 May 1858). The Harbor Commissioners agreed to the closing of the canal in 1887 because of the flooding of Mad river bottom farms and sedimentation of north (Arcata) bay (Arcata *Union* 10 Sept. 1887). With the closure of the canal and the development of dairying on the bottom, there was growing interest in reclamation of the marshes from Brainard's Point to the mouth of Mad river. The first permanent efforts at reclamation on Arcata bottom began in 1892.

> Marsh Land--Partly surrounding Arcata, extending from Brainard's Point on the southeast to the vicinity of the mouth of Mad river on the west, is a strip of marsh land, most of which the tide ebbs and flows over, consisting of several thousand acres. No richer or more productive land than this is to be found in any country but it cannot be utilized while salt water flows over it. One or two attempts have been made to dike small patches of this land, but in only one case that we know of was the dike built in such manner as to keep out the salt water long enough to give the land a fair trial. Recently, however, work has been commenced with a view of making a success of this undertaking. Thos. Bair, President of the Bank of Arcata, is the owner of a half section of land about two miles west of Arcata of which 200 acres is marsh....A contract has been let to build over 500 rods [1.56 miles] of dike, which will reclaim pretty much all the marsh land and convert the entire 320 acres into one farm, all of which can be cultivated....
>
> The Arcata bottom creamery is being built near where Mr. Bair is reclaiming his marsh land. No better clover land lies outdoors than this marsh land when once redeemed from the effects of salt water and as all our farmers are beginning to see that they have been working on an up-grade by not putting their land in clover years ago, it is more than probable that one creamery will not meet the demands of our farmers in one or two years from now. Reclaiming our fine tillable land is a move in the right direction and one that will add much to the wealth of this end of the bay (Arcata *Union* 20 Feb. 1892).

That summer saw the construction of the Harpst & Spring dike that started at Butcher slough [tidal portion of Jolly Giant creek], proceeded down the slough to the bay, then along the mudflats for a mile or more to the mouth of Jacoby creek. From there it followed up the bank of the creek to the point where tidal action stopped.

> The first owner who took up this marsh as swamp and overflowed land never dreamed that this large stretch of country, from Arcata to Jacoby Creek, inhabited only by the festive clam and the busy little crab would some day be pasture for hundreds of cattle....The expense of building and the credit of inaugurating this fine piece of work was shared in alike by Flanigan & Brosnan and M.P. Roberts (Arcata *Union* 16 June 1892).

In the spring of 1893, the Arcata Land Improvement Company was incorporated for the purpose of reclaiming marsh land west of the Harpst & Spring dike. Incorporators were: M.P. Roberts, George Zehndner, John Harpst, O.H. Spring, Sylvester Myers, and John C. Bull. The company purchased a ditcher and dredger, described as a three-quarter yard Barnhart machine with a 20-horsepower engine. It was the company's intention to reclaim 1,500 acres extending from the west side of the Arcata railroad, which ran from the Plaza to the bay on a line that would approximate I Street if extended, around the edge of the marsh to the Deuel [Liscom] slough. Diking operations began in April 1893 at the mouth of Daniels slough, working eastward toward the railroad tracks. "Throwing up" about 200 feet of dike daily, the dredger was "doing good work" and reached the railroad in early May. The dike was 20 feet wide and five feet high, and local residents were encouraged to take the train to "examine the machine and see it work." After reaching the tracks, the ditcher/dredger returned to Daniels slough to begin the westward construction of the dike, planning to eventually reach the mouth of Deuel slough (Arcata *Union* 22 April 1893; 19 April 1893; 6 May 1893).

Diking was interrupted when the machine was sent to Eureka to work on the city's boat slip (Arcata *Union* 1 July 1893). But in late July the ditcher/dredger returned home and starting working again on the portion of the dike between the mouth of Daniels slough and the railroad to make it "stronger and higher" (Arcata *Union* 22 July 1893). In August the Arcata *Union* ran an extensive article entitled "Reclaiming Tide Lands."

> For many years residents of Arcata owned the tide lands adjoining the bay south of town, using them as an inferior pasture occasionally, but the salt water made the feed very inferior and the land, covered by the tide twice a day, served only as a breeding place for mosquitoes and was an eye sore as one approached the place by the railroad. But this is all in process of change. Over a year ago certain men in Arcata determined to redeem their marsh land, if possible, and immediately commenced to dyke against the tide, beginning just east of the railroad embankment and working east....

> But this land does not constitute all of the tide lands adjacent to Arcata. West of town is a body of some 600 acres, owned by Messrs. John C. Bull, M.P. Roberts, Harpst & Spring, George Zehndner and S. Myers. These gentlemen appreciated the fact that their money could be devoted to no better or worthier object than the reclamation of these waste lands from the clutches of the bay. The result was the formation of the Arcata Land Improvement company, with a capital stock of $100,000....A little over a month ago, work was begun at the railroad and from there west the company is engaged in building a substantial dyke. By means of the machine the company is enabled to build much cheaper than they could by hand and erect a much more substantial structure. The dyke is thirty feet wide at the bottom, five feet high and about twelve feet wide on top. Over a mile has been built at the present time.
>
> The steam ditching machine leaves a broad canal on the inner edge of the dyke which serves as a reservoir for the surplus water, and enables supplies to be brought to the scene of operations without trouble.
>
> By means of an ingenious arrangement of flood gates, which close automatically against the incoming tide, and open when the tide falls below the level of the water inside the dyke, the water is thoroughly drained from the land. As this land consists of a mass of decayed vegetation, the deposits of past centuries upon it, when drained it will prove the richest in the county and will be available for other dairying or planting purposes. It will raise the largest crops of hay, potatoes, mangel wurtzel beets, or, in fact, anything which may be planted in it.
>
> At the present rate of progress, if no accidents occur, the work in hand will be completed in a year and 600 acres of the best farming land added to the visible wealth of the county. This enterprise, successful as it is, should lead to others taking advantage of the waste land between Arcata and Eureka and along the bay south of that place, until thousands of acres of the best lands in the State have been brought under cultivation (Arcata *Union* 19 Aug. 1893).

The first Arcata bottom creamery was built on what is now Upper Bay Road in 1892 (Arcata *Union* 19 April 1892). Within a year it was handling close to 22,000 pounds of milk daily and there was a movement to construct another creamery near the newly-reclaimed lands at the southern end of the bottom (Arcata *Union* 25 Nov. 1893). The new creamery on George Zehndner's land at the west end of 11th Street was in operation in June 1894 and the drainage from the plant was "carried to the Daniels slough through a Y shaped sewer," the hog pen also being located on the slough (Arcata *Union* 16 June 1894).

By November 1894, the Arcata Land Improvement Company had completed its work of diking the large tract of land to the south and west of Arcata, except for the portion on the "east side of the Daniels slough" (Arcata *Union* 24 Nov. 1894). Although the dike running from the

mouth of the slough to the railroad was the initial construction in the spring of 1893, it wasn't until the spring of 1895, that the dike "up the east bank of the Daniels slough" was constructed, including a flood gate which would open the slough for navigation (Arcata *Union* 9 March 1895). Completion of this dike up the slough brought final reclamation of the land between the slough and the railroad, which is the land where the Bull-Hunt Barn is located and the property under consideration for wetlands restoration and enhancement more than a century later. In May 1895, the company, having completed the work of reclaiming about 1800 acres of marsh land lying south of Arcata and west of the railroad, sold the ditcher/dredger for diking on Freshwater slough (Arcata *Union* 25 May 1895).

With completion of the reclamation, the Arcata Land Improvement Company got down to the business of getting the land under production.

> The Arcata Land Improvement company are now fencing off the large tract of marsh land to the south and west of Arcata into suitable lots and parcels for grazing purposes and to segregate tracts in the enclosure belonging to the owners of farms adjoining. The matter of piping and providing the reclaimed land with fresh water is under consideration, as well as applying for reclamation patents. The State will pay the company $1.25 per acre for all the land reclaimed, the money for that purpose being on deposit with the county treasurer (Arcata *Union* 12 Oct. 1895).

The first barn and house on the reclaimed land were completed in the spring of 1896 and the newspaper predicted that not less than 40 families would find homes there and make a comfortable living (Arcata *Union* 28 March 1896). By that summer, the Union Water Company was providing water to the new district and the Land Improvement company put in about eight miles of pipe and water troughs for the stock (Arcata *Union* 4 July 1896). The marsh lands between the railroad tracks and Liscom slough, which had been subject to daily tidal flows from time immemorial, was now a place of family homes and farming activities.

Native American Consultations

On April 9, 2003, James Roscoe met with Marnie Atkins, Cultural Director for the Table Bluff Reservation-Wiyot Tribe at the project area. Consultations with Mrs. Atkins were initiated to: 1) review the proposed development within the project area, 2) consult about historic era and prehistoric land use, and 3) find out if there were any Wiyot tribal concerns regarding project implementation.

Mrs. Atkins expressed concerns regarding the area to the immediate east of the Bull-Hunt Barn, in the location where Ca-Hum-42 had been shown on the NCIC Base Maps. It was mutually agree that the area contained an elevated level of archaeological sensitivity.

Recommendations

Restoring portions of the project area to salt marsh will require removal of several small portions of the dikes that were constructed in the 1890's. Dozens of miles of similar dikes, built during the same time period, exist along the margins of Humboldt Bay. The removal of less than one hundred feet of the project area dikes will be mitigated by the recordation of these dikes completed during this investigation (see historic feature records below).

Because of the archaeological sensitivity of the eastern most portion of the project area, it is recommended that a cultural resources specialist monitor any project related ground disturbing activities within the area depicted on Map 2 of this report. CA-HUM-42, had been previously plotted on the NCIC Base Maps in this location. A surface survey of the area did not reveal any site indicators. It may be that the site was misplotted during the transfer of the site's location from Loud's original field map to later maps, or that any archaeological deposit present in the

area has subsided or been obscured by historic activities and is now not visible on the ground surface. Proposed pond construction in this area will create a substantial subsurface impact. A cultural resources monitor will ensure that any significant subsurface cultural deposit in this area is quickly recognized and recorded. If archaeological materials are uncovered during construction operations within the project area, all ground-disturbing work shall be temporarily halted and/or shifted to another area. Work near the archaeological finds shall not be resumed until a qualified archaeologist has evaluated the materials and offered recommendations for further action.

Prehistoric materials which could be encountered include: obsidian or chert flakes or tools, locally darkened midden, groundstone artifacts, deposits of shell, dietary bone, and human burials. Should human remains be encountered during future ground disturbing activities within the project area, State laws require that the County Coroner be contacted immediately. Should the Coroner determine that the remains are likely those of a Native American, he or she must contact the California Native American Heritage Commission. The Heritage Commission consults with the most likely Indian descendents from the area to determine appropriate treatment of the remains.

References

Douglas, Barry
1984 An Archaeological Investigation of the Bayside Sewer Collection System, Arcata California. Report on file, NCIC (S-6403)

Fredrickson, David A., Sonia Tamez, and Pamela Roberts
1975 An Archaeological Survey of the Proposed McKinleyville Sewage Collection and Treatment Facility. Report on file, NCIC (S-132)

Haddof, Brian
1999 Archaeological Survey for the City of Arcata, Janes Creek Culvert and Drainage Improvements, FEMA HMGP #1008-6283

Hidebrandt, W. R., Swenson L. K.
1985 Ethnography and Prehistory of the North Coast Range, California. Center For Archaeological Research at Davis, Publication Number 8.

Kroeber, A. L.
1925 Handbook of the Indians of California. Bureau of American Ethnography Bulletin 78. Smithsonian Institution, Washington, D. C.

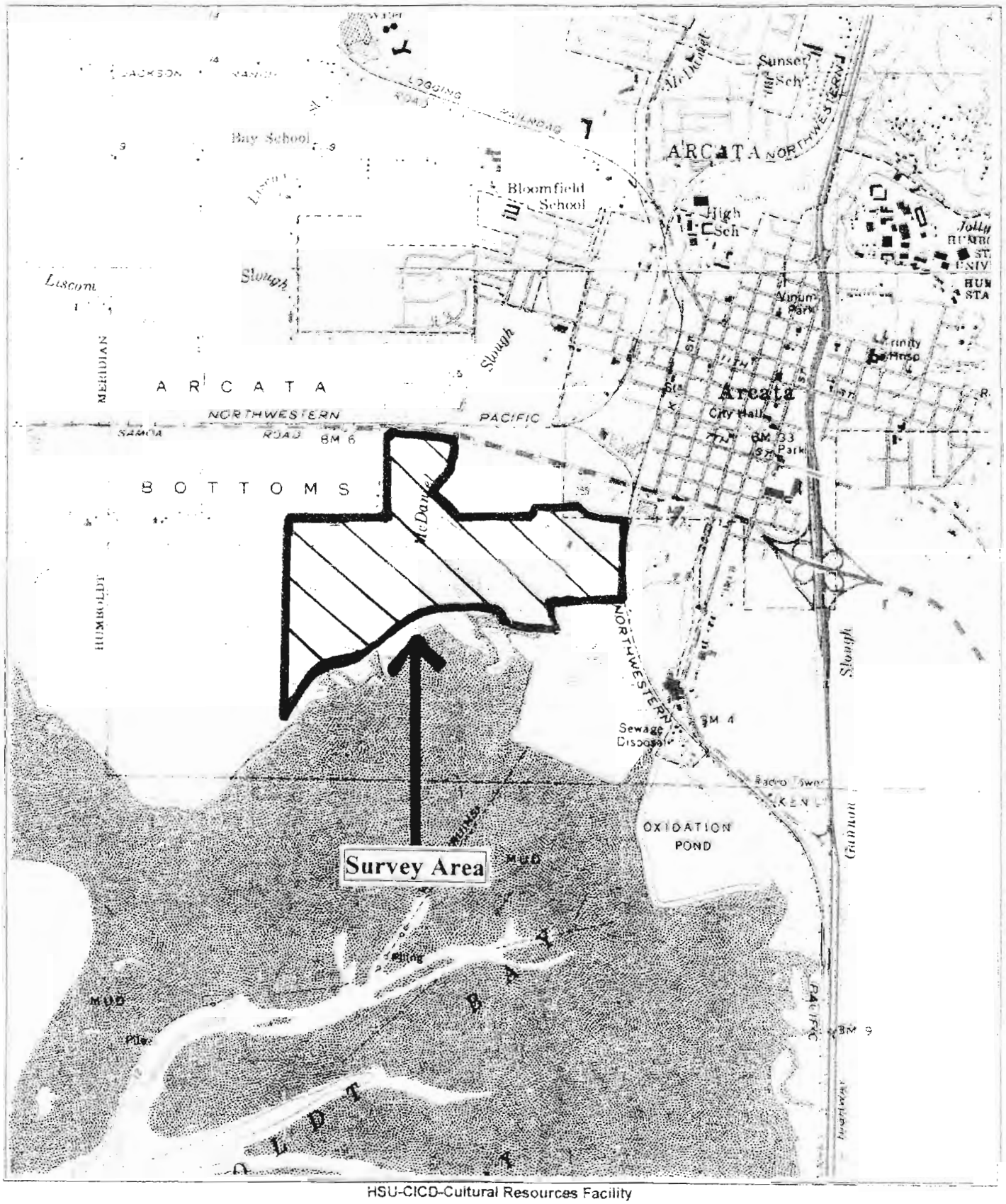
Loud, Llewelyn L.
1918 Ethnogeography and Archaeology of the Wiyot Territory. University of California Publications in American Archaeology and Ethnology. Berkeley.

Shipley, W. F.
1978 Native Languages of California. In Handbook of North American Indians, Volume 8, California, R. F. Heizer, ed., Smithsonian Institution, Washington D. C.: .

Van Kirk, Susie
2001 Historic Resources Report, Bull-Hunt Barn.

Map 1: Archaeological Survey Coverage Map
McDaniel Slough Marsh Enhancement Project
February 2003

U.S.G.S. 7.5' Arcata South, Calif. Topographic Quadrangle Scale: 1 inch = 2000 feet Date of map: 1969



Appendix B

Interviews with Isaac Dias in February 2003,
and Harold Hunt in June 2001 by Susie Van Kirk,
Historic Resources Consultant.

SUSIE VAN KIRK
HISTORIC RESOURCES CONSULTANT
P.O. BOX 568
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svkirk@humboldt1.com

Interview with Isaac Dias on February 11, 2003

Ike and I met at his barn on the Old Samoa Road (extension of "V" street across the new Samoa Road on south side). Later we drove around the area so that he could show me specific places. We also met up with Jack Wallace at his place and had a short conversation with him.

Matthew Dias, Ike's father, came to this country from the Azores. He left San Francisco after the 1906 earthquake, settling in Humboldt County where he resided for seven years before returning to his home where he married Ike's mother. Matthew purchased the 80-acre ranch from George Zehndner before WW I and built the present barn in 1921. Caston and Bertio (sp?) were the carpenters. All the lumber was sawed on the ground and raised up into place. The Silva twin brothers helped pull it up into place. It measures 72 by 90 feet with room for 30 cows on each side.

Part of the house was on the corner of Janes and Vaissade road and was brought down on sleds pulled along the gravel road. Ike said they used a milk truck from the nearby creamery to stabilize the tractor in the front, otherwise the weight of the house tilted the front end skyward. The house was moved about 1925. Ike's father dairied, then Ike ran the ranch until 1957. Presently, his nephew Clifford DeMello runs the ranch.

Ike said that in all his years on the place and in the area, he never saw any Native artifacts. Ike Moxon, who lives on Bay School Road, said they used to find artifacts when they hoed the root crops. He had a small, obsidian arrow head made into a necklace for his wife. Its size indicates that it was probably used to hunt waterfowl.

Ike Dias said the dike had to be built higher because the tides were taking off the top. The land across the road from his place through which lower Daniels Slough passes was owned by the Brizard Company. It was pasture land with some cultivation of carrots, beets and corn for cow feed. He said it did not look like it presently does, because it was grazed and there was an abundance of clover. It was real good for dairying. There were lots of ducks but no geese as there are today. The used to grub out the rushes. He said the county used to cleaned out the drainage ditches, later used herbicides, but now it is up to the private landowners, so there is more water in the pastures that in the past.

Ike said the silo at the corner was taken down by Fish and Game about six to eight months ago. On the south side of the silo was a manure pit which was taking the ground strength from the silo and it began to lean. He said the silo was built about the 1950s. John Stansberry had the silo built. Using metal forms, the silo was constructed of poured concrete. Ike said silos were not very successful because a farmer needs to be able to grow two crops a season. Locally they can only get one. There was a fine house associated with the silo. It was located right on the road curve behind the board fence. There was a concrete corral behind the silo. The concrete block alongside the road was the milk house. There was also a little cabin on the northeast of the house and a barn. Stansberry bought the land from Brizard.

Ike said Bob Matthews was running the Brizard company. He was a "flighty" person and wanted to get rid of the land because it wasn't making any money. Stansberry bought 160 acres for $19,500. He came from Oklahoma, worked as a cook in Bakersfield before coming to Humboldt. He worked for Madge Buck at her cafe on the Plaza. He tried farming the ranch like they farmed in Oklahoma, but it didn't work. He hired a company to level the land (from Ike's road eastward across Daniels Slough). They built a pond and ditches and proceeded to begin irrigating, using a 16 horse power Fairbanks-Morse engine that required a tractor to start. They filled the ditches with water, but the irrigation didn't work because the soil was clay, not sand.

We drove around to the Industrial Electric parking lot to look at the Bull/Hunt property Ike said the slaughter house he remembered was located on the high ground at the end of the pasture road that runs straight from the gate. The holding yard was adjacent, where the chutes are now. There was a rail that ran from the slaughter house to the slough. They pushed a wheelbarrow to the slough and dumped the offal into the slough. This attracted lots of sea gulls. He said Ralph Bull ran it, but it was abandoned when Ike was a young man, in the early 1950s. Louis Ferreira's family was the last to dairy on this parcel. He lives on Lanphere Road, 822-2277. Their name was Manezes. Ike said that old Manezes spoke a Portuguese dialect that he couldn't understand.

We drove down Old Samoa Road to the west of the silo. Ike said Fish and Game at the Farm Bureau's request will permit grazing on about 100 acres of its land. There is a 40 acre parcel, east of the first barn, that belongs to the Moranda family that still has cows on it. Fish and Game will graze parcels to the west. Ike said there was a house with the first barn which burned. Names he mentioned with the second barn and house were Meeds (sp?), then Sousa and Christiansen, then Rasmussen. He said fellows with a truck with Arizona plates spray-painted the house for Fish and Game.

The reclamation district includes Domingo Santos, Earl Moranda, the Wallaces, and others. We spoke with Jack who is now 88. He and Lois moved to their place in 1964 just before the flood. Ike teased Jack, asking him how many black and white cattle he was grazing on the place (referring to the geese on his pasture). Jack replied a 1000 head or so. Jack also said that the dike needed fixing, but the Coastal Commission hadn't given them a permit to do so.

Ike was born the 19th of April 1921. He dairied on his place until 1957, going to work for G.P. at Samoa for a short time after that. Later he worked for the school district, then for Simpson before retiring.

Telephone Interview with Judy Ferreira, 2/25/03

Her husband's grandparents were the Manezes.[husband is Louis Ferreira, Jr.] The Manezes son, Tony, married Gloria, who lives in Orland, 530-865-9348. She did not recall Uncle Tony having this ranch, but suggested that Gloria would know. She also recommended Sara Day, Vivian's daughter, who is doing a family history on the Manezes, 822-8586. Vivian is a Ferreira

Telephone Interview with Gloria Manezes, 2/25/03

Gloria married Antone Manezes in 1949 and they lived on the Ralph Bull ranch for about six months, before leasing another ranch on the Arcata Bottom. However, Tony's parents, Joseph and Dolinda Manezes, had leased the Ralph Bull ranch for some years. Gloria thinks they were there from the mid 1930s through the War years. She recalled that they were milking cows there during the War.

Joseph came from the Azores about 1900, returned to marry Dolinda and they were in San Francisco just after the 1906 earthquake. Gloria said that the different islands in the Azores did, in fact, have different dialects, as Ike had suggested. They came to Humboldt County and over the years leased a number of ranches, sometimes as many as three at a time with different family members on the different ranches. They had purchased a ranch in the mountains and were living there when Gloria and Tony were married; Tony was running the Ralph Bull Ranch. Gloria and Tony were on that ranch, as a married couple, from June 1949 until the lease ran out in December 1949. She recalled the house being up near the road [Samoa Road?] and the barn some distance in the rear. She said that the house burned and some electrical business took over the property [this would be Industrial Electric?]. Gloria said she was a city girl and didn't know anything about ranching and only went to the barn a couple of times.

After those few months on the Ralph Bull ranch, they leased a ranch on Lanphere Road for seven years, then a ranch on Vaissade Road for seven years before moving to McKinleyville. He dairied but was also into beef cattle. They moved to the Central Valley in 1978 and bought a ranch. Tony died in 1986 and Gloria moved to Orland where her son and family live. They raise olives and almonds and she is very happy to be away from the wet, depressing weather of the Arcata Bottom!

INTERVIEW ON SITE WITH HAROLD HUNT, 6 June 2001.

Harold Hunt met me at the gate on a bright, warm morning and we drove in his red truck onto the land and eventually to the barn. Harold is the son of Chester Hunt and the grandson of A.N. Hunt who settled on the Arcata Bottom in the 1880s. Harold lives at the A.N. Hunt place on Mad River Road. He is 74 years old. He knows this piece of land and is currently, with a partner, running Holstein yearlings on the place. I tried to use a recorder with a lapel mic, but it apparently got cut off when he put it in his pocket. So no recorded interview except at the very last when we were in the truck and I took off the exterior mic and recorded directly into the recorder. But by this time I had missed all the information about the land and barn, however, I took pretty good notes as follows.

We drove through the gate at Industrial Electric and onto a road. Harold said this was a 20-foot right of way that accesses the rear property. The front piece once belonged to Ralph Bull, then his widow, Berniece, then to a man named Wallace who had a grape stake place in Eureka, then to Industrial Electric. This parcel is 23 acres. The land directly west of the fence line along this access belongs to the Moranda family and has for years and year. There is a tunnel under the Samoa highway that connects the Moranda properties located on either side.

The Hunt property, once the J.C. Bull property, begins at a fence line that runs east and west between what was Ralph's land to the north and John C.'s land on the south. A dark fence post on the Moranda line marks this boundary and a few posts can be seen to the east where the fence line ran clear to the railroad tracks. The fencing is gone, but the line was maybe 40 or 50 feet from the front of the barn. Harold thought this was a strange place for a barn, but perhaps it was built so close to the property land in order to have it as far from the bay as possible and still be on John C.'s land.

Harold said that when the property was sold by Heidi and Holly Hunt to the City, he handled the business and retained a right to use the property for ten years, in case it took that long for the City to do anything. The Hunt parcel, formerly John C. Bull's, is 65 acres.

The mound with the thistles growing on it on the Hunt property was fill brought in from the water cooling plant (Foster Wheeler plant, but property owned by Fred Slack) that was located east of the Industrial Electric building and north of their pasture land. The slaughter house was located about where the track turns off the road towards the barn. He said in the past he found concrete there from the foundation and we walked around looking for evidence. I found a small piece of concrete, one side appearing to be flooring. He said there is a cart in the creek (Daniels slough) that was used to take the offal to the slough for dumping. He doesn't recall a boardwalk here, as Moxon suggested, but there was a boardwalk in the front of the barn that went towards the east. There was a well associated with the slaughter house. He thinks they quit using it in the 1930s. There were ruins there when Industrial Electric bought its parcel and wanted to build on it.

Regarding ownership's, he said he didn't know if Vernon Hunt, his uncle, bought the property in his name or in the name of Everett Hunt and Jim Cady. Because Everett and Jim didn't do anything with property, Vernon arranged for Sound Lumber Company to deck logs on the back portion. The logs were brought by truck and then taken out by truck to the Company's mill on 10th street. He said he built the present corral and that

before that the road split near there, the western fork going about 2/3 of the way to the dike and that was where the decked the logs.

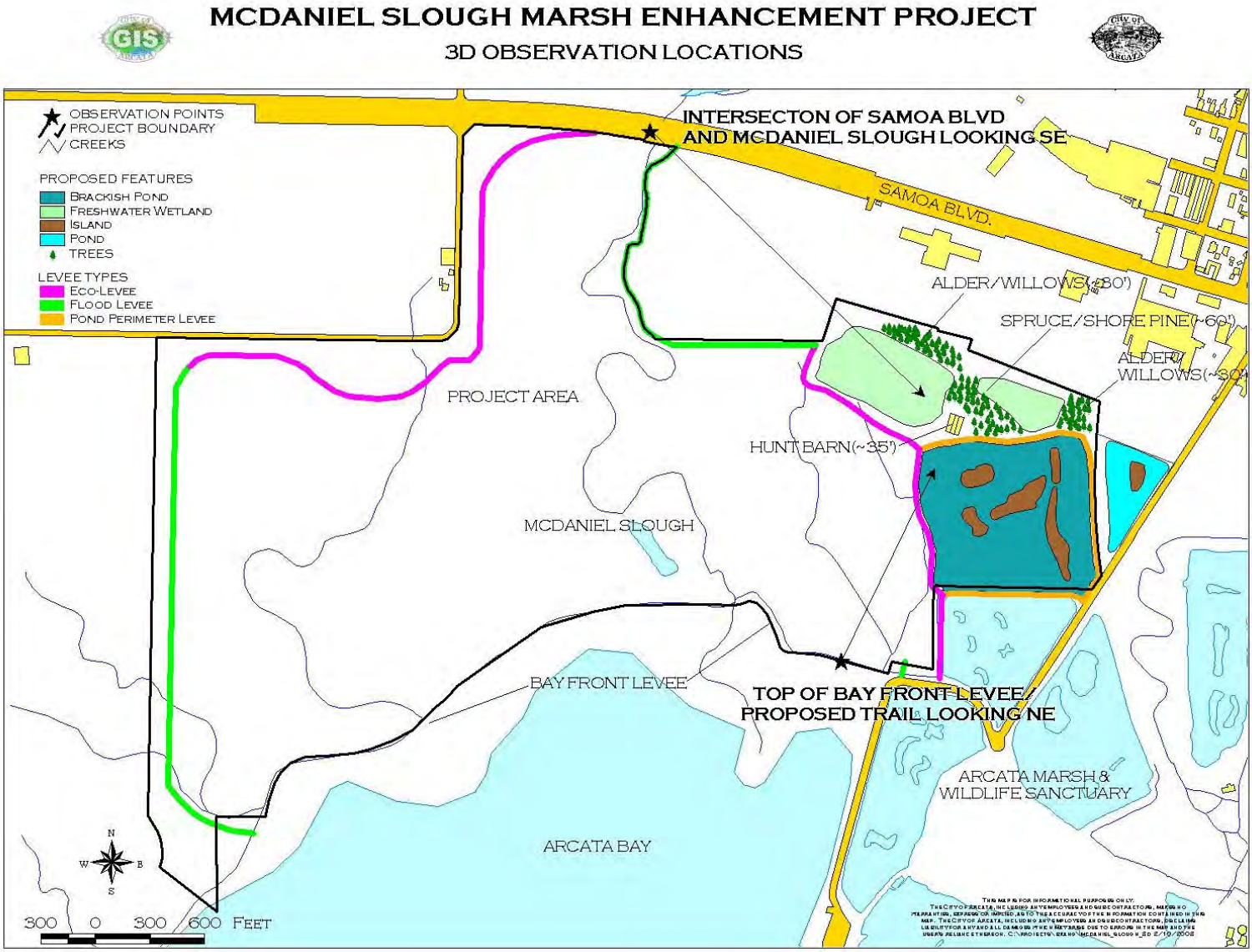
He thought Vernon bought the land in the late 1930s or early 1940s. When he died the property went to Everett and when Everett died it went to his daughters Heidi and Holly. Where the City's pond is at the southeastern end of the property was owned by Mrs. Ralph Bull. She sold it to Emerson and Berg who had the mill on Butcher Slough, but she never realized it was this piece of property and the Hunts paid her rent on it and Emerson and Berg never got a cent.

After Vernon bought the property, he moved a house onto it that had been at the Challenge Creamery (Zehndner Creamery on 11th and Janes Road). He rented it out. They had city water which was always a problem to keep the line in working order. It leaked. Finally City moved the meter off the property, so it became the Hunt's responsibility to repair the pipe. He thought there could have been a earlier house; he mentioned something about a septic system. The house that Vernon moved onto the property was burned down by the fire department.

Harold drove down to the barn. He said there were two lean-to sheds added to the barn. The one on the south end had a feed bunk on the west side, a ramp on the east and the shed roof slanted to the south. The one at the southwest corner had the feed bunk in the east end and the roof slanted to the west. I asked if he thought the stanchions came later when the barn was used for dairying since it wasn't originally built for a dairy operation. He didn't think so, saying they fed cattle in the barns, until Grade A barns were required and built in the late 1930s. He said they built the chute in the southeast corner and that his father had put in the cross pieces, using ladders. There were two or three horse stalls at the south end of the barn. It was open on the west side and the horses came in through the large sliding door to the west driveway. Regarding the silos, he doesn't think they were ever finished and used. There are no hoops or evidence that there were silos there, maybe just the foundations for them. He thought it was interesting that that the horizontal siding was cove shiplap, fancy siding for a board which is generally flush boards. Maybe somebody knew somebody at Eastern Redwood Company and asked for the best. He noted borers in the fir posts in the barn.

East of the barn there are what appear to be berms, but is actually fill just brought in and dumped. They use that higher ground to feed cattle on when the land gets extremely wet. He said the back of the field is very wet in the winter time. He put a new roof on the storm shed at the rear, thinking he could hold it together, but is went down anyway. He recalled that in the '64 flood, there was water one foot deep on the barn's floor. They came in by boat to the barn and had a inmate from jail who was sent to help them with the cattle. The guy went into the barn and fell into one of the silo foundations.

Appendix D-1
3D Observation Locations

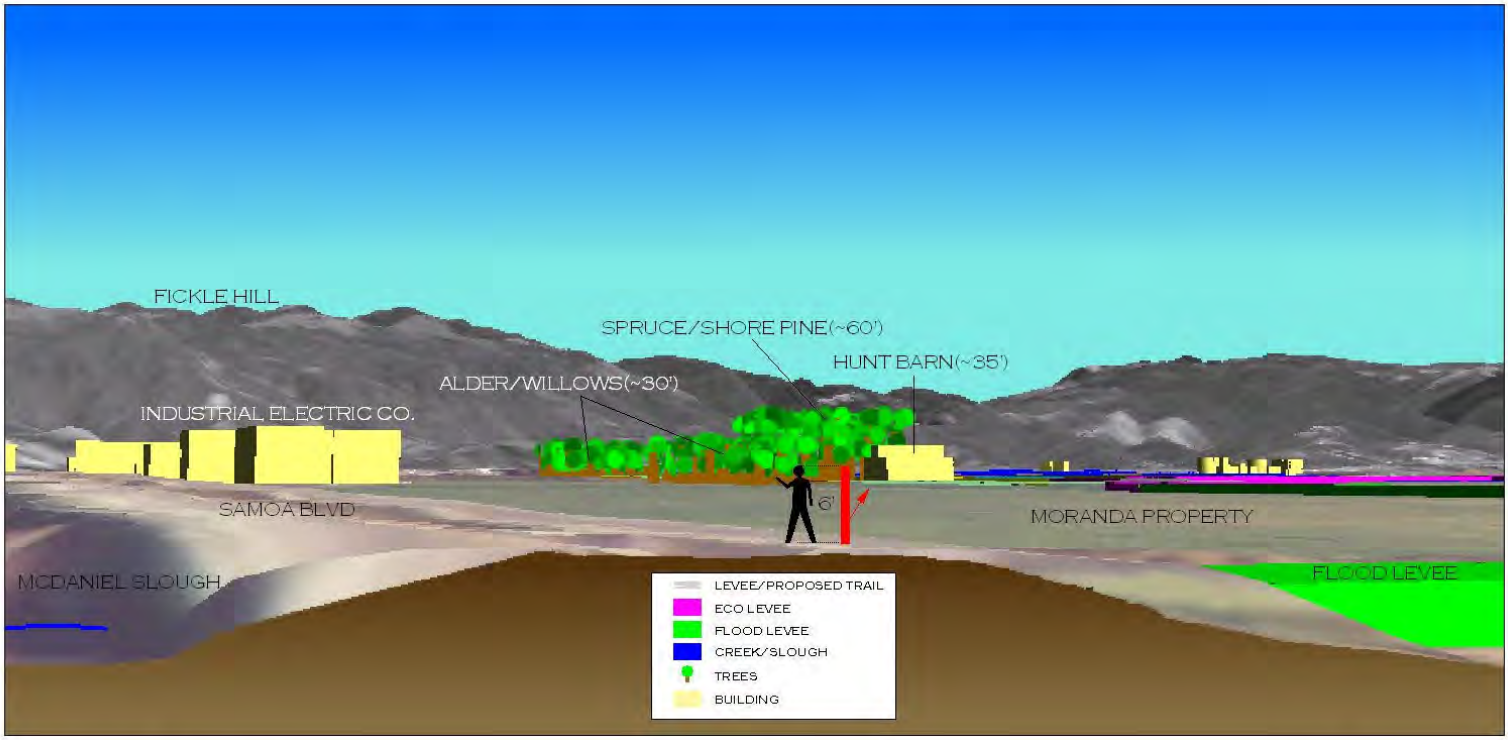


Appendix D-2
3D perspective view: Samoa Blvd looking Southeast

MCDANIEL SLOUGH MARSH ENHANCEMENT PROJECT

3D PERSPECTIVE

INTERSECTION OF SAMOA BLVD AND MCDANIEL SLOUGH LOOKING SE TO FORMER HUNT BARN



3D MODEL PROPERTIES:
UNITS = METERS
SUN AZIMUTH 270º
SUN ALTITUDE 30º
VERICAL EXAGGERATION = 1.5x
OBSERVER = 6FT ABOVE SAMOA BLVD.

DIGITAL ELEVATION MODEL DERIVED
FROM 1' CONTOURS(IN PROJECT AREA) AND
2' CONTOURS(SURROUNDING PROJECT AREA)
WITH 1998 COLOR IMAGERY(1' PIXEL RESOLUTION)
DRAPED ON SURFACE MODEL

N

THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY.
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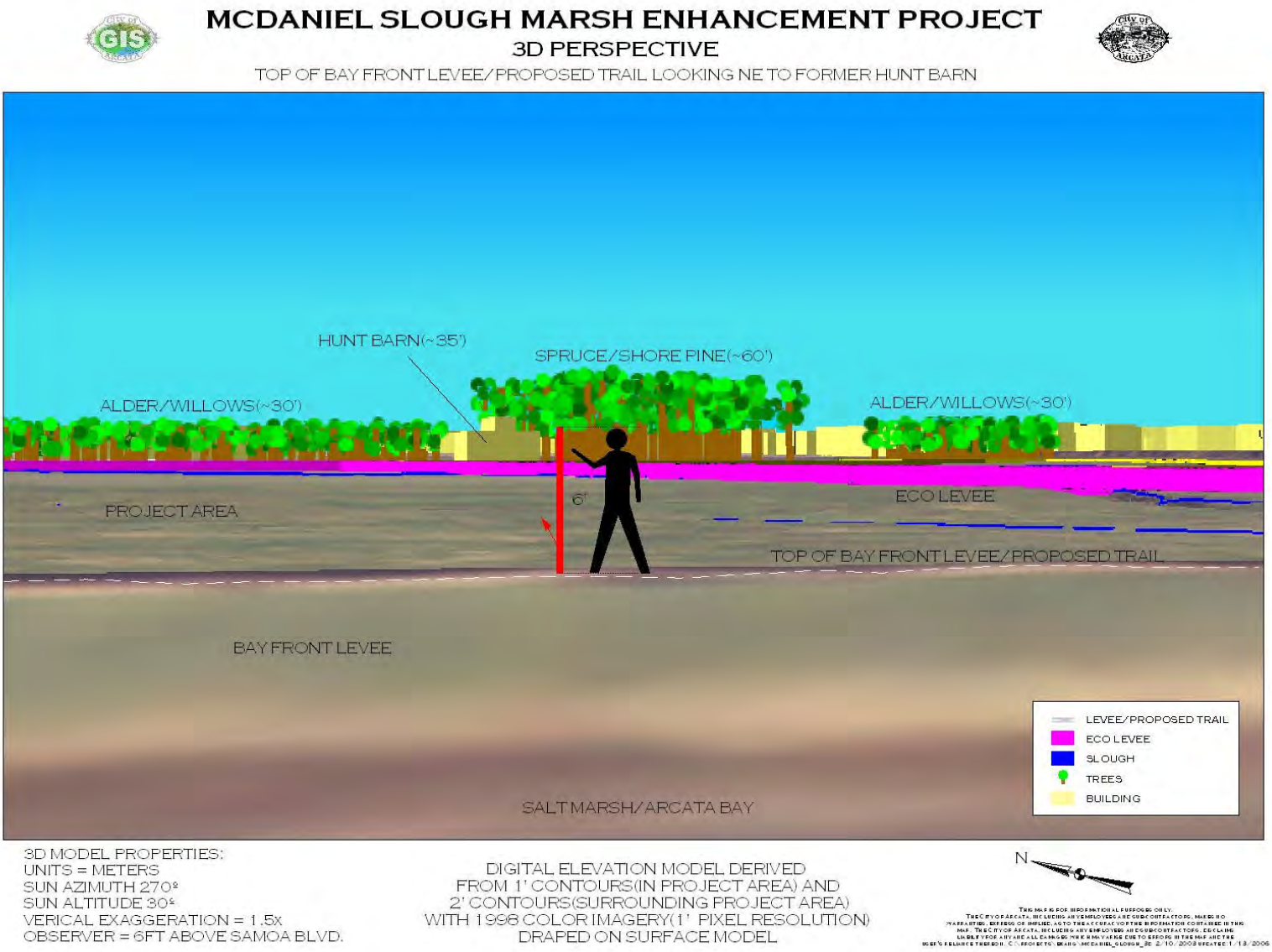
Appendix D-3
3D-perspective view: Bayfront levee looking Northeast



Appendix F
CEQA Guidelines

http://ceres.ca.gov/topic/env_law/ceqa/guidelines/index.html

CEQA The California Environmental Quality Act

Title 14. California Code of Regulations

Chapter 3. Guidelines for Implementation of the California Environmental Quality Act

Overview of the California Environment Review and Permit Approval Process: Introduction

Article 1	General	§§15000-15007
Article 2	General Responsibilities	§§15020-15025
Article 3	Authorities Granted to Public Agencies by CEQA	§§15040-15045
Article 4	Lead Agency	§§15050-15053
Article 5	Preliminary Review of Projects and Conduct of Initial Study	§§15060-15065
Article 6	Negative Declaration Process	§§15070-15075
Article 7	EIR Process	§§15080-15097
Article 8	Time Limits	§§15100-15112
Article 9	Contents of Environmental Impact Reports	§§15120-15132
Article 10	Considerations in Preparing EIRs and Negative Declarations	§§15140-15154
Article 11	Types of EIRs	§§15160-15170
Article 11.5	Master Environmental Impact Report	§§15175-

		15179.5
Article 12	Special Situations	§§15180-15190
Article 13	Review and Evaluation of EIRs and Negative Declarations	§§15200-15209
Article 14	Projects Also Subject to the National Environmental Policy Act (NEPA)	§§15220-15229
Article 15	Litigation	§§15230-15233
Article 16	EIR Monitor	§ 15240
Article 17	Exemption for Certified State Regulatory Programs	§§15250-15253
Article 18	Statutory Exemptions	§§15260-15285
Article 19	Categorical Exemptions	§§15300-15333
Article 20	Definitions	§§15350-15387

Appendices

CEQA Judges

This file last modified on: Friday, December 9, 2005.
Document URL: http://ceres.ca.gov/topic/env_law/ceqa/guidelines/index.html
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Appendix G
Wetland Area Impacted by Levee Footprints

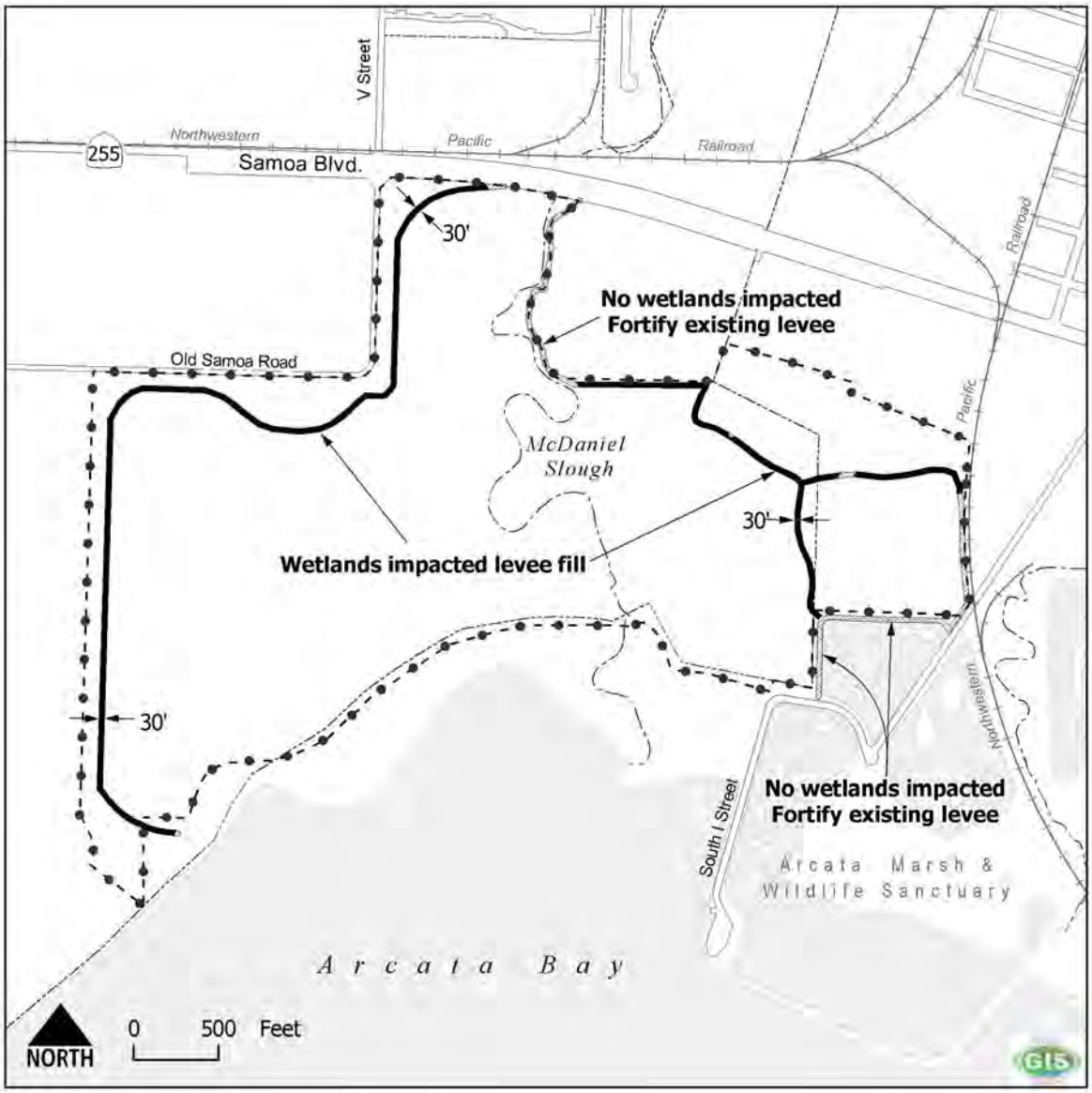


Figure 2-4b
McDaniel Slough
WETLAND AREA IMPACTED BY LEVEE FILL

Boundaries
- Project Boundary
- Arcata City Limits

Water Features
- Streams
- Waterbody

Transportation
- Railroad
- Streets

Levee Footprint
- Wetlands impacted by levee fill 288,576.2 sq. ft. or 6.6 acres (Elev < 4.5 feet NGVD29)
- Wetlands not impacted by levee fill (Elev > 4.5 feet NGVD29)

Source: City of Arcata, Geonex Aerial Surveys 1' contour mapping 1995, NGVD29

Appendix H
Project Planting Plan

N.O.A.A. Grant Application

Community Based Restoration

Vegetation Plan

Redwood Community Action Agency,
City of Arcata & Cal. Dept. of Fish & Game

McDaniel Slough Wetland Enhancement Project 2004

Boundaries
- Project Boundary
- Arcata City Limits

Recreation
- Trail
- Bird Blind
- Information Kiosk
- Boat Launch

Levee Types
- Flood Levee
- Eco-Levee
- Pond Perimeter Levee

Water Features
- Streams
- Freshwater Marsh
- Brackish Pond

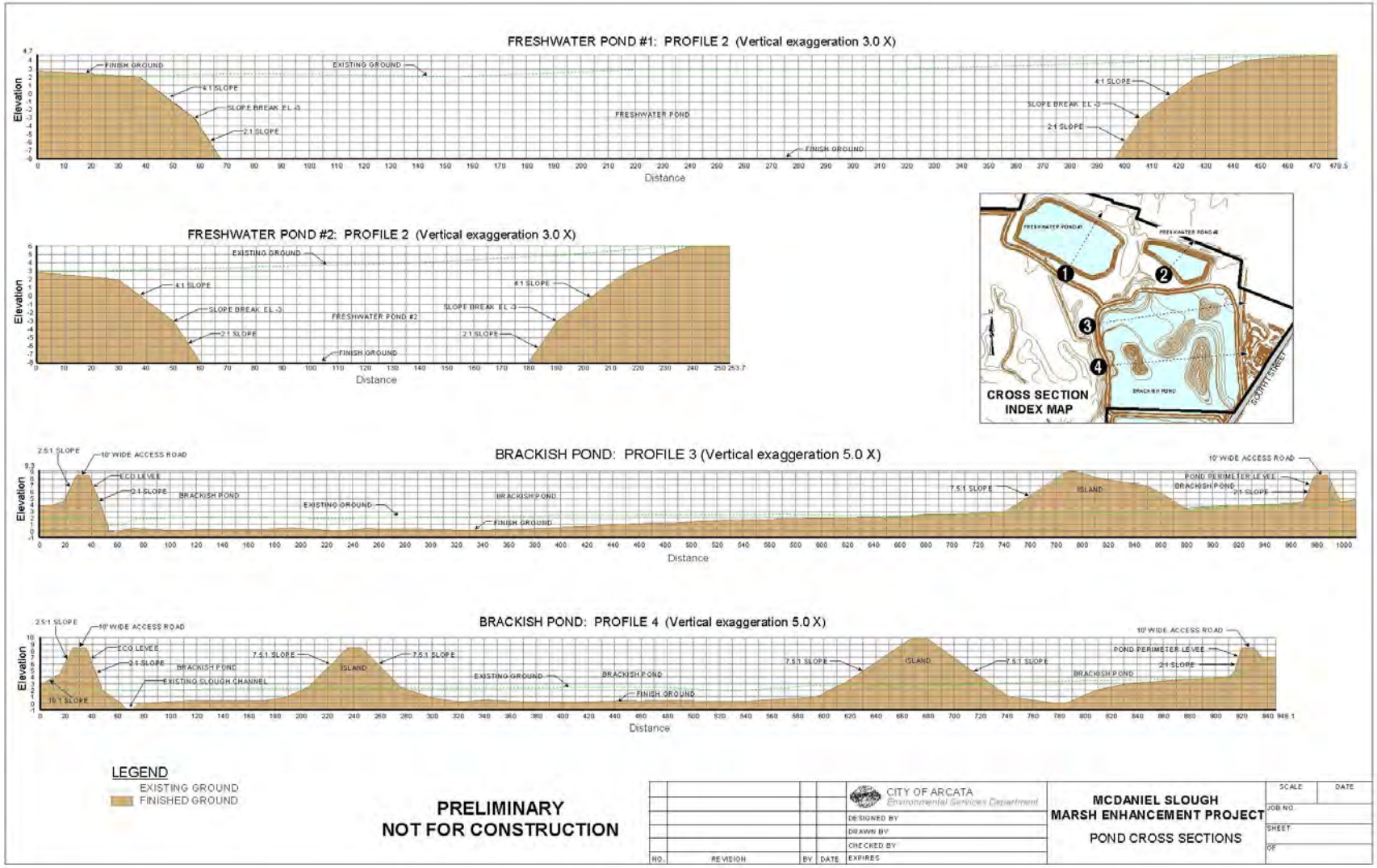
Vegetation
- Trees (various)
- Snag
- Native Shrubs
- Freshwater Wetland Plants
- Salt Marsh Plants

Transportation
- Access Road
- Railroad

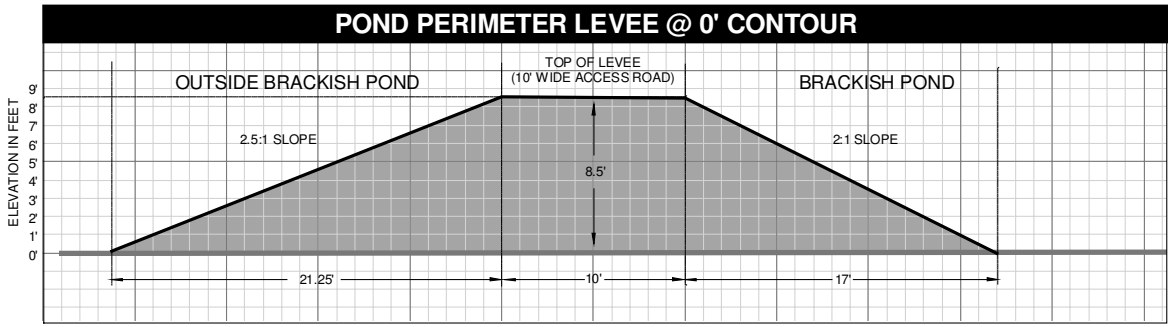
Other Features
- PG & E Tower
- Drainage Ditch
- Remove Culvert/Tide gate
- Drainage pipe
- Remove Levee
- Roosting island
- Parcel

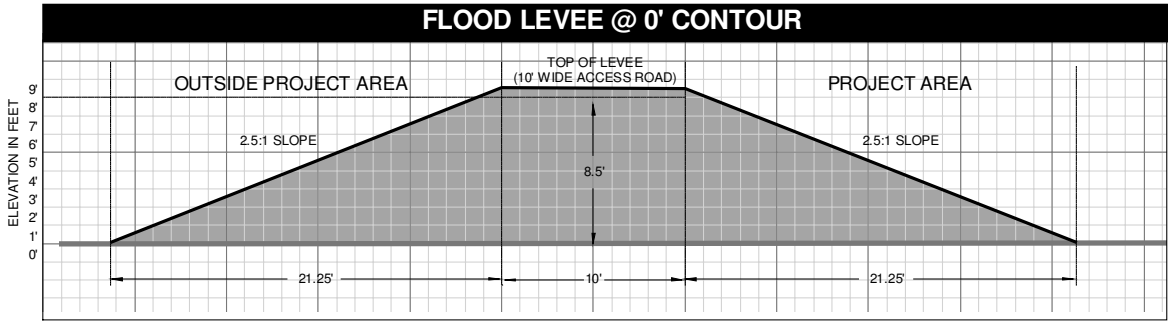
Source: City of Arcata

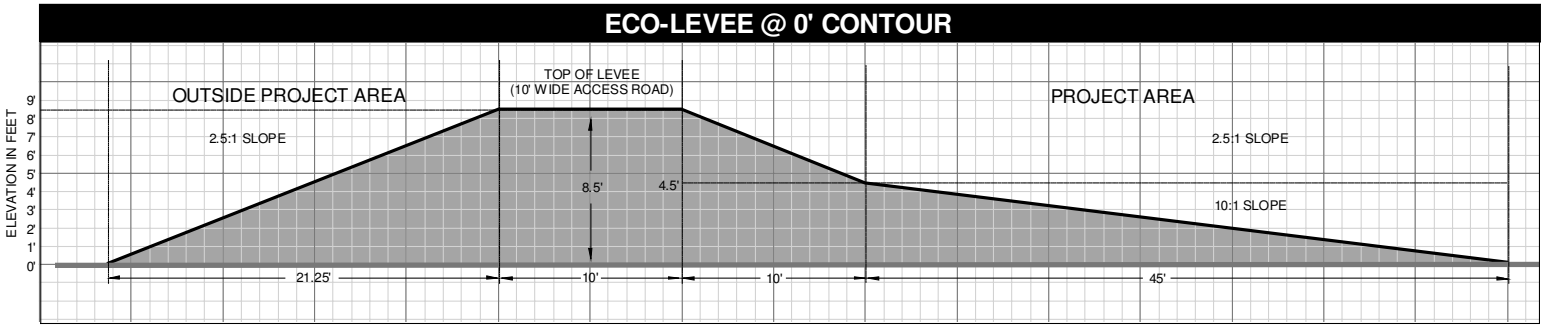
Appendix I
Pond Cross-Sections



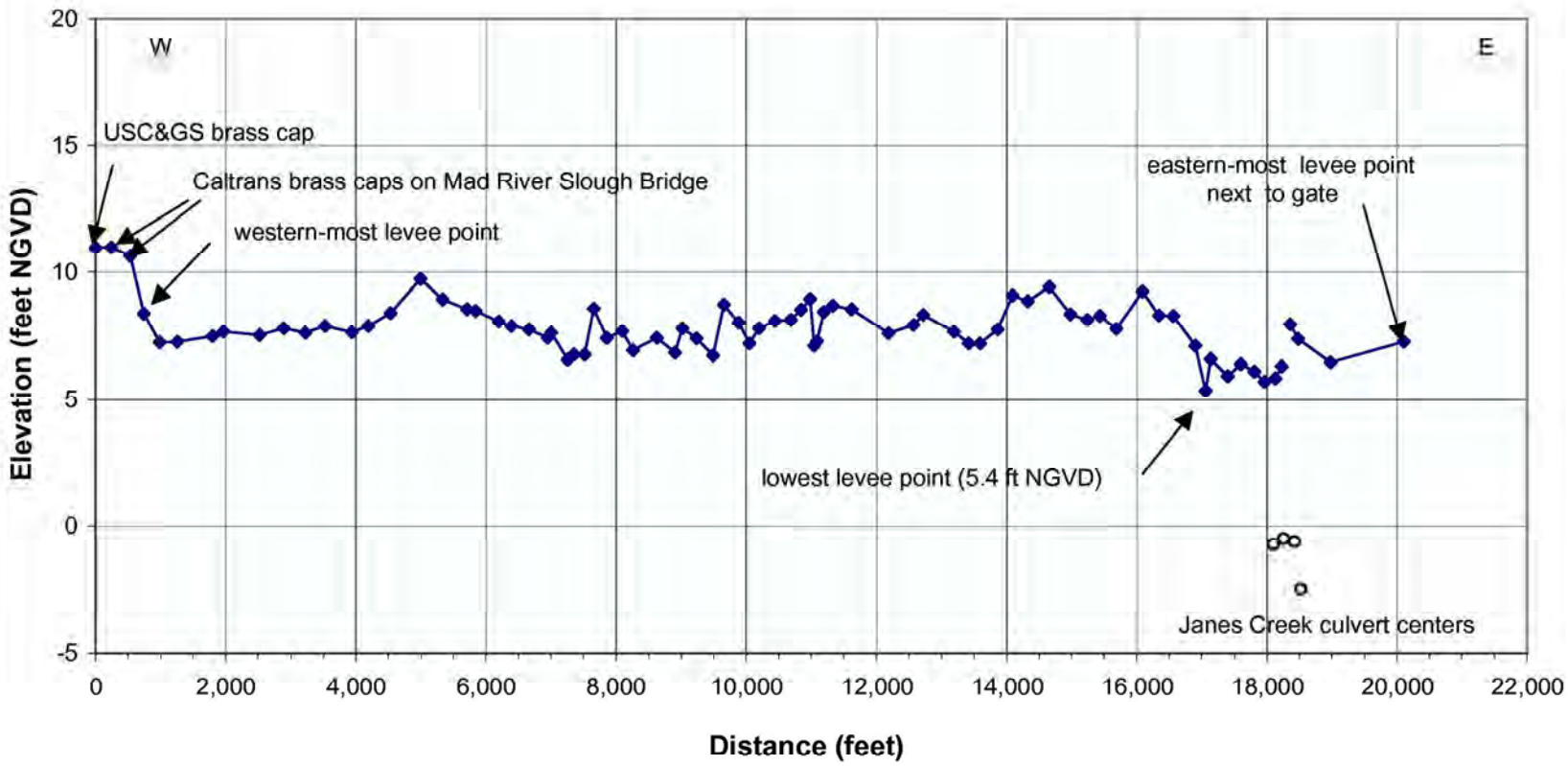
Appendix J
Levee Cross-Sections







Appendix K
Bay Front Levee Profile



Source: North Arcata Bay levee survey, Graham Matthews & Associates, 2000
Survey dates: August 11 and 12, 2000

figure 3-2

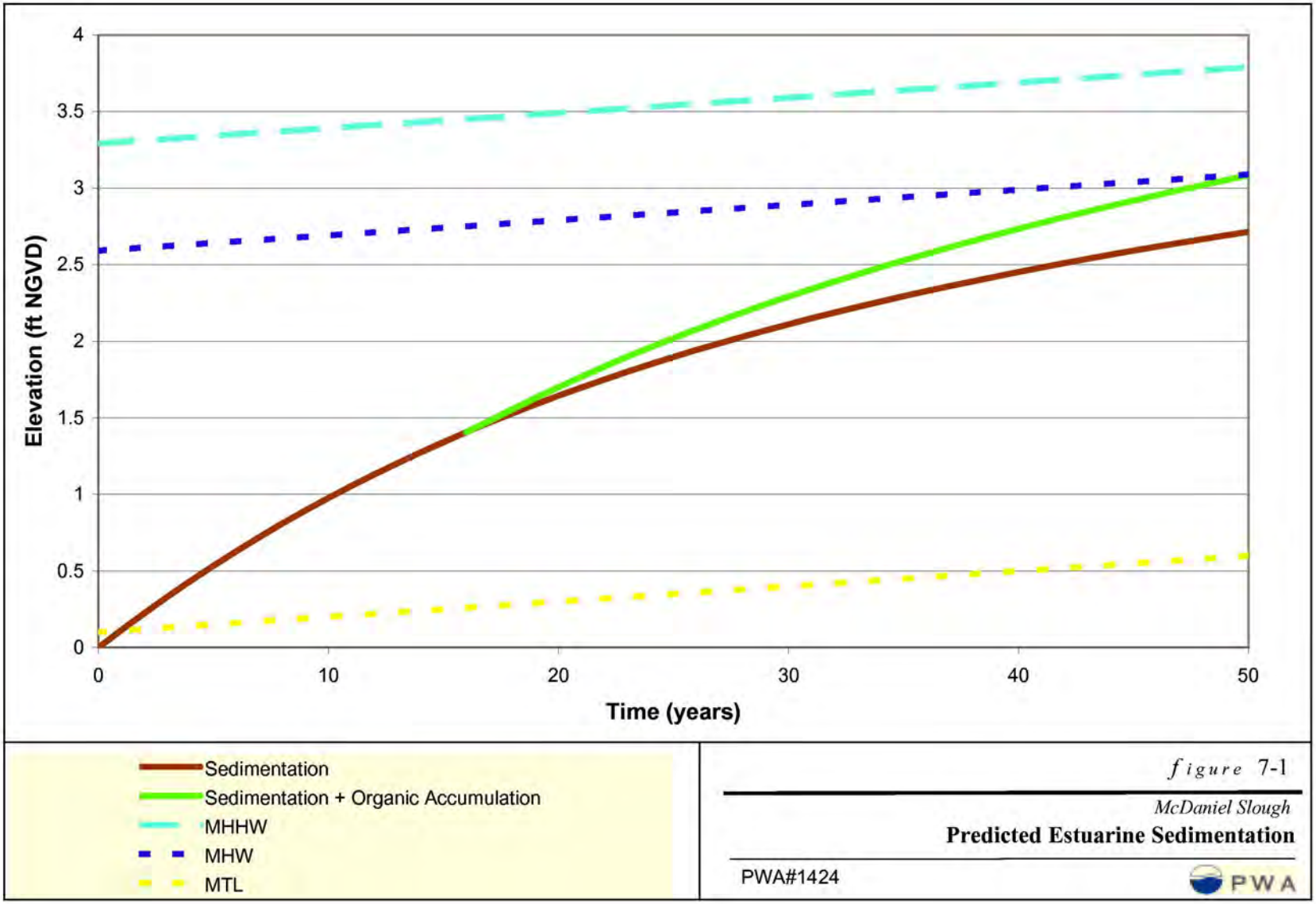
McDaniel Slough

Bay-Front Levee Profile

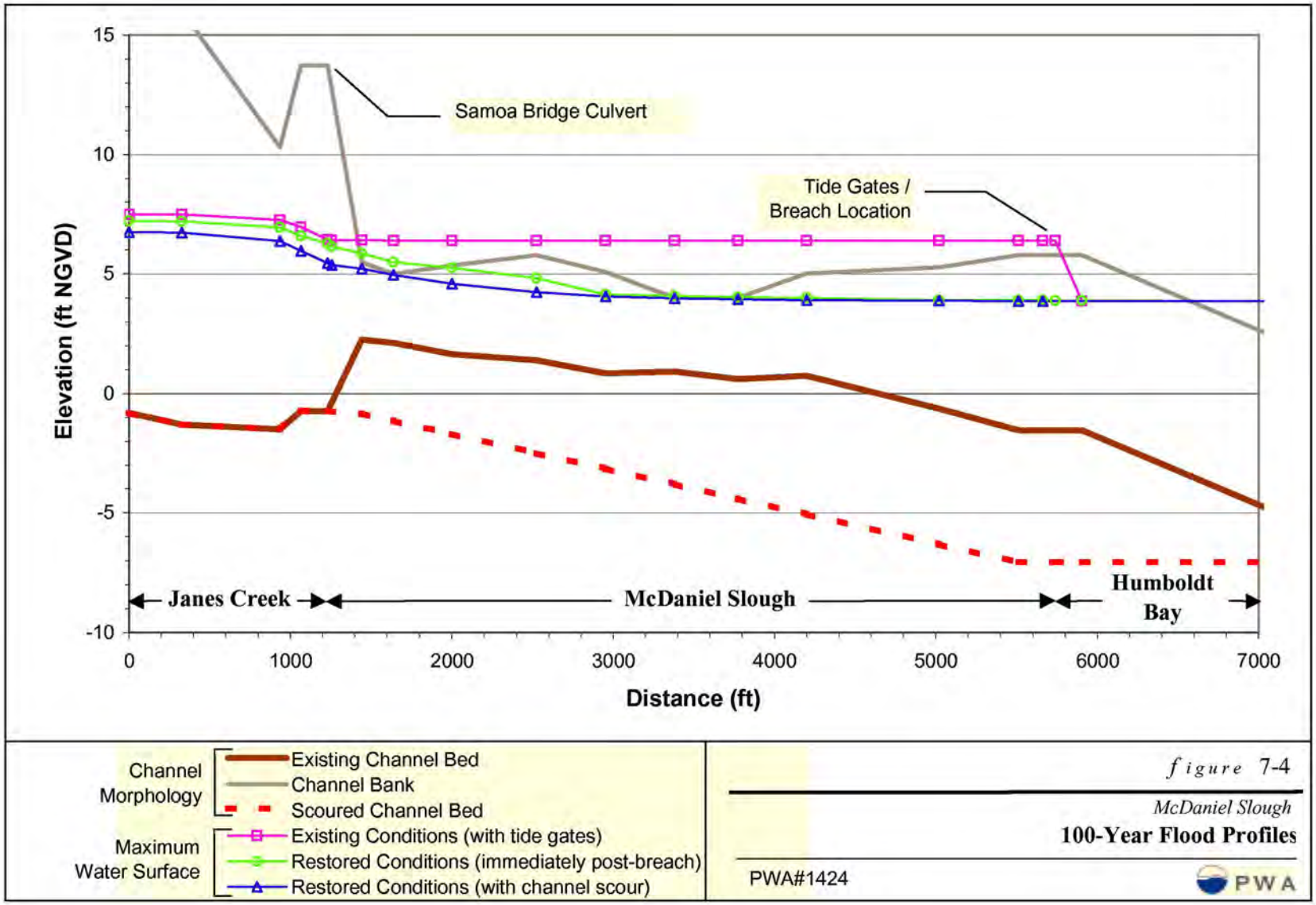
PWA#1424

PWA

Appendix L
Predicted Estuarine Sedimentation



Appendix M
100 Year-Flood Profiles



Appendix N
Wetland Delineation

WETLAND DETERMINATION

OF THE

DEPARTMENT OF FISH AND GAME

McDANIEL SLOUGH SALT MARSH RESTORATION PROJECT

Prepared by

Melissa Bukosky, Associate Wildlife Biologist
Department of Fish and Game
619 2nd Street
Eureka, CA 95501

March 2004

INTRODUCTION

This report documents the results of a wetland delineation conducted for the McDaniel Slough Salt Marsh Restoration Project (Project). This is a joint effort being implemented by the City of Arcata and the Department of Fish and Game (DFG). The field work for this delineation was conducted between July 15 through 24, 2003 by Melissa Bukosky, Associate Wildlife Biologist with DFG.

The project is located partially within and adjacent to the City of Arcata, Humboldt County, and DFG's Mad River Slough Wildlife Area. It is located in the Arcata South USGS 7.5" Quadrangle, to the south of Samoa Blvd. (St. Route 255) and south of Old Samoa Blvd. The delineation characterizes the vegetation on entire 240 acre project site but detailed sampling (soils) was performed only on the edges where dikes are proposed to be located.

BACKGROUND

The project area is located on reclaimed former tideland created when a perimeter dike was placed along northern Humboldt Bay in the1850's for agricultural purposes. The site has developed into degraded seasonal palustrine agricultural wetland interspersed with uplands created by historic agricultural practices. Seasonally (Oct. - May), surface runoff drains from on-site and adjacent fields into historic tidal slough channels and then into the borrow ditch adjacent to the perimeter dike. Flooding of fields and sloughs is temporary as tide gates along the perimeter dike facilitate drainage to Humboldt Bay at low tide. Due to elevation, only the borrow ditch retains water year round. Existing vegetation is dominated by introduced pasture grasses, exotic weeds, vetch, clover, and native wetland species.

The Soils of Western Humboldt County, California (McLaughlin and Harradine) identifies the soils of the Project area as predominately Bayside soil (Ba2,3). This soil type is poorly to imperfectly drained silty clay loam of alluvial origin and occurs where drained intertidal marshlands were converted to agricultural uses around Humboldt Bay. According to the National Wetlands Inventory, (USFWS) the site is defined PEMICd (palustrine, persistent, emergent, seasonally flooded, partially drained, wetland).

METHODS

The Project area was delineated using the U.S. Army Corps of Engineers (COE) methodology within the 1987 Wetland Delineation Manual, and wetland definitions from DFG (Fish and Game Code) and the Coastal Act (1976). The presence of "wetlands" was determined by three traditional criteria: vegetation, soils, and hydrology and listed as a 1, 2, or 3 parameter wetland depending on how many criteria were met.

Vegetation was assessed by an on-site survey in which individual sample plot were characterized using a 1m² quadrat. The plant species were recorded based on percent coverage within each sample and plot wetland indicator status. The plant taxonomy used follows the Jepson Manual (Hickman, 1993) and hydrophytic indicator status was determined using the USFWS National List of Plant Species that Occur in Wetlands for California (Region 0), (1988).

Soils were sampled with a 3 inch wide auger. If the soil displayed conclusive hydric characteristics immediately below the "A" horizon or 10 inches then a hydric soil determination was made. Further examination at depth (18-22 inches) was performed only in the areas of historic fills and unique geologic features. The Munsell Soil Color Chart, (Kollmorgen Corp. 1975) was used to describe the soil colors at each sample plot.

Hydrology was determined by records of seasonal inundation (air photos, historic maps, and visual observation), proximity to drainage features, onsite characteristics and by the subsurface level of reduced soil.

Vegetation

Since diking and conversion, intense agricultural management of the area during the past 100 years has favored upland exotic grasses and weeds such as thistle (*Cirsium vugare*), and velvet grass (*Holcus lanatus*). Since DFG acquisition of the Mad River Slough Wildlife Area in 1990, agricultural practices were suspended on the Project area. The majority of the sample locations exhibited dominant (>50%) plant species of facultative (FAC-) to facultative upland (FACU).

Data from adjacent ungrazed pastures show the dominant species to be velvet grass, creeping bent grass (*Agrostis stolenifera*), curly dock (*Rumex crispus*), Pacific silverweed (*Potentilla anserina*), and bird's foot trefoil, (*Lotus corniculatus*) all of which are classified as FAC or wetter.

Soils

Soils at the project location are classified as poorly-drained Bayside soils (McLaughlin and Harradine 1965). Soil samples between 6-12 inches showed evidence of hydric conditions such as low chroma, oxidized root channels, extensive mottling, and small gleyed inclusions.

Hydrology

Historical records and maps indicate this area is reclaimed former tideland created when a perimeter dike was placed along northern Humboldt Bay in the1850's for agricultural purposes. With the removal of tidal inundation, the only hydrology

remaining is seasonal precipitation (Oct. - May) and surface runoff from on-site. Off-site runoff from adjacent fields also back up behind the dike and into historic tidal slough channels and the borrow ditch adjacent to the perimeter dike. Flooding of fields and sloughs is temporary as tide gates along the perimeter dike facilitate drainage to Humboldt Bay at low tide. Only the borrow ditch retains water year round.

On the day of inspection soils were completely saturated and the smallest slough channels were holding water. Other indicators included free water in soil pits between 6-12 inches at locations 9 and 10, water flattened vegetation on soil surface, and oxidized root channels.

RESULTS

With the exception of sampled Points 3-5, , Points 1 through 10 indicate that the majority of the Project area is federal jurisdictional wetland characterized by hydric soils and facultative plant species such as velvet grass, creeping bent grass, and Pacific silverweed. The wetland upland boundary is abrupt where road fill (from Old Samoa Blvd.) has been placed. Obligate (OBL) and wetland facultative (FACW) plant species such as water parsley (*Oenanthe sarmentosa),* pickleweed *(Salicornia virginica)*, Pacific silverweed and creeping bent grass dominated wetlands west of the road. To the east of the road, rush (*Scirpus robustus)* dominates the inundated drainage ditch. Species dominant on the upland road fill are rye grass (*Lolium perenne)* velvet grass, wild radish *(Raphanus sativa)*, and yarrow (*Achillia millefolium*). Where soil could not be sampled, the presence of facultative and upland plants indicated that the fill was above the elevation of seasonal inundation. The southern extent of road fill is shallower and may be influenced by groundwater fluctuations. The absence of obligate vegetation indicates that these soil characteristics may also be relic as these are native borrow soils.

CONCLUSIONS

As a result of historic modifications the site has developed into degraded seasonal palustrine agricultural wetland interspersed with uplands (manure piles and imported fill) created by historic agricultural practices. Vegetation at the site typifies seasonal grazed wetlands. Points 3-5 (one parameter wetland) occur in the vicinity of former farming infrastructure/modifications where fill and subtle vegetation changes occur. However, all other Points meet a three parameter wetland determination subject to federal jurisdiction (Clean Waters Act/River and Harbors Act).

REFERENCES

California Coastal Act of 1976. Public Resources Code, Division 20.

California Department of Fish and Game Commission Policies. Wetland Definition. 1987. Section 703, California Fish and Game Code 2004.

Cowardin, L, V. Carter, F. Golet, and E. Larue. 1979. U.S. Fish and Wildlife Service. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. 103 pages

Environmental Laboratory. 1987 Corps of Engineer Wetland Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station. Vickburg, Miss. 100 pp, plus appendices.

Hickman, J.C. (ed.). 1993. The Jepson Manual: Higher Plants of California. University of California Press. 1400 pp.

Kollmorgen Corp. 1975. Munsell Soil Color Chart.

McLaughlin, J. and F. Harradine. 1965. Soils of Western Humboldt County. University of California Davis.

United States Department of the Interior. 1988. National List of Plant Species that Occur in Wetlands: California (Region 0). U.S. Fish and Wildlife Service. Biological Report 88, (26.10), May 1988. 135 pp.

Appendix O
Initial Study

WINZLER & KELLY
CONSULTING ENGINEERS

RECEIVED
JAN 10 2003
CITY OF ARCATA
Dept. of Environmental Services

ORIGINAL

Ref: 02-1051-01031

January 10, 2003

Mr. Mark Andre
City of Arcata Environmental Services Department
736 F Street
Arcata, CA 95521

Re: Transmittal of McDaniel Slough Tidal Marsh Restoration Project Preliminary Initial Study

Dear Mark:

Winzler & Kelly has completed and transmits its scope of work to prepare an Initial Study for the McDaniel Slough restoration project. A copy is enclosed for your use. We refer to this document as preliminary because there are several important areas of uncertainty or where a lack of data exists in the available information that are beyond our scope and budget to remedy. For your convenience, I summarize below W&K's major activities and findings.

While developing the preliminary Initial Environmental Study, Winzler & Kelly performed the following tasks:

- Reviewed a compilation of the City's documents and other literature pertaining to the project, including the hard copy of the PWA report provided to us by the City
- Attended the following meetings:
  - Start-up meeting with you
  - Agency consultation meeting with City staff, DFG, USFWS, NMFS, and COE
  - Agency consultation meeting with City staff, DFG, and Coastal Commission
  - Farm Bureau Land Use Committee
- Contacted Humboldt County Agricultural Extension Advisor and the North Coast Unified Air Quality Management District
- Arranged for a Cultural Resource Record Search
- Visited the project site
- Drafted a preliminary Project Description and Environmental Setting based on the information in the PWA report
- Drafted a preliminary Environmental Checklist and explanations, using a sample format provided by the City
- Had ongoing communication with City staff to obtain information and documentation

In the same order as presented in the environmental checklist, the following is a list of information gaps that we encountered, along with our recommendations.

WINZLER & KELLY
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- A complete project description that is consistent with the PWA report is necessary for an adequate analysis in the final CEQA document. This includes a description of the design and function of the managed freshwater ponds.
- The appearance of the three types of proposed levees should be described and the aesthetic impact of the proposed levee system analyzed. If the impact may be significant, feasible mitigation would be needed, if possible.
- A cumulative impact assessment should be prepared for the overall loss of agricultural lands associated with this project, past projects, and reasonable foreseeable future projects. The California Coastal Commission could require such an assessment during their consideration of a Coastal Development Permit for this project. If the cumulative impact may be significant, feasible mitigation would be needed, if possible.
- Information on the presence or absence of tidewater gobies is necessary to determine whether an impact to the species should be anticipated.
- Wetlands on the site should be described and delineated to the satisfaction of and using the criteria of the multiple agencies having jurisdiction over wetlands on the project site, followed by an impact analysis and mitigation plan.
- An archaeological survey of the site should be performed and impacts analyzed as recommended in the cultural resource record search (letter attached).
- The impact of the project on the historic barn should be explicitly stated, including the proximity of the levees.
- The possible historic significance of the bay-front levee, and impact if appropriate, should be explicitly stated.
- Additional information about the anticipated amount of sediment to be released is necessary to evaluate potential impacts to water quality and species both upstream and downstream of the project site.
- The functioning of the proposed managed freshwater ponds and associated water quality should be described as the basis for an evaluation of potential water quality impact from the discharge into the proposed tidal marsh.
- The restoration plan prepared by Philip Williams & Associates contains preliminary analysis of potential flooding impacts. Further analysis is necessary before an evaluation of impacts can be made. Potential impacts of stream down cutting should also be analyzed.
- Whether any aspect of the project would require approval from LAFCo should be determined.
- Verification of State Lands Commission and Harbor District jurisdiction in the project area should be made.
- A description of maintenance requirements and responsibilities should be used as the basis for assessing the potential impacts on public services.
- A description of anticipated visitor volume should be used as the basis for assessing the adequacy of parking.

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CONSULTING ENGINEERS

Mr. Mark Andre
January 10, 2003
Page 3

Based on our Preliminary Initial Study, we recommend that an Environmental Impact Report (EIR) be prepared for this project. This recommendation is based in part on the known concern over the project as it pertains to agricultural land conversion to non-agricultural uses. In a meeting with the Farm Bureau Land Use Committee, it was stated that it is not possible to mitigate the loss of agricultural land, whether it is considered "prime" or not. Based on assurance given by the City, the Farm Bureau anticipates that an EIR will be prepared. Other impact categories potentially susceptible to the "fair-argument legal standard"—facilitated by the large magnitude of the proposed physical changes—include aesthetics, biology, and hydrology. The opinions here are strictly W&K's. We acknowledge that the City, as the CEQA Lead Agency, has the sole authority and responsibility to make the pertinent judgments. I hope that our efforts help the City advance this very interesting and regionally important project. We are pleased to assist the City of Arcata in this manner.

Sincerely,
WINZLER & KELLY

Misha Schwarz
Project Manager

Enclosure: Preliminary Initial Study

ORIGINAL

CITY OF ARCATA ***Preliminary* Initial Study and Checklist**

Community Development Department, 736 "F" Street, Arcata, CA 95521 (707) 822-5955

PROJECT: McDaniel Slough Tidal Marsh Restoration Project

LEAD AGENCY: **City of Arcata**
736 F Street
Arcata, CA 95521

LEAD AGENCY CONTACT PERSON:
Mark Andre, Deputy Director
Environmental Services Department
(707) 822-8184

THIS PRELIMINARY *INITIAL STUDY and CHECKLIST* PREPARED BY:
Winzler & Kelly Consulting Engineers
633 Third Street
Eureka, CA 95501
707-443-8326

PROJECT LOCATION:
Assessor Parcel Numbers: 505-251-010; 021-191-005; 503-251-002, -003; 506-011-004, -005, -006, -007, -008; 506-021-007, -008; 506-031-005.

The project is located southwest of the City of Arcata, in Humboldt County, California. Approximately 30 acres of the eastern edge of the project site is within the City of Arcata city limits. The project site runs parallel with Highway 255 and Old Samoa Road, west of I Street (Figure 1).

PROJECT PROPONENT and PROPERTY OWNER:
City of Arcata and California Department of Fish and Game
736 F Street
Arcata, CA 95521
707-822-8184

ZONING/GENERAL PLAN DESIGNATION:
COUNTY ZONING: Agriculture Exclusive (A-E); COUNTY GENERAL PLAN: A-E
CITY ZONING: Agriculture Exclusive (A-E); CITY GENERAL PLAN: A-E

PROJECT SUMMARY: Restoration of tidal functions to approximately 205 acres of diked agricultural land. In addition, 35 acres at the eastern edge of the project site will be converted from diked agricultural and former industrial land to managed freshwater ponds using discharges from the City's wastewater treatment wetlands and discharging into the proposed tidally restored area. A project description is attached following the checklist and explanatory notes.

SURROUNDING LAND USES AND SETTING: The project site is currently an agricultural field and Department of Fish and Game managed lands. Surrounding parcels are agriculture fields, industrial offices/facilities, Arcata Marsh and Wildlife Sanctuary. Additional information about the project setting is attached following the checklist and explanatory notes.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☑ Aesthetics	☐ Hazards & Hazardous Materials	☐ Public Services
☑ Agricultural Resources	☑ Hydrology/Water Quality	☐ Recreation
☐ Air Quality	☐ Land Use/Planning	☐ Transportation/Traffic
☑ Biological Resources	☐ Mineral Resources	☐ Utilities/Service Systems
☑ Cultural Resources	☐ Noise	☑ Mandatory Findings of Significance
☐Geology/Soils	☐ Population/Housing	

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☑ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potential significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed in an earlier EIR or NEGATIVE DEDCLARATION pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Mark Andre — Feb. 9, 2003
Signature — Date

Mark André — City of Arcata
Printed Name — For

EVALUATION OF ENVIRONMENTAL IMPACTS

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g. the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g. the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Potentially Significant Unless Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section 17, "Earlier Analysis," may be cross-referenced).

5) Earlier analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063 (c) (3) (d). In this case, a brief discussion should identify the following:

   (a) Earlier Analysis Used. Identify and state where they are available for review.

   (b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   (c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references information sources for potential impacts (e.g. general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The analysis of each issue should identify: (a) the significance criteria or threshold used to evaluate each question; and (b) the mitigation measure identified, if any, to reduce the impact to less than significant.

Issues and Supporting Information	Potentially Significant Impact	Less than Significant without Mitigation	Less than Significant Impact	No Impact
1. **AESTHETICS.** Would the project:				
a) Have a substantial adverse effect on a scenic vista?	?	?	?	
b) Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?	?	?	?	
c) Substantially degrade the existing visual character or quality of the site and its surroundings?			X	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				X
2. **AGRICULTURE RESOURCES:** In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project?				
a) Convert Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency to non-agricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	?	?		
3. **AIR QUALITY:** Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?		X		
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation.		X		
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?			X	
d) Expose sensitive receptors to substantial pollutant concentrations?				X
e) Create objectionable odors affecting a substantial number of people?			X	
4. **BIOLOGICAL RESOURCES.** Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U. S. Fish and Wildlife Service?	?	?		
b) Have a substantially adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U. S. Wildlife Service?		X		
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		?		
d) Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established native resident migratory wildlife corridors, or impede the use of native wildlife nursery sites?		X		
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, other approved local, regional, or state habitat conservation plan?				X

Issues and Supporting Information	Potentially Significant Impact	Less than Significant without Mitigation	Less than Significant Impact	No Impact
5. **CULTURAL RESOURCES**. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	?	?	?	
b) Cause a substantial adverse change in the significance of an archaeological resources pursuant to Section 15064.5?	?	?	?	
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d) Disturb any human remains, including those interred outside of formal cemeteries?	?	?	?	
6. **GEOLOGY AND SOILS**. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving:				
(i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
(ii) Strong seismic ground shaking?		X		
(iii) Seismic-related ground failure, including liquefaction?		X		
(iv) Landslides?				X
(b) Result in substantial soil erosion or the loss of topsoil?		X		
(c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
(d) Be located on expansive soil, as defined in Table 18-a-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X
(e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X
7. **HAZARDS AND HAZARDOUS MATERIALS.** Would the project?				
a) Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials?			X	
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment?			X	
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an exiting or proposed school?				X
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result would it create a significant hazard to the public or the environment?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X
8. **HYDROLOGY AND WATER QUALITY**. Would the project:				
a) Violate any water quality standards or waste discharge requirements?		?	?	?

Issues and Supporting Information	Potentially Significant Impact	Less than Significant without Mitigation	Less than Significant Impact	No Impact
b) Substantially degrade groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	?	?	?	?
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	?	?	?	
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or surface runoff in a manner which would result in flooding on- or off site?		?	?	?
e) Create or contribute runoff which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?				X
f) Otherwise substantially degrade water quality?		?	?	
g) Place housing within a 100-year floodplain, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?			X	
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?		X		
j) Inundation by seiche, tsunami, or mudflow?		?	?	
9. **LAND USE AND PLANNING**. Would the project:				
a) Physically divide an established community?				X
b) Conflict with an applicable land use plan, policy or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?		?	?	
c) Conflict with any applicable habitat conservation plan or natural communities conservation plan?				X
10. **MINERAL RESOURCES.** Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X
11. **NOISE.** Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		X		
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?			X	
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d) A substantially temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?		X		
e) For a project located within an airport land use plan, or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X
f) For a project within the vicinity of a private airstrip, would the project expose				X

Issues and Supporting Information	Potentially Significant Impact	Less than Significant without Mitigation	Less than Significant Impact	No Impact
people residing or working in the project area to excessive noise levels?				
12. **POPULATION AND HOUSING.** *Would the project:*				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X
13. **PUBLIC SERVICES.** Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
a) Fire protection?				X
b) Police protection?				X
c) Schools?				X
d) Parks?			X	
e) Other public facilities?		?	?	
14. **RECREATION.**				
a) Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?			X	
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?			X	
15. **TRANSPORTATION/TRAFFIC.** Would the project:				
a) Cause an increase in the traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?			X	
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d) Substantially increase hazards to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?				X
e) Result in inadequate emergency access?				X
f) Result in inadequate parking capacity?			?	?
g) Conflict with adopted policies or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X
16. **UTILITIES AND SERVICE SYSTEMS.** Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X

Issues and Supporting Information	Potentially Significant Impact	Less than Significant without Mitigation	Less than Significant Impact	No Impact
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				X
e) Result in a determination by the wastewater treatment provider which services or may serve the project determined that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f)) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g) Comply with federal, state, and local statues and regulations related to solid waste?				X
17. **MANDATORY FINDINGS OF SIGNIFICANCE.**				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	?	?		
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of the past projects, the effects of other current projects, and the effects of probable future projects)?	?	?		
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	?	?		

1. AESTHETICS

a) The City of Arcata General Plan (GP 2020) Policy D-3a designates Samoa Boulevard, all public roads west of the City, and South I Street from Samoa Boulevard south as coastal scenic highways/routes. The project area falls within this zone. GP 2020 Policy D-3h also designates farmlands and open countryside as a scenic resource that should be protected. The site is surrounded by agricultural fields to the north and west, industrial businesses to the north and northeast, Humboldt Bay to the south, and the Arcata Marsh and Wildlife Sanctuary to the south-east of the project site. Views of the project area, including the bay, from Highway 255, Old Samoa Road, and South I Street will be modified as a result of levee construction. The levees will be topped with gravel to allow vehicle access and prevent intrusion of vegetation that would further inhibit views of the area. **The appearance of the three types of proposed levees should be described and the aesthetic impact that the proposed levee system analyzed. If the impact may be significant, feasible mitigation would be needed, if possible.**

b) A Historical Resources Report was prepared by Susie Van Kirk in July 2001, that provided an analysis of the Bull-Hunt barn, which is located within the project boundaries. The report indicated that the barn is eligible for the California Register of Historical Resources and is an historical resource under CEQA. The report was prepared as an initial analysis when the barn was slated for demolition. Because the analysis determined the barn to be an historical resource, it was conclude that the barn should be protected. **Additional analysis is needed to determine whether the proximity of constructed levees and inhibited views from Highway 255 will result in significant impacts to the scenery with respect to the Bull-Hunt barn.**

There are no rock outcroppings or other notable topographical features on the site. The project is not located within or adjacent to a state scenic highway right-of-way.

c) See 1a above.

d) The proposed project would not create a new source of light or glare. No impact is anticipated and mitigation is not warranted.

2. AGRICULTURAL RESOURCES

a) In general, the classification for determining prime agricultural land is the Storie Index, a classification system based on soil profile, surface texture, slope, and soil limitations. According to the definition of prime agricultural soils in the GP 2020 and the Humboldt County General Plan, the proposed project site is not considered prime agricultural land. The definition of prime agricultural land in GP 2020 is "...land which qualifies for rating 60 through 100 in the Storie Index Rating." The Humboldt County General Plan lists the Storie Index of prime agricultural land as 80-100. According to Soils of Western Humboldt County, a soil survey conducted in 1960's, the project site contains Bayside silty clay loam (Ba2 and Ba3) and Loleta loam (Lo3), which are all poorly or imperfectly drained soils with 0-3% slopes. The Ba2 soils have a Storie Index rating of 36 and Ba3 soils have a Storie Index rating of 49. The Storie Index for Lo3 soils is 52; thus, the project area does not qualify as prime agricultural land under the GP 2020 or Humboldt County General Plan definitions.

There are also other definitions for determining prime agricultural lands as identified in the Humboldt County General Plan, such as livestock capacity and agricultural production. These soils are limited by their seasonal wetness and are unable to accommodate agricultural production

and livestock during prolonged wet periods. The wetness of the project area limits year-around agricultural production and its viability as prime agricultural lands.

b) The existing zoning for the City's portion of the project site is Agriculture Exclusive (AE). The City is currently updating its Local Coastal Plan (LCP), which includes a recommended change of this parcel to Natural Resource zoning. The proposed project is not contingent on the approval of that revision because the proposed project is allowable with a conditional use permit. The County also has the same zoning designation for the remainder of the property and wetland restoration, fish and wildlife management, and resource-related recreation are all conditionally permitted uses under the zoning regulations. The proposed project would therefore not have any impact on current or planned zoning regulations.

No Williamson Act contracts exist for the subject properties. The parcels in question are owned by either the City of Arcata or the California Department of Fish and Game. Properties owned by public agencies are exempt from the tax role and can therefore not have a Williamson Act contract placed on the property.

c) The proposed project seeks to restore tidal functions to approximately 205 acres of diked agricultural land and to convert an additional 35 acres of diked agricultural land to managed freshwater ponds. **A cumulative impact assessment should be prepared for the overall loss of agricultural lands associated with this project, past projects, and reasonable foreseeable future projects. The California Coastal Commission could require that during their consideration of a Coastal Development Permit for this project. If the cumulative impact may be significant, feasible mitigation would be needed, if possible.**

3. AIR QUALITY

a) The North Coast Unified Air Quality Management District (NCUAQMD) regulates air quality on the north coast. According to GP 2020, NCUAQMD currently meets all federal and state air quality standards, except its non-attainment classification for California Ambient Air Quality Standards for air borne particles that are 10 microns in diameter and smaller (PM_{10}). A potential source of emissions would be from grading and construction activities at the site. These sources are temporary in nature, lasting only as long as construction is occurring. Dust control measures will be implemented during grading and construction of the levees. The project has the potential to conflict or obstruct implementation of the attainment plan; however, with implementation of Mitigation Measure 3-1, the impacts are considered less than significant.

b) As described above, NCUAQMD is currently in non-attainment for PM_{10}, as is most of California. The proposed project has the potential to temporarily add to this air quality violation. Mitigation Measure 3-1 as described below will reduce this potential impact to a less than significant level.

c) Construction activities will result in temporary emissions of diesel and gasoline engine combustion products and earthen dust from construction. The non-attainment of PM_{10} standard is an ongoing significant cumulative impact. The project's contribution would be cumulatively considerable without adequate controls. Mitigation 3-1 is recommended to ensure that construction dust is kept to a minimal, insignificant effect.

d) There are no known sensitive receptors in the project area and the project does not include the use of substantial pollutants. As noted above and described below, Mitigation Measure 3-1 will reduce any potentially significant affect to a less than significant level.

e) The project has the potential to create objectionable odors during the initial die-off of pastureland when the levee is breached. This potential impact is considered to be less than significant because the impact will be temporary and limited to twice daily, during exposure from low-tide

conditions. In addition, substantial numbers of people will not be affected by this potential impact. No mitigation is warranted.

IMPACT 3-1: Construction activities will generate earthen dust.

MITIGATION 3-1: Construction will comply with Rule 430 of the North Coast Unified Air Quality Management District, which covers this issue. Measures may include watering, sweeping, and/or dust palliatives as needed to prevent excessive emissions. Earthen dust will be controlled by conforming to recommended control measures for construction emissions of PM_{10}.

4. BIOLOGICAL RESOURCES

a) Appendix B of the attached PWA report lists the following species as having been identified or have the potential to exist in the project area based on a reconnaissance survey: northern harrier, white-tailed kite, Vaux swift, tricolored blackbird, coastal cutthroat trout, tidewater goby, Townsend's big-eared bat, pallid bat, coho salmon, steelhead trout, chinook salmon, and two CNPS List 1B species (Point Reyes bird's beak and Humboldt Bay owl's clover). **Additional evaluation is required to determine the presence/absence and extents of these special status species and make an analysis on whether potential impacts of the proposed project can be avoided.**

b) According to a reconnaissance level survey completed by H.T. Harvey & Associates, approximately one acre of the project site contains willow riparian habitat and Army Corps of Engineer's jurisdictional wetlands are known to exist on site. **A wetland delineation that satisfies multiple agencies is needed to characterize the site and determine whether potentially significant impacts can be anticipated as a result of the conversion of diked agricultural lands to tidally influenced salt marsh.**

c) Same as item 4b above.

d) As mentioned in Section 4a above, various salmonids are known to exist within the project area. Additional information is needed to determine whether initial sediment releases will have significant impacts on salmonids in the project area. Although the project will likely result in positive long-term benefits to salmonids, **short-term impacts must be analyzed for their potential impacts and properly mitigated as necessary**.

e,f) There are no local policies or ordinances protecting biological resources, or adopted Habitat Conservation Plans or Natural Community Plans with which the proposed project would conflict.

5. CULTURAL RESOURCES

a) A historic structure exists within the project boundary (the Bull-Hunt barn). The structure will be protected from tidal influence by the construction of levees. **Additional analysis is needed to determine whether the proximity of constructed levees will result in significant impacts to the Bull-Hunt barn.**

b) A cultural resources records search was conducted by the North Coastal Information Center in December 2002 to determine whether culturally important sites exist within the potential impact area of the project (see attachment). Several sites were determined to exist in the vicinity and a formal archaeological survey was recommended. The results of the survey will determine whether impacts to cultural resources are anticipated as a result of this project. Whether or not the survey results in the discovery of cultural resources, a mitigation measure shall be included in the project to avoid impacts from accidental discovery of unknown cultural resources. In addition, as discussed with the Wiyot Tribe and the City of Arcata, a representative from the Wiyot Tribe will be on site to oversee excavations of the ponds and levees.

In the event of an accidental discovery of unknown cultural resources that are not encountered during the field survey, Mitigation Measure 5-1 is included as an added precaution to protect the resource from adverse affects.

c) No known paleontological resource or unique geologic features exist on the subject site. Therefore, the project will not directly or indirectly destroy a unique paleontological resource or site or geologic feature. Mitigation Measure 5-1 includes specific guidelines should unknown paleontological resources be discovered during construction activities.

d) No human remains are known or suspected to exist on the subject site. Mitigation Measure 5-1 includes specific guidelines should unknown human remains be discovered during construction activities.

IMPACT 5-1: Potential accidental disturbance if unknown cultural resources.

MITIGATION 5-1: Should concentrations of archaeological materials, paleontogical resources, or human remains be encountered during construction, all ground-disturbing work will be temporarily halted in that area. Work near the archaeological finds will not be resumed until a qualified archaeologist has evaluated the materials and offered recommendations for further action. Project personnel shall not collect cultural resources. Prehistoric resources include chert or obsidian flakes or tools, projectile points, mortars and pestles, groundstone artifacts, deposits of shell, dietary bone, locally darkened midden (dark friable soil containing shell and bone dietary debris), heat-affected rock or human burials. In the event human remains are discovered, the County Coroner shall be contacted immediately and all work will cease until further instruction from qualified personnel.

6. GEOLOGY AND SOILS

a) i) The subject site is not included on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the Department of Mines and Geology. No impact is anticipated.

ii) The project site is subject to seismic ground shaking, as is much of California. The constructed levees could experience adverse effects involving strong seismic ground shaking. Mitigation Measure 6-1 below requires that a geotechnical study be completed and incorporated into the design of the project. Standard engineering design will lessen the probability that the levees will be damaged by geologic hazards.

iii) According to the GP2020 Hazards Map, the project is located in a moderate to high liquefaction area. The geotechnical study will address liquefaction potential and recommend measures to reduce the potential for impacts to constructed levees.

iv) According to the GP 2020 Hazards Map, the subject parcels are located on slopes of less than 15%. The project site is near level, with a gradual slope (<4%). The potential for landslides to effect the subject site is remote, as there are no steep or unstable slopes located on or adjacent to the site. Therefore, the project will have no impact on the environment due to landslides.

b) The project will result in substantial soil erosion as the proposed drainage methods for the project are designed to change current drainage from its original pattern. A large amount of sediment is expected to be released from the site upon the initial breaching of the levee. In addition, sediments currently held behind the tide gates will be released when the gates are removed. McDaniel Slough, and subsequently Janes Creek, will be allowed to flow more freely and it is anticipated that a substantial amount of down cutting will occur as a result of the project. The down cutting will result in soil erosion as the creek channel equilibrates. The soil will be released into Humboldt Bay, resulting in a potentially significant impact. **Additional analysis and**

mitigation is needed to reduce this potential impact to a less than significant level, if possible.

In addition, there is a potential for soil erosion during construction of the levees. Mitigation Measure 6-2 below requires that a Grading Permit be obtained from the Humboldt County and City of Arcata Community Development Departments prior to any grading or vegetation clearing activities on the site. An Erosion and Sediment Control Plan will be submitted with the permit application and the adopted plan, or updates thereof, shall be implemented during construction. The Grading Permit plot plan shall include notations regarding cultural resources (see mitigation 5-1) and dust control (see mitigation 3-1). Although the project has the potential to result in soil erosion and loss of topsoil, mitigation measures will ensure project impacts on the geologic issues referenced above will be mitigated to a less than significant level. For more information, please see Section 8 (Hydrology and Water Quality).

c) The proposed project would not cause the ground to become unstable, nor is it in an area that is considered unstable. No impact is anticipated and mitigation is not warranted.

d) The proposed project is not in an area identifies as having expansive soils. As such, the project will have no impact on the environment by being located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code.

e) The project will have no impact on the environment with respect to soils incapable of supporting the use of septic tanks or alternative wastewater disposal system. The project does not include facilities requiring of wastewater disposal facilities.

IMPACT 6-1: Potential impact due to strong seismic ground shaking, liquefaction, or levee collapse.

MITIGATION 6-1: A geotechnical study shall be completed and incorporated into the design of the project and standard engineering design will lessen the probability that the levees will be damaged by geologic hazards.

IMPACT 6-2: Potential impact due to soil erosion and loss of soil from the proposed project site.

MITIGATION 6-2: A Grading Permit shall be obtained from the City of Arcata and the Humboldt County Community Development Departments. The Grading Permit shall include an Erosion and Sediment Control Plan. The Erosion and Sediment Control Plan shall include storm water pollution prevention measures applicable to the scope of construction activities proposed and shall include Best Management Practices (BMPs) as provided in the Caltrans *Storm Water Quality Handbook* or an equivalent approved by the City. In addition, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared as required by the Regional Water Quality Control Board.

7. HAZARDS AND HAZARDOUS MATERIALS

a) The only chemical hazard will be the use of ordinary equipment fuels and fluids during construction. In the unlikely event of a spill, fuels will be controlled and cleaned up in accordance with County and State regulations, with minimal environmental impact. Hazardous materials will not be routinely transported, stored, or disposed of on site. Therefore, the project will have a less than significant impact with regards to the above referenced hazards and hazardous materials.

b) Same as a (see above).

c) The project is not anticipated to emit any hazardous emissions or handle any hazardous or acutely hazardous materials, substances, or waste as specified above. The proposed project is not within

one-quarter mile of an existing or proposed school. No impact is anticipated and mitigation is not warranted.

d) The site is not included on any listing of hazardous materials sites compiled pursuant to Government Code Section 65962.5. **However, additional documentation for the industrial properties included in the project is recommended.**

e) The site is not located within an airport land use plan or within two miles of a public airport or public use airport and thus will not result in a safety hazard for people residing or working in the project area.

f) The project is not located in the vicinity of a private airstrip and therefore will not result in a safety hazard for people residing or working in the project area.

g) The project will not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Project plans will include a traffic control and safety plan that will ensure that potential impacts to emergency plans do not occur. For more information, refer to Section 15 (Transportation).

h) The site is not located within an area subject to wildland fires. No impact is anticipated and mitigation is not warranted.

8. HYDROLOGY AND WATER QUALITY

a) The City of Arcata contacted the Regional Water Quality Control Board (RWQCB) regarding potential impacts of wastewater discharges through the tidally restored area. According to the RWQCB and based on their current understanding of the project, this appears to be a project that will be supported by the RWQCB. According to the City, RWQCB made the following findings: It was determined that the water released from the treatment ponds into the managed ponds, and ultimately through the tidally restored area and into Humboldt Bay, would already be treated to the point where it is considered waters of the state. **Additional documentation of this is recommended for inclusion in the environmental document.**

As stated in Section 6 (Geology and Soils), the project will result in the release of sediment to Humboldt Bay as the bay front levee is breached and the tidegates are removed from McDaniel Slough. The tidegates currently act as a dam, retaining sediments that flow down from Janes Creek. **Additional analysis and mitigation is needed to reduce this potential impact to a less than significant level.**

b) The proposed project will not withdraw groundwater. Because much of the project area will be restored to tidal inundation, it is possible that seawater intrusion would occur and affect local wells. **Additional analysis is recommended to determine the potential impact, notwithstanding the preliminary hydrologic investigation by Klein and Anderson in December 2001.**

c) The project is designed to change current drainage to its original pattern. A large amount of sediment is expected to be released from the site upon the initial breaching of the levee and the subsequent release of sediments from McDaniel Slough. **Additional information is needed to assess potential impacts of erosion and subsequent siltation into Humboldt Bay. As specified in Section 6 (Geology and Soils), mitigation is needed to reduce this potential impact to a less than significant level.**

d) The analysis provided in the PWA Restoration Plan concluded that flooding impacts would actually be lessened as a result of the project. **However, the PWA analysis is preliminary and further analysis is necessary before an adequate assessment can be made whether a significant impact should be anticipated. Further analysis of upstream affects and the project's affects as it relates to the freshwater component must be analyzed before a**

determination of significance can be made. Flood analyses provided in the PWA report were *not* verified during the process of assessing environmental impacts in this preliminary environmental analysis.

e) The proposed project will not result in substantial amounts of polluted runoff or contribute to any stormwater drainage systems. No impact is anticipated and mitigation is not warranted.

f) **Further analysis of sediment releases from the site are necessary to adequately describe potential impacts to water quality. The functioning of the proposed managed freshwater ponds and associated water quality should be described as the basis for an evaluation of potential water quality impact from the discharge into the proposed tidal marsh.**

g) The proposed project does not involve the construction of housing. No impact is anticipated and mitigation is not warranted.

h) Constructed levees will be placed within the 100-year flood zone as identified on the GP 2020 Hazards Map. The levees are intended to redirect flood flows and result in a positive impact on current flooding issues along Janes Creek. However, see 8d above.

i) The proposed project involves placement of levees to protect property, including several structures, from tidal influence. There is the potential that people or property may be exposed to a significant loss, injury, or death as a result of levee failure. However, as specified in Section 6 (Geology and Soil), Mitigation Measure 6-1 will require that a geotechnical study be completed for this project and that recommendations made therein be incorporated into the project to avoid potentially significant impacts cause by levee failure.

j) The GP 2020 Hazards Map does not show this project to be in the tsunami run-up zone. **However, in relation to breaching the levee, that potential hazard should be verified.** It is not anticipated that the project site would be inundated by seiche or mudflow.

9. LAND USE AND PLANNING

a) The project does not include design features that would divide the existing established community. The project will have no impact on the environment as it relates to physically dividing the community.

b) The existing zoning for the City's portion of the project site is Agriculture Exclusive (AE). The City is currently updating its Local Coastal Plan (LCP), which includes a recommended change of this parcel to Natural Resource zoning. The proposed project is not contingent on the approval of that revision because the proposed project is allowable with a conditional use permit. The County also has an AE zoning designation for the remainder of the property and wetland restoration, fish and wildlife management, and resource-related recreation are all conditionally permitted uses under the zoning regulations. See Section 1 for GP 2020 policies regarding scenic resources. **Because this project is largely outside of the city limits of Arcata, and much of it is also outside of the City's sphere of influence, it should be determined whether any aspect of the project would require approval from LAFCo should be determined. In addition, Harbor District and State Lands Commission jurisdiction over the project area is necessary.**

The proposed project is within the Coastal Zone and therefore Coastal Act policies will be used to analyze potential impacts of the project. There are conflicting Coastal Act policies governing land and marine resources. Public Resource Code 30241 seeks to maintain the maximum amount of prime agriculture land to assure the protection of the area's agricultural economy and minimize conflicts between agricultural and urban land uses. Public Resource Code 30230 seeks to maintain, enhance, and, where feasible, restore marine resources. The California Coastal Commission, which has permit jurisdiction over a majority of the project site, will have to

balance these policies when considering the Coastal Development Permit for this project. ***Evaluation of the consistency of the City of Arcata and Humboldt County Local Coastal Plans and the Coastal Act is warranted.***

c) The project site is not included in any existing habitat conservation plan or natural community conservation plan. The project will have no impact on the environment with regards to conflicting with habitat conservation or natural community conservation plans.

10. MINERAL RESOURCES

a) No known mineral resources of any value are known to exist on the subject site. Therefore, the proposed project will have no impact on environment with regards to mineral resources.

b) The subject property and vicinity is not included in any locally important mineral resource recovery site delineated on the GP 2020, Specific Plan or other land use plan. Therefore, the proposed project will have no impact on environment with regards to the loss of availability of a locally important mineral resource.

11. NOISE

a) There will be a temporary increase in sound and vibration levels at the site during construction. Construction may involve a significant amount of equipment because of the large earthmoving requirements. The project has the potential to expose people offsite to objectionable sound if loud construction activities occurred during sensitive nighttime hours, or if improperly muffled machinery were operating. Otherwise, the temporary elevation of ambient sound and vibration levels is not considered significant. Mitigation 11-1 is recommended to prevent a significant noise impact.

b) See 11a above.

c) The proposed project will not result in a permanent increase in ambient noise levels. Noise increases will be temporary and associated with construction equipment. No permanent impact on noise levels will occur and mitigation is not warranted.

d) Noise generated during the construction phase will increase ambient noise levels. See 11a above.

e) The project is not located within an airport land use plan or within two miles of a public or private airport or airstrip. The nearest airport is the Eureka - Arcata Airport located approximately 7 miles north of the project location. Therefore, the project will have no impact by exposing people in the area from excessive noise levels generated from airport operations.

f) The project is not located in the vicinity of a private airstrip. The nearest private airstrip is Murray Airfield, located approximately 3 miles south of the proposed project location. Therefore, the project will have no impact by exposing people in the area from excessive noise levels generated from airport operations.

<u>IMPACT 11-1:</u> Construction noise.

<u>MITIGATION 11-1</u>: The Project Specifications should include the following requirements: 1) construction activities that generate noticeable sound offsite will be limited from 7 a.m. to 7 p.m., Monday through Friday, and 9 a.m. to 7 p.m. on weekends, 2) construction equipment will be maintained in proper condition to prevent excessive noise, and 3) backup beepers will be no louder than necessary.

12. POPULATION AND HOUSING

a) The proposed project will have no bearing on population growth in the area due to the nature of the project.

b) The project will not displace any existing housing or require the construction of replacement housing elsewhere. No impact is anticipated and mitigation is not warranted.

c) The project will not displace any people, thus will have no impact on the environment with regards to displacement of people. Mitigation is not warranted.

13. PUBLIC SERVICES

a) The proposed project will have no bearing on fire protection, police protection, public schools. It is not anticipated that the project will increase the need for these services or affect service ratios or response times of these public services. Impacts are not anticipated and therefore mitigation is not warranted.

b) Same as a. Please see the discussion above.

c) Same as a. Please see the discussion above.

d) It is not anticipated that the proposed project will have a significant impact on parks. The proposed project is located adjacent to the Arcata Marsh and Wildlife Sanctuary. The proposed project has the potential to increase the number of people visiting the Sanctuary, though this is not an impact thought to be of significance. Mitigation is not warranted.

e) It is not clear how the proposed project will affect public services as is pertains to maintenance requirements and responsibilities of the levees. **Additional information on maintenance requirements and responsibilities is recommended as the basis for assessing the potential impacts on public services.**

14. RECREATION

a) The proposed project may increase the use of the adjacent Arcata Marsh and Wildlife Sanctuary. However, the increased use is not anticipated to result in a potential impact because the amount of potential increase is thought to be negligible.

b) The proposed project includes elements to construct recreation facilities, such as the hiking trail, informational kiosk, and bird-watching blinds. The project design will incorporate measures that will ensure significant impacts do not occur. The inclusion of these elements will not result in an adverse physical effect on the environment. No mitigation is warranted.

15. TRANSPORTATION / TRAFFIC

a) The proposed project will not cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system. During project construction, the number of construction-related vehicles in the area will increase modestly. Although this type of traffic may be noticeable, it will have little effect on street and intersection capacities, and it will be temporary. The project will include appropriate traffic controls and no mitigation is needed to prevent a significant impact.

b) The number of vehicle trips generated by the project will not individually or cumulatively exceed a level of service standard established by a county congestion management agency for designated roads or highways, as no roads or Highways with such a designation exist in the vicinity of the project.

c) The project will have no effect upon air traffic patterns as it is not located in the vicinity of an airport or airstrip and it will not, due to the nature of the project, generate substantial vehicle traffic that could potentially affect functions of an airport or airstrip. Therefore, the project will have no impact on the environment as it relates to air transportation.

d) The project does not include changing any design features of roads that would result in a significant impact. No impact is anticipated and mitigation is not warranted.

e) A traffic control plan will be prepared by the contractor that will include measures to ensure that emergency vehicles will be permitted to pass through the construction zone at all times. No separate mitigation is needed to prevent a significant impact.

f) Onsite parking will be provided for by the existing designated public access points as shown on the Freshwater/Estuarine Alternative 4.1 in the PWA Restoration Plan (attached). There are no additional public access points being proposed. **Information on existing and anticipated visitor use is recommended as the basis for determining whether there is adequate parking to accommodate expected visitors, even though this impact is probably minor and insignificant.**

g) The proposed project will have no bearing on adopted policies promoting or supporting alternative transportation. No impact is anticipated and mitigation is not warranted.

16. UTILITIES AND SERVICE SYSTEMS

a) The project has no bearing on wastewater treatment requirements or the functioning of the wastewater treatment system.

b) The proposed project includes plans to create freshwater wetlands that will receive discharges from the City of Arcata's wastewater treatment ponds. The freshwater ponds will not be constructed as a means of treating wastewater, but rather will further clarify already treated wastewater. The process will allow the city to reduce the amount of chlorination currently used to treat wastewater at their facility. This aspect of the project is not considered an expansion of the existing facility, but rather additional treatment for increased water quality and a second discharge point. Impacts associated with this aspect of the project will be mitigated, or findings will be made otherwise. No additional mitigation is necessary.

c) The proposed project does not include the construction of new storm water drainage facilities. No impact is anticipated and mitigation is not warranted.

d) The proposed project does not necessitate the need for water supplies. No new entitlements are needed and impacts are not anticipated. Mitigation is not warranted.

e) The project will not place additional demand on the current wastewater treatment system, nor will it expand the existing system's capacity. No impact is anticipated and mitigation is not warranted.

f) Due to the nature of the proposed project its construction or implementation will have no bearing on solid waste or disposal facilities and therefore no impact is anticipated. Mitigation is not warranted.

g) Same as 17f above.

17. MANDATORY FINDINGS OF SIGNIFICANCE

a) Based on the preliminary analysis of the proposed project, it appears that significant impacts may occur that could substantially reduce the habitat available for several special-status species. Additional analysis is required to determine the presence/absence of the tidewater goby, salmonids, Point Reyes bird's beak, and Humboldt Bay owl's clover. Also, an archaeological survey is needed to determine whether an impact to cultural resources of the area should be anticipated. It has not yet been determined whether the potential for the impact is there and therefore mitigation measures have not been developed and an adequate analysis can not be made at this time.

b) The proposed project may have impacts to agricultural land that can be considered cumulative and significant. It has been requested by representatives of the agriculture community that a cumulative impact analysis be provided to assess potential impacts from the loss of agricultural land in the vicinity. Approximately 240 acres of agricultural land will be converted to non-

agricultural uses. A cumulative impact analysis should be completed as part of the final environmental document.

c) The proposed project may have potentially significant impacts on human beings, either directly or indirectly. Additional information in the areas of Aesthetics, Agricultural Resources, Biology, Cultural Resources, Geology and Soils, Hydrology and Water Quality, Land Use and Planning, and Public Services is necessary to determine whether impacts can be anticipated as a result of this project.

PERSONS CONSULTED

Ammerman, David – Army Corps of Engineers, Arcata, CA. pers. comm. December 2002

Andre, Mark – City of Arcata Environmental Services Department, Arcata, CA. pers. comm. December 2002

Austin, Tavis – City of Arcata Planning Department, Arcata, CA. pers. comm. December 2002

Baskin, Jim – California Coastal Conservancy, Eureka, CA. pers. comm. December 2002

Bukosky, Melissa – California Department of Fish and Game, Eureka, CA. pers. comm. December 2002

Class, Doby –City of Arcata Community Development Department, Arcata, CA. pers. comm. December 2002

Farm Bureau Land Use Committee - John LaBogteaux, Gene Senestraro, Butch Parton, Marty McClelland, Sanford Lowry, and Katherine Ziemer, Eureka, CA. pers. comm. December 2002

Hunter, Allison – County of Humboldt Planning Department, Eureka, CA. pers. comm. December 2002

Kelly, Mike – National Marine Fisheries Service, Arcata, CA. pers. comm. December 2002

Markegard, Gary - Livestock and Natural Resources Advisor, Humboldt County Agricultural Extension, Eureka, CA. pers. comm., December 2002.

Merrill, Robert – California Coastal Commission, Eureka, CA. pers. comm. December 2002

Mullen, Mike – City of Arcata Community Development Department, Arcata, CA. pers. comm. December 2002

Neander, Julie – City of Arcata Environmental Services Department, Arcata, CA. pers. comm. December 2002

Schatz, Elizabeth – City of Arcata Planning Department, Arcata, CA. pers. comm. December 2002

Torzynski, Robert – North Coast Unifies Air Quality Management District, Eureka, CA. pers. comm. December 2002.

Watkins, Jim – US Fish and Wildlife Service, Arcata, CA. pers. comm., December 2002

REFERENCES CITED

City of Arcata General Plan: 2020, City of Arcata, Arcata, CA.

County of Humboldt General Plan, 1984

Department of Soils and Plant Nutrition, University of California, Davis in cooperation with Humboldt County, California – *Soils of Humboldt County, California*, November 1965

Klein, Randy and Jeff Anderson – *Preliminary Hydrologic Investigation of Pond/Marsh Wetland Alternatives and Salinity, McDaniel Slough Restoration Site*, December 2001

North Coast Information Center, Yurok Tribe – Cultural Resource Record Search, December 2002

Van Kirk, Susie – Historical Resources Consultant, *Historic Resources Report Bull-Hunt Barn*. July 2001

ATTACHMENTS TO THE PRELIMINARY INITIAL STUDY FOR THE MC DANIEL SLOUGH TIDAL MARSH RESTORATION PROJECT

Preliminary Project Description and Environmental Setting

Figure 1: McDaniel Slough Marsh Enhancement Project Area

Figure 2: Post LCP Certification Permit and Appeal Jurisdiction Boundary – McDaniel Slough Project Area

North Coast Information Center Cultural Resource Record Search Results

A Restoration Plan for McDaniel Slough Tidal Marsh, prepared by Philip Williams and Associates, Ltd. (PWA), October 2002

Preliminary Project Description and Environmental Setting for the McDaniel Slough Tidal Marsh Restoration Project Initial Study

PROJECT DESCRIPTION

Introduction

The City of Arcata, in cooperation with the California Department of Fish and Game and California Coastal Conservancy, are seeking to restore tidal functions to approximately 205 acres of diked agricultural land. The primary purpose of the restoration is to recreate sustainable salt marsh habitat connected to the Humboldt Bay estuarine ecosystem. In addition, 35 acres at the eastern edge of the project site will be converted to managed freshwater ponds using discharges from the City's wastewater treatment wetlands and discharging into the proposed tidally restored area. This project requires environmental impact review under CEQA and permits from the City, the County of Humboldt, the California Coastal Commission, the Army Corps of Engineers, and the California Department of Fish and Game. **Verification of Harbor District and State Lands Commission jurisdiction over the project area is necessary.** No changes are required to the City's or the County's Local Coastal Plan.

Location

The McDaniel Slough Project is located southwest of downtown Arcata, in Humboldt County, California. Approximately 30 acres of the project site at its eastern edge is within the city limits of the City of Arcata (Figure 1).

CEQA Requirements

This project is subject to the requirements of the California Environmental Quality Act (CEQA). The lead agency is the City of Arcata. The purpose of this Initial Study is to provide a basis for deciding whether to prepare an EIR or a Negative Declaration. This Initial Study is intended to satisfy the requirements of CEQA (Public Resources Code, Div 13, Sec 21000-21177), the State CEQA Guidelines (California Code of Regulations, Title 14, Sec 15000-15387), and the City's CEQA Guidelines. CEQA encourages lead agencies and applicants to modify a project to avoid significant adverse impacts (for example, State CEQA Guidelines Sec 15070 and discussion).

Section 15063(d) of the State CEQA Guidelines states the content requirements of an Initial Study as follows:

> (d) Contents. An Initial Study shall contain in brief form:
>
> (1) A description of the project including the location of the project;
>
> (2) An identification of the environmental setting;
>
> (3) An identification of environmental effects by use of a checklist, matrix, or other method, provided that entries on a checklist or other form are briefly explained to indicate that there is some evidence to support the entries…
>
> (4) A discussion of the ways to mitigate the significant effects identified, if any;

***Preliminary* Project Description and Environmental Setting for the McDaniel Slough Tidal Marsh Restoration Project Initial Study**

(5) An examination of whether the project would be consistent with existing zoning, plans, and other applicable land use controls;

(6) The name of the person or persons who prepared or participated in the Initial Study.

Some key concepts in determining significance of impacts are stated in the following sections of the State CEQA Guidelines:

15064. Determining the Significance of the Environmental Effects Caused by a Project

(a) Determining whether a project may have a significant effect plays a critical role in the CEQA process.

(1) If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, the agency shall prepare a draft EIR.

(f) The decision as to whether a project may have one or more significant effects shall be based on substantial evidence in the record of the lead agency.

(1) If the lead agency determines there is substantial evidence in the record that the project may have a significant effect on the environment, the lead agency shall prepare an EIR... Said another way, if a lead agency is presented with a fair argument that a project may have a significant effect on the environment, the lead agency shall prepare an EIR even though it may also be presented with other substantial evidence that the project will not have a significant effect…

Background

The following text in this section is summarized from "A Restoration Plan for McDaniel Slough Tidal Marsh," prepared by Philip Williams and Associates, Ltd. (PWA), in October 2002. The full text of the plan is attached.

More than 90% of the approximately 10,000 acres of tidal marsh that used to support estuarine ecologic processes in Humboldt Bay has been diked over the last 150 years. The McDaniel Slough Marsh Restoration Project will be the largest tidal restoration so far attempted in the Bay. Because this project is located at the mouth of Janes Creek, a major consideration in judging its feasibility is its influence on flood hazards upstream. Philip Williams & Associates, Ltd. (PWA), with their subconsultants H.T. Harvey & Associates, were retained by the City to develop a restoration plan for the 240-acre site that would not increase, and possibly reduce, flood hazards upstream, comparing a no-action alternative with two full tidal alternatives. As part of the study process, the City solicited community input on the formulation of the alternatives.

Preliminary Project Description and Environmental Setting for the McDaniel Slough Tidal Marsh Restoration Project Initial Study

Many interested members of the public expressed strong concerns that restoring the eastern portion of the site to tidal marsh would preclude the opportunity for using freshwater discharges from the adjacent Arcata Marsh and Wildlife Sanctuary wastewater treatment wetlands to expand managed wetland habitat. As a result, a fourth alternative was developed by the City that set aside approximately 35 acres in the eastern portion of the site for expansion of managed freshwater ponds that will allow for discharges of treated wastewater into the tidally restored site. This alternative also had the advantage of providing an on-site source of fill material to construct perimeter flood control levees. The City has adopted Alternative 4 as the selected alternative.

After completion of the environmental review and obtaining the necessary permits, the City will develop specific design drawings and specifications for construction and implementation of both portions of the site.

Proposed Project

Tidal Restoration

The following text is summarized from the PWA restoration plan. The full text of the plan is attached. The elevation datum referenced in the PWA report is the National Geodetic Vertical Datum, NGVD, which is essentially mean sea level. The common tidal zero elevation is mean lower low water, MLLW, which is 3.91 feet lower than NGVD. Relative to NGVD, mean low water (MLW) is –2.68 ft, mean high water (MHW) is +2.48 ft, and mean higher high water (MHHW) is +3.15 ft.

The restoration project will be accomplished by removing the tide gates at McDaniel Slough and constructing a single breach through the Bay-front levee. The Bay-front levee will otherwise be unaffected. Three types of levees will be constructed around the site perimeter: flood levee, bermed levee with benched upland slope (eco-levee), and brackish pond perimeter levee.

Levees will be constructed to an elevation of +8.0 feet NGVD to provide protection against the 100-year extreme tide. The more permanent bermed levees **[meaning?]** will be constructed adjacent to the private property along the northwest site boundary with Old Samoa Road and along the western site boundary with the managed wetland areas. The bermed levees [eco-levees] will have a 4:1 side slope down to 4.5 ft NGVD and a 10:1 side slope on the inboard side between 4.5 and 3.5 feet NGVD. The flood levees **[more permanent?]** will be constructed with a straight 4:1 side slope down to existing grade and will therefore require less fill material. **[How will brackish levees be constructed?]**

The cost of the 205-acre tidal restoration is estimated to be approximately $2.96 million assuming all fill material can be obtained on-site from excavating the 35-acre managed wetlands area.

Managed Freshwater Wetlands

***Preliminary* Project Description and Environmental Setting for the McDaniel Slough Tidal Marsh Restoration Project Initial Study**

The project also includes approximately 35 acres of land set aside for expansion of managed freshwater treatment ponds, which would allow for discharges of treated wastewater into the tidally restored site. The design and management plan for the 35-acre managed wetland, including hydraulic structures connecting the managed wetlands to the tidal portion of the site and costs, has not been prepared. **Additional information on design, management, and maintenance of the managed freshwater wetlands is necessary to assess potential impacts.**

Public Access
Public access to the site already exists at the Department of Fish and Game public access area on Old Samoa Road and at the end of South I Street at the Arcata Marsh and Wildlife Sanctuary. No other public access points are proposed.

Operations and Maintenance
Operation of the managed wetlands will be provided by the City of Arcata. **Additional information on the operation of the freshwater wetlands is necessary to assess environmental impacts.**

Maintenance of the levees and tidal marsh will be provided by the Department of Fish and Game on an as-needed basis. **Additional information on maintenance requirements and responsibilities is necessary.**

ENVIRONMENTAL SETTING
The following indented text is from the "McDaniel Slough Restoration and Management Plan: Existing Biological Conditions," prepared by H.T. Harvey & Associates and included as Appendix B to the PWA report, which is attached.

> Janes Creek originates in the hills east of Arcata and flows generally to the southwest through the northern part of Arcata. The creek then flows south from 11th Street into Humboldt Bay as McDaniel Slough. Agricultural lands border the site to the north, east and west. Humboldt Bay and associated salt marsh and mudflat habitats border the site to the south. The Arcata Marsh and Wildlife Sanctuary are to the immediate southeast of the project area. Elevations range from 9.9 feet National Geodetic Vertical Datum (NGVD) on the highest internal levees, to –0.9 feet NGVD in the remnant slough channels. The topography of the property is generally sloping from the north to the south, with the elevations of the agricultural field going from 4.5 feet NGVD in the north sloping to 0.8 feet NGVD in the south. The project site is in the Arcata South U. S. Geological Survey (USGS) Quadrangle.
>
> The soils found within the levees of the project site belong to the Bayside series (Ba). Two soil types within that series are present: Bayside silty clay loam, poorly drained, 0 to 3 percent slopes (Ba2) and Bayside silty clay loam, imperfectly drained, 0 to 3 percent slopes (Ba3). Bayside soils are fine-textured basin soils developed in sedimentary alluvium from

small streams, and are generally found in reclaimed tidal marsh areas adjacent to Humboldt Bay (McLaughlin and Harradine, 1965).

The Arcata area has moderate temperatures and precipitation and frequent foggy days throughout the year. Average temperatures along this portion of the coast usually vary as little as 10° F from summer to winter. The moderate temperatures are attributed to the proximity of the area to the Pacific Ocean. Average temperatures range from 47° F in January to 56° F in July, with a mean annual temperature of 52° F. Average annual precipitation in the area is approximately 40 inches. The City of Arcata has a population of approximately 16,800, of which about half attend Humboldt State University.

The City of Arcata owns 88 acres of the eastern portion of the project site, including the recently acquired 75-acre Hunt property. The Hunt parcel is not within the city limits of Arcata, though it is within their sphere of influence. The property is currently designated as AE (Agriculture Exclusive) on the City's land use map, though it is recommended in the City's Local Coastal Plan update to be changed to Natural Resources. The County of Humboldt has zoning jurisdiction over a majority of the project site (approximately 227 acres). The area is also designated AE in the Humboldt County zoning regulations, with natural resource use types allowed as conditionally permitted uses. The Department of Fish and Game owns and manages the property west of McDaniel Slough, which includes 152 acres. McDaniel Slough divides the ownership boundaries of the City and State. Coastal Development Permit jurisdictions are split between the California Coastal Commission and the City of Arcata, necessitating coastal development permits from both entities (Figure 2).

Historic resources on the property include the Bull-Hunt Barn, which was surveyed by Susie Van Kirk in July of 2001. According to the report prepared by Ms. Van Kirk, the barn is considered an historic resource under Section 106 of the National Historical Preservation Act. The barn will remain on the property because of its historic importance and will be protected by constructed berms.

Figure 1

McDaniel Slough Marsh Enhancement Project Area

ARCATA SOUTH 7.5 MINUTE QUADRANGLE
SECTION 31 & 32, T.6.N., R.1.E. OF H.B. & M

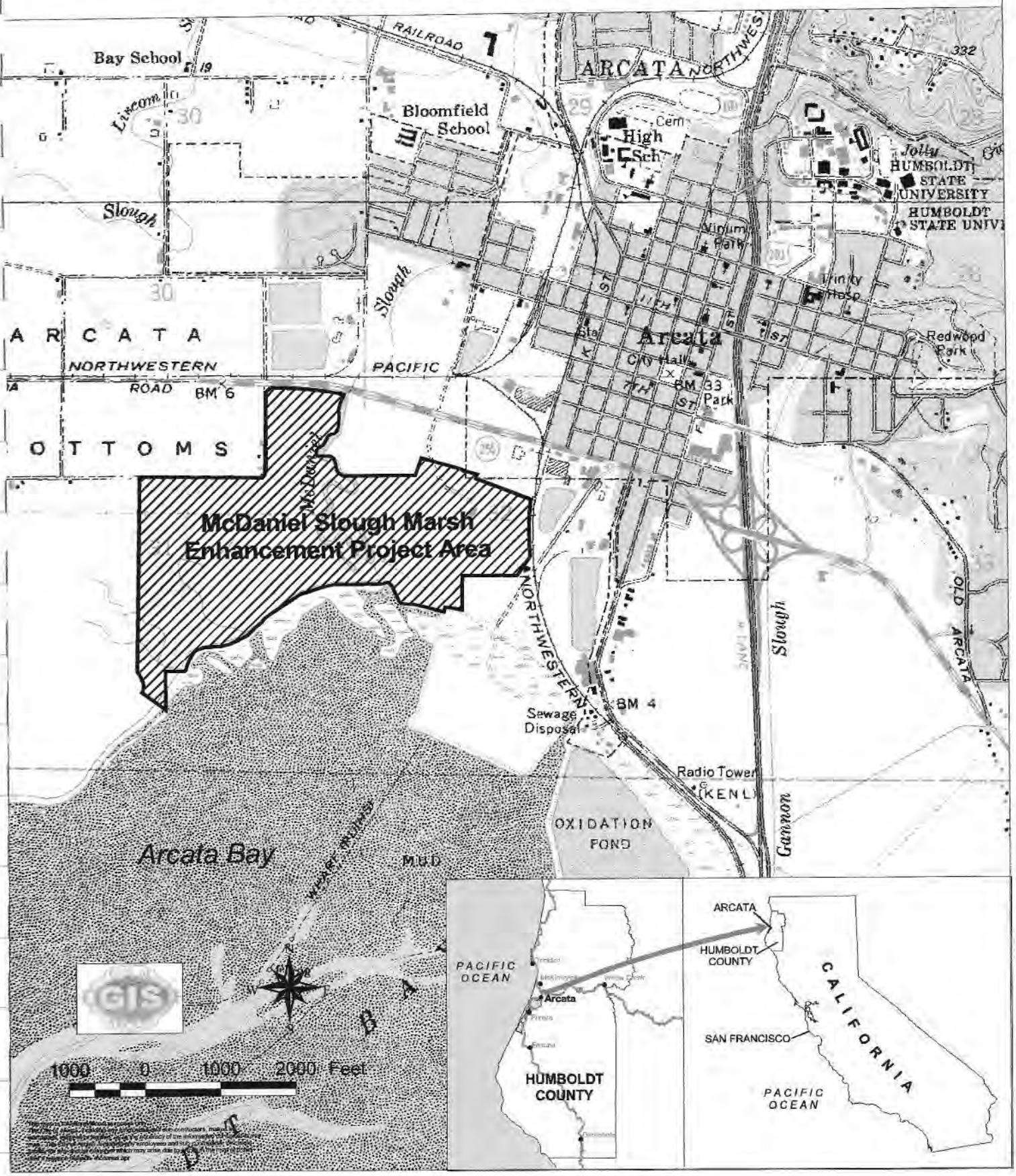
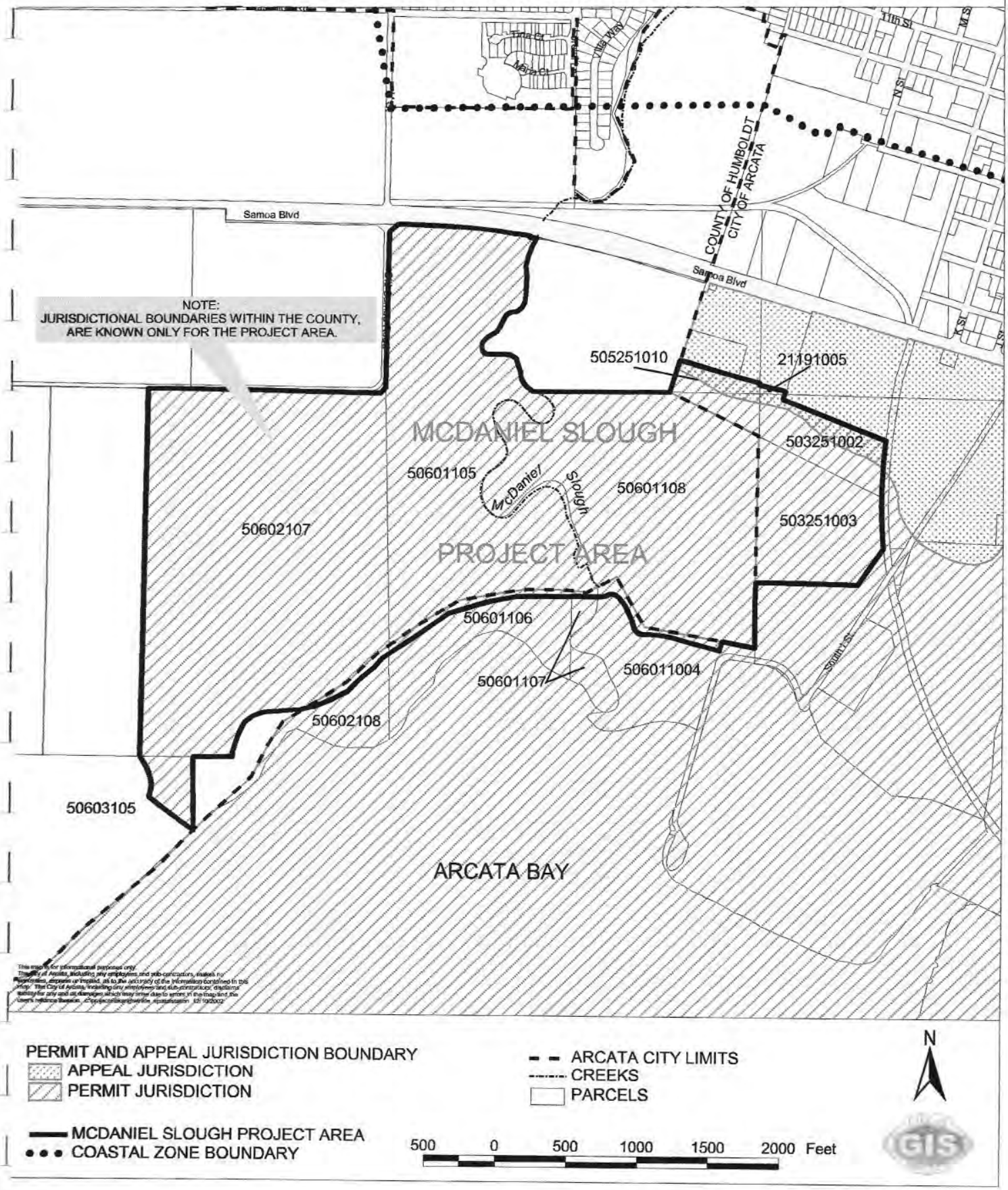


Figure 2

POST LCP CERTIFICATION
PERMIT AND APPEAL JURISDICTION BOUNDARY
MCDANIEL SLOUGH PROJECT AREA



CALIFORNIA
HISTORICAL
RESOURCES
INFORMATION
SYSTEM

DEL NORTE
and
HUMBOLDT
COUNTIES

North Coastal Information Center
Yurok Tribe
15900 Hwy 101 N.
Klamath, California 95548
707-482-1822

December 18, 2002 File Number: Bauer 02-03

Winzler & Kelly
Gina K. Bauer
736 F Street
Arcata, CA 95521

Re: City of Arcata McDaniel Slough Restoration Project CEQA Environmental Document

Dear Ms. Bauer,

Per your request, a complete records search was conducted for the area that you indicated on the attached map. This record search included review of previous studies conducted in the vicinity of the project, review of any previously recorded site records (archeological and historic), review of historic maps, and review of applicable historic and ethnographic documents.

Previous Studies Conducted in Vicinity

The following reports and accompanying survey areas have been plotted on your attached map in green. Any relevant information is summarized below.

S-132 notes a site less than 1/16 mile North of project area on the corner of Sections 32,31,30, & 29. Site consisted of a small scatter of red chert flakes. Recommends an Arch survey.

S-22314 No sites.

Historic and Cultural Resources

This Office has records of previously recorded historic resources that have been found in or near your project area.

Site #39 Mipa't - occupied in 1850 (located on the west bank of McDaniel Slough)

Site #42 No name (located on west side of US 101 just south of the Arcata city limits.)

Literature Review

The following literature and maps were reviewed for possible unrecorded historic resources. Further information was obtained from these sources.

Ethnogeography and Archaeology of the Wiyot Territory(Loud)	Sites #39 and 42 noted above.
Place Names of Humboldt County (Turner)	No sites.
California Inventory of Historic Resources (OHP)	No sites.
California Historic Property Inventory (OHP)	No sites.
1855 GLO Land Plat Map	No sites.

Recommendations

These recommendations are based only on the information on file in this office. There is always the possibility that additional documents and records exist elsewhere or that unrecorded historic and cultural resources exist within your project area.

Your project area has been 10% surveyed.

We predict that there is a **High** probability of finding sites or other evidence of human historic or cultural activity in your project area. We recommend that a professional archeologists conducts a survey of your project area.

Please be advised that the locations of historic and cultural resources do not always follow predictive patterns.

Thank you for your efforts to preserve Northwest Californian historic and cultural resources. Should you have further question concerning your project or this correspondence please do not hesitate to call us at (707) 482 1822.

Sincerely,

Thomas Gates

Dr. Thomas Gates
Coordinator
North Coastal Information Center

Bibliography

S-132

1975 Fredrickson, David A., Sonia Tamez, & Pamela Roberts. An Archeological Survey of the Proposed McKinleyville Sewage Collection and Treatment Facility. On file at North Coastal Information Center.

S-22314

1999 Fukutomi, David. Archaeological Survey for City of Arcata, Janes Creek Culvert and Drainage Improvements, FEMA HMGP #1008-6283. On file at North Coastal Information Center.

Loud, L.L.

1918 Ethnogeography and Archaeology of the Wiyot Territory. University of California Publications in American Archaeology and Ethnology 14(3): 221-436. Berkeley.

Office of Historic Preservation

2002 California Historic Property Inventory. On file at North Coastal Information Center.

Office of Historic Preservation

2002 California Inventory of Historic Resources. On file at North Coastal Information Center

Turner, Dennis.

1993 Place Names of Humboldt County, California. A Compendium 1542-1992. Eureka Printing Company. Eureka, CA.

Appendix P
Phillip Williams Hydrological Modeling Report 10/25/2002

This document served as the basis for developing the proposed project "Mixed Habitat Project".

A RESTORATION PLAN FOR THE McDANIEL SLOUGH TIDAL MARSH

Prepared for

City of Arcata, Environmental Services Department

Prepared by

Philip Williams & Associates, Ltd.

October 25, 2002

PWA Ref. 1424

PWA
PHILIP WILLIAMS & ASSOCIATES
CONSULTANTS IN HYDROLOGY
720 CALIFORNIA ST., 6TH FLOOR, SAN FRANCISCO, CA 94108
TEL 415.262.2300 FAX 415.262.2303
SFO@PWA-LTD.COM

October 25, 2002

Mark Andre
Environmental Services
City of Arcata
736 F Street
Arcata, CA 95521

RE: **A RESTORATION PLAN FOR THE McDANIEL SLOUGH TIDAL MARSH**
PWA Ref. # 1424

Dear Mr. Andre:

Please find attached an electronic format of the report. Please do not hesitate to contact us if you have any questions.

Sincerely,
PHILIP WILLIAMS & ASSOCIATES, LTD.

Services provided pursuant to this Agreement are intended solely for the use and benefit of the City of Arcata.

No other person or entity shall be entitled to rely on the services, opinions, recommendations, plans or specifications provided pursuant to this agreement without the express written consent of Philip Williams & Associates, Ltd., 720 California Street, 6th Floor, San Francisco, California 94108.

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1. INTRODUCTION

The City of Arcata, in cooperation with the California Department of Fish and Game (DFG) and the California State Coastal Conservancy (CSCC), is seeking to restore wetland functions on approximately 240 acres of diked agricultural land that was formerly salt marsh adjacent to McDaniel Slough on the north shore of Humboldt Bay. The project site is located southwest of downtown Arcata, Humboldt County, California adjacent to a California Department of Fish and Game Wildlife Area and the City of Arcata Marsh and Wildlife Sanctuary (Figure 1-1). The primary purpose of the restoration is to recreate sustainable salt marsh habitat connected to the Humboldt Bay estuarine ecosystem. More than 90% of the approximately 10,000 acres of tidal marsh that used to support estuarine ecologic processes in Humboldt Bay has been diked over the last 150 years. The McDaniel Slough Marsh Restoration Project will be the largest tidal restoration so far attempted in the Bay.

Because this project is located at the mouth of Janes Creek, a major consideration in judging its feasibility is its influence on flood hazards upstream.

Philip Williams & Associates, Ltd. (PWA) with their subconsultants H.T. Harvey and Associates, and Winzler and Kelly, were retained by the City to develop a restoration plan for the 240-acre site, that would not increase and if possible reduce flood hazards upstream, comparing a no-action alternative with two full tidal alternatives. As part of the study process the City solicited community input on the formulation of the alternatives. Many interested members of the public expressed strong concerns that restoring the eastern portion of the site to tidal marsh would preclude the opportunity for using freshwater discharges from the adjacent Arcata Marsh and Wildlife Sanctuary (AMWS) wastewater treatment wetlands to expand managed wetland habitat. These treatment wetlands are internationally renowned for their demonstration of innovative wastewater treatment technology. As a result, a fourth alternative was developed by the City that set aside approximately 35 acres in the eastern portion of the site for expansion of managed freshwater ponds and allowed for discharges of treated wastewater into the tidally restored site. This alternative also had the advantage of providing an on-site source of fill material to construct perimeter flood control levees.

The City has adopted Alternative 4 as the selected alternative. This report describes a preliminary design for the tidally influenced portions of that alternative. The design and management plan for the 35-acre managed wetland is not within the scope of this report and will be done at a later stage by the City. After completion of an environmental review and obtaining the necessary permits the City will develop specific design drawings and specifications for construction implementation of both portions of the site.

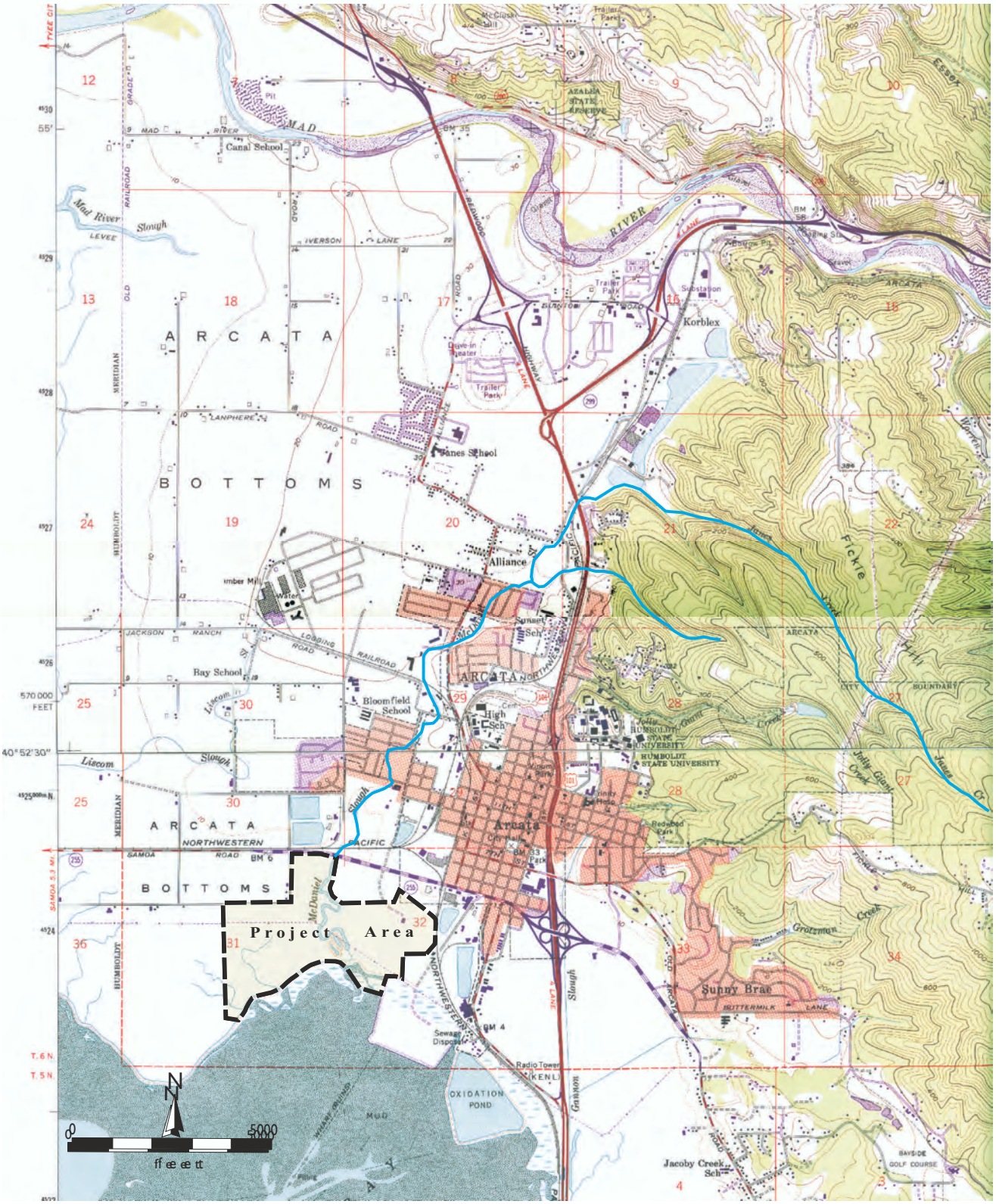


figure 1-1

McDaniel Slough

Project Location Map

1424 LocMap3.cdr

PWA

2. PROJECT FINDINGS

1. The McDaniel Slough restoration site is located entirely on what was part of the extensive tidal salt marsh that previously bordered Humboldt Bay. These tidal marshes used to provide vital ecologic functions to the estuarine ecosystem, including nurseries for fish, feeding areas for birds, and habitat for a wide variety of organisms.
2. It is feasible to restore tidal marsh habitat on the site by breaching the Bay-front levee provided adjacent properties are protected from coastal flooding by new inboard levees constructed as part of the project.
3. We expect a vegetated tidal marsh to develop quite rapidly within the site – in about ten years. This is because the diked former tidal marsh has only subsided 1 to 2 ft and is still high enough relative to the tide level for plants to colonize.
4. It is uncertain whether the dominant vegetation colonizing the site will be native pickleweed or exotic cordgrass.
5. Removal of the tide gates at the McDaniel Slough will remove a major barrier to the migration of salmonids between the Bay and Janes Creek.
6. The restoration plan allows for potential future expansion of restored tidal marsh to the west on DFG property.
7. The Bay-front levee along the north shore of Humboldt Bay has deteriorated and is susceptible to overtopping during extreme tides. Construction of a new inboard levee as part of this project will improve protection against coastal flooding in some areas immediately adjacent to the site. However, reconstruction of the deteriorated levee to the west of the site is not part of the project.
8. Removal of the tide gate and reconnecting McDaniel Slough to the Bay will slightly reduce peak flood levels and periods of flooding upstream of Samoa Boulevard during coincident major floods and high tides.
9. Tidal scouring will enlarge McDaniel Slough, improve flood flow conveyance with time, and further reduce flood hazards upstream of Samoa Boulevard. However, full alleviation of flood hazards in this area will require other measures outside the scope of this plan.
10. The cost of the 205-acre tidal restoration is estimated to be approximately $2.96 million assuming all fill material can be obtained on-site from excavating the 35-acre managed wetlands area. The construction and management costs of the managed wetlands are outside the scope of this report.

3. PROJECT SETTING

3.1 HISTORIC CONDITIONS

Humboldt Bay is a unique estuarine ecosystem on the West Coast of the United States, best described as a multi-basin coastal lagoon with limited freshwater input (Costa, 1982). About 15,000 years ago, during the last glacial advances, sea level was approximately 400 feet below its present elevation. Following glacial retreat the sea level rose rapidly slowing about 6,000 years ago. Tidal marshes formed over the last few thousand years on the margin of the Bay expanding inland with the gradual rise in sea level. These tidal marshes kept pace with sea level by capturing estuarine sediments brought in on the tide and by accumulation of peat in their soils. At this location the tidal marshes encroached on the southern edge of the alluvial fan created by flood overflows of the Mad River discharging to Humboldt Bay. The entire 'Arcata Bottoms' was part of the alluvial plain for the Mad River system and the main channel of Janes Creek probably formed as a distributary channel of the Mad River during flood flows. As Janes Creek entered Humboldt Bay, it formed a tidal slough channel, named McDaniel Slough.

150 years ago McDaniel Slough not only discharged Janes Creek flows but also conveyed the ebb and flood tide to approximately 300-400 acres of historic tidal marshplain as shown in Figure 3-1. These marshplains typically formed to an elevation of the average diurnal high tide (MHHW) and were drained by a complex dendritic tidal channel system. In its natural state the marshplain was vegetated by native salt tolerant plant species such as pickleweed (*Salicornia virginica*), saltgrass (*Distichlis spicata*), jaumea, and Humboldt Bay owl's clover (*Castilleja ambiguq ssp. humboldtiensis*).

Historically, McDaniel Slough and the surrounding marsh areas provided rich coastal habitat high in biotic diversity and primary productivity. The historic habitat supported harvest and nursery functions for fish, shellfish, waterfowl, and wildlife species within the expansive marsh ecosystem. A comprehensive description of the evolution and ecology of Humboldt Bay was prepared by the US Fish and Wildlife Service and is described in "The Ecology of Humboldt Bay, California: An Estuarine Profile" (Barnhart et al, 1992).

3.2 SYSTEM DISTURBANCES

The major alterations of Humboldt Bay began in the 1880's, when large scale diking of tidal marshes ringing Humboldt Bay began. The diked and drained wetlands were used primarily for dairy cattle grazing. A levee ringing northern Humboldt Bay was constructed along the edge of the marshplain using material from an inboard borrow ditch. This levee eliminated saltwater marsh habitat, including the historic habitat of the project site. Tide-gates were installed in several locations to allow for freshwater drainage, including those at the mouth of Janes Creek at McDaniel Slough. The intertidal area of Humboldt Bay at high tide has been reduced from 27,000 acres to 18,000 acres. The lost 9,000 acres was almost entirely comprised of tidal saltmarsh and today less than 1,000 acres of saltmarsh remains (Barnhart et al, 1992). With construction of the levee and landfill to the east, the marsh edge has changed

over time. Over the last century, wave exposed areas have eroded back about 70 feet and accreted in sheltered areas up to 650 feet.

During the same period, the forested watershed of Humboldt Bay was settled and logged. The elimination of ancient woodlands altered the hydrologic and sediment regimes of the streams flowing into Humboldt Bay. In addition the lower reach of the Mad River was leveed to prevent flood overflows onto the farmland of the Arcata Bottoms.

As the City of Arcata expanded, significant portions of the McDaniel Slough/Janes Creek watershed and floodplain were developed. Tide gates were installed at the mouth of McDaniel Slough to allow discharge through the Bay-front levee at low tide. This caused backwater and sedimentation in lower Janes Creek. The levees and tide gates also impeded natural tidal scouring, allowing sediment to accumulate in the McDaniel Slough channel and riparian vegetation to colonize within the channel upstream, decreasing flood conveyance. Occasionally, accumulated sediment has been dredged from the channel and side-cast in mounds on-site.

The character of native salt marsh vegetation in Humboldt Bay was altered possibly as early as the 1850's, when the non-native Chilean species of salt marsh cordgrass *Spartina densiflora* was inadvertently introduced through seeds transported by lumber ship ballasts (Spicher and Josselyn, 1985). First identified in the early 1980's (P. Faber, *pers. comm.*), the invasive *Spartina densiflora* is now recognized as an aggressive colonizer that threatens to out-compete native species in Humboldt Bay marshes.

3.3 THE CONTEMPORARY SYSTEM

3.3.1 Topography

The site lies entirely within the area of diked former saltmarsh as shown in Figure 3-1. With diking and draining the land surface has subsided one to two feet and has flat or very gently sloping topography. The imprint of the former larger tidal sloughs is still expressed in ditches or shallow swales. Elevations are higher where alluvial deposition occurs near the mouth of Janes Creek and typically range from about 4.0 feet NGVD in the north to 1.5 feet NGVD in the south. McDaniel Slough itself has been extensively modified through dredging, straightening and sedimentation. A partial levee was constructed along the east bank of McDaniel Slough with a crest elevation of approximately 5 feet NGVD. However breaches in this internal levee allow free connection of flows between the eastern and western parts of the site.

The Bay-front levee within the site is typically 6 to 7 feet NGVD, with its lowest elevation at 5.4 feet NGVD (see Figure 3-2). The condition of the Bay-front levee along the outboard site boundary and continuing towards the west was characterized by reconnaissance by PWA staff and an independent survey by Graham Matthews & Associates (2000). PWA identified the locations of culverts, tide gates, and evidence of erosion along the levee and confirmed the locations of low elevation areas identified by the independent survey. The existing Bay-front levee is in a poor condition of repair, and does not provide protection against extreme tide events in Humboldt Bay.

Geonex Aerial Surveys (Sacramento, CA) conducted an aerial photographic survey of the project site in 1995 for the City of Arcata. Figure 3-3 is an elevation grid for the project site based on this data with NGVD as datum. PWA surveyed transects of the project site in 2000 and verified these elevations based on local benchmarks.

Outboard of the levee the typical elevation of the mature vegetated marshplain is approximately 3.5 feet NGVD based on elevation surveys. This is consistent with equilibrium elevations for emergent tidal marshes in mesotidal estuaries that are typically at around Mean Higher High Water (MHHW) tidal elevation. For northern Humboldt Bay, MHHW is taken as 3.46 ft NGVD (Table 3-1).

3.3.2 Drainage and Runoff Hydrology

The site receives runoff directly from the 4.5 square mile Janes Creek watershed and indirectly from the Arcata Bottoms through the Bay-front levee borrow ditch. During low tide, flows discharge to Humboldt Bay through four 48-inch culverts equipped with tidal flap gates. Due to poor maintenance, the tide gates are not fully effective and allow saltwater intrusion to the site. On a rising tide, these gates close and runoff is stored in the low-lying areas of the site until the succeeding ebb when the tide level drops below the stored water level.

Flows on Janes Creek can vary seasonally from a few cubic feet per second (cfs), to more than 1000 cfs during extreme floods (Klein and Anderson, 2000). There have been various estimates of 100-year peak flow discharges at Samoa Boulevard. The 10- and 100-year peak flood flows given by FEMA for Janes Creek further upstream at Q Street are 610 cfs and 1030 cfs respectively (FEMA, 1997). Klein and Anderson (2000) estimated the 100-year peak flow to be between 585 cfs and 1,312 cfs based on a 3.9 square mile watershed. Scalici et al (1992) more accurately estimated the watershed limits to be 4.5 square miles. Applying this to Klien and Anderson's anlaysis gives an upper estimate of 1,400 cfs.

During the winter the project site can receive runoff from about 8 square miles of agricultural fields to the north and west of the project boundary within the Arcata Bottoms. This water flows through a complex system of drainage ditches to the lowest lying land along the Bay-front levee between Mad River Slough and Janes Creek. Here it is discharged to the bay through the four culverts described above. During high tides a portion of this runoff can flow eastwards along the levee perimeter borrow ditch onto the site to mix with stored Janes Creek water. Conversely, stored Janes Creek water can also flow westwards to discharge into Mad River Slough.

Figure 3-4 details the local drainage pathways on the project site.

3.3.3 Tidal Hydrology

Tidal data for McDaniel Slough is available from a NOAA maintained tide gauge at Mad River Slough, Humboldt Bay, which is located approximately 0.3 mile from the project site. Table 3-1 shows tidal

statistics based on data from this gauge. The tide data is used in the analysis of site drainage, estuarine sedimentation and tidal channel development.

Table 3-1. Humboldt Bay Tide Data

Tide Elevation	Feet MLLW	Feet NGVD
Highest Observed Tide	10.60	6.32
Mean Higher High Water (MHHW)	7.74	3.46
Mean High Water (MHW)	7.03	2.75
NGVD29 Zero Datum	4.28	0
Mean Tide Level (MTL)	4.18	-0.1
Mean Low Water (MLW)	1.32	-2.96
Mean Lower Low Water (MLLW)	0	-4.28
Lower Observed Tide (12-10-1977)	-1.24	-5.52

Notes: (Derived from NOAA Station ID: 9418865)

During the winter high winds, low air pressure and swell conditions offshore can combine to create storm surges that elevate tide levels in Humboldt Bay. The 100-year extreme high tide level taking into account storm surges is estimated by FEMA to be 6.5 feet NGVD and is derived from approximate methods (FEMA, 1997).

3.3.4 Flood Hazards

There are two principal flood hazards conditions to be considered that could affect adjacent properties: those resulting from coastal flooding from extreme tides and those from coincident high flood flows in Janes Creek and high tides.

The existing Bay-front levee has deteriorated and would be easily overtopped by the 100-year high tide storm surge event, regardless of rain flood conditions. Properties inland below elevation 6.5ft NGVD are susceptible to coastal flooding.

Coincident flood flows from the Janes Creek watershed fill the storage area within the project site and cannot discharge to the Bay until the Bay-front levee is overtopped or the tide level drops. Before this happens, floodwaters can back up McDaniel Slough and Janes Creek causing upstream flood hazards. PWA modeled the peak flood elevations for coincident high tides and 100-year flood flows (described in detail in Appendix A). This analysis showed that the limited culvert capacity on McDaniel Slough caused backwater on the site and eventual overflow of the levee.

Due to the loss of tidal scour and the creation of backwater at high tide caused by the tide gates, there has been more than 2 feet of deposition within the channel. Sedimentation and vegetation now limit the flow conveyance of McDaniel Slough and further exacerbate flood hazards upstream.

3.3.5 Ecologic Conditions

In general, estuarine and tidal marsh ecosystems are important coastal habitats characterized by high biotic diversity and high primary productivity. Tidal marshes provide vital habitat for fish, shellfish, and waterfowl. Because the site has been diked, it currently supports only very limited areas of incidental muted tidal, brackish, and freshwater marsh habitat. Nine biotic habitat were identified on the project site (see Figure 3-5). These habitats include ruderal/upland, agricultural field, freshwater marsh, brackish marsh, salt marsh, willow riparian, mudflat, riparian and developed. The majority of the site is agricultural field (87%) and only a small percent is marsh habitat (6%). Detailed descriptions of vegetation and wildlife characterizing each habitat type are contained in Appendix B.

The identification of wetland areas within the project site is based on a preliminary assessment. The accurate identification of these resources and their jurisdictional definition will require further field surveys and compilation of historical, legal, and regulatory documentation, which are not within the scope of this study.

H.T. Harvey & Associates performed an evaluation of special status plant and wildlife species known to be associated with the habitat types that occur in the project site (Appendix B). Two plant species with a federal listing status of 'species of concern' are found in salt marshes adjacent to the project site and in salt marshes present in the southeast corner of the project area: Point Reyes bird's-beak (*Cordylanthus maritimus ssp. palustris*) and Humboldt Bay owl's clover (*Castilleja ambiguq ssp. humboldtiensis*). Humboldt Bay owl's clover is an endangered plant species that should be a high conservation priority (P. Baye, *pers. comm.*). Existing populations of Humboldt Bay owl's clover present in the outboard marsh adjacent to the Bay-front levee are likely to have an opportunity to colonize areas within the restoration site.

A comprehensive listing and discussion of special-status animal species known to occur in habitats that are present on the site and in the vicinity of the project area are given in Appendix B. Of particular interest to the present plan are three special status species of salmonids in Humboldt Bay: coho salmon (*Oncohynchus kisutch*), steelhead trout (*Oncorhynchus mykiss*), and Chinook salmon (*Oncorhynchus tshawytscha*). Currently, the tide gates are a barrier to fish passage from the Bay to McDaniel Slough and Janes Creek. Fish passage could be improved by removing the tide gates and restoring the hydraulic connection between McDaniel Slough and the Bay. However, the concrete-bottom culvert (invert elevation of –0.7 ft NGVD) under Samoa Boulevard (Highway 255) may act as a future barrier to upstream fish passage. Full restoration of fish passage to the upper reaches of Janes Creek would allow anadramous fish to spawn in the creek and may help to stabilize, or increase, their populations.

3.4 FUTURE CONDITIONS

There are several physical processes that will shape the future evolution of the project site. These include:

- Continued sedimentation of McDaniel Slough from watershed-derived fine sediments.
- Long-term gradual sea-level rise in response to climate change. Recent studies have indicated this could be of the order of 0.2 to 0.9 ft in the next 50 years (IPCC, 2001).
- Accelerated wind wave erosion of fringing marsh due to sea level rise.
- Continued settlement and erosion of the Bay-front levee. The Bay-front levee is currently in a poor state of repair and has subsided since construction.
- The poorly functioning tide gates, likely combined with poorly constructed levees have resulted in saltwater intrusion on the interior of the site. With sea level rise this problem is likely to worsen.

These processes will combine over the medium to long-term to worsen conditions for continued use of the site for cattle grazing or other agricultural use.

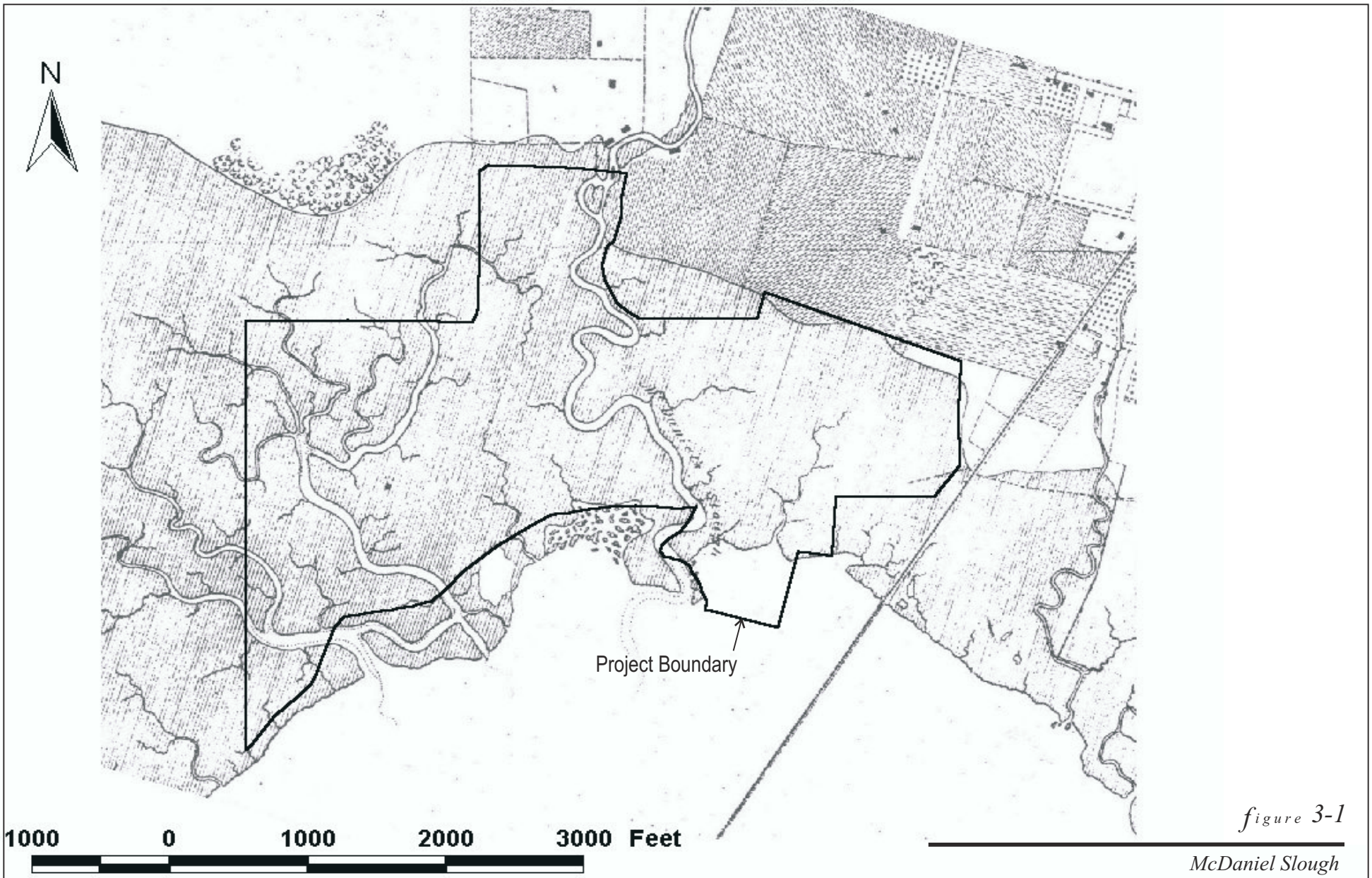


figure 3-1

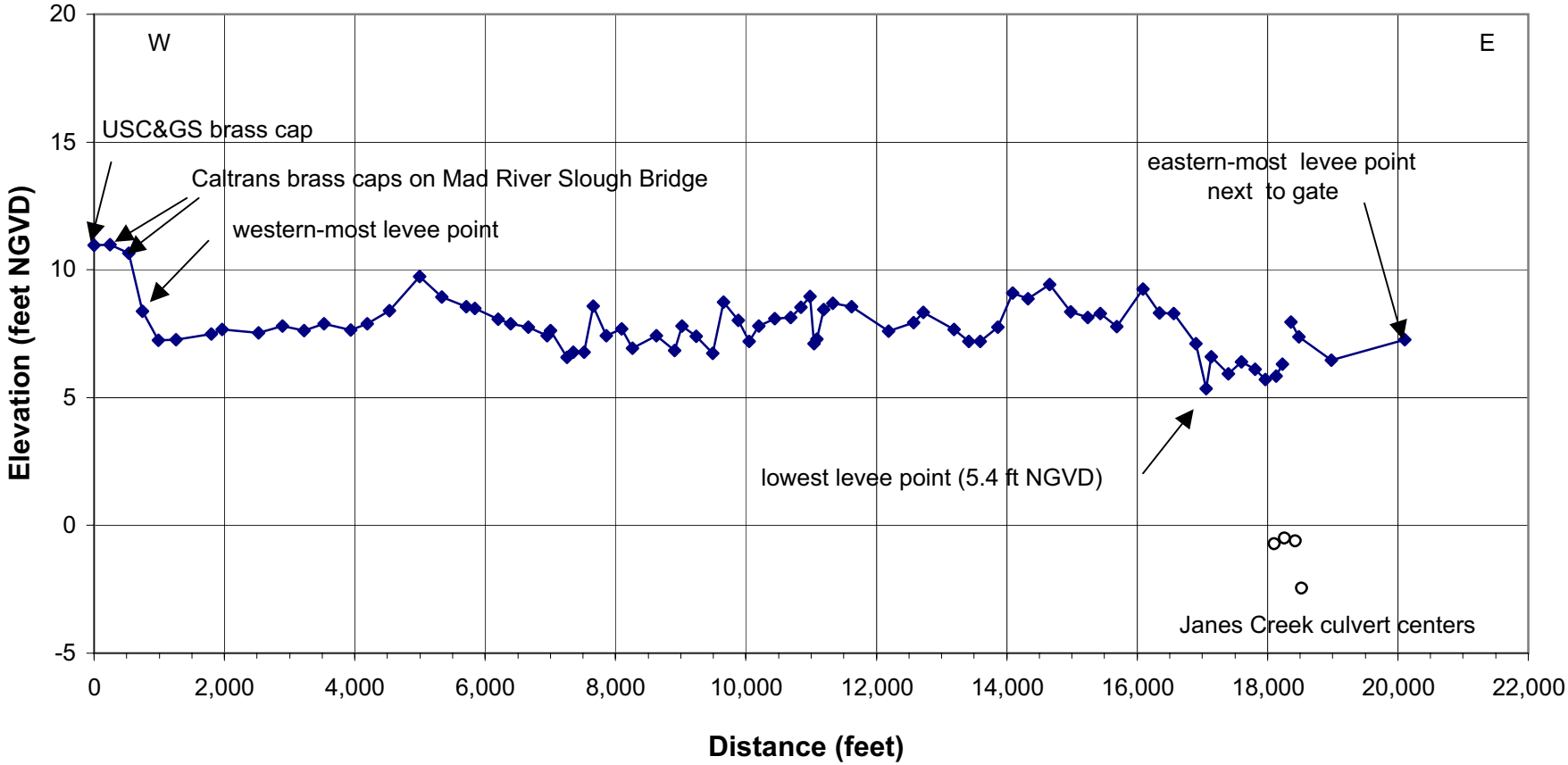
McDaniel Slough

1870 Historic Survey Map

Source: U.S. Coast & Geodetic Survey Map of Humboldt Bay

PWA

1424 Historic_Map fig 3.14.cdr



Source: North Arcata Bay levee survey, Graham Matthews & Associates, 2000
Survey dates: August 11 and 12, 2000

figure 3-2

McDaniel Slough

Bay-Front Levee Profile

PWA#1424

PWA

-2 to -1 ft, NGVD29
-1 to 0 ft
0 to 1 ft
1 to 2 ft
2 to 3 ft
3 to 4 ft
4 to 5 ft
5 to 6 ft
>6 ft, NGVD29

N

0 1000
feet

figure 3-3

McDaniel Slough

Site Topography

PWA

1424 SiteTopo fig 3-3.cdr

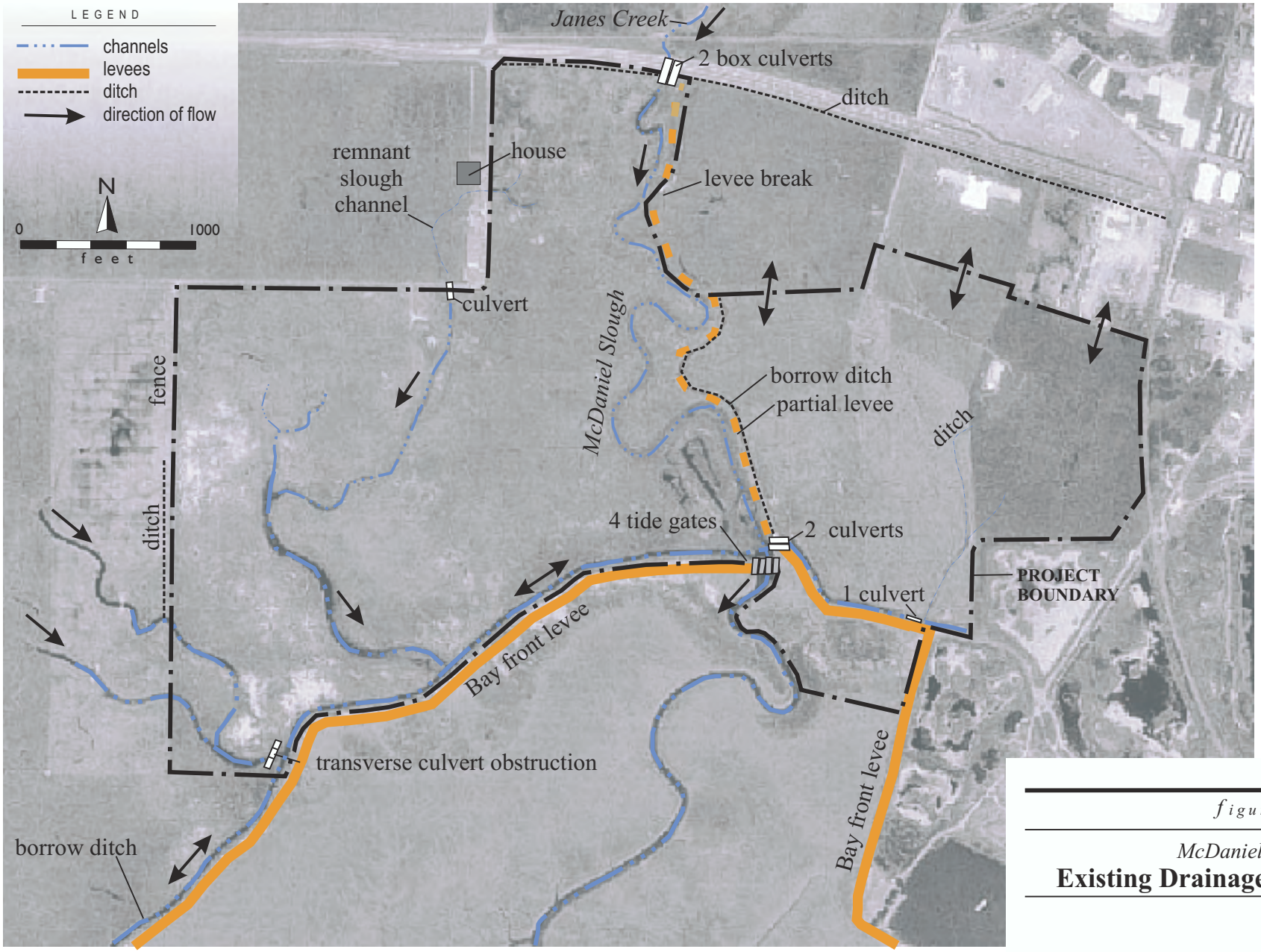


figure 3-4

McDaniel Slough

Existing Drainage Map

PWA

1424 McD\drainage map.cdr 10/2/02 BE

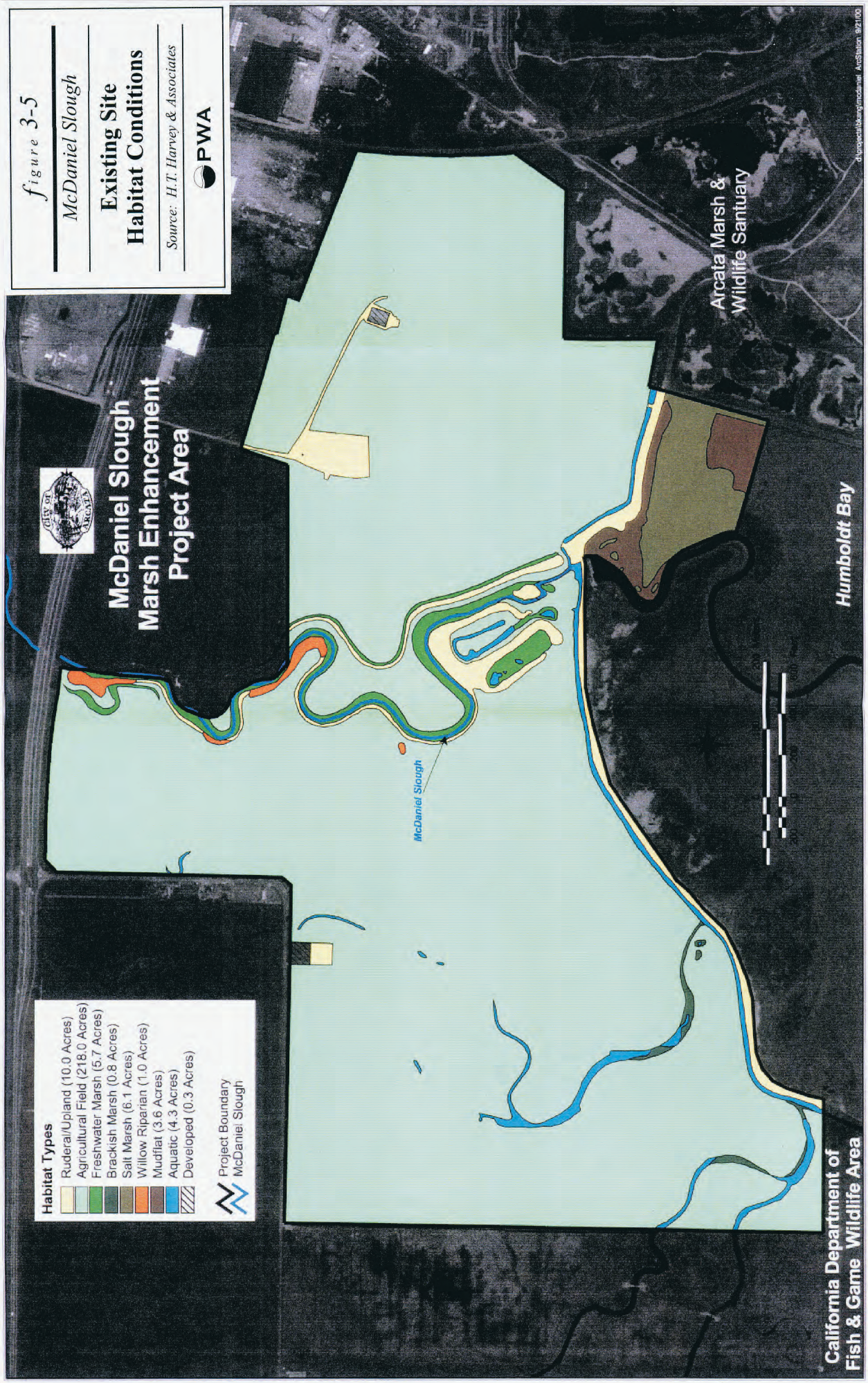


figure 3-5
McDaniel Slough
Existing Site
Habitat Conditions
Source: H.T. Harvey & Associates
PWA
McDaniel Slough
Marsh Enhancement
Project Area
Arcata Marsh &
Wildlife Santuary
Humboldt Bay
McDaniel Slough
Habitat Types
Ruderal/Upland (10.0 Acres)
Agricultural Field (218.0 Acres)
Freshwater Marsh (5.7 Acres)
Brackish Marsh (0.8 Acres)
Salt Marsh (6.1 Acres)
Willow Riparian (1.0 Acres)
Mudflat (3.6 Acres)
Aquatic (4.3 Acres)
Developed (0.3 Acres)
Project Boundary
McDaniel Slough
California Department of
Fish & Game Wildlife Area

4. RESTORATION GOALS AND OBJECTIVES

4.1 PROJECT GOAL

The goal of the McDaniel Slough Marsh Enhancement Project, as specified by the City of Arcata and steering committee, is:

> *"To create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes"*

The project goal described above, together with specific objectives listed below, will be used as the sole basis for evaluating project alternatives and in guiding the recommendation for the preferred restoration approach.

4.2 PROJECT OBJECTIVES

The following project objectives were defined by the project steering committee, with input from project stakeholders and PWA at a public meeting held in Arcata City Hall in May 2000:

1. Maximize the opportunity for restoring a large area of tidal marsh habitat dominated by pickleweed.
2. Re-create a natural gradation of diverse wetland habitats transitioning from upland habitats and freshwater wetland meadows through a riparian corridor, brackish tidal marsh, and salt marsh to the mudflats and shallow water habitat of the Humboldt Bay estuary.
3. Provide unimpeded access for anadromous fish migration between Janes Creek and Humboldt Bay.
4. Re-create a tidal channel system that maximizes the estuarine fisheries habitat in large high-order subtidal channels.
5. Provide connectivity of habitats between the wetlands and uplands.
6. Provide lateral connectivity with existing and potential future habitats along the shores of Humboldt Bay.
7. Achieve desired wetland ecologic function as rapidly as possible, within a period of a few decades.
8. Create a visually appealing landscape.
9. Provide opportunities for public education and enjoyment.
10. Create a passively managed system that minimizes the need for maintenance activities on the site.

In addition to the above objectives, the restoration of the site, via removal of Bay-front levees, has the potential to reduce flooding upstream of Samoa Boulevard and increase tidal scour in lower Janes Creek.

5. OPPORTUNITIES AND CONSTRAINTS ANALYSIS

5.1 RATIONALE FOR OPPORTUNITIES AND CONSTRAINTS ANALYSIS

The objective of conducting an analysis of opportunities and constraints presented by the physical and biological environment of the project site is to clearly establish, at an early stage in project planning, the rationale on which key project decisions, in particular the formation of project alternatives, are based. The opportunities and constraints described below where developed based on input from a public meeting held at City Hall, in Arcata, May 2000.

5.2 PROJECT OPPORTUNITIES

The opportunities listed below are in addition to those implicit in the project goals and objectives section described above. Opportunities presented by the project site include:

- Restoration of significant area of saltwater/brackish wetland habitat that has been largely eliminated in the Humboldt Bay estuary over the last 100 years.
- Removal of tide gates as a major barrier to fish migration.
- Ability to take advantage of estuarine and alluvial sedimentation in rebuilding subsided marshplains.
- Recreation of natural creek delta morphology extending into marsh.
- Re-grading channels and levees to create barriers to feral animals
- Grading higher intertidal islands to provide loafing areas for shorebirds and to increase extent of edge habitat.
- Provision of roosting habitat for heron and for raptors in vegetated perimeter uplands.
- Provision of un-constricted tidal access that allows for deposition of a woody debris wrack-line that creates disturbance and colonization opportunities for rare plants.
- Possible use of AMWS water to create fresh or brackish habitat area and provide areas for future expansion of the AMWS.
- Possible reduction of flood hazards along lower Janes Creek by altering levees and eliminating flow constriction.

5.3 PROJECT CONSTRAINTS

The constraints presented by the project site include, but are not limited to:

- Subsidence of land surface since former tidal marshes were diked.
- Potential wind-wave effects within site.
- Adequate drainage of adjacent properties.
- Potential for invasive exotic species to colonize the site – such as *Spartina densiflora* (commonly referred to as cordgrass).
- Intrusion of feral animals on-site.

- Possible existing habitat of protected species on-site.
- Property boundaries that dictate site template.
- Need for levee reconfiguration to protect adjacent properties; e.g. Moranda Property to the west.
- Need for access to, and protection of, PG&E infrastructure on-site.
- Potential flood impacts on adjacent properties and areas upstream on Janes Creek.
- Tidal restoration in the eastern portion of the site precludes expansion of managed wetlands.

6. PROJECT ALTERNATIVES

6.1 FORMULATION OF PROJECT ALTERNATIVES

In evaluating the objectives and constraints it became clear that there were two potential conflicts in integrating a restoration plan design. These were:

1. The question of whether the Bay-front levee should be removed to allow direct connection between the restored tidal marsh and Humboldt Bay, or whether it should be used and maintained as a public Bay-front trail.
2. The competition for restoration opportunities in the easternmost 35 acres to either restore tidal marsh or expand the managed wetlands of the Arcata Marsh and Wildlife Sanctuary.

Three restoration alternatives were therefore developed and compared with the no-action alternative (Alternative 1). Alternative 2 incorporates the existing Bay-front levee as a Bay-front trail and therefore emphasizes the importance of integration of current human activities on-site with potential restoration. Alternative 3 eliminates the existing Bay-front levee, relocates the Bay-front trail inland and therefore places greater emphasis on restoring the full range of natural processes at the site. Alternative 4 apportions a 35-acre segment of the site for managed marsh and retains the Bay-front levee for future use as trail.

6.1.1 Alternative 1 – The No-Action Alternative

The no-action alternative is included as a baseline condition against which the other three alternatives can be assessed in terms of delivering project objectives. It is assumed that the site would continue to be managed as at present with continuation or possible increase in the flood hazard level for adjacent areas.

6.1.2 Alternative 2 – Full Tidal Restoration with Bay-front Levee Trail

Tidal action would be reintroduced to the site by removing the existing tide gates and excavating a breach in the levee sufficient to convey tidal and flood flows on Janes Creek. A low pedestrian bridge would be installed across the breach to allow trail access along the Bay-front levee. Estimates of breach sizing (see Section 7.2.4) indicate that a long span bridge of 100 feet or more may be required. A new levee would be reconstructed inboard around the perimeter of the site, as shown in Figure 6-1. This levee would be designed to protect against the 100-year tide level of 6.5 feet NGVD reported by FEMA (1997). A simple engineered flood control levee is proposed for areas bounding zones that may be incorporated into the restoration site at a future date. These levees would have 4:1 side slopes with a constructed crest elevation of +8.0 feet NGVD allowing for one foot of freeboard and 0.5 ft for subsidence. Benched levees are proposed to protect areas that would not be considered for future wetland expansion. The benched levees

are intended to provide a band of transitional high marsh habitat by grading a 10:1 side slope for elevations between MHHW (3.5 feet NGVD) and 4.5 feet NGVD.

Three small culverts fitted with tide gates would be installed around the perimeter of the site to drain surrounding properties. A larger tide gate would be installed at the southwestern corner of the project site to drain the area to the west. All the tidal flows would be concentrated through McDaniel Slough and a 'pilot' channel network would be excavated on the site to accelerate the formation of a dendritic tidal channel system.

6.1.3 Alternative 3 – Full Tidal Restoration with Bay-front Levee Removal

This alternative would be similar to Alternative 2 but would require the complete removal of the Bay-front levee and selective filling of the levee borrow ditch in order to provide complete ecologic connectivity between the Bay and restored marsh as shown in Figure 6-2. Tidal connector channels and additional levee breaches would be designed according to the respective drainage areas. This alternative is based on restoring, where possible, the tidal drainage system as shown on the 1870 U.S. Coast Survey of Humboldt Bay (Figure 3-1). Removing the levee would allow for deposition of a woody debris wrack-line during spring tides that creates natural disturbance and colonization opportunities for rare plants. This alternative would incorporate a site boundary trail along the new flood control levees shown, and is also intended to minimize human disturbance to wetland wildlife use.

6.1.4 Alternative 4 – Tidal Restoration with Managed Wetlands – the Selected Alternative

Alternative 4 dedicates the eastern 35 acres for the creation and management of managed freshwater ponds that utilize treated wastewater discharges from the adjacent treatment wetlands. This freshwater discharge could also be used to create an area of brackish tidal marsh near the discharge outlet. The design or management plan of these managed wetlands is not within the scope of this study.

The remaining 205 acres would be restored in a similar way to Alternative 2. However, although the Bay-front levee would otherwise remain intact, the decision will be made in the design phase to either: (1) remove the levee and add breaches, or (2) maintain the levee as part of a Bay trail. Figure 6-3 details the layout of Alternative 4 and Section 8 provides a detailed description of the elements and costing of the selected alternative.

LEGEND

- Bermed Levee
- Flood Levee
- Bay Front Levee
- Trail
- Ditch
- Breach and Bridge
- Flow Direction

N

0 1000 feet

figure 6-1

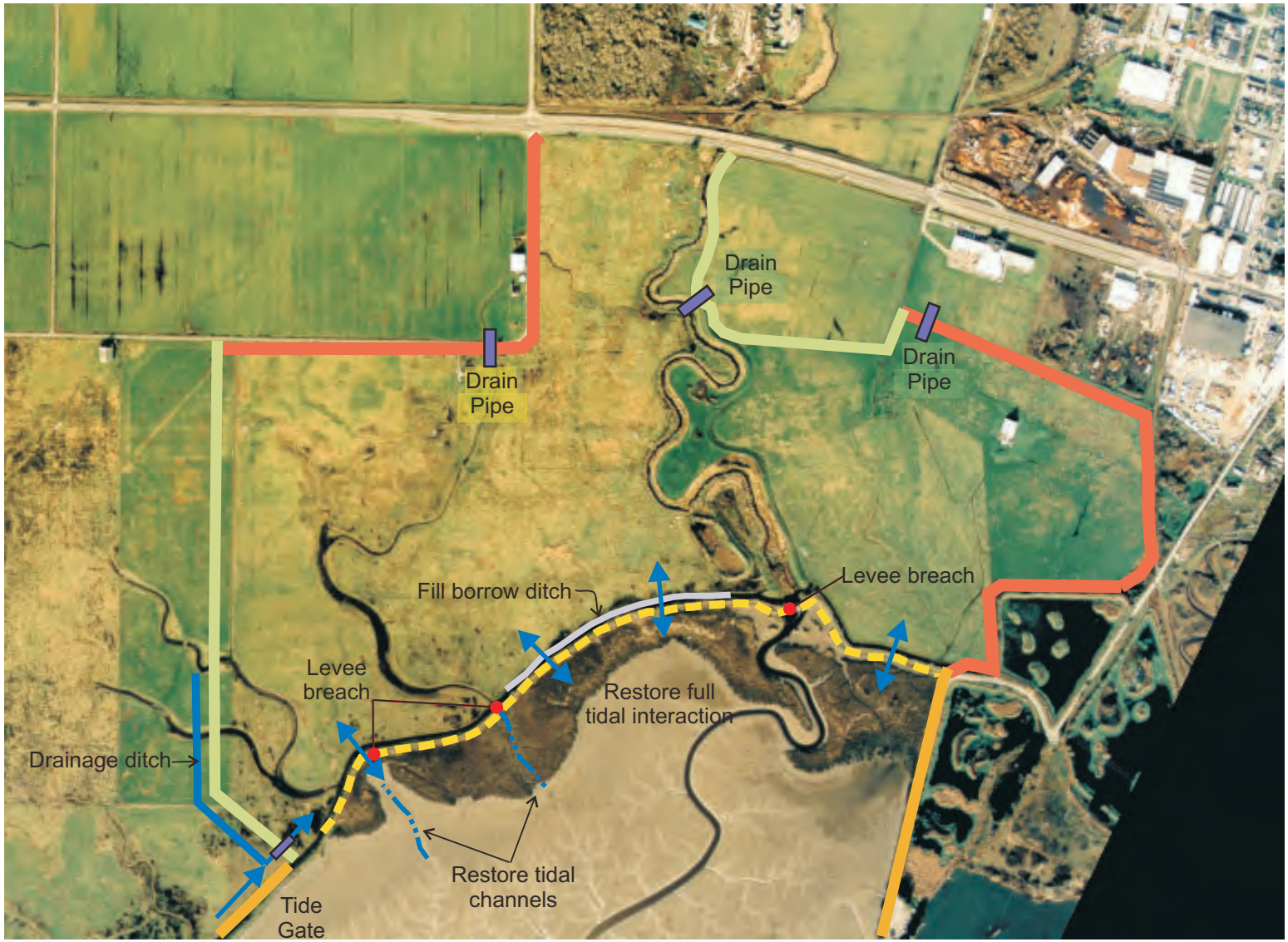
McDaniel Slough

Project Alternative 2

Bayfront Levee Trail

PWA

1424 Altern2 fig 6.1.cdr



LEGEND

- Bermed Levee
- Flood Levee
- Bay Front Levee
- Remove Bay Front Levee
- Ditch
- Breach
- Flow Direction

N

0 1000 feet

figure 6-2

McDaniel Slough

Project Alternative 3

Bayfront Levee Removed

PWA

1424 Altern3 fig 6-2.cdr

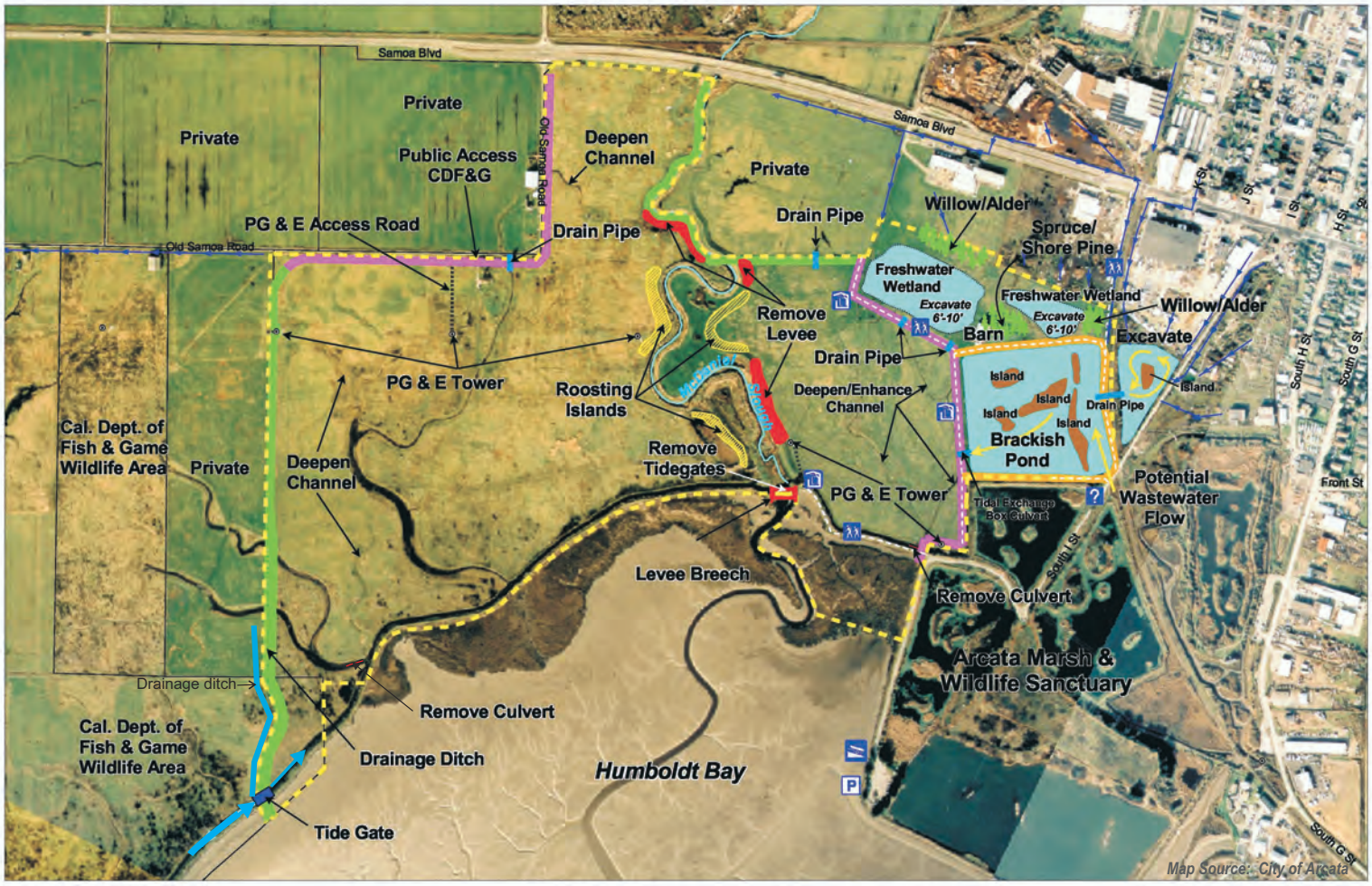


figure 6-3

McDaniel Slough

Project Alternative 4
Preferred Alternative

Tidal Restoration with Managed Wetlands

Source: City of Arcata

PWA

Legend
- Project Boundary
- Bermed Levee
- Flood Levee
- Pond Perimeter Levee
- Remove Levee
- Ponds
- Island
- Roosting Island
- Parcels
- Potential Wastewater Flow
- Surface Water Flow
- McDaniel Slough/Janes Creek
- Trail
- Bird Blind
- Kiosk
- Boat Ramp
- Parking

N W E S

1:3000

0 400 800 1200 1600 Feet

1424 Altern4 Leger fig 6.3.cdr

7. EVALUATION OF PROJECT ALTERNATIVES

7.1 ASSESSMENT METHODOLOGY

Our assessment of the four alternatives was carried out in three steps:

1. A projection of how the site would evolve to provide tidal wetland functions and benefits. This requires specifying a planning horizon. In this case 50 years into the future was selected.
2. An analysis of whether two major potential constraints: flood hazards or drainage problems could be increased as a result of removing the tide gates on McDaniel Slough.
3. An assessment of how well each alternative achieves the ten selected ecologic objectives and resolves the eleven main constraints identified. In addition the relative cost of each alternative is compared.

7.2 EXPECTED SITE EVOLUTION

7.2.1 Tidal Marsh Morphology

The basic morphological features defining a mature or natural tidal marsh are a vegetated marshplain and a system of tidal channels that drain the marshplain. These features are primarily formed by the tidal processes of estuarine sedimentation and channel formation.

Allen (2000) provides a discussion of a conceptual model of youthful salt marsh development, summarized here. Flood tides carry in suspended estuarine sediments that deposit in the slack waters of a re-flooded site like McDaniel Slough. Ebb tidal currents are insufficient to re-suspend deposited muds and silts, except in the locations of nascent tidal channels. As sediment accumulates, large areas of intertidal mudflats form. As they rise in elevation, the period of inundation decreases and rate of sedimentation declines. Once the mudflats reach a high enough elevation relative to the tidal frame, pioneer vegetative colonization can occur. The rate of marshplain accumulation increases after vegetation colonizes through the production of organic peat in marsh soils. Salt marsh approaches maturity as the marshplain rises towards an equilibrium elevation of MHHW.

In the early stages of evolution of the marsh, shallow channels form on the emerging mudflats. As vegetation colonizes the channel banks, the dendritic channel system becomes well defined, and the tidal prism of the emerging marsh they flood and drain determines their morphology and drainage pattern.

7.2.2 Estuarine Sedimentation

Mudflats within the Humboldt Bay estuary provide an important source of sediments for processes of marsh accretion. During periods of high wind-waves, turbulence at the sediment bed causes the re-suspension of fine cohesive sediment particles (i.e. mud and silt) into the water column. Suspended estuarine sediments are redistributed by tidal flows to various areas of the estuary and are deposited on

the marshplain surface during the slack water of the flood tide. The long-term rate of sedimentation of estuarine muds depends on the suspended sediment concentration in the water column, and the elevation of the mudflat within the tidal frame. Suspended sediment concentrations in an estuarine system vary greatly with seasonal and tidal cycles. However, for the purpose of restoration modeling, a yearly average annual suspended sediment concentration can be estimated from sedimentation records and then used in a predictive one dimensional sedimentation model to estimate long-term accretion rates.

To determine the likely rate of estuarine sediment accumulation on the site under restoration alternatives, the MARSH 98 estuarine sedimentation model was applied and calibrated using marshplain core data collected by PWA and other data made available by the City of Arcata. Table 7-1 summarizes the data used for model calibration. Linear averaged rates range from 0.2 feet /year of subtidal sedimentation for the Arcata Harbor boat ramp down to 0.02 – 0.04 feet/year of intertidal accumulation (which includes both organic and/or sediment input) at Arcata and Bracut Marshes.

Table 7-1. Sedimentation Data

	Initial Elevation		**Final Elevation**		**Sedimentation Rate**	
Reference Site	ft NGVD	Year	ft NGVD	Year	(ft/yr)	**Source**
Arcata Salt Marsh	2.48	1981	3.18	2000	0.04	PWA marshplain core survey data, 8/2000
	2.57	1981	3.32	2000	0.04	
	2.72	1981	3.22	2000	0.03	
Bracut Marsh	3.11	1992	3.36	2000	0.03	
	3.47	1992	3.59	2000	0.02	
	2.60	1992	2.80	2000	0.03	
Arcata Boat Ramp	-7.32	1972	-3.32	1992	0.20	City of Arcata, *pers. comm.*

The MARSH 98 model is based on Krone's (1987) model of sedimentation. Technical details of MARSH 98 and its application are provided in Appendix C. A yearly average suspended sediment concentration value of 125 mg/L was estimated by calibrating the MARSH 98 sedimentation model to subtidal sedimentation data using a historic rate of sea level rise and a density of deposited material from literature (550 kg/m^3, Ogden Beeman and Krone, 1992). The increase in the rate of marshplain accretion due to peat formation once vegetation establishes on the mudflat was estimated using marshplain core data (Table 7-1). The difference between calibrated subtidal sedimentation rates and observed rates of marshplain accumulation was calculated, yielding an estimated average linear rate of organic peat accumulation of 0.02 feet/year.

The estimated peat accumulation rate was added to the projected sedimentation for the project site at elevations above the vegetation colonization elevation (1.4 ft NGVD, see Section 7.2.3 below). Projected sedimentation rates including peat accumulation for the project site over the 50-year planning horizon are shown in Figure 7-1. For all areas of the project site with an initial starting elevation above 0 feet NGVD, which represents the majority of the site, accumulation of up to 3 feet is predicted in 50 years. Substantial areas of vegetated marshplain are expected to evolve within 10 years. After 50 years, the project site is

expected to develop a fully vegetated marshplain at an elevation between MHW and MHHW (assuming 0.5 feet of future sea level rise, IPCC, 2001)

7.2.3 Vegetation Colonization

Above a certain critical elevation, salt tolerant plant species will vegetate emergent mudflats and develop into vegetated marshplains. Different vegetation types may dominate marshes of different ages and will vary according to specific elevations within the tidal zone. Figure 7-2 from Eicher (1987) shows the distribution of major salt marsh plant species across the tidal elevation gradient in North Humboldt Bay. Additionally, PWA performed surveys to evaluate the elevation zone of vegetation found in marsh areas on the outboard side of the Bay-front levee.

In Humboldt Bay, pickleweed (*Salicornia virginica*) dominates young marshes along with the invasive cordgrass species *Spartina densiflora*. Pickleweed is locally dominant at the leading edge of younger, prograding marsh areas and often vegetates the lowest parts of the marsh as well as higher marsh elevations (P. Baye, *pers. comm.*). Eicher's (1987) results show that the invasive *Spartina densiflora* establishes within the same range of elevations as pickleweed. The decline of picklweed at intermediate elevations corresponds with a peak in the abundance of *Spartina densiflora* (Eicher, 1987), showing how the invasive cordgrass can out-compete the native vegetation in North Humboldt Bay.

Older salt marshes, such as some of the Mad River Slough marsh islands, are seldom dominated by one species such as pickleweed. Rather, they exhibit uneven fluctuating mosaics of *Distichlis spicata*, *Jaumea carnosa*, pickleweed, and other common marsh plant species. *Triglochin maritima, Puccinelia nutkanensis,* brackish species such as *Juncus* and *Deschampsia cespitosa*, and even "rare" plants such as Point Reyes bird's-beak (*Cordylanthus maritimus ssp. palustris*) can be co-dominant over extensive marsh areas during some years. (P. Baye, *pers. comm.*)

Appendix D shows vegetation and elevation transects surveyed by PWA and survey locations in the salt marsh on the outboard side of the Bay-front levee. Table 7-2 summarizes the elevation growth zones for the primary vegetation types surveyed by PWA and compares these results with those found by Eicher (1987). Comparison shows that the surveyed range of vegetation elevations correspond well with Eicher's results for North Humboldt Bay, which show a wider range due to sampling at additional study sites.

The one exception to this correspondence with Eicher is that pickleweed (*Salicornia virginica*) was found to grow down to a minimum elevation of 1.4 ft NGVD in the younger outboard marsh adjacent to the project site. These low pickleweed elevations were surveyed in a recently colonized area occupying the location of a historic channel mouth that has sedimented in (see Appendix D). An elevation of 1.4 ft NGVD was selected as the minimum elevation for vegetation to colonize on mudflats and within the restored project site.

PWA estimates that a vegetated marsh dominated by pickleweed could develop in less than 10 years and approach full marshplain coverage after 50 years. This estimate is based on the assumption that

colonization by the invasive cordgrass will be controlled on the site. Other plant species such as salt grass (*Distichlis spicata*), *Jaumea carnosa*, Point Reyes bird's-beak (*Cordylanthus maritimus ssp. palustris*) and Humboldt Bay owl's clover (*Castilleja ambiguq ssp. humboldtiensis*) are expected to be mixed or co-dominant along with pickleweed.

The assumption that cordgrass can be controlled is open to question and should be investigated further as part of any final design phase for the project. Significant surface treatments will be required to prevent colonization of the site by invasive vegetation species and encourage the development of native plant species.

Table 7-2. Vegetation and Elevation Relationships (elevation range in feet NGVD)

Species	Outboard Marsh (PWA 8/21/00)	Jacoby Marsh (PWA 8/24/00)	North Humboldt Bay (Eicher 1987)
Salicornia virginica	1.4 – 3.3	3.2	1.7 – 4.1
Salicornia & Distichlis	2.5 – 3.8	2.9 – 3.7	NA
Distichlisspicata	3.0 – 3.3	NA	2.3 – 4.1
Spartina densiflora	2.2 – 3.6	2.2 – 3.3	1.6 – 3.9
Mixed w/ *Spartina*	2.0 – 3.7	2.9 – 3.0	NA
Mixed no *Spartina*	2.0 – 3.8	NA	NA

NA = Not available

7.2.4 Tidal Channel Development

Tidal channels form in response to the ebb tide drainage of the marshplain and reach equilibrium dimensions related to the marsh size. Hydraulic geometry relates the channel cross-section morphology to marsh area and tidal prism. PWA has developed empirical correlations between channel cross-sectional area, thalweg depth, and top width and marsh area or tidal prism based on data from ancient salt marshes within the San Francisco Bay (Williams et al, 2002).

Tidal channel morphology for Humboldt Bay may differ from San Francisco Bay due to differences in tidal range and other marsh characteristics. To account for this, PWA collected channel width and marsh area data from US Coast and Geodetic historic maps and performed a comparison against the width versus area hydraulic geometry relationship for San Francisco Bay, shown in Figure 7-3. Comparison shows that Humboldt Bay hydraulic geometry corresponds well with that of San Francisco Bay. The use of San Francisco Bay hydraulic geometry relationships to estimate the development and dimensions of tidal channels for the McDaniel Slough restoration plan is therefore appropriate.

PWA made estimates of the breach channel dimensions for each restoration alternative using these hydraulic geometry relationships and calculations of marsh drainage areas and tidal prisms. Table 7-3 shows the results of this analysis. Drainage areas for the respective breaches were delineated based on the project boundary and site topography. Diurnal tidal prism estimates were made by calculating the volume between MLLW and MHHW of each drainage area from a Digital Elevation Model (DEM) in Arcview.

Initial channel dimensions were calculated using the estimated tidal prism that will be restored to the subsided site. As the marshplain evolves and increases in elevation, the tidal prism will decrease until the marshplain reaches an equilibrium elevation of MHHW. Long-term equilibrium channel dimensions that accommodate the mature equilibrium marshplain and tidal prism were calculated based on the marsh drainage area.

In the evolution of tidal channels towards long-term dimensions, short-term geometry may never be reached if the tidal prism decreases faster than the channels equilibrate. For this reason, the dimensions of the constructed breach channels to be determined in the final design stage should be similar to the long-term dimensions.

'Pilot' channel networks will be excavated in the site interior to encourage the development of an appropriate tidal channel network within the project site. Based on previous PWA experience with tidal channel restoration where full tidal exchange is being restored to a site of this size, it is anticipated that the tidal channel network will evolve fully over the 50-year planning horizon.

Table 7-3. Expected Tidal Channel Development.

Breach Channel Alternative	Drainage Area (ac)	Diurnal Tidal Prism (ac-ft)	Short-term Dimensions			Long-term Dimensions		
			XSA (ft^2)	Width (ft)	Depth (ft)	XSA (ft^2)	Width (ft)	Depth (ft)
McDaniel Slough								
Alt- 2	240	310	1290	180	12.2	890	140	10.9
Alt- 3	140	160	820	130	10.8	600	110	9.8
Alt- 4	215	290	1230	180	12.1	790	130	10.5
Western Drainages (2)								
Alt-3 only	50	80	520	100	9.6	260	60	7.9

XSA = Cross-sectional area

7.3 FLOOD HAZARD AND DRAINAGE ANALYSIS

7.3.1 Tidal Storm Surge Flooding

With construction of a new perimeter levee at a higher crest elevation, areas to the east of McDaniel Slough that are now susceptible to flooding during a storm surge event that overtops the Bay-front levee will be protected. Areas to the west of McDaniel Slough will still be susceptible to storm surge flooding due to the deteriorated condition of the remaining Bay-front levee. However, when this levee is rebuilt, the new levee that is part of this project will help provide protection to low lying areas to the west. The new levees that are part of this project will require periodic maintenance and raising to counter the effects of subsidence and sea level rise.

7.3.2 Flooding Along Lower Janes Creek

All of the restoration alternatives would remove the tide gates at the outlet of McDaniel Slough allowing free passage of floodwater into the Bay.

To determine the potential impact on flood prone areas upstream of Samoa Boulevard, a one-dimensional, MIKE 11, hydrodynamic model was used to simulate the hydraulic response of McDaniel Slough and the surrounding marshplain upon removal of the tide gates and introduction of full tidal action. A 'worst case' scenario was analyzed of a coincident 100-year peak flood flow and diurnal high tide, with the existing silted in channel. This would represent flood hazard conditions immediately after breaching. Within a few years it would be expected that tidal channel would scour and widen in response to the increased tidal prism of the site. The ultimate expected dimensions are estimated in section 7.2.4 above. The 100-year hydrograph, boundary conditions, model construction and assumptions are described in Appendix A.

Table 7-4 summarized the model results. It was found that immediately after breaching peak flood stages just above Samoa Boulevard changed by only 0.4 feet. However, the period of high stage was greatly reduced by removal of the tide gates. With McDaniel Slough enlarged by natural scouring the flood stage would be lowered by 1 foot. Figure 7-4 shows the longitudinal flood profiles for McDaniel Slough/Janes Creek under existing, post-restoration, and scoured conditions.

Table 7-4. Model Results: Upstream Water Surface Elevations

Project Alternative	Peak Flood Water Surface Elevation above Samoa Blvd. (ft NGVD)	Period of Flooding above 5 ft NGVD (hours)
Alternative 1 No-Action (with tide gates)	7.0	36
Alt 2, 3, 4 – Restored (Year 0)	6.6	20
Alt 2, 3, 4 – Restored (with scouring)	6.0	8

7.3.3 Impact on Local Drainage

Concern was raised at the public meeting in May 2000 that the restoration project might aggravate drainage problems encountered in low lying portions of the Arcata Bottoms. Construction of the new perimeter levees will isolate runoff from the 4.5 square mile Janes Creek watershed from runoff originating in the 8 square mile are of the flatlands of the Arcata Bottoms. It would eliminate 240 acres of runoff storage area from approximately 1,500 acres of diked former marshland remaining. Isolating Janes Creek flow from the rest of the area would therefore proportionally reduce the potential backwater ponding effects of Janes Creek flows spilling over to the west. However, isolating runoff from the Arcata Bottoms flatland from being able to discharge through McDaniel Slough might have a small negative impact. To ameliorate this potential impact a new culvert and tide gate would be installed through the

new levee at the existing borrow ditch as part of the project. The design of this culvert draining the western areas to the project site will be detailed during final design. Additional analysis outside the scope of this report may be required to determine the culvert dimensions needed to prevent an increase in flood storage in the areas to the west of the project site.

Because of the deteriorated condition of the Bay-front levee and leaking culverts elsewhere in the system it is unlikely there will be any significant change in saltwater intrusion into the ditch system in the low lying areas to the west of the site.

7.4 EVALUATION MATRIX

For the no-action Alternative 1, and for the three restoration Alternatives 2 through 4, an assessment was made of how each would meet the ten selected ecologic objectives as well as reconciling the eleven main planning constraints 50 years into the future. This assessment is illustrated as the matrix shown in Table 7-5.

The ecologic objectives are:

1. *Tidal Marsh Habitat*. Rapid colonization of the intertidal areas is expected within the site for the restoration alternatives, probably within the first ten years, because the site has suitable elevations for colonization and a nearby source of estuarine sediment. After 50 years, a mature marshplain will be expected to have developed throughout the area below MHHW, with initial colonization of *salicornia* in the lower elevations and *spartina* in the higher areas. The ultimate dominant vegetation type cannot be predicted, as this will depend on the effectiveness of *spartina* control measures. For the no-action alternative it is assumed the levees and tide gates will continue to be maintained, precluding tidal salt marsh development.

2. *Gradation of wetland habitats from riparian to salt marsh*. All of the restoration alternatives allow the opportunity for future development of a natural transition of habitats at the mouth of Janes Creek. This would occur over 50 years as alluvial sedimentation builds up a natural delta on the marshplain at slightly higher elevations allowing establishment of riparian vegetation. Near the mouth of Janes Creek, brackish tidal marsh species are expected to become established. For the selected Alternative 4, there is an additional opportunity to create a transition zone of habitats using the freshwater discharges from the treatment wetland. How this would be accomplished would depend on the water management regime adopted. Alternative 3, which removes the existing levee, would allow for uninterrupted access from the mudflats of Humboldt Bay to the riparian habitat of Janes Creek.

3. *Unimpeded access for fish migration*. All of the restoration alternatives would improve fish passage by removal of the tide gates at McDaniel Slough. However, because the bed of the Samoa Boulevard Culvert is at –0.7 ft NGVD, several feet higher than the natural channel bed, there will still remain a significant barrier to fish passage on Janes Creek.

4. *Recreate a tidal channel system*. All the restoration alternatives will recreate a dendritic tidal channel system as the marshplain evolves. This system will include deep subtidal higher order channels that favor estuarine fish.

5. *Connectivity of habitats between wetlands and uplands*. There are only limited opportunities to accomplish this objective because of the presence of Samoa Boulevard and development to the north and east. Nevertheless, the design of the benched levees and the adjacent higher elevation areas of the Arcata Marsh does allow for establishment of a vegetation transition zone from wetland to upland for the restoration alternatives.

6. *Lateral connectivity with future wetland habitat.* All of the restoration alternatives have been designed to allow for future expansion of tidal wetland habitat to the west.

7. *Achieve wetland functions as rapidly as possible*. Fortunately, because of the limited amount of subsidence and adjacent wetland vegetation seed source, rapid vegetation colonization is expected– within a decade. In the first few years prior to colonization the site will be mainly mudflats that are important habitat for shorebirds.

8. *Visually appealing landscape*. Based on feedback from the stakeholder workshop, all of the restoration alternatives are considered more visually appealing than the no-action alternative.

9. *Opportunities for public use*. In respect to public use, those alternatives (2 and 4) that preserve the existing outboard levee to allow for a Bay-front trail are considered superior to Alternative 3, which removes the levee.

10. *Passively managed system*. The tidal wetland restoration portions of the site will evolve naturally. The main interventions anticipated would be those initiated to control invasive *spartina* and maintain the perimeter levee trail. For the no-action alternative, continual maintenance of the tide gates and deteriorating levee will be required. The 35 acres of managed marsh in the selected alternative will require indefinite active management of water levels and maintenance of water control structures.

The major identified constraints are:

1. *Land subsidence.* Surveys of colonization elevation and existing topography show that, unlike many restoration sites elsewhere, this is not a major constraint on restoring tidal wetlands on this site.
2. *Wind wave effects.* With the limited degree of subsidence, it is not anticipated that wind-wave erosion will limit re-establishment of a tidal marsh.
3. *Drainage of adjacent properties.* As described in Section 7.2 the alternatives would provide for drainage through new tide gates through the new setback levee.

4. *Invasive exotic species.* There are a number of alternative management techniques that can be applied to all restoration alternatives to control exotic species. It should be noted that so far none of these techniques are proven over a long period.
5. *Intrusion of feral animals.* It may not be possible to preclude feral animals from the site. However, Alternative 3, which removes the Bay-front levee, may impede access to the marsh interior.
6. *Existing protected species habitat on-site.* No protected species were identified in the existing conditions survey.
7. *Property boundaries.* The site template can accommodate a natural marsh configuration for all alternatives.
8. *Protection of adjacent properties.* The design for all alternatives allows for perimeter levee construction protecting adjacent properties entirely within the site.
9. *Access to PGE power towers.* All alternatives will allow for road access to three of the four PG & E power towers on-site.
10. *Flood impacts.* Flood modeling results (see Section 7.3.2) show that all alternatives will reduce upstream peak flood water levels and flood periods.
11. *Expansion of managed wetlands.* Alternative 4 provides for a 35-acre expansion of the managed wetland complex of the Arcata Marsh.

Additionly, a qualitative assessment of the relative capital costs of the restoration alternatives is shown in the matrix. The major cost for all restoration alternatives is earth moving primarily for the construction of levees. Alternatives 2 and 3 will require the importation of fill material for levee construction from off-site, while Alternative 4 allows for on-site borrow excavation from the creation of the managed wetlands. Alternative 4 is therefore the cheapest restoration alternative for the tidal wetland restoration component (excluding the cost of the creation of managed wetlands). A breakdown of costs of the selected Alternative 4 is described in Section 8.

Table 7-5. Alternatives Evaluation Summary

Alternative	Objectives										Constraints											Captital Cost (millions of dollars)
	Area of tidal marsh restoration	Gradation of habitats	Fish access	Tidal channel system	Connectivity	Lateral connectivity	Rate of evolution	Landscape value	Public use	Passive management	Land subsidence	Wind waves	Drainage	Exotic species	Feral animals	Protected species	Boundaries	Adjacent properties	PG&E access	Flood impacts	Managed wetlands	
Alternative 1, No Action	0	0	-	0	0	0	0	+	+	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alternative 2, Retain Bay-Front Levee	240	+	+	++	+	+	++	++	++	+	NA	NA	NC	0	0	NA	NA	+	+	+	0	>$3
Alternative 3, Remove Bay-Front Levee	240	+	+	++	+	+	++	++	+	++	NA	NA	NC	0	+	NA	NA	+	+	+	0	>$3
Alternative 4, Managed Wetlands	215	+	+	++	+	+	++	++	++	+[1]	NA	NA	NC	0	0	NA	NA	+	+	+	+	$2.96

1- Does not include active management required for 35 acre managed wetland

++ Exceeds objective / eliminates constraint

+ Meets objective / reduces constraint

0 Does not meet objective / has no impact on constraint

- Fails objective / worsens constraint

NA – Not Applicable

NC – No Change

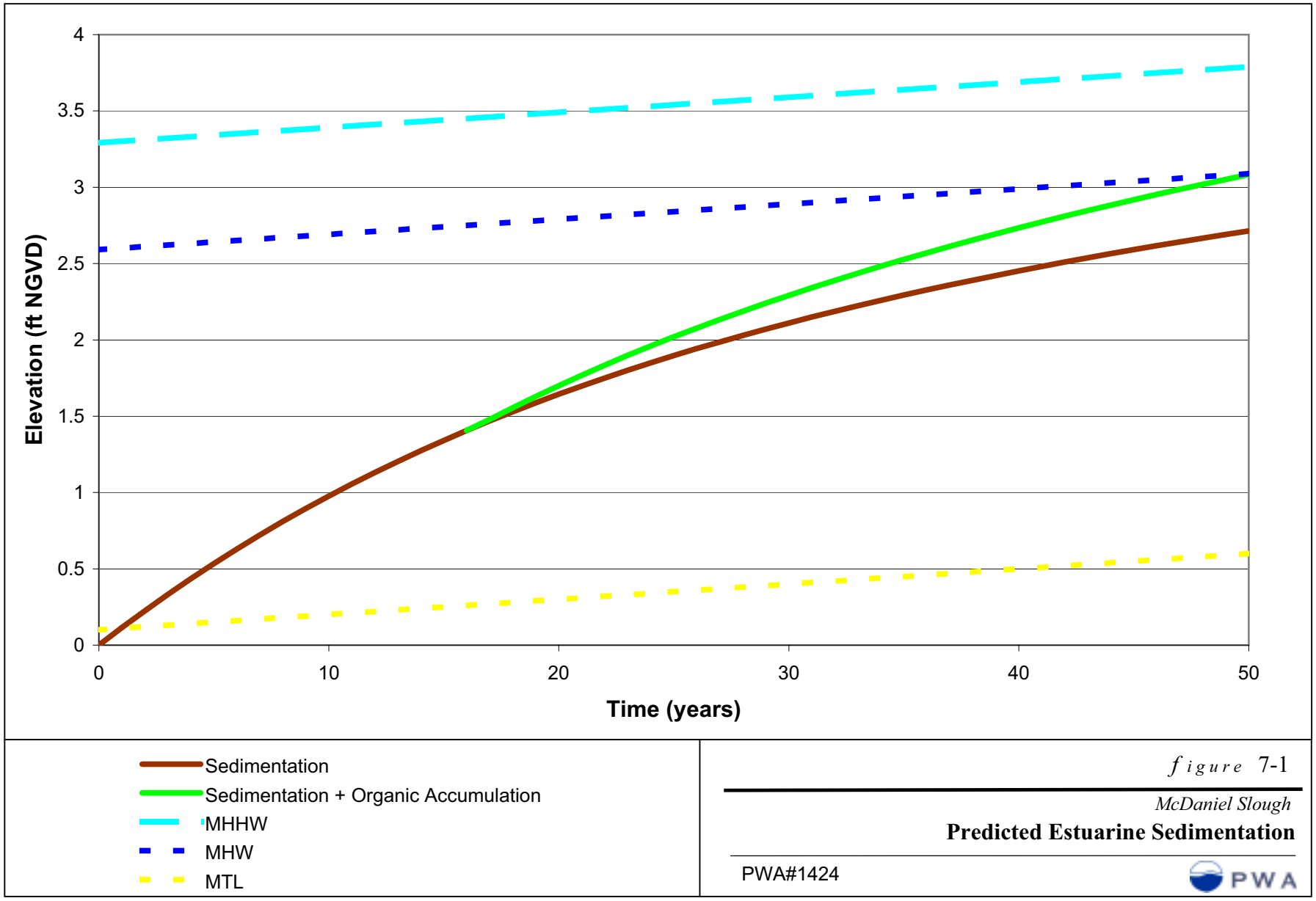


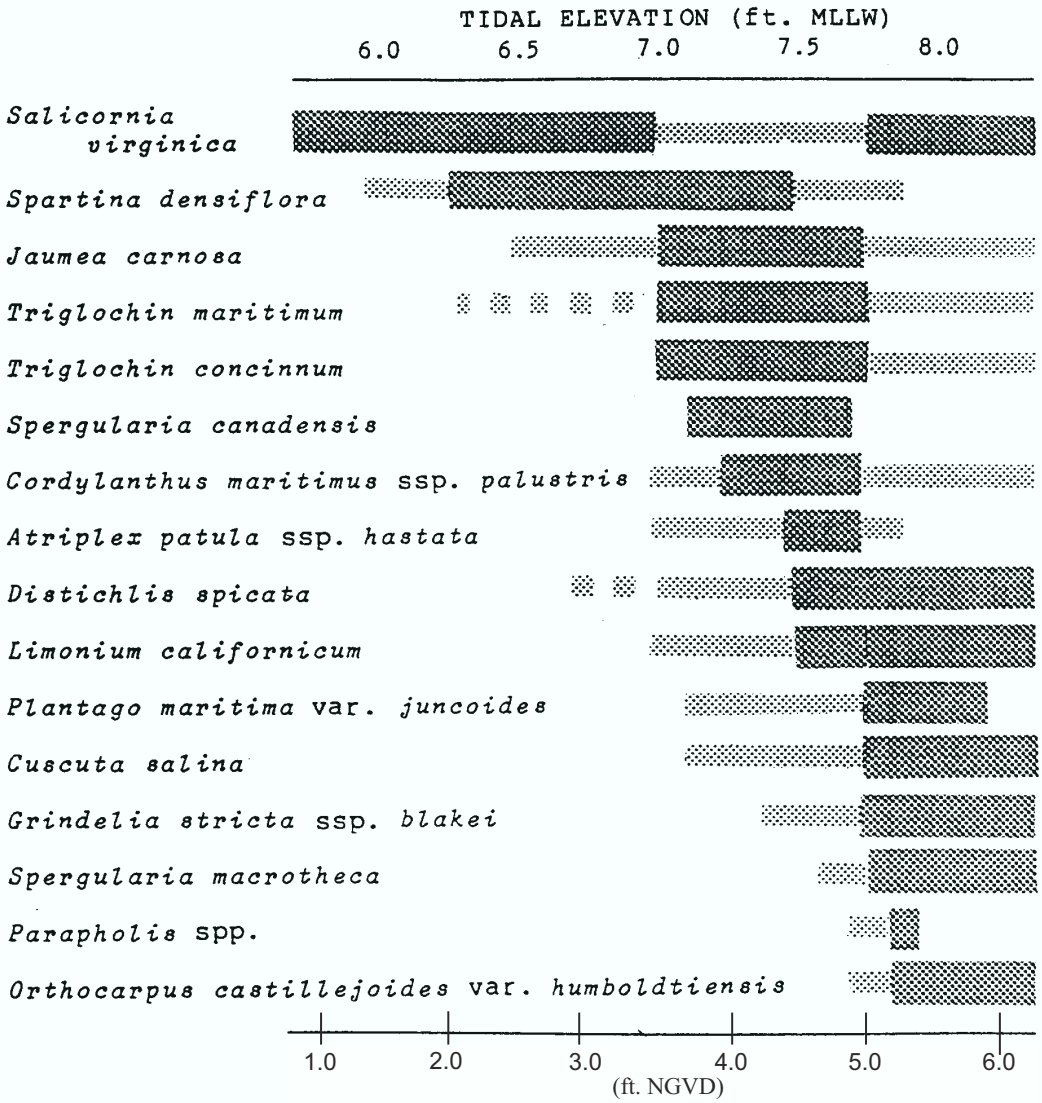
figure 7-1

McDaniel Slough

Predicted Estuarine Sedimentation

PWA#1424

PWA



Distribution of major salt marsh plant species across the tidal elevation gradient in North Humboldt Bay, California. Wider bands indicate the range in which each species had its peak cover, as assessed within 0.25-foot elevation classes. Broken bands indicate sporadic occurrence.
(Eicher, 1987)

figure 7-2

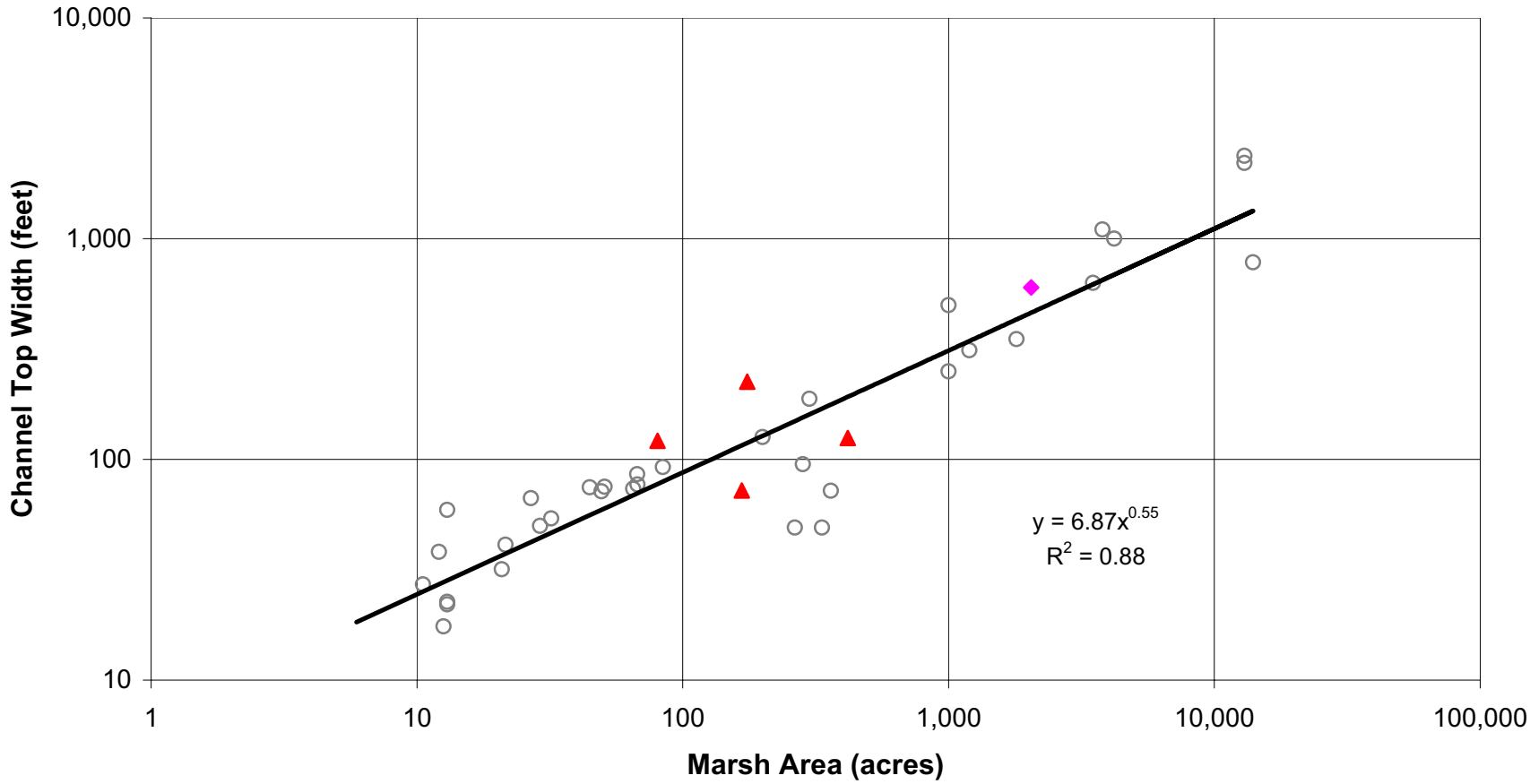
McDaniel Slough

Plant Distribution

Source: Eicher 1987

PWA

1424 Plants.cdr



San Francisco Bay, ancient marshes

North Humboldt Bay, historic marshes

Eureka Slough, historic

figure 7-3

McDaniel Slough

Comparison of Hydraulic Geometry Relationships

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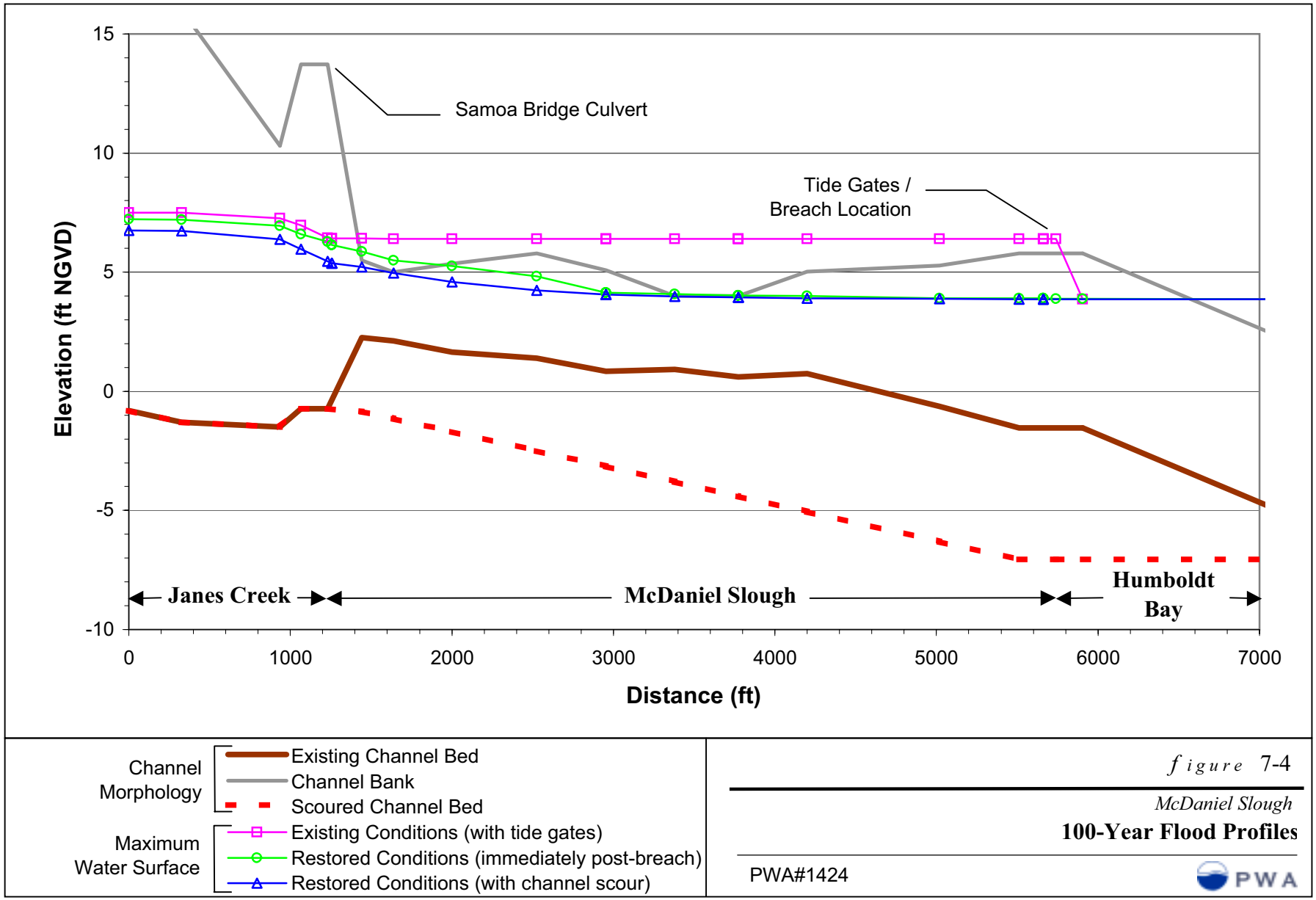

figure 7-4

McDaniel Slough

100-Year Flood Profiles

PWA#1424

PWA

8. THE PREFERRED RESTORATION APPROACH

8.1 DESCRIPTION OF THE PREFERRED RESTORATION APPROACH

The preferred restoration approach adopted by the City of Arcata, shown in Figure 6-3, will restore tidal wetland functions to 215 acres of the 240-acre project site. The remaining 35 acres will be managed as freshwater wetlands and brackish ponds. The restoration plan for the managed wetlands, including hydraulic structures connecting the managed wetlands to the tidal portion of the site, is not described here and should be specified in the final project design.

To restore the tidal connection between Humboldt Bay and the tidal portion of the site, the tide gates at McDaniel Slough will be removed and a single breach through the Bay-front levee will be constructed. The dimensions of the constructed breach will be similar to the long-term equilibrium channel dimensions calculated in Section 7.2.4. Approximate breach dimensions will require 100 feet of top width and 10 feet of channel depth below MHHW (i.e. -7 feet NGVD thalweg elevation). The Bay-front levee will otherwise be preserved. The decision to further breach the levee or maintain the levee as a Bay-front trail will be made in the design phase.

Three types of levees will be constructed around the site perimeter: flood levee, bermed levee with benched upland slope, and brackish pond perimeter levee. As described in Section 6.2, levees will be constructed to an elevation of +8.0 feet NGVD to provide protection against the 100-year extreme tide. The more permanent bermed levees will be constructed adjacent to the private property along the northwest site boundary with Old Samoa Road and along the western site boundary with the managed wetland areas. The bermed levees will have a 4:1 side slope down to 4.5 ft NGVD and a 10:1 side slope on the inboard side between 4.5 and 3.5 feet NGVD. The flood levees will be constructed with a straight 4:1 side slope down to existing grade and will therefore require less fill material. To accommodate the possible restoration of property adjacent to the flood levees, the flood levees may be removed in the future. Specifications for the brackish pond perimeter levee will be given in the final design stage and are not included as part of the tidal marsh restoration plan or cost.

Drainage of properties adjacent to the restoration project site through the constructed levees will be controlled by the installation of drainage pipes equipped with tidal flap gates around the site perimeter. The drainage pipes and tide gates will allow adjacent properties to drain to the project site at lower tides and prevent tidal flooding of the adjacent properties. A larger tide gate at the southwest corner of the project site will serve to drain the large storage area to the west. The dimensions of this tide gate will be specified during final design to preserve the present drainage capacity (see Section 3.3.2). The culvert located at the southeast corner of the project site will be removed.

The preferred alternative also includes a limited amount of site grading. Portions of the existing partial levee along the McDaniel Slough channel will be removed to improve marshplain drainage and habitat transition. Other portions of the partial levee will remain intact to serve as roosting islands. Several

smaller historic slough channels that have sedimented in will be deepened by excavation to improve site drainage. The exact dimensions and extent of channel deepening will be specified in the design phase.

Additional features of the preferred restoration alternative include infrastructure to accommodate PG&E and public access. A PG&E access road leading south from Old Samoa Road to a PG&E power tower will be constructed (Figure 6-3). This road will be constructed with on-site borrow material to have a 12 foot top width and 4:1 side slopes. It is assumed the access road will be surfaced with crushed rock aggregate. The design and cost of public access features such as trails, bird blinds, information kiosks, and public access maintenance will also be determined in the design phase.

8.2 PRELIMINARY QUANTITY AND CONSTRUCTION COST ESTIMATE

The preliminary quantity and cost estimates for the preferred restoration approach are summarized in Table 8-1. The estimated cost is $2,962,200. Cost estimates are based on bid results from similar projects, consultation with construction contractors, and engineering judgment. They do not include costs for the construction or maintenance of the managed freshwater marsh and brackish pond component of restoration. A contingency of 25% has been added to the estimate of total project cost to cover circumstances and design issues not readily apparent at the current stage of project development.

Due to the conceptual nature of the design, construction costs have been estimated conservatively. Future analysis of design optimization and additional data may result in decreasing costs. The preliminary excavation and fill volumes and cost estimates will be refined in subsequent phases of design development, based on refinement of design objectives and further detailed geotechnical exploration and analysis. Final costs of any given project will depend on actual labor and material costs, competitive market conditions, final project scope and layout, implementation schedule and other variables.

Formal investigation of geotechnical conditions will be required for detailed design of the proposed levees. No formal assessment of the suitability of on-site soils for use as engineered levee fill has been made to date. In the absence of geotechnical analysis, the levees (except for the bermed levee) were assumed to have a prismatic cross-section with relatively flat (4:1) side slopes. During subsequent design, the final levee configuration and dimensions should be selected to account for stability, wave protection, settlement/consolidation, habitat objectives, etc. The relatively conservative prismatic cross section used for this estimate was selected to allow for some design optimization without significantly increasing quantities. Note that if geotechnical analysis indicates that on-site soils are not suitable for levee construction, the costs of levee construction may significantly increase.

Table 8-1. Preliminary Quantity and Construction Cost Estimate for the Preferred Alternative 4

Design Element	Quantity	Unit	Unit Cost	Sub-Total Cost
Mobilization/ Demobilization (8%)				$152,600
New Levee Construction [1] (12,300 linear feet)	79,300	cubic yard	$20	$1,586,000
Breach [2]	2,000	cubic yard	$20	$40,000
New Culvert Installation with Flap Gate		lump sum	$125,000	$125,000
Tide Gate / Culvert Removal [3]		lump sum	$20,000	$20,000
'Pilot' Tidal Channel Excavation [4] (5,200 linear feet)	1,900	cubic yard	$10	$19,000
Island Removal [5] (1,200 linear feet)	6,200	cubic yard	$5	$31,000
PG&E Access Road (800 linear feet)	4,200	cubic yard	$20	$84,000
Aggregate Base [6]	100	cubic yard	$30	$3,000
Construction Subtotal				**$2,060,600**
Contingencies (25%)				$515,200
Construction Total				**$2,575,800**
Other Project Costs:				
Design				$257,600
Permitting				$128,800
Maintenance [7]				N/A[8]
Total Project Cost				**$2,962,200**

1- Assumes on-site borrow material. Cost includes on-site transportation, placement, & compaction. Does not include excavation of borrow material from managed wetland areas or imported fill, if needed.
2- Approximate based on long-term hydraulic geometry estimates (Table 7-3). Assumes 70 foot length and 100 foot width.
3- Includes removal of 4 tide gates at breach and 1 additional culvert removal.
4- Assumes 1 foot deepening over 10 foot channel width and on-site disposal by side casting.
5- Assumes island is excavated down to 0 to 2 feet NGVD.
6- Assumes 6-inch depth crushed rock aggregate road surface.
7- To be determined in Final Design stage. Will include levee upkeep and *spartina* control.
8- N/A – not available

9. REFERENCES

Allen, J.R.L. 2000. Morphodynamics of Holocene salt marshes: a review sketch from the Atlantic and southern North Sea coasts of Europe. Quaternary Science Reviews 19, pp. 115-1231.

Barnhart, R.A., M.J. Boyd, and P.E. Pequegnat. 1992. The ecology of Humboldt Bay, California: an estuarine profile. Biological report 1, U.S. Fish and Wildlife Service, Washington, D.C. 120 pp.

Baye, Peter. Personal communication.

Casebier, T. and L. Toimil. 1973. Physical dynamics of Arcata Bay. Senior thesis, Humboldt State Univeristy, Arcata, CA. 23 pp.

City of Arcata, CA. Personal communication.

Costa, S.L. 1982. The physical oceanography of Humboldt Bay. Pages 2-31 in C. Toole and C. Diebel, eds. Proceedings of the Humboldt Bay Symposium. Humbolt State University, Centre for Community Development, Arcata, CA.

Eicher, A.L. 1987. Salt marsh vascular plant distribution in relation to tidal elevation, Humboldt Bay, California. M.A. thesis, Humboldt State University, Arcata, CA. 86 pp.

Faber, Phyllis. Personal communication.

Federal Emergency Management Agency (FEMA). 1997. Flood insurance study, City of Arcata, Humboldt County, CA.

Geonex Aerial Surveys. 1995. Topographic survey and map of Janes Creek marsh area. Prepared for Environmental Services Department, City of Arcata, CA.

Graham Matthews & Associates, 2000. North Arcata Bay levee survey by Keith Barnard and Randy Klein. Prepared for Environmental Services Department, City of Arcata, CA.

Intergovernmental Panel on Climate Change (IPCC). 2001. Climate change 2001: the scientific basis. Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson, eds. Cambridge University Press.

Klein, R.D. and J.K. Anderson. 2000. Hydrologic data preparation and analyses for Janes Creek, City of Arcata, CA. Prepared for Environmental Services Department, City of Arcata, CA.

Krone, R.B. 1987. A method for simulating historic marsh elevations. Coastal Sediments 1987. Proceedings of the Specialty Conference on Quantitative Approaches to Coastal Sediment Processes, pp. 316-323. New Orleans, LA. May 12-14.

Ogden Beeman & Associates and Ray B. Krone & Associates. 1992. Sediment budget study for San Francisco Bay. Prepared for the U.S. Army Corps of Engineers, San Francisco District, CA.

Scalici, M., P. Olofson, J. Nosera, R. Norman, B. Lydgate, B. Job (aka The Hydrology Group). 1992. Project site hydrologic conditions evaluation for the Mad River Slough wildlife area wetland enhancement project at North Point. Presented to Dr. Bob Gearheart and Doug Titus, ENGR 480, Humboldt State University, Arcata, CA.

Spicher, D.P. and M.N. Josselyn. 1985. Spartina (Gramineae) in northern California: distribution and taxonomic notes. Madrono 323, pp. 158-167.

Williams, P.B., M.K. Orr, N.J. Garrity. 2002. Hydraulic geometry: a geomorphic design tool for tidal marsh channel evolution in wetland restoration projects. Restoration Ecology Vol. 10 No. 3, pp. 577-590.

10. LIST OF PREPARERS

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APPENDIX A
Hydrodynamic Model of Coincident Flood and High Tide

A.1 MODELING APPROACH

PWA used the hydrodynamic module of MIKE 11 to evaluate the hydraulic conditions of the McDaniel Slough and Janes Creek system during coincident 100-year flood and high tide conditions. MIKE 11 is a one-dimensional hydrodynamic model, developed by the Danish Hydraulics Institute (DHI), which solves the vertically integrated conservation of mass and momentum equations (Saint-Venant equations). The model expands upon basic channel hydraulics by more realistically portraying the dynamic interactions between the river and slough channels, the over-bank marshplain, and the dynamic tidal and hydrologic boundary conditions. This added complexity allows the model to accurately represent the current site conditions, and more importantly, to accurately characterize the future site conditions under different project alternatives.

A.2 MODEL INPUT

A number of existing information sources were collected and reviewed to provided input to the present hydrodynamic analysis. These included the topographic survey data collected by the City in 1995 (Geonex 1995), and data made available from both a FEMA flood study of McDaniel Slough and Klein and Anderson's analysis of Janes Creek flows (FEMA 1997, Klein and Anderson 2000). Project data were compiled into a spatial database (GIS) by thematic type (coverage) using ArcView software. This included site topography and both tidal and surface runoff hydrology.

Available data for model boundary conditions were limited to a flood hydrograph on Janes Creek upstream of the Samoa Road Bridge and tidal conditions for Humboldt Bay. It was assumed that all other localized runoff tributary to the restored marsh areas would not be significant when compared to the volume and discharge of water being conveyed through the site and thus was not considered.

A measured time series of a spring tide from January 1998 was used as the tidal boundary condition. The upstream 100-year flood boundary condition was modeled as a triangular flood hydrograph with a 24-hour period. The peak flood flow value was based on the average of Klein and Anderson's (2000) high and low Lehre method estimates of the 100-year peak flow. The ratio of the watershed area used by Klein and Anderson (3.9 square miles, 2000) to the more accurate estimate made by Scalici et al (4.5 square miles, 1992) was applied to estimate the boundary condition peak flood flow of 1,400 cfs, which includes a baseflow of 50 cfs. The peak flood flow was modeled as occurring during a high tide. Boundary condition time series are shown with model results in Figure A-2.

Roughness values for the channel and marshplain, listed in Table A-1, were selected from the literature and previous modeling experience.

Table A-1. Manning's Roughness Values.

Feature	Manning's 'n' value	Source/Justification
McDaniel Slough Channel – Existing Conditions	0.03	Roughness based on densely vegetated channel – Chow, 1959
McDaniel Slough Channel – Project Conditions	0.03	Roughness based on open channel with cohesive boundary and limited riparian vegetation
Tidal Channels	0.03	Small channels with cohesive boundary
Marsh Plain / Agriculture Field	0.035	Floodplain roughness based on pasture
Janes Creek – upstream of Samoa Boulevard	0.03	FEMA Flood Study

A.3 MODEL CONSTRUCTION

A model network schematic was developed for the project site based on field reconnaissance, aerial photographs and site topographic data. Topographic data for Janes Creek was derived from the FEMA flood study data made available by the City, and more recent topographic survey data collected by the City. The more recent survey data was used where a discrepancy between the two data sets was evident. In-channel topography for McDaniel Slough was limited based on the site topographic sheets. Bottom elevations for cross-sections cut based on this data were extended to represent estimates of more realistic tidal channel geometry, and to provide consistency with known upstream channel data.

The network was developed to mimic the expected flow paths through McDaniel Slough, across the marshplain and in remnant/restored slough channels. The model network for existing conditions is shown in Figure A-1. Nine interlinked channels were chosen to characterize the slough channels and marsh plain. Each channel was made up of a number of cross-sections developed from the 1-foot contour topographic maps (Geonex 1995). The existing conditions model network was modified for project conditions to reflect levee breaches, re-routed slough channels and levee construction/re-grading as appropriate.

Channel cross-sections for the main branch of McDaniel Slough were modified to reflect the estimated amount of expected scour after restoration in an additional model run. The long-term equilibrium channel dimensions calculated from the hydraulic geometry relationships were used to re-size the channel mouth, giving an estimated depth of scour of 5.6 feet. The channel cross-section below the Samoa Bridge culvert was assumed to scour down to the invert elevation of the culvert (-0.7 ft NGVD). A linear interpolation was used to estimate cross-section geometry between these two end points.

It is important to note that the channel cross-sections contained in the model are based on-site topography and should therefore be considered as estimates. PWA recommends that ground and channel surveys be performed and the models are re-run using refined cross-sections as part of any final design phase prior to restoration.

A.4 MODEL RUNS AND RESULTS

Three model runs were performed: existing conditions with tide gates intact, restored conditions immediately post-breach with tide gates removed, and restored conditions with estimated channel scour.

Model results consist of water and discharge levels over the course of the model run. For the purpose of analyzing the effect of restoration on upstream flood water levels, water level time series at a point just upstream of the Samoa Bridge were extracted from the model results for all three runs. Figure A-2 shows these results along with the modeled boundary conditions.

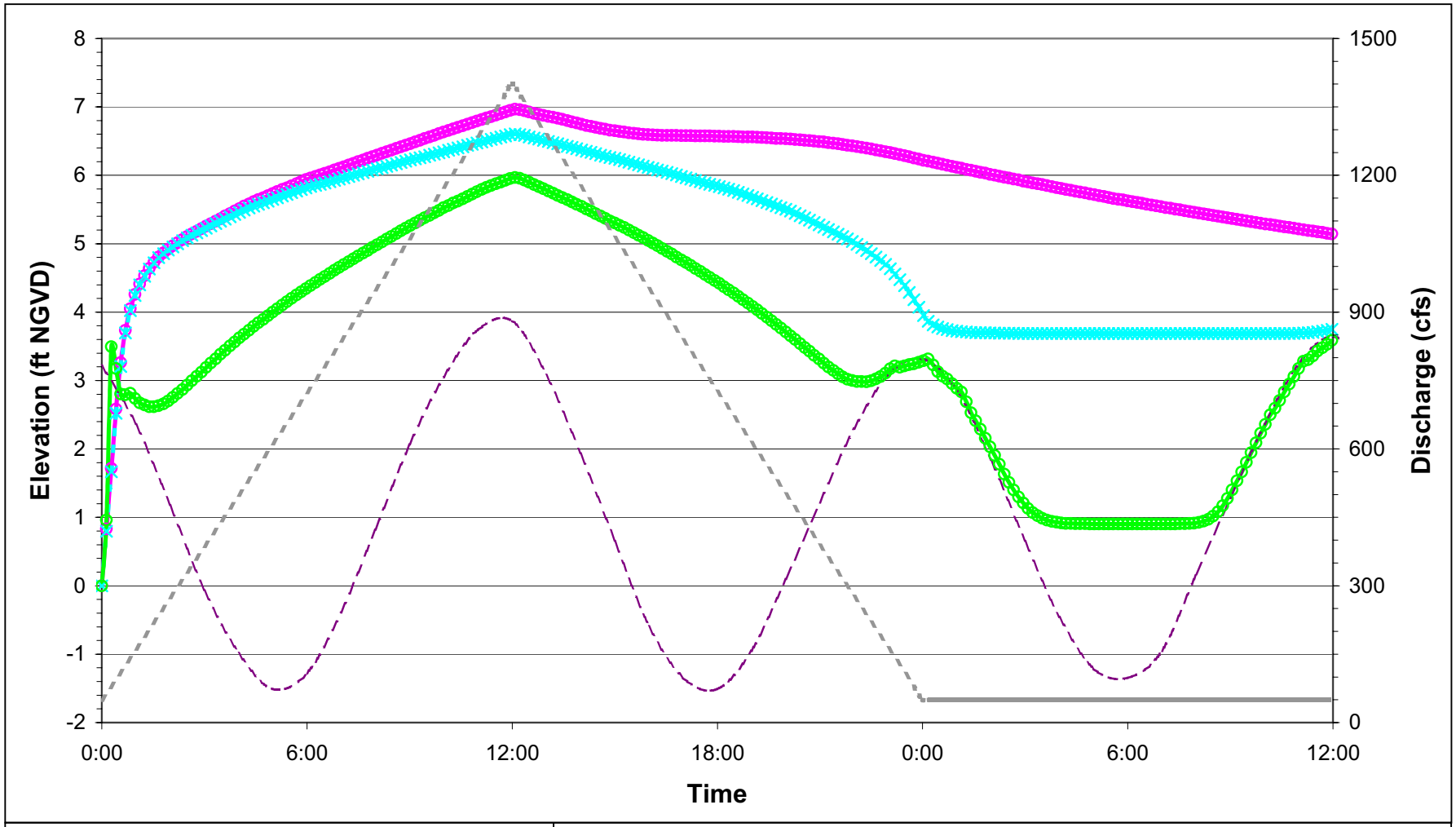
figure A-1

McDaniel Slough

MIKE 11 Model Layout

PWA#1424

PWA



Existing Conditions (with tide gates)
Restored Conditions (immediately post-breach)
Restored Conditions (with scour)
Tidal Boundary Condition
Flood Hydrograph

figure A-2

McDaniel Slough

Boundary Conditions and Upstream Water Levels, 100-yr Flood Event Results

PWA#1424

PWA

Appendix B
Existing Ecological Conditions Report

McDANIEL SLOUGH RESTORATION AND MANAGEMENT PLAN: EXISTING BIOLOGICAL CONDITIONS

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October 12, 2000 Project Number 1750-01

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1.0 INTRODUCTION

The McDaniel Slough Restoration project site is located southwest of downtown Arcata, Humboldt County, California, south of Highway 255 (11th Street, Samoa Boulevard) and west of I Street (Figure 1). Janes Creek originates in the hills east of Arcata and flows generally to the southwest through the northern part of Arcata. The creek then flows south from 11th Street into Humboldt Bay as McDaniel Slough. Agricultural lands border the site to the north, east and west. Humboldt Bay and associated salt marsh and mudflat habitats border the site to the south. The Arcata Marsh and Wildlife Sanctuary are to the immediate southeast of the project area. Elevations range from 9.9 feet National Geodetic Vertical Datum (NGVD) on the highest internal levees, to –0.9 feet NGVD in the remnant slough channels. The topography of the property is generally sloping from the north to the south, with the elevations of the agricultural field going from 4.5 feet NGVD in the north sloping to 0.8 feet NGVD in the south. The project site is situated on the Arcata South U. S. Geological Survey (USGS) Quadrangle Map.

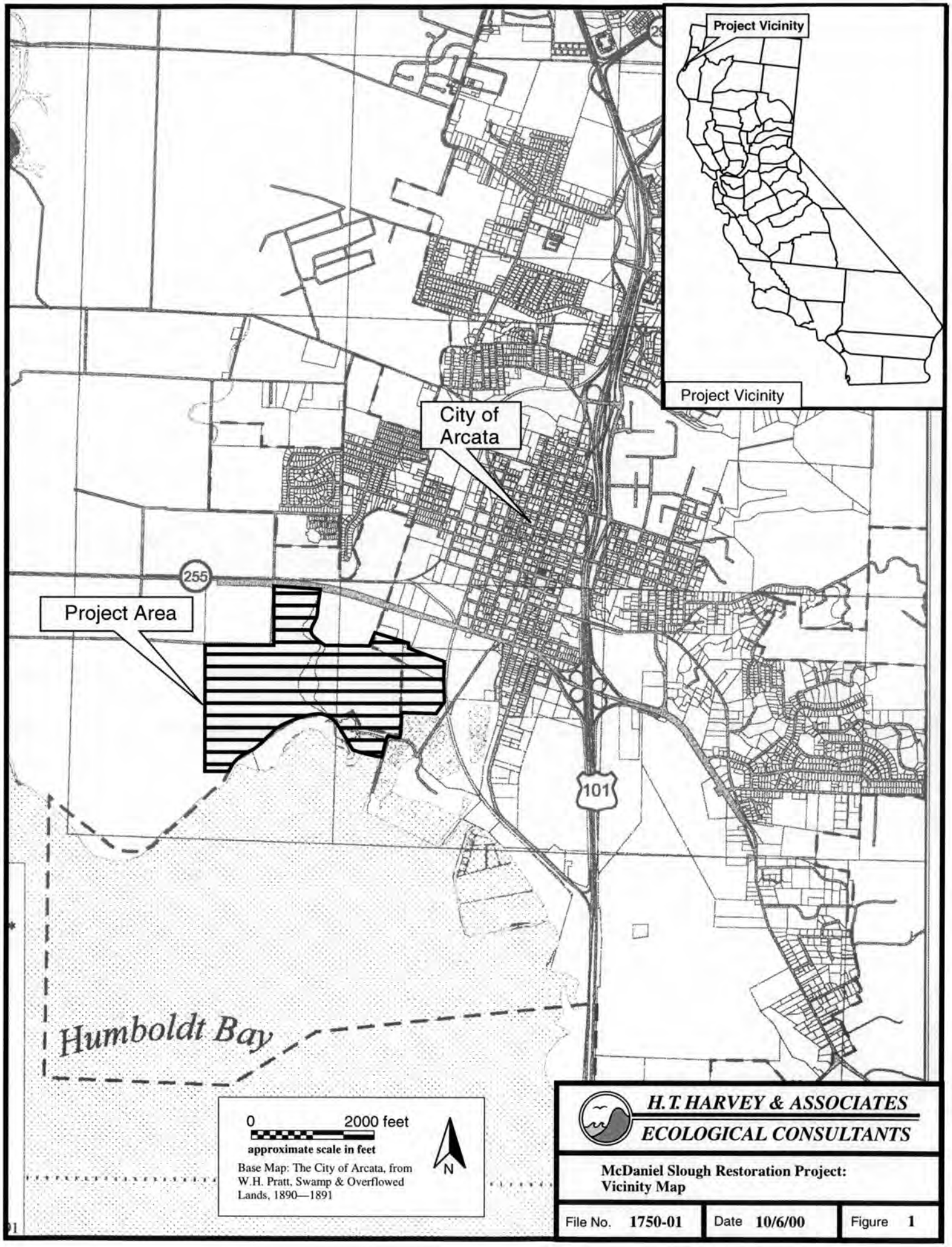
The soils found within the levees of the project site belong to the Bayside series (Ba). Two soil types within that series are present: Bayside silty clay loam, poorly drained, 0 to 3 percent slopes (Ba2) and Bayside silty clay loam, imperfectly drained, 0 to 3 percent slopes (Ba3). Bayside soils are fine-textured basin soils developed in sedimentary alluvium from small streams, and are generally found in reclaimed tidal marsh areas adjacent to Humboldt Bay (McLaughlin and Harradine, 1965).

Average temperatures range from 56˚ F in July to 47˚ F in January, with a mean annual temperature of 52˚ F (McLaughlin and Harradine, 1965). Combined with a mean annual precipitation of about 40 inches, the growing season is upwards of 300 days (McLaughlin and Harradine, 1965). According to the National Weather Service, the 30-year (1961-1990) average normal daily temperature for Eureka, California is 52.7˚ F and the normal annual precipitation is 37.53 inches.

The McDaniel Slough Restoration project proposes to restore tidal marsh at the approximately 240-acre parcel. The project area was originally part of the extensive salt and brackish marshes that fringed all of Humboldt Bay. In the late 1800's, the area was diked and drained for agricultural purposes. Tide gates were installed in the 1940's in an effort to thwart salt water from intruding onto adjacent farmland upstream. Removing tidal action (and associated scour) has resulted in fresher conditions, but also has increased sedimentation in the area and has contributed to upstream flooding.

The objectives of the project include restoring the area to tidal salt marsh dominated by pickleweed (*Salicornia virginica*) and restoring hydrologic connectivity between McDaniel Slough and Humboldt Bay for anadromous fish. The proposed restoration will impact some existing habitats that are regionally abundant and whose loss is therefore not considered significant. These habitats include developed land, agricultural/pasture land, and ruderal habitat. Restoration of the area will also likely impact freshwater and brackish

marsh, agricultural land with wetland characteristics, and willow riparian habitat. This document provides a detailed description of the existing biological conditions found on the McDaniel Slough Restoration project site


Project Vicinity
Project Vicinity
City of Arcata
255
Project Area
101
Humboldt Bay
0
2000 feet
approximate scale in feet
Base Map: The City of Arcata, from W.H. Pratt, Swamp & Overflowed Lands, 1890—1891
N
H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS
McDaniel Slough Restoration Project:
Vicinity Map
File No. 1750-01
Date 10/6/00
Figure 1

2.0 EXISTING BIOLOGICAL CONDITIONS

METHODS

Reconnaissance-level field surveys were conducted on the McDaniel Slough restoration site on June 8 and 9, 2000. The purpose of these surveys was to document the existing biotic resources associated with the site. Specifically, surveys were conducted to: 1) describe biotic habitats; 2) determine whether the site supports habitats capable of supporting special-status species, and; 3) document the potential presence/absence of regulated habitats including Waters of the U. S. and California Department of Fish and Game jurisdiction. Survey personnel included H. T. Harvey & Associates' restoration ecologist John Bourgeois and wildlife ecologist Naomi Nichol, Winzler & Kelly's soil scientist Misha Schwarz, and the City of Arcata botanist Mignonne Bivin.

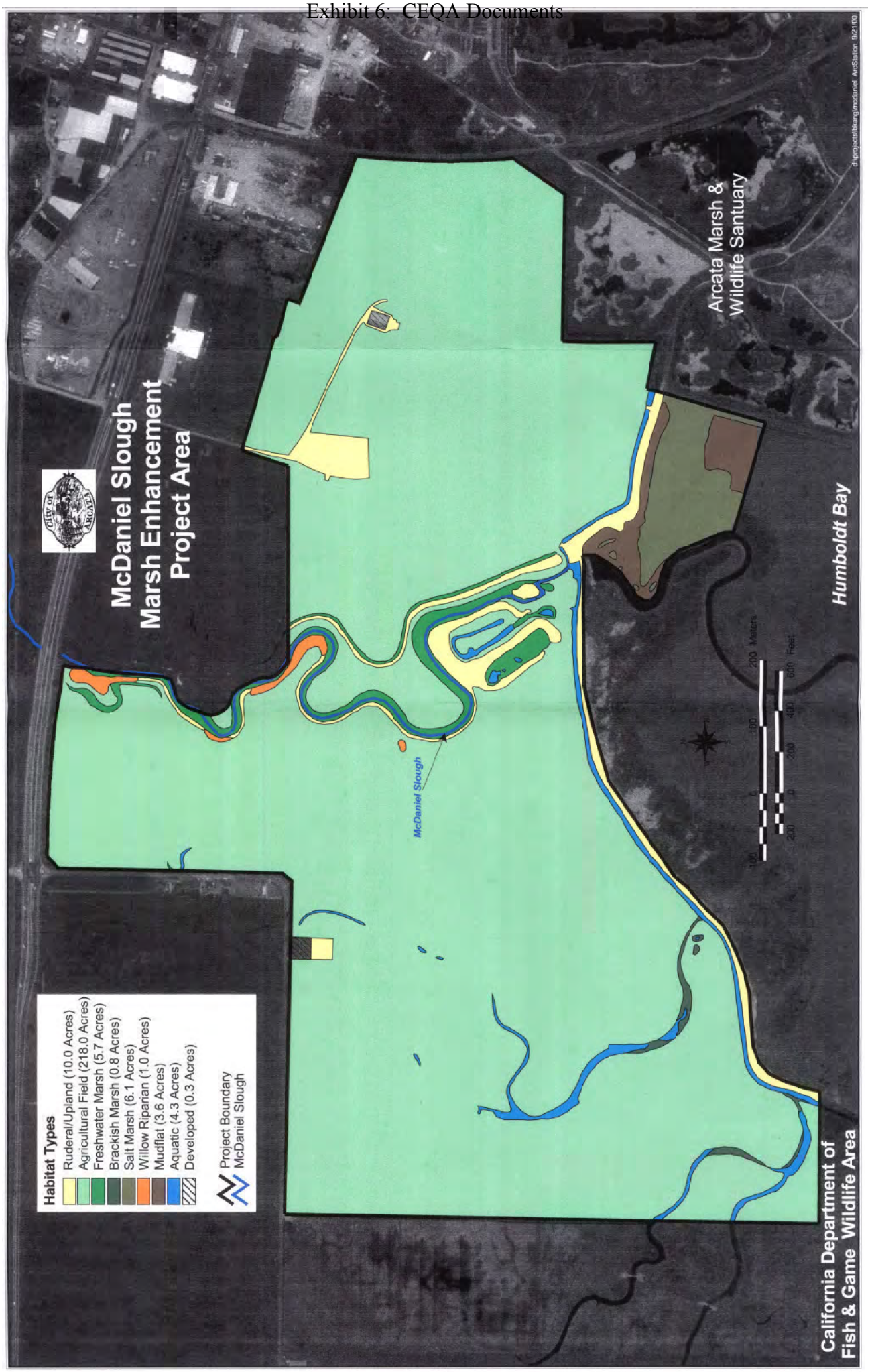
Surveys were conducted at a reconnaissance-level by City of Arcata botanist Mignonne Bivin in November and December of 1998 and in June of 2000 for habitats capable of supporting special-status plants on site. Wildlife biologist Naomi Nichol conducted reconnaissance-level field surveys on June 8, 2000 for any special-status wildlife species on site, or habitats capable of supporting them. The survey method involved hiking the entire project in order to observe all habitats on site.

RESULTS

Nine biotic habitats were identified on the project site (Figure 2). These habitats include ruderal/upland, agricultural field, freshwater marsh, brackish marsh, salt marsh, willow riparian, mudflat, riparian and developed. Table 1 summarizes the relative size of the habitats found within the project site. Habitats were mapped by hand on an acetate overlay of black and white aerial photography at a scale of 1 inch = 200 feet. These habitats were then scanned and digitized and acreages were calculated using GIS software (ArcInfo).

Table 1. Summary of habitat area found at the U. S. Dataport project site, Santa Clara County, California.

Habitat Type	Acres	Percent of Total
Ruderal/Upland	10.1	4.0%
Agricultural Field	217.9	87.3%
Freshwater Marsh	5.7	2.3%
Brackish Marsh	0.8	0.3%
Salt Marsh	6.1	2.4%
Willow Riparian	0.9	0.4%
Mudflat	3.6	1.4%
Aquatic	4.3	1.7%
Developed	0.3	0.1%
Total =	**249.7**	100%


McDaniel Slough
Marsh Enhancement
Project Area
Habitat Types
Ruderal/Upland (10.0 Acres)
Agricultural Field (218.0 Acres)
Freshwater Marsh (5.7 Acres)
Brackish Marsh (0.8 Acres)
Salt Marsh (6.1 Acres)
Willow Riparian (1.0 Acres)
Mudflat (3.6 Acres)
Aquatic (4.3 Acres)
Developed (0.3 Acres)
Project Boundary
McDaniel Slough
McDaniel Slough
Arcata Marsh &
Wildlife Santuary
Humboldt Bay
100 0 100 200 Meters
200 0 200 400 600 Feet
California Department of
Fish & Game Wildlife Area
d:\projects\bkang\mcdaniel ArcStation 9/21/00

Ruderal/Upland

Vegetation. The ruderal/upland species, which largely occur along the levees around and within the project site, total 10.1 acres and are dominated by mostly invasive non-native species. Coyote brush (*Baccharis pilularis*) and Himalayan blackberry (*Rubus discolor*) compose the shrub layer. Himalayan blackberry forms dense thickets on the sides of the dike and along fence lines. Dominant herbaceous vegetation includes wild radish (*Raphnus sativa*), velvet grass (*Holcus lanatus*), bird's foot trefoil (*Lotus corniculatus*), Aster (*Aster chilensis*) and English plantain (*Plantago lanceolata*).

Wildlife. Mammals found in this type of habitat are those typical of urban habitats, such as 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*). Bird species include the European Starling (*Sturnis vulgaris*), Fox Sparrow (*Passerella iliaca*), White-crowned Sparrow (*Zonotrichia leucophrys*), and American Goldfinch (*Carduelis tristis*). Pacific tree frogs (*Hyla regilla*), and Western fence lizards (*Sceloporus occidentalis*) also forage in ruderal habitats.

Agricultural Field

Vegetation. Approximately 217.9 acres supported vegetation characteristic of fallow farm fields. The vegetation is primarily introduced grasses, perennial rye (*Lolium perenne*), fescue (*Festuca andurdinaceae*) and velvet grass (*Holcus lanatus*). The major forbs are Canada thistle (*Cirsium vulgare*), bird's foot trefoil (*Lotus corniculatus*) and curly dock (*Rumex crispus*). Many other grasses and forbs occur in this habitat type and are listed in Appendix 1.
Portions of these agricultural fields exhibit wetland characteristics typical of agricultural lands with level topography and heavy-textured soils. Observed evidence of wetland hydrology includes sediment cracks and algal mat formation in depressional areas, and vegetation associated with saturated soils. These areas are dominated by obligate wetland plants such as manna grass (*Glyceria occidentale*) and water foxtail (*Aleopecurus genticulatus*).

Wildlife. This habitat supports many species that utilize seasonal standing water, in addition to those utilizing regular agricultural lands. Mammals that typically use such fields include the California vole (*Microtus californicus*), Pacific shrew (*Sorex pacificus*), Coast Mole (*Scapanus orarius*), and many of the same mammals as listed for ruderal habitat. Bird species using the fallow fields include Barn Swallows (*Hirundo rustica*), Long-billed Curlews (*Numenius americanus*), and Killdeer (*Charadrius vociferous*). These fields provide foraging habitat for a number of raptor species including the Peregrine Falcon (*Falco peregrinus*), Red-tailed Hawk (*Buteo jamaciensis*), Barn Owl (*Tyto alba*), and the Turkey Vulture (*Cathartes aura*).

When flooded, many more species of ducks, herons, and shorebirds will use this area. Great-blue Herons (*Ardea herodias*), Great Egrets (*Ardea alba*), Snowy Egrets (*Egretta thula*), and Black-crowned Night Herons (*Nycticorax nycticorax*) could forage in these wet meadows.

Freshwater Marsh

Vegetation. The freshwater marsh habitat occupies approximately 5.7 acres on the project site and is found within the McDaniel Slough channel, within a small borrow ditch east of the slough and at a former stock pond in the southern portion of the project (Figure 2). The freshwater marsh habitat is dominated by cattail *(Typha latifolia*), bulrush (*Scripus acutus*) and slough sedge (*Carex obnupta*) within the deeper portions of the channel. Low growing wetland plants dominate the borders of the channel and the shallower portions of this habitat type. Among these are soft rush (*Juncus effusus*), tufted hairgrass (*Deschampsia ceaspitosa*), Pacific silverweed (*Potentilla anserina*), water foxtail (*Aleopecurus genticulatus*) and water parsely (*Oenanthe sarmetosa*).

Wildlife. The freshwater marsh attracts many bird species that use the freshwater marsh habitats in the adjacent wildlife refuge. Example species include the American Bittern (*Botaurus lentiginosus*), Red-winged Blackbird (*Agelaius phoeniceus*), Marsh Wren (*Cistothorus palustris*), Western Grebe (*Aechmophorus occidentalis*), Pied-billed Grebe (*Podilymbus podiceps*), American Coot (*Fulica americana*), Great-blue Heron, and Cinnamon Teal (*Anas cyanoptera*).

Brackish Marsh

Vegetation. Brackish marsh habitat represents only about 0.8 acres of the entire project site, and is limited to the inside (north) of the levee and along the two large remnant slough channels in the southwest portion of the project area. This habitat type is dominated by alkali bulrush (*Scripus robustus),* arrow grass (*Triglochin maritima*) and salt rush (*Juncus lesueurii)*. Other plants present along the edges of the brackish marsh include Pacific silverweed (*Potentilla anserina*) and soft rush (*Juncus effusus*).

Wildlife. Most wildlife species using the brackish marsh are those that also use the freshwater marsh and/or the adjacent ruderal or agricultural areas. These channels provide foraging opportunities for herons and egrets, as well as some dabbling ducks such as Mallards (*Anas platyrhynchos*), and Gadwalls (*A. strepera*). The vegetation along these channels provides habitat for Marsh Wrens, Red-winged Blackbirds, Short-billed Dowitchers (*Limnodromus griseus*), and Pacific treefrogs.

Salt Marsh

Vegetation. Salt marsh habitat is restricted to the tidal areas bayside of the existing levee system. Currently, about 6.1 acres of salt marsh are within the boundaries of the project, and this habitat represents one of the primary target habitats for restoration. The salt

marshes are dominated by cordgrass (*Spartina densiflora*), juamea (*Juamea martima*) and pickleweed. Other species that occur in this habitat type are spear oracle (*Atriplex patula*) and sea lavender *(Limonium californicum*). This habitat type is very restricted in Humboldt Bay, as over 90 percent of the historic salt marsh has been lost to impoundment and subsequent conversion to agricultural or industrial uses (Barnhart et al, 1992).

Three rare plant species occur in the salt marshes of Humboldt Bay: Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*), Pt. Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*) and alkali grass (*Puccinellia pumila*). In the spring of 2000, the salt marsh was surveyed for the former two species. Humboldt Bay owl's clover was quite abundant along the entire length of the outer dike. It was estimated that between 2000 and 3000 individuals were present. The Pt. Reyes bird's beak population was estimated at approximately 500 individuals.

Wildlife. This remnant salt marsh supports many species of birds, however examples of more common birds include Savannah Sparrows (*Passerculus sandwichensis*), Song Sparrows (*Melospiza melodia*), Greater Yellowlegs (*Tringa melanoleuca*), Marsh Wrens, and American Avocets (*Recurvirostra americana*). Although the marsh is relatively small, it provides habitat for Virginia Rails (*Rallus limicola*), Soras (*Porzana carolina*), American Wigeon (*Anas americana*), Lesser Scaup (*Aythya affinis*), Whimbrel (*Numenius phaeopus*), and the Common Yellowthroat (*Geothlypis trichas*). During migration a substantial number of migrant species use this habitat as a migratory stopover refuge. A number of "vagrant" species, such as Bobolink (*Dolichonyx oryzivorus*) have been found here.

Willow Riparian

Vegetation. Willow-riparian habitat occupies about 0.9 acres on the project site. Although it provides high quality riparian habitat, it only occurs in four small patches along the edges of McDaniel Slough, and consists primarily of arroyo willow (*Salix lasiolepsis*). Other plants present in the riparian habitat include sitka willow (*Salix sitchensis*), Himalayan blackberry (*Rubus discolor*) and California blackberry (*Rubus ursinus*).

Wildlife. The willow-riparian habitat provides tree canopy and understory, which provides cover for both birds and mammals. Species that may nest or forage here include Anna's Hummingbird (*Calypte anna*), Allen's Hummingbird (*Selasphorus sasin*), American Goldfinch, Black Phoebe (*Sayornis nigricans*), House Wren (*Troglodytes aedon*), Green Heron (*Butorides virescens*), and American Kestrel (*Falco sparverius*). Other species include White-crowned Sparrows, Bushtits (*Psaltriparus minimus*), and Winter Wrens (*Troglodytes troglodytes*). Small mammals such as brush rabbits (*Sylvilagus bachmani*), black-tailed hares (*Lepus californicus*), and striped skunks will use these areas to seek shelter and access to water. Riparian habitats are important for migrating songbirds, and during the fall and spring this habitat provides food and a resting place for many more species of birds, including Rufous Hummingbirds (*Selasphorus*

rufus), Yellow Warbler (*Dendroica petechia*), Yellow-rumped Warbler (*Dendroica coronata*), Orange-crowned Warblers (*Vermivora celata*), Wilson's Warblers (*Wilsonia pusilla*), Pacific-slope Flycatchers (*Empidonax difficilis*), Warbling Vireos (*Vireo gilvus*), Ruby-crowned Kinglets (*Regulus calendula*), and Cedar Waxwings (*Bombycilla cedrorum*).

Mudflat

Mudflat habitat (3.6 acres) occurs outside the existing levee system in conjunction with salt marsh habitat. At low tide, large expanses of mudflat are exposed to the south of the project area in Humboldt Bay. At high tide, these areas are shallow open water habitat.

Wildlife. The proximity of the adjacent wildlife refuge provides a contiguous area of mudflat that provides foraging habitat to a large number of shorebirds, particularly through the winter. Examples of the more common species include the American Avocet, Dunlin (*Calidris alpina*), Marbled Godwit (*Limosa fedoa*), Long-billed Curlew, Sanderling (*C. alba*), Least Sandpiper (*C. minutilla*) and Western Sandpipers (*C. mauri*). Gulls will also use mudflats to forage, including the Herring Gull (*Larus argentatus*), California Gull (*L. californicus*), and Glaucous-winged Gull (*L. glaucescens*), all of which winter on Humboldt Bay. Mudflats do not provide habitat for mammals.

During high tide, the mudflats are submerged and during this time these areas provide habitat for fish found in the bay. These fish include sharks such as the leopard shark (*Triakis semifasciata*), the brown smoothhound (*Mustelus henlei*), and the sevengill shark (*Notorynchus maculates*). These sharks, as well as bat rays (*Myliobatis californica*) will forage over mudflats and in small channels. Many species of salmonids in Humboldt Bay are anadromous and use the tributaries to spawn. Although tide gates restrict access to Janes Creek, these fish should be mentioned as they likely occur outside the tide gates. They include the threatened Chinook salmon (*Oncorhyncus tshawytscha*), threatened coho salmon (*O. kisutch*), steelhead rainbow trout (*O. mykiss*), as well as coast cutthroat trout (*O. clarki clarki*), which are also found inside the tide gates. The degradation of stream habitat in the tributaries of Humboldt Bay has led to the decline in these species' populations. Other fish that use tributaries and estuaries to spawn on Humboldt Bay include the longfin smelt (*Spirinchus thaleichthys*), and the redtail surfperch (*Amphistichus koelzi*).

Aquatic

Approximately 4.3 acres of aquatic habitat exist within the project boundary. McDaniel Slough, which bisects the project area, is largely freshwater marsh, however aquatic habitat occurs in McDaniel Slough near the existing water control structures adjacent to Humboldt Bay. The majority of the aquatic habitat consists of remnant slough channels and depressions from excavation activities. The depressions in the agricultural field correspond to the locations of former tidal slough channels and remain hydrologically

connected to McDaniel Slough via the borrow ditch that is on the north side of the southern levee.

Wildlife. The aquatic area on site mainly provides habitat for duck species such as Mallard, Green-winged Teal (*Anas crecca*), Canvasback (*Aythya valisineria*), Bufflehead (*Bucephala albeola*), Ruddy Duck (*Oxyura jamaicensis*), and other waterbirds such as American Coots and Pied-billed Grebes (*Podilymbus podiceps*). These areas also provide water for mammals living in adjacent habitats, such as striped skunk and feral cats. There are few fish species likely to occur in most of the aquatic areas, however Janes Creek is known to support a remnant population of coastal cutthroat trout.

Developed

A barn is located in the eastern portion of the project area and a silo with an adjacent parking area in located in the western portion of the project area. These developed areas total approximately 0.3 acres.

Wildlife. Many species of birds and mammals likely make use of this barn for shelter and foraging, as well as possibly reproduction. The most likely species are Barn Owls, Barn Swallows, Cliff Swallows (*Petrochelidon pyrrhonota*), Norway rats, house mice, and feral cats. Both the barn and the silo provide good foraging perches for raptors, such as Red-tailed Hawks and American Kestrels.

REGULATED HABITATS

United States Army Corps of Engineers Jurisdiction

Regulatory Overview. Areas meeting the regulatory definition of "Waters of the United States" (jurisdictional waters) are subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE). The USACE, under provisions of Section 404 of the Clean Water Act (1972) and Section 10 of the Rivers and Harbors Act (1899), has jurisdiction over "Waters of the U.S." These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the U. S.," tributaries of waters otherwise defined as "Waters of the U. S.," the territorial seas, and wetlands adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3).

Areas not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially-irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 CFR, Part 328).

Construction activities within jurisdictional waters are regulated by the USACE. The placement of fill into such waters must be in compliance with permit requirements of the USACE. No USACE permit will be approved in the absence of state water quality certification pursuant to Section 401 of the Clean Water Act. State Water Resources Control Board is the state agency charged with implementing water quality certification in California.

Survey Results. Potential jurisdictional waters, including tributary waters, other waters, wetlands and farmed wetlands, occur throughout the entire project area. The only areas that do not appear to be potential jurisdictional waters are those areas mapped as ruderal/upland and developed (Figure 2).

The habitats with wetland indicators were identified at a reconnaissance level utilizing guidance provided in two federal technical field manuals (the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the *National Food Security Act Manual* third edition titled "Making Wetland Determinations on Agricultural Land"), as well as regulations and statutes currently in effect. The level of effort involved a reconnaissance of existing vegetation and hydrologic conditions, as well as a few representative soil pits.

To determine the extent and distribution of the jurisdictional areas at a level sufficient for review by the resource agencies would require additional field surveys (e.g. further soils test pits, water monitoring wells, vegetation transects, etc.) as well as complete documentation of historical conditions, review of previous land use management practices, compilation of aerial photographic evidence regarding farming practices since 1985, documentation of all regional and site-specific hydrologic modifications which have occurred in the last several years (i.e., construction of drainage ditches, drainage tiles, groundwater monitoring well records, surface flow diversion structures), review of farm records, submittal of information to the Farm Services Agency, and interviews with persons familiar with farm/ranch operations in the last decade.

In addition, a detailed topographic map of this area would be required to accurately describe these jurisdictional areas. It is only after additional field surveys and review and compilation of additional information that wetland habitats can be accurately defined. Many habitats such as stock ponds, irrigation holding ponds, and drainage and irrigation ditches are not typically claimed by these agencies as within their jurisdiction. However, the burden of proof is upon the landowner to compile and document the construction and maintenance of such features in order for this occur.

The difference in level of effort for the reconnaissance-level field surveys that were conducted and an enhanced-level survey/documentation is substantial. For this reason, the description of areas with wetland indicators in this report should be considered preliminary. The accurate identification of these resources involves further field surveys, compilation of historical and existing land uses, and review of laws, regulations, guidance letters and statutes dealing with such resources. A large portion of the site may qualify as

farmed wetlands, making the delineation of the McDaniel Slough Restoration project area a more time consuming process. Such a level-of-effort is beyond the scope of the present work.

California Department of Fish and Game Jurisdiction

Areas potentially subject to the jurisdiction of CDFG, under Section 1600 of the California Fish and Game Code were identified during this survey as the top of along McDaniel Slough.

3.0 SPECIAL-STATUS PLANT AND WILDLIFE SPECIES

Prior to the site 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 2000), and miscellaneous information available through the U.S. Fish and Wildlife Service (USFWS), CDFG, and technical publications. The California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1994) and *The Jepson Manual* (Hickman 1993) supplied information regarding the distribution and habitats of vascular plants in the vicinity. Sources for information on local wildlife include the *California's Wildlife* series (Zeiner et al. 1988), *Freshwater Fishes of California* (McGinnis 1984), and *Northwestern California Birds* (Harris 1991). Contacts with local biologists were also made (e.g., Dr. Terry Roelofs of HSU, and Jamie Bettaso of Redwood Sciences Lab).

A search of published accounts of special-status species was conducted within the Arcata South U.S.G.S. quadrangle map in which the project occurs, and for 7 surrounding quadrangles including Arcata North, Blue Lake, Iaqua Buttes, Fortuna, Fields Landing, Eureka, and Tyee City using CNDDB Rarefind reports (CNDDB 2000).

SPECIAL-STATUS PLANT SPECIES

Of the 19 special-status plant species known to occur within the vicinity, 11 are associated with habitat types that do not occur in the project site (CNDDB 2000). These habitats include: broad-leafed upland forest, vernal pools, coastal dunes, coastal strand, coastal scrub, coastal bluff scrub, coastal prairie, north coast coniferous forest**,** meadows and seeps, lower montane coniferous forest, and meadows.

The special-status plant species that occur in regional habitats similar to those found in the project area include: dwarf alkali grass (*Puccinellia pumila*), Point Reye's bird's-beak, Humboldt Bay owl's-clover, marsh pea (*Lathyrus palustris*), running-pine (*Lycopodium clavatum*), Western lily (*Lilium occidentale*), marsh violet (*Viola palustris*) and flaccid sedge (*Carex leptalea*) (CNDDB 2000). However, only Point Reye's bird's-beak and Humboldt Bay owl's clover were found in the vicinity of the project area.

Point Reyes Bird's-Beak (*Cordylanthus maritimus ssp. palustris*). Federal listing status: Species of Concern; State listing status: None; CNPS List 1B. This annual hemi-parasitic herb occurs in coastal salt marsh. The blooming period extends from June to October. The range of this species includes 5 counties in California, and in southwestern Oregon. Point Reyes bird's-beak has been found in the salt marshes adjacent to the project site, as well as in the salt marshes present in the southeast corner of the project area.

Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*). Federal listing status: Species of Concern; State listing status: None; CNPS List 1B. Humboldt Bay owl's clover is an annual plant that occurs in coastal salt marsh habitats. Its range is restricted to Humboldt Bay and Point Reyes. The blooming period occurs from May through August. Humboldt Bay owl's clover has been found in the salt marshes of Humboldt Bay adjacent to the project site, as well as in the salt marshes present in the southeast corner of the project area.

SPECIAL-STATUS ANIMAL SPECIES

The special-status animal species that occur in the vicinity of the site in habitats similar to those found on the project site are described below. Expanded descriptions are included only for those species for which suitable habitat occurs on the project site and that may be impacted by project implementation.

There are several special-status species known to occur in habitats that are present on the site or may forage in the project area, which will not be significantly impacted by site alteration. These special-status species include California Brown Pelicans (*Pelecanus occidentalis californicus*), Cooper's Hawk (*Accipiter cooperii*), Sharp-shinned Hawk (*Accipiter striatus*), Merlin (*Falco columbarius*), California Gull (*Larus californicus*), Short-eared Owl (*Asio flammeus*), Vaux's Swift (*Chaetura vauxi)*, Black-capped Chickadee (*Parus atricapillus*), and Yellow-breasted Chat (*Icteria virens*).

Some special-status species are known to occur in the area but are thought to be absent from the project site due to a lack of habitat, or thought or known to occur only rarely as stray migrants or transients. These include Golden Eagles (*Aquila chrysaetos*), Ferruginous Hawk (*Buteo regalis*), Greater Sandhill Crane (*Grus canadensis tabida*), Burrowing Owls (*Athene cunicularia*), Bank Swallow (*Riparia riparia*), and Loggerhead Shrikes (*Lanius ludovicianus*).

Other species, which are not expected to breed or forage on the site frequently, or for long durations during the breeding season, include the Double-crested Cormorant (*Phalacrocorax auritus*), Osprey (*Pandion haliaetus*), and American Peregrine Falcon (*Falco peregrinus anatum*). Bald Eagles (*Haliaeetus leucocephalus*) may occasionally perch on the project site while foraging in adjacent water during the winter, however there is no breeding habitat for Bald Eagles on site. Large flocks of Aleutian Canada Geese (*Branta canadensis leucopareia*) winter in the area, and may forage in agricultural fields on the site. There is no habitat on or in the immediate vicinity of the site for Snowy Plover (*Charadrius alexandrinus nivosus*).

A few special-status species are found in the vicinity of the site or may be washed downstream onto the site, but for which there is no habitat on site include the Western pond turtle (*Clemmys marmorata*), tailed frogs (*Ascaphus truei*), and Southern torrent salamanders (*Rhyacotriton variegatus*). Other special-status species that are found

outside the tide gates and likely would not be greatly affected by the restoration include Longfin Smelt (*Spirinchus thaleichthys*) and Brown Pelican (*Pelecanus occidentalis*).

The following species are likely to be found on the project site, and may be affected by the proposed restoration.

Northern Red-legged Frog (*Rana aurora aurora*). Federal Listing Status: None; State Listing Status: Species of Special Concern. The northern red-legged frog is found in humid habitats including grasslands and streamsides in northwestern California. There are records of frogs in the vicinity of the project site, and there is suitable habitat found on site, therefore it is assumed that the northern red-legged frog occurs on site.

Northern Harrier (*Circus cyaneus*). Federal Listing Status: None; State Listing Status: Species of Concern. Northern Harriers are found in open grasslands, agricultural fields, and marshes throughout much of North America. They perch and fly low, hunting for a variety of prey such as mice, birds, frogs, reptiles, and insects. They are ground nesters, building nests in areas where the ground vegetation is sufficient to allow cover. This species was observed foraging on the site during the reconnaissance survey, and may nest on site.

White-tailed Kite (*Elanus caeruleus*). Federal listing status: None; State Listing Status: Protected. The White-tailed Kite is found in brushy grasslands and agricultural areas with low ground cover, as well as grassy foothills, marsh, riparian, woodland, and savanna. This species requires tall oaks, willows, or other broad-leaved deciduous trees for nesting. Prey items comprise primarily rodents and insects, although will also take reptiles, amphibians, and birds. Kites are quite common on and around the project area, however optimal nesting trees are lacking on site. It is more likely that kites use this area primarily for foraging. There are abundant foraging areas adjacent to the project site.

Vaux's Swift (*Chaetura vauxi*). Federal Listing Status: None; State Listing Status: Species of Special Concern. The Vaux's Swift is a common summer resident and breeder in the vicinity of the project site. They use hollow trees and chimneys for nests and roosts, and there is habitat on site for these birds to both nest and forage.

Tricolored Blackbird (*Agelaius tricolor*). Federal Listing Status: None; State Listing Status: Species of Special Concern. Tricolored Blackbirds are endemic to California and Baja California. This species forms dense nesting colonies, typically in tall stands of cattails or tules, as well as in blackberry, wild rose bushes, riparian brush, and other similar habitats associated with freshwater. Tricolored Blackbirds forage in open areas (agriculture, grasslands, etc.) in the nonbreeding season. There are records of these birds nesting in blackberry/coyote brush patches in the vicinity of the project site, and there is habitat on the levee and along Janes Creek that would support nesting blackbirds.

Coastal cutthroat trout (*Oncorhynchus clarki clarki*). Federal Listing Status: None; State Listing Status: Species of Special Concern. Coastal cutthroat trout are often

found in small, coastal streams as opposed to larger channels. Coastal cutthroats require streams with shaded areas, cool water, and small-grained gravel for spawning. Generally, these fish are threatened by water diversion, siltation, and marsh and tideland reclamation. There are records of cutthroat trout in Janes Creek upstream of the site. Although the coastal cutthroat trout could occur within the project area, the tide gates present at the downstream end of McDaniel Slough restrict any potential passage of the fish to Humboldt Bay.

Tidewater goby (*Eucylogobius newberryi*). Federal Listing Status: Endangered; State Listing Status: Species of Special Concern. The tidewater goby is a fish that occurs in tidal streams associated with coastal wetlands in California. Since 1900, the tidewater goby has disappeared from nearly 50 percent of the coastal lagoons within its historic range, including 74 percent of the lagoons south of Morro Bay in central California. The tidewater goby is the only species in the genus *Eucylogobius* and is almost unique among fishes along the Pacific coast of the United States in its restriction to waters with low salinities in California's coastal wetlands. There are records of tidewater gobies in the vicinity of the project site, and it is likely that they occur on site downstream of the tide gates.

Townsend's Big-eared Bat (*Plecotus townsendii*). Federal Listing Status: None; State Listing Status: Species of Special Concern. The Townsend's big-eared bat was once common in California, but now is considered uncommon to rare. This species frequents rural buildings, woodlands, or xeric environments, but is extremely sensitive to human disturbance and will quickly abandon traditional roosting sites if disturbed. This species may forage on site, and may roost in the abandoned barn on site

Pallid Bat (*Antrozous pallidus pacificus*). Federal Listing Status: None; State Listing Status: Species of Special Concern. Pallid bats are large bats, with the Pacific race representing one of the largest bats in California. Colonies of this species generally roost in rocky outcroppings, in buildings, under bridges, and in hollow trees, and range from a few to over a hundred individuals in a given roost. Pallid bats forage on terrestrial arthropods, and frequent dry, open grasslands near water. This species may forage in open fields and roost in the barn on the site.

Other Salmonids. Three special-status fish species, coho salmon (*Oncorhynchus kisutch*), steelhead trout (*Oncorhynchus mykiss*), and Chinook salmon (*Oncorhynchus tshawytscha*) likely occur outside the tide gates, and use other tributaries in Humboldt Bay to spawn. However, it is likely that restoration of Janes Creek as an accessible tributary would allow these fish to spawn in the creek and may help to stabilize, or increase, their populations.

4.0 LITERATURE CITED

Barnhart, R.A., M.J. Boyd and J.E. Pequegnat. 1992. The Ecology of Humboldt Bay, California: An Estuarine Profile. U.S. Department of Interior, Fish and Wildlife Service. Biological Report 1. 121 pp.

CNDDB 2000. California Natural Diversity Data Base. California Department of Fish and Game.

California Native Plant Society. 1994. Inventory of Rare and Endangered Vascular Plants of California.

Dunn, J. L. 1999. Field Guide to the Birds of North America: Revised and Updated. National Geographic Society.

Environmental Laboratory. 1987. U. S. Army Corps of Engineers Wetlands Delineation Manual.

Harris, S.W. 1991. Northwestern California Birds. Humboldt State University Press, Arcata, California.

Hickman, J. C. 1993. The Jepson Manual: Higher Plants of California. University of California Press.

Holland, R. F. 1986. Preliminary Description of the Terrestrial Natural Communities of California. California Department of Fish & Game.

McGinnis, S. M. 1984. Freshwater Fishes of California. University of California Press, Berkeley, California.

McLaughlin, J. and F. Harradine. 1965. Soils of Western Humboldt County. Cooperative project between the Department of Soils and Plant Nutrition, University of California, Davis and the County of Humboldt, California.

Skinner, M. W. and B. M. Pavlik (eds.) 1994. California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California. Sacramento: California Native Plant Society.

Zeiner, D. C., W. F. Laudenslayer Jr., and K. E. Mayer, eds. 1988. California's Wildlife: Volumes I, II, and III. California Department of Fish and Game, Sacramento, California.

Appendix A.
Plant Species List

Appendix 1: List of plant species observed on the McDaniel Slough site during surveys in November 1998-January 1999 and June 2000. Locations within the project area are listed by habitat type: salt marsh (SM), brackish marsh (BM), freshwater marsh (FM), willow riparian (WR), ruderal/upland (R/U), and agricultural field (AF).

Trees

Scientific name	Common name	Habitat type	Wetland rating
Alnus rubra	red alder	AF, FM	FACW
Salix lasiolepis	arroyo willow	WR, R/U	FACW
Salix sitchensis	sitka willow	WR, AF	

Shrubs

Scientific name	Common name	Habitat type	Wetland rating
Baccharis pilularis	coyote bush	R/U	UPL
Rubus discolor	Himalayan blackberry	R/U, WR	FACW*
Rubus ursinus	California blackberry	R/U, WR	FACW*

Grasses/Sedges/Rushes

Scientific name	Common name	Habitat type	Wetland rating
Agrostis stolonifera	spreading bentgrass	AF	FACW
Aira caryophylla	hair grass	AF, R/U	
Alopecurus genticulatus	water foxtail	AF, FM	OBL
Anthoxanthum odoratum	sweet vernal grass	AF	FACU
Avena fatua	wild oats	R/U	
Bromus diandrus	ripgut brome	AF	
Bromus hordeaceus	soft brome	AF	
Bromus madritensis rubens	fox tail brome	AF	
Carex lyngbyei	Lynbyes sedge	BM	OBL
Carex obnupta	slough sedge	FM	OBL
Carex tumulicola	carex	AF	
Dactylus glomerata	orchard grass	AF	FACU
Deschampsia ceaspitosa	tufted hairgrass	BM, FM, R/U	FACW
Distichilis spicata	saltgrass	BM, SM	FACW
Eleocharis macrostachya	spike rush	FM	OBL
Festuca arundinacea	Kentucky fescue	AF	FAC-
Glyceria occidentale	manna grass	AF	OBL
Holcus lanatus	velvet grass	AF	FAC
Hordeum bracyantherum	meadow barely	AF, FM	FACW
Hordeum marinum	barely	AF	FAC
Juncus effusus	soft rush	AF, FM, BM	OBL
Juncus lesueurii	salt rush	BM	FACW
Juncus patens	patens rush	AF	
Lolium perenne	perennial rye	AF, R/U	FAC*
Phalaris arundinaceae	reed canary grass	FM	OBL
Poa annua	annual bluegrass	AF	FACW-
Poa trivialis	bluegrass	AF	FACW
Polypogon monspieliensis	rabbitsfoot grass	FM	FACW
S*cirpus acutus*	hardstem bullrush	FM	OBL
S*cirpus robustus*	salt marsh bullrush	BM	OBL
Typha latifolia	cattail	FM, BM	OBL

Vulpia bromoides	six week brome	AF, R/U	
Vulpia microstachys	six week brome	AF, R/U	
Vulpia myuros	six week brome	AF, R/U	

Herbs

Scientific name	Common name	Habitat type	Wetland rating
Achiilea millefolium	yarrow	AF	FACU
Alisma plantago-aquatica	water plantain	FM	OBL
Aster chilensis	common California aster	R/U, AF	FAC
Atriplex patula	arrow saltbush	BM	FACW
Bellis perennis	English daisy	AF	UPL
Brassica nigra	black mustard	R/U	
Brassica rapa	field mustard	R/U	
Cerastrium arvense	mouse-eared chickweed	AF	FAC
Chamomilla suaveolens	pineapple weed	AF, R/U	
Cirsium arvense	Canada thistle	AF, R/U	
Cirsium vulgare	bull thistle	AF	FACU
Conium maculatum	poison hemlock	R/U	FACW
Conyza canadensis	Canada horseweed	R/U, AF	FAC
Cotula coronopifolia	brass buttons	AF, FM	FACW+
Daucus carota	queen Anne's lace	AF	UPL
Dipsacus sylvestris	teasel	AF, R/U	NI
Epilobium ciliatum	fireweed	AF, R/U	
Epilobium sp.	fireweed	R/U	
Foeniculum vulgare	fennel	R/U	
Galium aparine	bedstraw	AF	
Geranium dissectum	cranes bill	AF	UPL
Grindelia stricta	gumplant	R/U	FACW
Hydrocotyle ranunculoides	hydrocotyle	FM	OBL
Hypericum perforatum	Klamath weed	R/U	
Hypocharis radicata	false dandeloin	AF	UPL
Jaumea carnosa	fleshy jaumea	SM	OBL
Limonium californicum	sea lavender	SM	OBL
Lotus corniculatus	bird's foot treefoil	AF	FAC
Malva sylvestris	cheeseweed	R/U	
Medicago polymorpha	bur clover	AF, R/U	
Melilotus alba	white sweetclover	AF	FACU+
Modiola caroliniana	scarlet cheeseweed	R/U	
Oenanthe sarmentosa	water parsely	FM	OBL
Parentecellia viscosa	parenticella	R/U	NI
Plantago lanceolata	english plantain	AF	FAC-
Polystichum munitum	sword fern	R/U	UPL
Potentilla anserina	pacific silverweed	FM, BM	OBL
Ranunculus muricatus	spiny-fruited buttercup	AF	
Ranunculus repens	creeping buttercup	AF	FACW
Raphanus sativa	wild radish	AF, R/U	UPL
Rumex acetocella	sheep sorrel	R/U, AF	FAC-
Rumex conglomeratus	clustered dock	AF, R/U	FACW
Rumex crispus	curly dock	AF, R/U	FACW-
Rumex pulcher	fiddle dock	AF, R/U	FAC+
Rumex salicifolius	narrow dock	AF	OBL
Salicornia virginica	pickleweed	SM	OBL
Sanicula crassicaulis	footsteps to spring	R/U	
Srophularia californica	bee plant	R/U	

Sonchus asper	sow thistle	R/U	
Taraxacum officinale	dandelion	R/U, AF	
Trifolium dubium	suckling clover	AF	FACU*
Trifolium repens	white clover	AF	FACU
Trifolium wormskoldii	purple clover	AF	
Triglochin maritimum	seaside arrowgrass	BM	OBL
Vicia sativa	common vetch	R/U	
Vicia villosa	hairy vetch	R/U	

Appendix B
Wildlife Species List

Appendix B. Wildlife Species Predicted and Observed on the McDaniel Slough Restoration Project Site, Arcata, California

Common Name	Scientific Name
CLASS: AMPHIBIA	
ORDER: CAUDATA (Salamanders)	
FAMILY: PLETHODONTIDAE (Lungless Salamanders)	
Ensatina	*Ensatina eschscholtzii*
Wandering Salamander	*Aniedes vagrans*
California Slender Salamander	*Batrachoseps pacificus*
FAMILY: SALAMANDRIDAE	
Rough-skin Newt	*Taricha granulose*
FAMILY: AMBYSTOMATIDAE	
Northwestern Salamander	*Ambystoma gracile*
FAMILY: RHYACOTRITONIDAE	
Southern Torrent Salamander	Rhyacotriton variegatus
ORDER: SALIENTIA (Frogs and Toads)	
FAMILY: BUFONIDAE (True Toads)	
Western Toad	*Bufo boreas*
FAMILY: HYLIDAE (Treefrogs and Relatives)	
Pacific Treefrog	*Hyla regilla*
FAMILY: RANIDAE (True Frogs)	
Bullfrog	*Rana catesbeiana*
Northern Red-legged Frog	*Rana aurora aurora*
ORDER: ANURA	
FAMILY: ASCAPHIDAE	
Tailed Frog	*Ascaphus truei*
CLASS: REPTILIA	
ORDER: TESTUDINATA (Turtles)	
FAMILY: EMYDIDAE (Pond and Marsh Turtles)	
Western Pond Turtle	*Clemmys marmorata*
ORDER: SQUAMATA (Lizards and Snakes)	
SUBORDER: SAURIA (Lizards)	
FAMILY: IGUANIDAE (Iguanids)	
Western Fence Lizard	*Sceloporus occidentalis*
FAMILY: SCINCIDAE (Skinks)	
Western Skink	*Eumeces skiltonianus*
SUBORDER: SERPENTES (Snakes)	
FAMILY: COLUBRIDAE (Colubrids)	
Ringneck Snake	*Diadophis punctatus*
Sharp-tailed Snake	*Contia tenuis*

Common Name	**Scientific Name**
Racer	*Coluber constrictor*
Gopher Snake	*Pituophis melanoleucus*
Common Garter Snake	*Thamnophis sirtalis*
Western Terrestrial Garter Snake	*Thamnophis elegens*
Western Aquatic Garter Snake	*Thamnophis couchi*
Northwestern Garter Snake	*Thamnophis ordinoides*
FAMILY: VIPERIDAE (Vipers)	
Western Rattlesnake	*Crotalus viridis*
CLASS: OSTEICHTHYES	
ORDER: PERCIFORMES	
FAMILY: GOBIOIDEI	
Arrow Goby	*Clevelandia ios*
Bay Goby	*Lepidogobius lepidus*
Tidewater Goby	*Eucylogobius newberryi*
ORDER: SALMONIFORMES	
FAMILY: SALMONIDAE	
Coast Cutthroat trout	*Oncorhynchus clarki clarki*
Coho Salmon	*Oncorhynchus kisutch*
Steelhead Trout	*Oncorhynchus mykiss*
Chinook Salmon	*Oncorhynchus tshawytscha*
ORDER: SCORPAENIFORMES	
FAMILY: COTTIDAE (Sculpins)	
Padded Sculpin	*Artedius fenestralis*
Pacific Staghorn Sculpin	*Leptocottus armatus*
Buffalo Sculpin	*Cottus asper*
Red Irish Lord	*Hemilepidotus hemilepidotus*
ORDER: OSMERIFORMES	
FAMILY: OSMERIDAE	
Longfin Smelt	*Spirinchus thaleichthys*
ORDER: ATHERINIFORMES	
FAMILY: ATHERINIDAE	
Topsmelt	*Atherinops affinis*
Jacksmelt	*Atherinopsis californiensis*
ORDER: GASTEROSTEIFORMES	
FAMILY: GASTEROSTEIDAE (Sticklebacks)	
Threespine Stickleback	*Gasterosteus aculeatus*
FAMILY: SYNGNATHIDAE	
Bay Pipefish	*Syngnathus leptorhynchus*
ORDER: PERCIFORMES	

Common Name	Scientific Name
FAMILY: EMBIOTOCIDAE	
Redtail Surfperch	*Amphistichus rhodoterus*
Shiner Perch	*Cymatogaster aggregata*
Striped Seaperch	*Embiotoca lateralis*
Walleye Surfperch	*Hyperprosopon Argenteum*
Silver Surfperch	*Hyperprosopon ellipticum*
FAMILY: PHOLIDAE	
Penpoint Gunnel	*Apodichthys flavidus*
Saddleback Gunnel	*Pholis ornate*
ORDER: PETROMYZONTIFORMES	
FAMILY: PETROMYZONTIDAE	
Pacific Lamprey	*Lampetra tridentata*
ORDER: HEXANCHIFORMES	
FAMILY: HEXANCHIDAE	
Sevengill Shark	*Notorynchus maculates*
ORDER: CARCHARHINIFORMES	
FAMILY: CARCHARHINIDAE	
Brown Smoothhound	*Mestelus henlei*
Leopard Shark	*Triakis semifasciata*
ORDER: RAJIFORMES	
FAMILY: MYLIOBATIDAE	
Bat Ray	*Myliobatis californica*
ORDER: PLEURONECTIFORMES	
FAMILY: PLEURONECTIDAE	
English Sole	*Parophrys vetulus*
Starry Flounder	*Platichthys stellatus*
FAMIILY: BOTHIDAE	
Speckled Sanddab	*Citharichthys stigmaeus*
Pacific Sanddab	*Citharichthys sordidus*
CLASS: AVES	
ORDER: GAVIIFORMES (Loons)	
FAMILY: GAVIIDAE	
Red-throated Loon	*Gavia stellata*
Pacific Loon	*Gavia pacifica*
Common Loon	*Gavia immer*
ORDER: PODICIPEDIFORMES (Grebes)	
FAMILY: PODICIPEDIDAE	
Pied-billed Grebe	*Podilymbus podiceps*
Horned Grebe	*Podiceps auritus*

Common Name	Scientific Name
Red-necked Grebe	*Podiceps grisegena*
Eared Grebe	*Podiceps nigricollis*
Western Grebe	*Aechmophorus occidentalis*
Clark's Grebe	*Aechmophorus clarkii*
ORDER: PELECANIFORMES (Totipalmate Swimmers)	
FAMILY: PELECANIDAE (Pelicans)	
American White Pelican	*Pelecanus erythrorhynchos*
California Brown Pelican	*Pelecanus occidentalis californicus*
FAMILY: PHALACROCORACIDAE (Cormorants)	
Brandt's Cormorant	*Phalacrocorax penicillatus*
Double-crested Cormorant	*Phalacrocorax auritus*
Pelagic Cormorant	*Phalacrocorax pelagicus*
ORDER: CICONIIFORMES (Herons, Ibises, Storks, American Vultures, and Allies)	
FAMILY: ARDEIDAE (Bitterns and Herons)	
American Bittern	*Botaurus lentiginosus*
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Snowy Egret	*Egretta thula*
Cattle Egret	*Bubulcus ibis*
Green Heron	*Butorides virescens*
Black-crowned Night Heron	*Nycticorax nycticorax*
FAMILY: THRESKIORNITHIDAE (Ibises and Spoonbills)	
White-faced Ibis	*Plegadis chihi*
FAMILY: CATHARTIDAE (New World Vultures)	
Turkey Vulture	*Cathartes aura*
ORDER: ANSERIFORMES (Screamers, Swans, Geese, and Ducks)	
FAMILY: ANATIDAE (Swans, Geese, and Ducks)	
Greater White-fronted Goose	*Anser albifrons*
Emperor Goose	*Chen canagica*
Snow Goose	*Chen caerulescens*
Ross's Goose	*Chen rossii*
Canada Goose	*Branta canadensis*
Aleutian Canada Goose	*B. c. leucopareia*
Brant	*Branta bernicla*
Trumpeter Swan	*Cygnus buccinator*
Tundra Swan	*Cygnus columbianus*
Wood Duck	*Aix sponsa*
Gadwall	*Anas strepera*

Common Name	**Scientific Name**
Eurasian Wigeon	*Anas Penelope*
American Wigeon	*Anas Americana*
Mallard	*Anas platyrhynchos*
Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Northern Shoveler	*Anas clypeata*
Northern Pintail	*Anas acuta*
Green-winged Teal	*Anas crecca*
Canvasback	*Aythya valisineria*
Redhead	*Aythya Americana*
Ring-necked Duck	*Aythya collaris*
Tufted Duck	*Aythya fuligula*
Greater Scaup	*Aythya marila*
Lesser Scaup	*Aythya affinis*
Surf Scoter	*Melanitta perspicillata*
White-winged Scoter	*Melanitta fusca*
Black Scoter	*Melanitta nigra*
Oldsquaw	*Clangula hyemalis*
Bufflehead	*Bucephala albeola*
Common Goldeneye	*Bucephala clangula*
Barrow's Goldeneye	*Bucephala islandica*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Ruddy Duck	*Oxyura jamaicensis*
ORDER: FALCONIFORMES (Diurnal Birds of Prey)	
FAMILY: ACCIPITRIDAE (Kites, Eagles, Hawks, and Allies)	
Osprey	*Pandion haliaetus*
White-tailed Kite	*Elanus caeruleus*
Bald Eagle	*Haliaeetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Ferruginous Hawk	*Buteo regalis*
Rough-legged Hawk	*Buteo lagopus*
Golden Eagle	*Aquila chrysaetos*
FAMILY: FALCONIDAE (Caracaras and Falcons)	

Common Name	Scientific Name
American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Peregrine Falcon	*Falco peregrinus*
Prairie Falcon	*Falco mexicanus*
ORDER: GALLIFORMES (Gallinaceous Birds)	
FAMILY: ODONTOPHORIDAE (New World Quail)	
California Quail	*Callipepla californica*
ORDER: GRUIFORMES (Cranes, Rails, and Allies)	
FAMILY: RALLIDAE (Railes, Gallinules, and Coots)	
Virginia Rail	*Rallus limicola*
Sora	*Porzana carolina*
Common Moorhen	*Gallinula chloropus*
American Coot	*Fulica Americana*
FAMILY: GRUIDAE (Cranes)	
Sandhill Crane	*Grus canadensis*
ORDER: CHARADRIIFORMES (Shorebirds, Gulls, Auks, and Allies)	
FAMILY: CHARADRIIDAE	
Black-bellied Plover	*Pluvialis squatarola*
American Golden Plover	*Pluvialis dominica*
Pacific Golden Plover	*Pluvialis fulva*
Snowy Plover	*Charadrius alexandrinus*
Semipalmated Plover	*Charadrius semipalmatus*
Killdeer	*Charadrius vociferus*
Mountain Plover	*Charadrius montanus*
FAMILY: RECURVIROSTRIDAE (Stilts and Avocets)	
Black-necked Stilt	*Himantopus mexicanus*
American Avocet	*Recurvirostra americana*
FAMILY: SCOLOPACIDAE (Sandpipers, Phalaropes, and Allies)	
Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Solitary Sandpiper	*Tringa solitaria*
Willet	*Catoptrophorus semipalmatus*
Spotted Sandpiper	*Actitis macularia*
Whimbrel	*Numenius phaeopus*
Long-billed Curlew	*Numenius americanus*
Hudsonian Godwit	*Limosa haemastica*
Marbled Godwit	*Limosa fedoa*
Ruddy Turnstone	*Arenaria interpres*
Red Knot	*Calidris canutus*

Common Name	**Scientific Name**
Sanderling	*Calidris alba*
Semipalmated Sandpiper	*Calidris pusilla*
Western Sandpiper	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
Baird's Sandpiper	*Calidris bairdii*
Pectoral Sandpiper	*Calidris melanotos*
Sharp-tailed Sandpiper	*Calidris acuminata*
Dunlin	*Calidris alpina*
Stilt Sandpiper	*Calidris himantopus*
Buff-breasted Sandpiper	*Tryngites subruficollis*
Ruff	*Philomachus pugnax*
Short-billed Dowitcher	*Limnodromus griseus*
Long-billed Dowitcher	*Limnodromus griseus*
Common Snipe	*Gallinago gallinago*
Wilson's Phalarope	*Phalaropus tricolor*
Red-necked Phalarope	*Phalaropus lobatus*
Red Phalarope	*Phalaropus fulicaria*
FAMILY: LARIDAE (Skuas, Gulls, Terns, and Skimmers)	
Franklin's Gull	*Larus pipixcan*
Little Gull	*Larus minutus*
Black-headed Gull	*Larus ridibundus*
Bonaparte's Gull	*Larus philadelphia*
Heermann's Gull	*Larus heermanni*
Mew Gull	*Larus canus*
Ring-billed Gull	*Larus delawarensis*
California Gull	*Larus californicus*
Herring Gull	*Larus argentatus*
Thayer's Gull	*Larus thayeri*
Western Gull	*Larus occidentalis*
Glaucous-winged Gull	*Larus glaucescens*
Glaucous Gull	*Larus hyperboreus*
Caspian Tern	*Sterna caspia*
Elegant Tern	*Sterna elegans*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Least Tern	*Sterna antillarum*
Black Tern	*Chlidonias niger*
ORDER: COLUMBIFORMES (Sandgrouse, Pigeons and Doves)	
FAMILY: COLUMBIDAE (Pigeons and Doves)	

Common Name	Scientific Name
Rock Dove	*Columba livia*
Mourning Dove	*Zenaida macroura*
ORDER: STRIGIFORMES (Owls)	
FAMILY: TYTONIDAE (Barn Owls)	
Barn Owl	*Tyto Alba*
FAMILY: STRIGIDAE (Typical Owls)	
Western Screech Owl	*Otus kennicottii*
Great Horned Owl	*Bubo virginianus*
Snowy Owl	*Nyctea scandiaca*
Burrowing Owl	*Athene cunicularia*
Long-eared Owl	*Asio otus*
Short-eared Owl	*Asio flammeus*
ORDER: CAPRIMULGIFORMES (Goatsuckers, Oilbirds, and Allies)	
FAMILY: CAPRIMULGIDAE (Goatsuckers)	
Common Nighthawk	*Chordeiles minor*
ORDER: APODIFORMES (Swifts and Hummingbirds)	
FAMILY: APODIDAE (Swifts)	
Vaux's Swift	*Chaetura vauxi*
FAMILY: TROCHILIDAE (Hummingbirds)	
Anna's Hummingbird	*Calypte anna*
Rufous Hummingbird	*Selasphorus rufus*
Allen's Hummingbird	*Selasphorus sasin*
ORDER: CORACIIFORMES (Kingfishers and Relatives)	
FAMILY: ALCEDINIDAE (Kingfishers)	
Belted Kingfisher	*Ceryle alcyon*
ORDER: PICIFORMES (Woodpeckers and Relatives)	
FAMILY: PICIDAE (Woodpeckers)	
Red-breasted Sapsucker	*Sphyrapicus nuchalis*
Downy Woodpecker	*Picoides pubescens*
Northern Flicker	*Colaptes auratus*
ORDER: PASSERIFORMES (Passerine Birds)	
FAMILY: TYRANNIDAE (Tyrant Flycatchers)	
Olive-sided Flycatcher	*Contopus borealis*
Western Wood-Pewee	*Contopus sordidulus*
Willow Flycatcher	*Empidonax trailii*
Pacific-slope Flycatcher	*Empidonax difficilis*
Black Phoebe	*Sayornis nigricans*
Ash-throated Flycatcher	*Myiarchus cineriascens*
Western Kingbird	*Tyrannus verticalis*

Common Name	Scientific Name
Eastern Kingbird	*Tyrannus tyrannus*
FAMILY: LANIIDAE (Shrikes)	
Loggerhead Shrike	*Lanius ludovicianus*
Northern Shrike	*Lanius excubitor*
FAMILY: VIREONIDAE (Typical Vireos)	
Cassin's Vireo	*Vireo vociferous*
Hutton's Vireo	*Vireo huttoni*
Warbling Vireo	*Vireo gilvus*
FAMILY: CORVIDAE (Jays, Magpies, and Crows)	
Steller's Jay	*Cyanocitta stelleri*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
FAMILY: ALAUDIDAE (Larks)	
Horned Lark	*Eremophila alpestris*
FAMILY: HIRUNDINIDAE (Swallows)	
Purple Martin	*Progne subis*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Hirundo pyrrhonota*
Barn Swallow	*Hirundo rustica*
FAMILY: PARIDAE (Titmice)	
Black-capped Chickadee	*Poecile atricapillus*
Chestnut-backed Chickadee	*Poecile rufescens*
FAMILY: AEGITHALIDAE (Bushtit)	
Bushtit	*Psaltriparus minimus*
FAMILY: TROGLODYTIDAE (Wrens)	
Bewick's Wren	*Thryomanes bewickii*
House Wren	*Troglodytes aedon*
Winter Wren	*Troglodytes troglodytes*
Marsh Wren	*Cistothorus palustris*
FAMILY: REGULIDAE (Kinglets)	
Ruby-crowned Kinglet	*Regulus calendula*
FAMILY: TURDIDAE (Solitaires, Thrushes, and Allies)	
Western Bluebird	*Sialia mexicana*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
American Robin	*Turdus migratorius*

Common Name	Scientific Name
FAMILY: TIMALIIDAE (Babblers)	
Wrentit	*Chamaea fasciata*
FAMILY: MIMIDAE (Mockingbirds and Thrashers)	
Northern Mockingbird	*Mimus polyglottus*
Sage Thrasher	*Oreoscoptes montanus*
FAMILY: STURNIDAE (Starlings)	
European Starling	*Sturnus vulgaris*
FAMILY: MOTACILLIDAE (Wagtails and Pipits)	
Red-throated Pipit	*Anthus cervinus*
American Pipit	*Anthus rubescens*
FAMILY: BOMBYCILLIDAE (Waxwings)	
Cedar Waxwing	*Bombycilla cedrorum*
FAMILY: PARULIDAE (Wood Warblers)	
Orange-crowned Warbler	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
Yellow Warbler	*Dendroica petechia*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Gray Warbler	*Dendroica nigrescens*
Townsend's Warbler	*Dendroica townsendi*
Hermit Warbler	*Dendroica occidentalis*
Palm Warbler	*Dendroica palmarum*
Northern Waterthrush	*Seiurus noveboracensis*
MacGillvray's Warbler	*Oporornis tolmiei*
Common Yellowthroat	*Geothlypis trichas*
Wilson's Warbler	*Wilsonia pusilla*
FAMILY: THRAUPIDAE (Tanagers)	
Western Tanager	*Piranga ludoviciana*
FAMILY: EMBERIZIDAE (Emberizines)	
Spotted Towhee	*Pipilo maculatus*
California Towhee	*Pipilo crissalis*
American Tree Sparrow	*Spizella arborea*
Chipping Sparrow	*Spizella passerina*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
Swamp Sparrow	*Melospiza georgiana*
White-throated Sparrow	*Zonotrichia albicollis*
White-crowned Sparrow	*Zonotrichia leucophrys*

Common Name	**Scientific Name**
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Sharp-tailed Sparrow	*Ammodramus caudacutus*
Dark-eyed Junco	*Junco hyemalis*
Lapland Longspur	*Calcarius pictus*
Chestnut-collared Longspur	*Calcarius ornatus*
FAMILY: CARDINALIDAE (Cardinals, Grosbeaks, and Relatives)	
Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
FAMILY: ICTERIDAE (Icterines)	
Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*
Tricolored Blackbird	*Agelaius tricolor*
Western Meadowlark	*Sturnella neglecta*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
Brewer's Blackbird	*Euphagus cyanocephalus*
Brown-headed Cowbird	*Molothrus ater*
Bullock's Oriole	*Icterus bullockii*
FAMILY: FRINGILLIDAE (Finches)	
Brambling	*Fringilla montifringilla*
Purple Finch	*Carpodacus purpureus*
House Finch	*Carpodacus mexicanus*
Pine Siskin	*Carduelis pinus*
Lesser Goldfinch	*Carduelis psaltria*
American Goldfinch	*Carduilis tristis*
FAMILY: PASSERIDAE (Old World Sparrows)	
House Sparrow	*Passer domesticus*
CLASS: MAMMALIA	
ORDER: MARSUPIALIA (Opossums, Kangaroos, and Relatives)	
FAMILY: DIDELPHIDAE (Opossums)	
Virginia Opossum	*Didelphis virginiana*
ORDER: INSECTIVORA (Shrews and Moles)	
FAMILY: SORICIDAE (Shrews)	
Pacific Shrew	*Sorex pacificus*
Marsh Shrew *Sorex bendirii*	
FAMILY: TALPIDAE (Moles)	
Shrew-mole	*Neurotrichus gibbsi*
Townsend's Mole	*Scapanus townsendii*
Coast Mole	*Scapanus orarius*

Common Name	Scientific Name
ORDER: CHIROPTERA (Bats)	
FAMILY: VESPERTILIONIDAE (Vespertilionid Bats)	
Little Brown Myotis	*Myotis lucifugus*
Yuma Myotis	*Myotis yumanensis*
California Myotis	*Myotis californicus*
Red Bat	*Lasiurus borealis*
Big Brown Bat	*Eptesicus fuscus*
Hoary Bat	*Lasiurus cinereus*
Pallid Bat	*Antrozous pallidus pacificus*
Townsend's Big-eared Bat	*Plecotus townsendii*
ORDER: LAGOMORPHA (Rabbits, Hares, and Pikas)	
FAMILY: LEPORIDAE (Rabbits and Hares)	
Brush Rabbit	*Sylvilagus bachmani*
Black-tailed Hare	*Lepus californicus*
ORDER: RODENTIA (Squirrels, Rats, Mice, and Relatives)	
FAMILY: SCIURIDAE (Squirrels, Chipmunks, and Marmots)	
California Ground Squirrel	*Spermophilus beecheyi*
FAMILY: GEOMYIDAE (Pocket Gophers)	
Botta's Pocket Gopher	*Thomomys bottae*
FAMILY: CRICETIDAE (Deer Mice, Voles, and Relatives)	
Western Harvest Mouse	*Reithrodontomys megalotis*
Deer Mouse	*Peromyscus maniculatus*
California Vole	*Microtus californicus*
Townsend's Vole	*Microtus townsendii*
Long-tailed Vole	*Microtus longicaudus*
Creeping Vole	*Microtus oregoni*
FAMILY: MURIDAE	
Black Rat	*Rattus rattus*
Norway Rat	*Rattus norvegicus*
House Mouse	*Mus Musculus*
ORDER: CARNIVORA (Carnivores)	
FAMILY: CANIDAE (Foxes, Wolves, and Relatives)	
Gray Fox	*Urocyon cinereoargenteus*
FAMILY: PROCYONIDAE (Raccoons and Relatives)	
Raccoon	*Procyon lotor*
FAMILY: MUSTELIDAE (Weasels, Badgers, and Relatives)	
Mink	*Mustela vison*
Striped Skunk	*Mephitis mephitis*
FAMILY: FELIDAE (Cats)	

Common Name	**Scientific Name**
Feral Cat	*Felis catus*

Appendix C
MARSH98 Sedimentation Model

C.1 INTRODUCTION

The FORTRAN program "MARSH98" estimates the long term sedimentation of constructed and natural marshes and marsh plains. The program, proprietary to PWA, utilizes Krone's approach of marsh plain modeling.

C.2 BACKGROUND

According to Krone, the elevation of a marsh plain rises at rates that depend on the (1) availability of suspended sediment and (2) depth and periods of inundation by high tides (Krone, 1987). When the level of an evolving marsh surface is low with respect to the tidal range, sedimentation rates may be high if the suspended sediment supply is ample. However, as the marsh surface aggrades through the tidal range, the frequency and duration of flooding by high tides is diminished so that the rate of sediment accumulation declines.

As laid out by Krone (Krone, 1987), MARSH 98 calculates the amount of suspended sediment that deposits during each period of tidal inundation and sums that amount of deposition over the period of record.

C.3 METHODS

MARSH 98 is based on methods devised by Professor R.B. Krone of UC Davis and reported in his 1987 paper (Krone, 1987). The algorithm is centered around the mass balance of suspended sediment throughout the water column. The equation for this balance is:

On the flood tide when $\frac{d\eta}{dt} \geq 0$,

$$(\eta - z)\frac{dC}{dt} = -V_s C + (C_o - C)\frac{d\eta}{dt}$$

On the ebb tide when $\frac{d\eta}{dt} < 0$,

$$(\eta - z)\frac{dC}{dt} = -V_s C$$

where:

η = Water surface elevation,
z = Marsh plain elevation,
C = Suspended sediment concentration,
t = Time,
V_s = Settling velocity, and
C_o = Ambient suspended sediment concentration of flood laden waters.

The major underlying assumption with the mass balance equation is that all material that settles to the bed becomes permanent marsh plain material and is not scoured by ebb currents, large waves, or storm conditions. The settling velocity for suspended particles has the following relationship:

$$V_s = KC^{4/3}$$

where:

V_s = Settling velocity,
K = A constant (0.00011 when units are S.I. Metric), and
C = Suspended sediment concentration.

Accumulation of material on the bed is determined by the following equation:

$$\Delta z = \frac{\int_t V_s C dt}{C_d}$$

where:

Δz = Change in bed elevation,
V_s = Settling velocity,
C = Suspended sediment concentration, and
C_d = Dry density of inorganic material in the deposit.

On the flood tide, the storage of suspended sediment in the water column is affected by (1) re-supply from the sediment laden flood waters (inflow), and (2) deposition to the marsh surface (outflow)— the suspended sediment concentration is affected by both of these processes. On the ebb tide, the storage is affected by (1) ebb waters that remove sediment (outflow), and (2) deposition on the marsh surface (outflow)— the suspended sediment concentration is only affected by the depositional process. MARSH 98 can perform the mass balance when the marsh surface is subtidal (always submerged) or intertidal (submerged only part of the time) and can transition between the two states.

Using a series of successively correcting and approximating half- and full-step advances, the algorithm moves the solution forward through time. The technique is very similar to how a second order Runge-Kutta ODE integrator would integrate the equations and advance the solution in time. The exact numerical recipe is laid out by Krone in his 1987 paper.

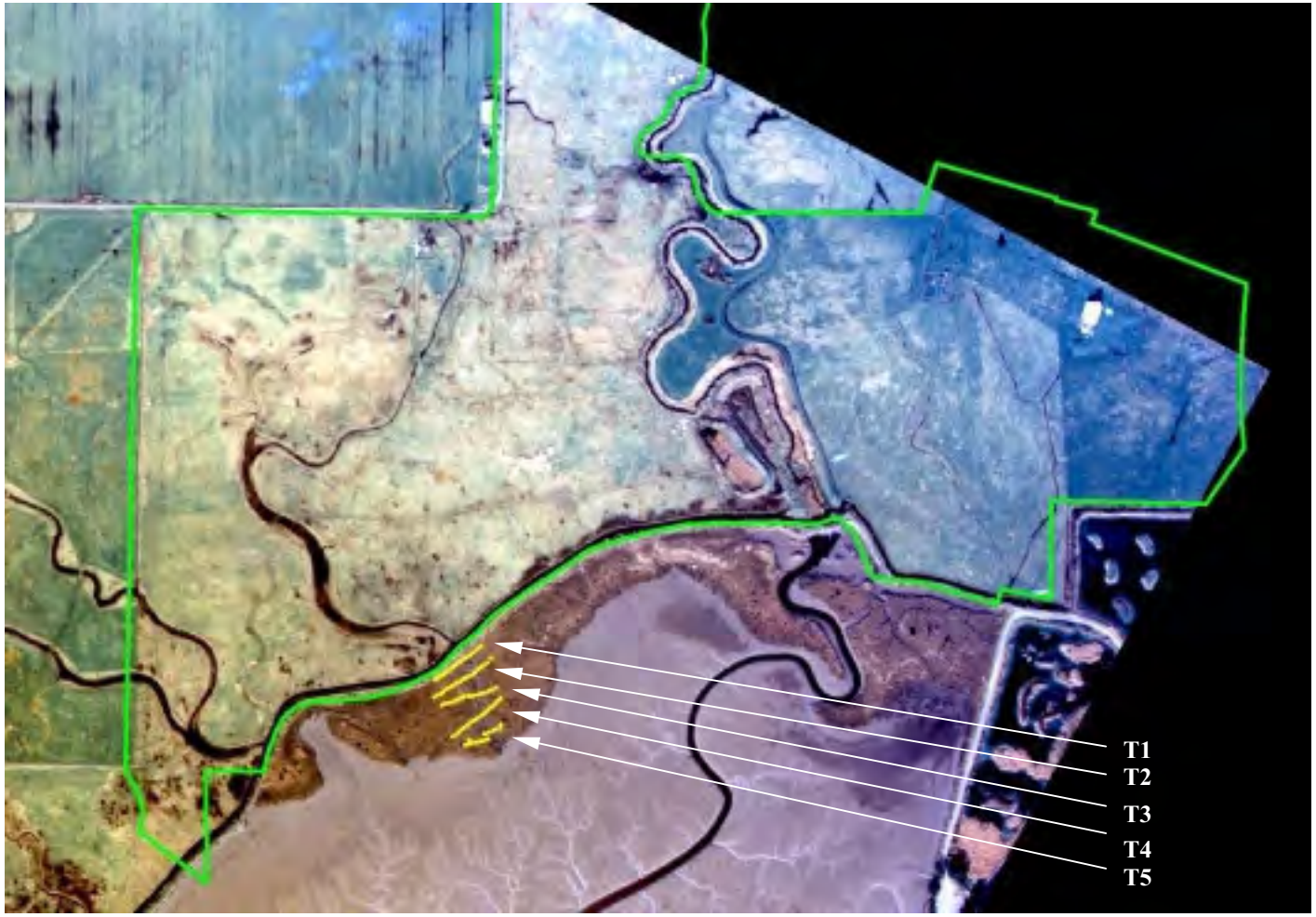
C.4 REFERENCES

Krone, R.B. "A Method for Simulating Historic Marsh Elevations." *Coastal Sediments '87. Proceedings of the Specialty Conference on Quantitative Approaches to Coastal Sediment Processes*. New Orleans, LA. May 12-14. 1987. 316-323.

Krone, R.B. "Simulation of Marsh Growth Under Rising Sea Levels." *Hydraulics and Hydrology in the Small Computer Age. Proceedings of the Specialty Conference, Hydraulics Division, ASCE*. Lake Buena Vista, FL. August 12-17. 1985. 106-115.

R.B. Krone & Associates. *Tidal Marsh Restoration at Bel Marin Keys*. Prepared for California Quartet, Ltd. January 17, 1996.

Appendix D
Outboard Marsh Vegetation Survey



Outboard marsh vegetation transect

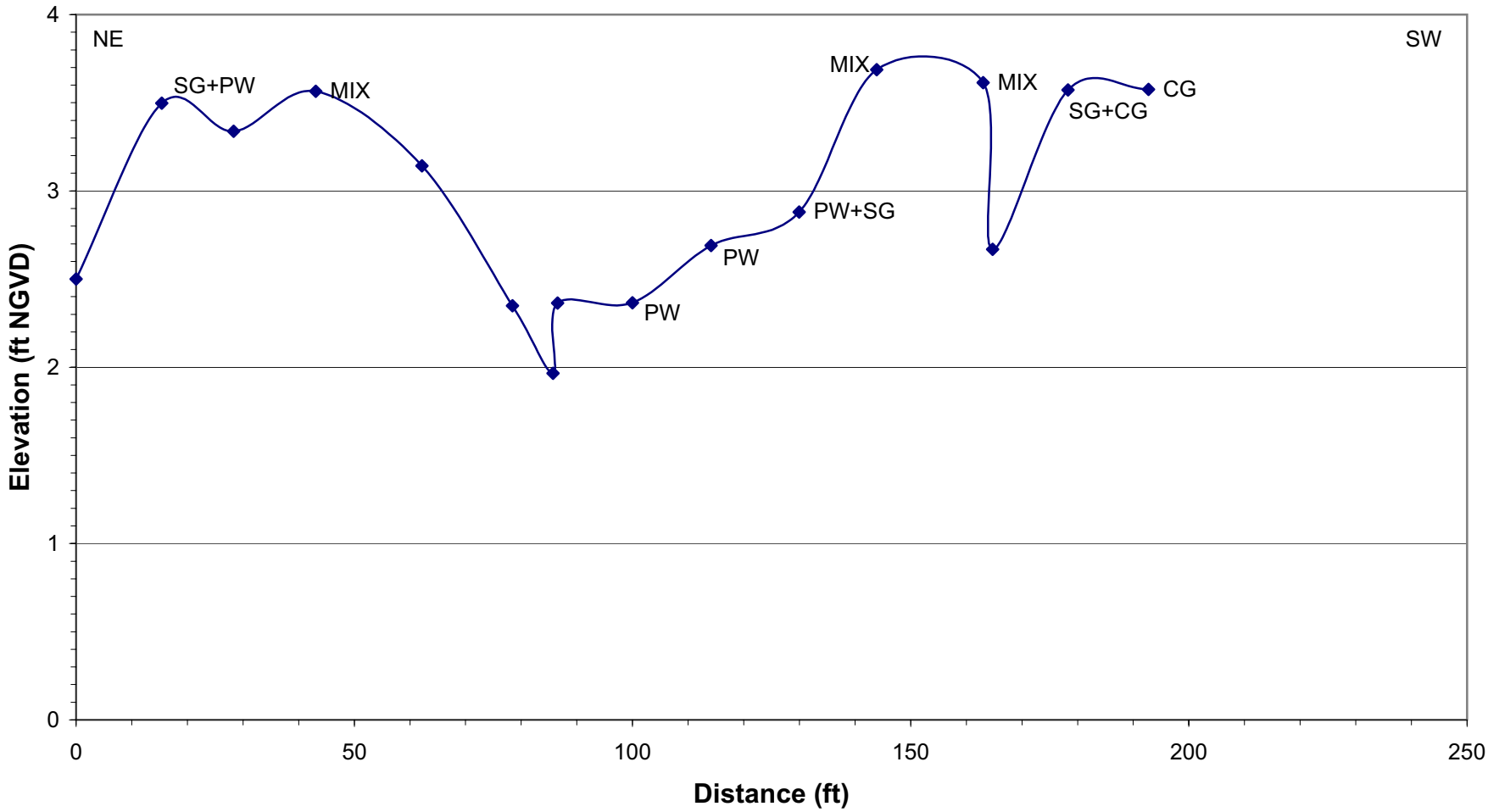
figure D-1

McDaniel Slough

Location of Outboard Marsh Vegetation Transects

PWA#1424

PWA



Notes: 'CG' = cordrass (*Spartina densiflora*)
'PW' = pickleweed (*Salicornia virginica*)
'SG' = salt grass (*Distichilis spicata*)
'+' indicates mix of vegetation and '/' indicates a break in vegetation

Source: PWA survey, 8/21/00

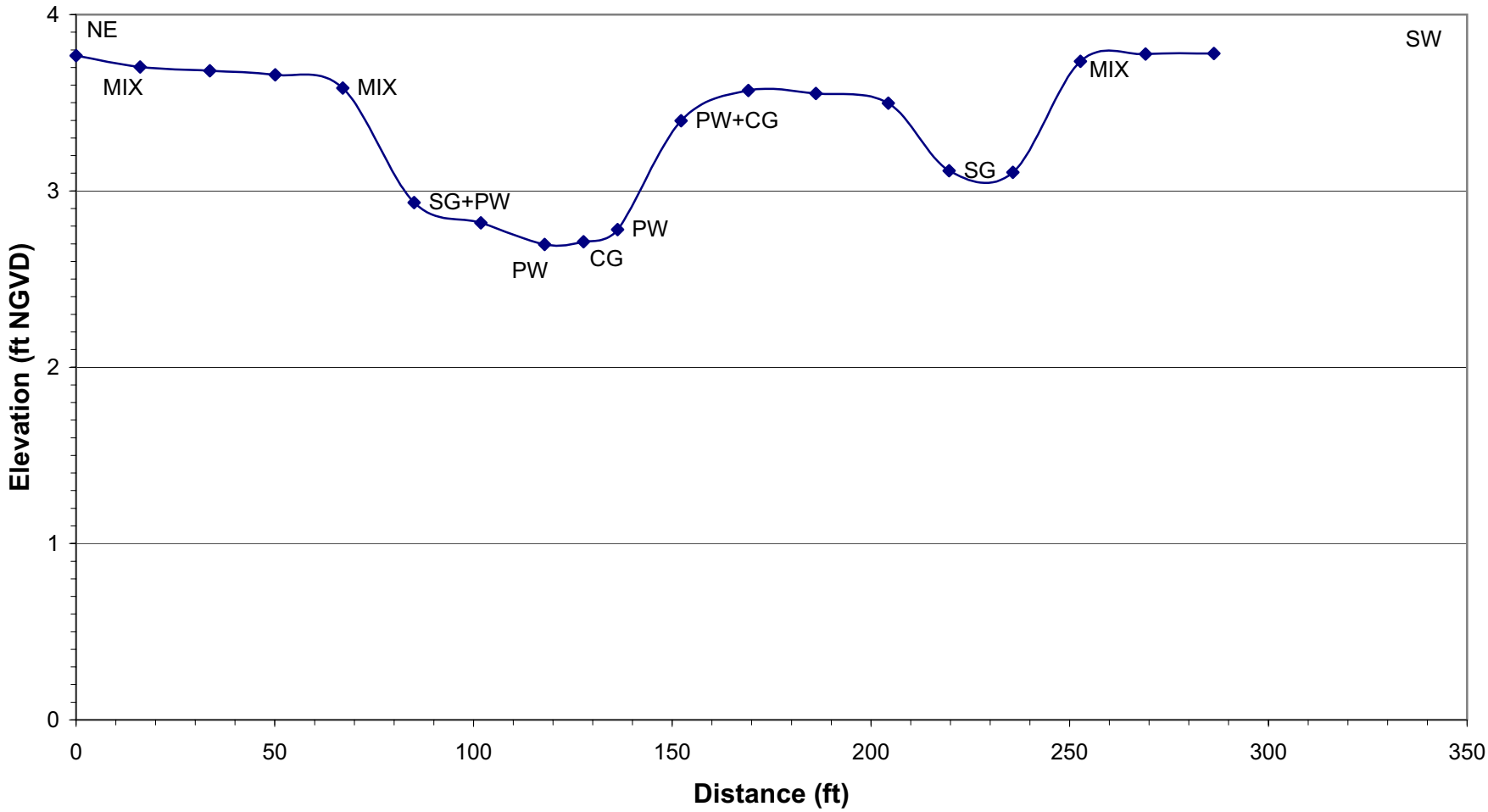
figure D-2

McDaniel Slough

Outboard Marsh Vegetation Transect 1

PWA#1424

PWA



Notes: 'CG' = cordrass (*Spartina densiflora*)
'PW' = pickleweed (*Salicornia virginica*)
'SG' = salt grass (*Distichilis spicata*)
'+' indicates mix of vegetation and '/' indicates a break in vegetation

Source: PWA survey, 8/21/00

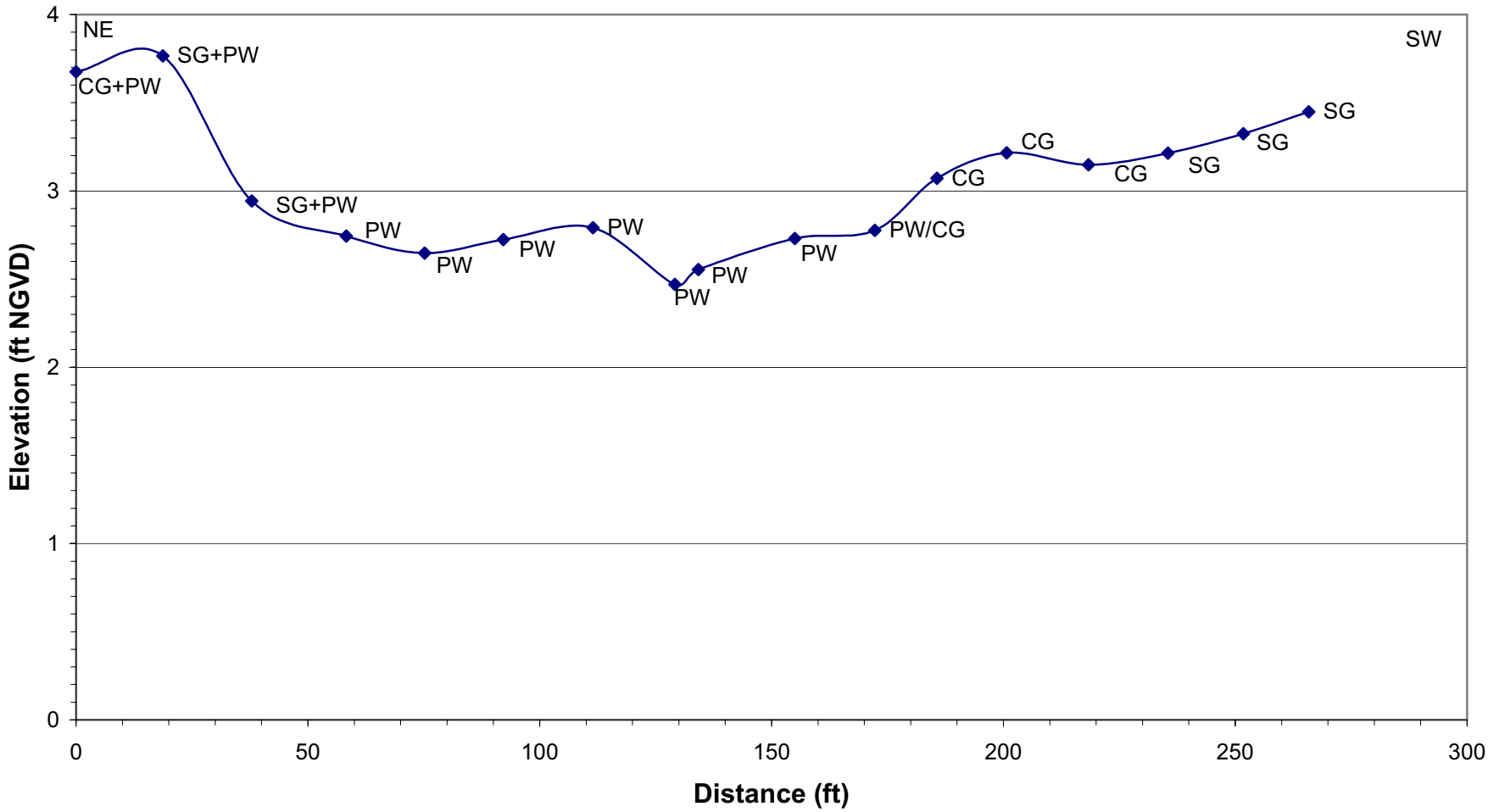
figure D-3

McDaniel Slough

Outboard Marsh Vegetation Transect 2

PWA#1424

PWA



Notes: 'CG' = cordrass (*Spartina densiflora*)
'PW' = pickleweed (*Salicornia virginica*)
'SG' = salt grass (*Distichilis spicata*)
'+' indicates mix of vegetation and '/' indicates a break in vegetation

Source: PWA survey, 8/21/00

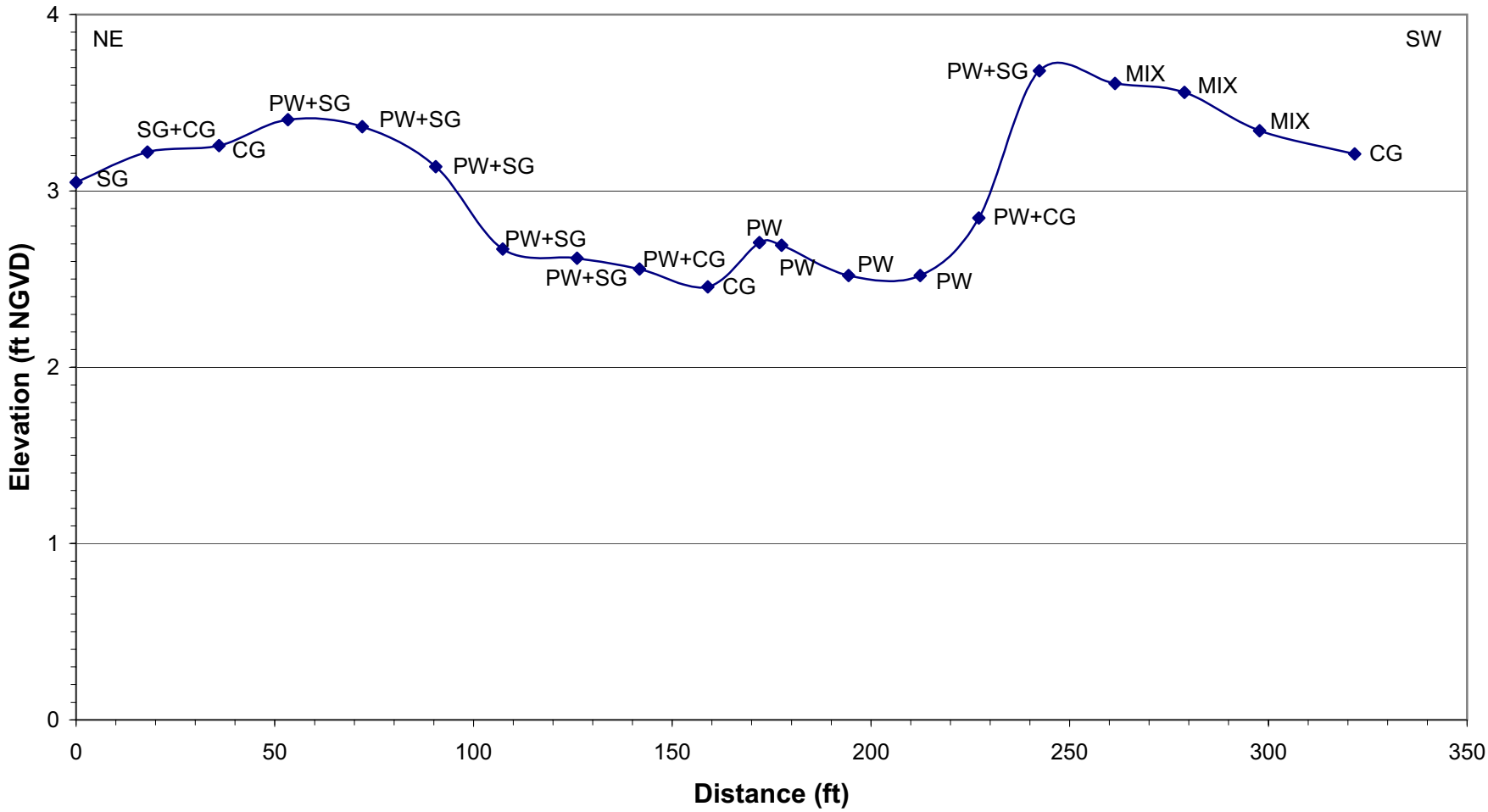
figure D-4

McDaniel Slough

Outboard Marsh Vegetation Transect 3

PWA#1424

PWA



Notes: 'CG' = cordrass (*Spartina densiflora*)
'PW' = pickleweed (*Salicornia virginica*)
'SG' = salt grass (*Distichilis spicata*)
'+' indicates mix of vegetation and '/' indicates a break in vegetation

Source: PWA survey, 8/21/00

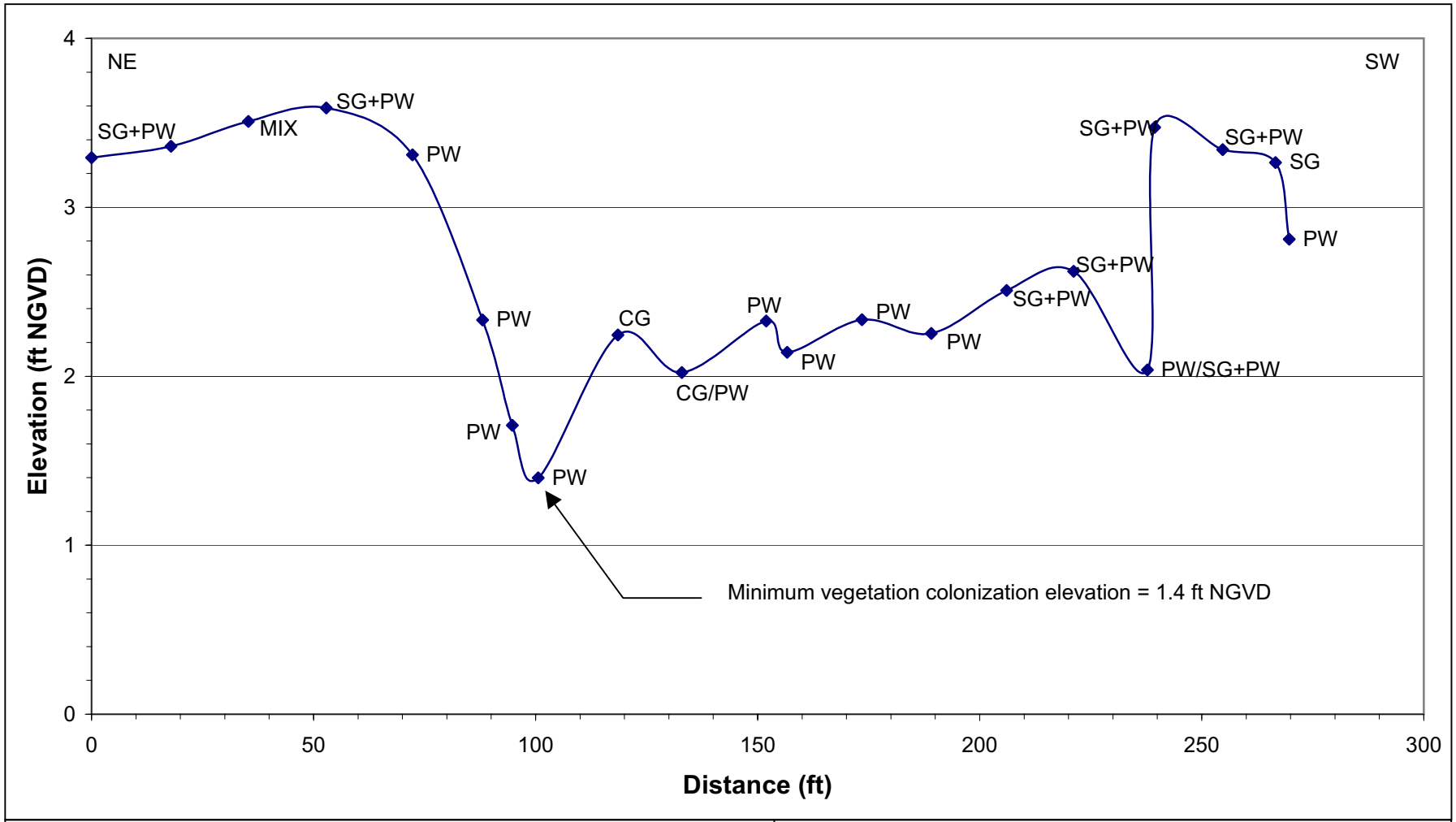
figure D-5

McDaniel Slough

Outboard Marsh Vegetation Transect 4

PWA#1424

PWA



Notes: 'CG' = cordrass (*Spartina densiflora*)
'PW' = pickleweed (*Salicornia virginica*)
'SG' = salt grass (*Distichilis spicata*)
'+' indicates mix of vegetation and '/' indicates a break in vegetation

Source: PWA survey, 8/21/00

figure D-6

McDaniel Slough

Outboard Marsh Vegetation Transect 5

PWA#1424

PWA

City of Arcata
California Dept. of Fish & Game

McDaniel Slough Wetland Enhancement Project

Final EIR
December 2006
State Clearing House #2003022091

Volume 1 - Comments, Responses, & Attachments
for Draft EIR, December 2006

Volume 1 of 2

McDaniel Slough
Marsh Enhancement Project
Final EIR – December 2006
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Introduction

California Environmental Quality Act Process

On March 27, 2006 the City of Arcata released the Draft Environmental Impact Report (DEIR) for the McDaniel Slough Wetland Enhancement Project for public review. The City of Arcata lead agency for the Project will use the EIR to comply with state of California Environmental Quality Act (CEQA) requirements. The 45-day public review and comment period for the DEIR ended on May 9, 2006.

The DEIR and this Response to Comments document constitute the Final EIR for the proposed Project. Under CEQA, before approving the Project or any City actions under the Plan, City will need to certify that the Final EIR is complete and adequate to make the necessary findings for project approval. A certified EIR indicates the following:

• The document complies with CEQA;
• The decision-making body of the lead agency reviewed and considered the Final EIR prior to approving the project; and
• The Final EIR reflects the lead agency's independent judgment and analysis.

Volume I

This volume contains public comments and responses to comments on the DEIR.

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Public Participation and Review

The City of Arcata notified all Responsible, Trustee and Reviewing agencies, interested groups, organizations, and individuals that a DEIR had been completed for the proposed Project. The City of Arcata used several methods to notice the availability of the DEIR and to solicit input during the review period, including:

• A Notice of Preparation (NOP) for the EIR was issued on February 13, 2003. The NOP was circulated through the State Clearinghouse and 14 copies were sent to Responsible Trustee and Reviewing agencies, adjacent property owners, selected interest groups, organizations and individuals.

• A Notice of Completion (NOC) and 15 copies of the DEIR were filed with the State Clearinghouse on March 27, 2006. An official 45-day state review period for the DEIR was established by the State Clearinghouse, ending on May 9, 2006.

• Copies of the DEIR were distributed to state, regional, and local agencies, and were made available at the Arcata Public Library, Humboldt State University-Humboldt Room, Arcata City Hall, Department of Fish and Game-Eureka Office and the Northcoast Environmental Center. The DEIR was also posted on the City of Arcata website and several electronic copies of the DEIR was made available to individuals requesting the document.

• A copy of the Final EIR (Volume I) and DEIR (Volume II) have been posted on the following website: http://www.arcatacityhall.org

Five separate organizations and or and individuals provided substantive and constructive comments. Comments are provided in Appendix "A" of this volume of the Final EIR. No new significant impacts were identified and no revisions have been made to the Draft EIR due to comments received.

Due to comments received the Final EIR eliminates the proposed pedestrian pathway located between Allen Marsh and the proposed brackish marsh to limit potential impacts to wildlife habitat. A trail link from Samoa Blvd to the project area along side the railroad corridor has also been eliminated from this project. This trail link may become viable in a future project but is out of the scope of this project, as the sponsoring agency does not currently have access across private lands. The site map listed as Appendix "B" details the revised site plan and trail network.

Background

The McDaniel Sough Wetland Enhancement Project involves the development, design, and ultimate implementation of a comprehensive coastal wetlands enhancement plan for the lower end of Janes Creek on McDaniel Slough, Arcata, California. The project includes restoration of tidal estuary function, creation of brackish marsh and freshwater pond habitat and a public access component.

The goal of the McDaniel Slough Marsh Enhancement Proposed Project, as specified by the City of Arcata, DFG and California Coastal Conservancy, is:

> "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

The Proposed Project goal, as described above, in combination with the specific objectives listed below, was used as the basis for evaluating the Proposed Project and alternatives in the DEIR.

Primary Objectives

1. Maximize the opportunity for restoring a large area of tidal marsh habitat dominated by pickleweed.

2. Provide unimpeded access for anadromous fish migration between Humboldt Bay and McDaniel Slough.
3. Create a tidal channel system that maximizes the estuarine fisheries habitat in large high-order subtidal channels.
4. Provide connectivity of habitats using "ecolevees" to create a gradation between the salt marsh/mudflat habitats and uplands.
5. Provide connectivity with existing habitats which also include freshwater meadows, riparian, fresh and brackish marsh) at the Arcata Marsh and Wildlife Sanctuary and the CDFG Mad River Slough Wildlife Area.
6. Achieve desired wetland ecologic function as rapidly as possible for the freshwater and brackish water ponds and within a period of a few decades for the establishment of salt marsh habitat.
7. Alleviate rural and urban area flooding due to tide gate restrictions.

Secondary Objectives

1. Create a visually appealing landscape.
2. Provide opportunities for public access, education and recreation.
3. Create a passively managed system to the greatest extent possible that minimizes the need for maintenance activities on the site.
4. Breach the Bay-front levee to achieve reduced flooding upstream of Samoa Boulevard and increase tidal scour in lower Janes Creek.

Essential to the project is the restoration of the slough's tidal functions, to be accomplished by eliminating the four tidegates that restrict bay water from entering Janes Creek.

The Department of Fish and Game (DFG) is responsible for the long-term management of their land (west of the slough channel). The City of Arcata is responsible for the long-term management of the area ease of the slough channel, and is acting as CEQA lead agency, grant recipient and project manager for design, permitting and implementation, of proposed enhancement activities on the DFG property as well as the City owned lands.

CONCLUSIONS

The primarily short-term impacts of the project are mitigated and outweighed by the anticipated benefits of the Proposed Project to habitat, plants, public access, hydrology, fish and wildlife. Furthermore, the site was purchased primarily with public funds, for the expressed purposes of habitat protection and restoration. Restoring tidal function at the McDaniel Slough site directly supports the primary elements of funds obtained from the California Coastal Conservancy (CCC), the State of California Wildlife Conservation Board (WCB), the State of California Environmental Enhancement and Mitigation Program (EEMP), and the United State Fish and Wildlife Service administered North American Waterfowl Conservation Act (NAWCA) and is consistent with the intended use of these funds.

The project would result in a permanent loss of agricultural lands and some long-term visual impacts. On the whole, however, the project would create a net benefit to many resources, as summarized below:

• Helping to restore aquatic functions by opening the tidal channel and maintaining tidal exchange between the bay and wetlands, thereby improving water quality and health of wetland habitat.
• Restoring habitat and improving existing habitat values, thereby benefiting listed species (Pt. Reyes bird's beak, Humboldt Bay owl's clover, tidewater goby, Coho salmon, Chinook salmon).
• Increasing acreage of tidal habitats with beneficial impacts on associated species.
• Improving functions and values of existing tidal habitats with beneficial impacts on associated species.
• Enhancing functions and values of seasonal wetlands with beneficial impacts on associated species.
• Restoring native uplands with beneficial impacts on associated species.
• Enhancing fresh and brackish water marsh and riparian woodland habitats.
• Preserving the site in open space and restoring a number of filled and otherwise degraded areas with native vegetation, thereby improving the overall aesthetic qualities of the site.
• Providing additional recreational opportunities in areas currently not available to public use through the design and implementation of a trail system and interpretive signage.
• Increasing channel capacity and improving the overall drainage of lower Janes Creek

Findings

CEQA sets forth certain mandatory findings of significance. The proposed Restoration Plan has been analyzed, and it has been found that it will not:

- Substantially degrade environmental quality;
- Substantially reduce fish or wildlife habitat;
- Cause a fish or wildlife habitat to fall below self-sustaining levels;
- Threaten to eliminate a plant or animal community;
- Reduce the numbers or range of a rare, threatened, or endangered species;
- Eliminate important examples of the major periods of California history or pre-history;
- Achieve short term goals to the disadvantage of long term goals;
- Have possible environmental effects that are individually limited but cumulatively considerable when viewed in connection with past, current, and reasonably anticipated future projects; or
- Have environmental effects that will directly or indirectly cause substantial adverse effects on humans.

Executive Summary

Under the requirements of the California Environmental Quality Act (CEQA), a Final Environmental Impact Report (Final EIR or FEIR) is required to contain: (i) the Draft EIR; (ii) comments or recommendations received by the lead agency during the public comment period concerning the Draft EIR, either verbatim or in summary; (iii) a list of persons, organizations, or individuals commenting on the Draft EIR; (iv) the responses of the lead agency to "significant environmental points" identified during the review process; and (v) anything else that the lead agency determines should be added (Guidelines Section 15132).

With respect to the first point above, the Draft EIR (or "DEIR") for the McDaniel Slough Wetland Enhancement Project is part of this Final EIR. The City of Arcata and the California Department of Fish and Game have not made, and do not intend to make, significant changes in the content of the Draft EIR's

text, tables, or figures. With respect to the second point, copies of all comment letters are included and summarized in this Final EIR. This Final EIR also includes a listing of the persons and organizations that commented upon the Draft EIR, the third requirement listed above. The fourth component, comments that raise "significant environmental points" about the EIR and the City and the Department's response comprise the bulk of this FEIR.

How This Final EIR Manages (iv) Comments and Responses

Comments that raise "significant environmental points" differ in important ways from comments and concerns of other types. The latter are not CEQA issues, however, and are addressed by the lead agency and responsible agencies in other project-review contexts. The necessary project approvals known to the City of Arcata and Department of Fish and Game were identified in Chapter 1 of the Draft EIR. As described in Chapter 1 of the Draft EIR, the EIR is intended to analyze the effects that the Proposed Project and a range of alternatives will have upon the environment; and make this analysis available to the public and to any other agencies that might be affected by the Proposed Project as well as to meet a number of procedural requirements.[1] That is, the EIR identified effects on the physical environment that might result from approving the Preferred Alternative (the "proposed plan"). The Final EIR is required to address "significant environmental points," or what are generally called "substantive" questions.[2] These are comments or questions about the Draft EIR's assessments and its conclusions relating to the project's impacts on the physical environment. Examples of substantive comments could include: (i) comments about the *methods* used in, say, the habitat analysis, or comments about the manner in which the EIR assessed the project's effects on aquatic species generally; (ii) comments about the *evidentiary basis* for determining the significance of, for example, geological questions; or (iii) comments about the EIR's *conclusions* regarding the project's consequences for wetlands, as one potential subject.

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1 CEQA applies to the "environment" as defined in Public Resources Code Section 21060.5, which includes "the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, minerals, flora, fauna, noise, objects of historic or aesthetic significance."

2 Neither the Act nor the Guidelines provides a definition of these terms, although various court opinions provide guidance.

The comment letters received by the City of Arcata and the Department of Fish and Game identified a variety of issues with respect to the "substance" of the Draft EIR. After reviewing all of the comment letters, the City of Arcata and the Department of Fish and Game of Fish identified comments of several sorts. This Final EIR consists of the comments and the City of Arcata and the Department of Fish and Game's responses to these comments. Some of the comments raise substantive issues about the Draft EIR, and some express a preference for changes in the proposed project. When comments expressed a preference for some changes in the proposed project the City and the Department's decision-makers have noted these comments.

Some responders included comments with questions from non-agency sources relating to the approval processes or the informational needs of third-party permit-granting agencies, specifically the County of Humboldt and LAFCO. Comments or questions about the requirements for approvals from these agencies, or the processes for reviewing those applications, don't raise significant environmental issues, however these processes are briefly addressed in this Final EIR. Virtually all of these approval processes include some requirements for public review of the applications, and the City of Arcata and the Department of Fish and Game note that such reviews are the appropriate places for comments of this type to be addressed.

Public Comments and Responses

1) Aleutian Goose Working Group - Blake Alexander - Chair - May 5, 2006

1.1 Reduction of Potential Habitat of Aleutian Goose

This comment raises concerns that "the City of Arcata intends to reduce potential habitat of Aleutian Goose by salt water flooding of approximately 200 acres of land in the Arcata Area" when there is already a " deficit of public land in feeding the growing numbers of Aleutian geese". The recommendation is made that the "project address the need for additional habitat for the Aleutian Goose on the north coast".

The project goal is "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site." Providing habitat for the Aleutian Goose is not a stated project goal.

The DEIR does note that the project site includes 76 acres of agricultural field. In an 11/08/06 conversation with Humboldt State University Professor Dr. Jeff Black, Dr. Black stated that the Aleutian goose has not been known to use the 76 acres of the project area that is agricultural field and that the small size of this area limits is potential use by this species.

2) Redwood Region Audubon Society - Chet Ogan – Conservation Chair – May 8, 2006

2.1 Recreational Trail Impacts to Wildlife

This comment raises concerns regarding trails located around the perimeters of both Gearheart Marsh and the proposed brackish marsh. An alternative suggestion is for a "handicapped-accessible raised platform, high enough to view over vegetation, be built near the current railroad track crossing on I Street". If the trail is to link with the Janes Creek Greenway it is suggested that the trail should be on the north side of the project.

Public use trails can potentially impact wildlife. To prevent negative impacts to wildlife the project design limits trails and public use to the eastern portion of the project area. The majority of the project area is not accessible to the public. To further reduce potential impacts the trail that runs between Gearheart Marsh and the brackish marsh has been eliminated. All trails will be subject to adaptive management which can include seasonal closures and prohibiting dogs should it be determined that public use is negatively impacting wildlife within the eastern portion of the site. An updated trail map is included in the Final EIR.

2.2 Impacts to Short-eared owls:

This comment concerns "lack of mitigation for Short-eared owls, a California Species of concern, as well as other winter raptors". The Redwood Region Audubon is concerned that this is the "only known area where Short-eared owl nesting has occurred in the current memory of Humboldt Co." (Reference - Atlas of Breeding Birds of Humboldt County documents possible Short-eared breeding at both the Mad River Slough and Fay Slough Wildlife Areas). An excerpt from a California Department of Fish and Game document on bird species of Special concern by J.V. Remson Jr. recommends protecting existing marshes and ungrazed grasslands in the lowlands. This comment also discussed other raptors that also use the area, Northern harriers, White-tailed kites, Ferruginous hawks and Rough-legged hawks stating that all require small mammals that are present in perennial grasslands.

The presence of short-eared owls on the Mad River Slough Wildlife Area (MRSWA) is well-documented (fall/winter migrant) by the California Department of Fish and Game, however, based on Department of Fish and Game staff observations over the past few years, the location of where these birds roost is not located within the McDaniel Slough Restoration Project Area. This roost is on the "highest" elevational area of the MRSWA that also support a cover of vegetation of tall rank grass and forbs and is located at least 1,500 feet away from the western portion of the Project Area. During the late fall and winter months, this roost area is above most of the surface area of standing water that covers the majority of the MRSWA. At the present time, this area will be maintained as tall grasslands primarily for short-eared owls roosting.

Existing conditions for habitat that supports short-eared owl roosting during the late fall and winter is virtually non-existent within the Project Area. Currently, water from faulty tide gates and winter precipitation has resulted in standing water to the surface over a large portion of the tall grass wetland precluding the presence of favorable small mammals (voles and mice) numbers. However, the area outside these saturated tall grass wetlands have been host to significant shorebird use and subsequent predation by other raptors such as northern harrier and peregrine falcon.

Other Department of Fish and Game lands within the Humboldt Bay area provides for tall grasslands (Fay Slough and Elk River Wildlife Areas) where late fall and winter observations for short-eared owls has varied depending the extent and duration of precipitation and cyclic small mammal populations numbers.

In 1990, observations of nesting short-eared owls were reported to occur on the Mad River Slough Wildlife Area. Short-eared owls are opportunistic breeders and given significant increases in small mammal numbers are able to take advantage of this abundant food resource. During the time period in and around 1990 on the Mad River Slough Wildlife Area (and at Fay Slough Wildlife Area as well), this area came into public ownership and livestock grazing was discontinued. It is suspected that the small mammal populations during this time period increased dramatically resulting in significant increases in raptor use. Since that time however, and in the absence of habitat management on these tall rank grasslands, our understanding is that nesting by short-eared owls has not occurred. As stated previously, the roost areas currently occupied by short-eared owls will not be disturbed by this Project.

3) Humboldt County Farm Bureau – John LaBoyeaux – April 21, 2006

3.1 Permit Jurisdiction: Chapter 1 and Chapter 4 –Community Environment

This comment states that a portion of the project area is outside the city limits and in the County of Humboldt Jurisdiction and State Coastal Development Permit jurisdiction. County Land Use Designation and implementing zoning (Agriculture Exclusive) "would require at least a Conditional Use Permit for a project of this nature". The comment suggests that there appears to be "substantial conflict between the County's Plan/Zoning and the proposed project and a plan/zone amendment appears to be needed.

The City consulted with the Humboldt County Planning Department in 2001 regarding the proposed project and any required County permits. The City received a letter from Steve Werner –Supervising Planner stating that "no county permits are required because the work is being conducted on lands owned by the City of Arcata and the State of California, the work is exempt from the County zoning and building regulations under the doctrine of "intergovernmental immunity". (Court Case to Lawler v City of Redding). City legal counsel concurs that "the City has intergovernmental immunity that exempts if from Humboldt County zoning and building laws".

The City and the Department of Fish and Game have worked with the State Coastal Commission to determine state, City and County Coastal Development jurisdictional boundaries and have determined that the project will occur completely within the State's jurisdiction.

3.2 City provision of services (flood control, recreation, and related) outside current boundary

This comment concerns the need to have the Local Agency Formation Commission approve an extension/expansion of services outside of City jurisdiction.

The project goal is "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed

Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

The project is not a flood control project though a secondary benefit provided by the project will be reduced flooding upstream of the project site. The LAFCO section relates to local jurisdictions contracting with third parties for the extension of services. This project does not involve third parties. Cities or other jurisdictions have the right to develop their own property based on intergovernmental immunity.

3.3 Reclamation District 768 Approvals

This comment concerns the need for Reclamation District 768 to approve activities that affect the facilities within its area of responsibility.

The City and the California Department of Fish and Game are part of the Reclamation District 768 and have been working closely with the District on designing this project. As noted above Cities or other jurisdictions have the right to develop their own property based on intergovernmental immunity.

3.4 Composition and potential contamination of materials to be released into the Bay

This comment requests information on the composition of materials to be released into the Bay (40,000 yd^3) - page 3.1-13. and whether heavy metals, hydrocarbons, pesticides or herbicides are being proposed to be discharged to the bay.

As stated in Section 3.1.3 on page 3.1-13, the estimated volume of sediment that will erode from the McDaniel Slough channel is approximately 25 acre-feet (40,000 cubic yards). Section 3.1 page 3.1-5 discusses the origin of the sediment. "Logging and development in the Janes Creek watershed over the last century have altered the sediment regime in Janes Creek. Due to the backwater at high tide and the loss of tidal scour caused by the tidegates, this sediment settles out on-site, primarily within the McDaniel Slough channel. Consequently, there has been more than 2 feet of deposition within the channel and riparian vegetation has colonized parts of the channel." This accumulated sediment is expected to slowly erode from the aggraded channel in McDaniel Slough channel when the tidegates are removed, the levee is breached, and water flows without obstruction from Janes Creek to Humboldt Bay. As stated on pages 3.1-12 and 13 "Fine-grained material and cohesive Bay mud will readily erode from the channel within the site and the Bay channel downstream of the site. Vegetation in the slough channel, which is concentrated in upstream portions of McDaniel Slough, will tend to stabilize sediments and slow erosion. Salt intolerant vegetation will eventually die off due to increased salinity in the restored marsh and thus will be more readily eroded by flows in the channel."

No regulatory agency has raised concerns with respect to contaminated sediments in this section of Janes Creek and there is no site history indicating contamination. The site is former tidelands that were converted to agricultural use including grazing.

3.5 Use of 1985 Arcata General Plan instead of the Arcata General Plan 2020

This comment requests information on why the Arcata General Plan 2020 was not used in the EIR.

Based on the 1985 Arcata General Plan, most of the project area located in the City of Arcata is designated for agricultural uses (Agricultural Exclusive A-E land use designation), the remainder of the project area is designated Natural Resource Conservation. Agricultural Exclusive also permits the use of the property for wildlife habitat management. The Arcata General Plan 2020 land use designation for the McDaniel Slough project site is Natural Resources –NR. Natural Resources also allows for continued grazing on this land. The project is consistent with the Arcata General Plan 2020. However, General Plan 2020 is not applicable in the coastal zone as it has not yet been certified by the California Coastal Commission.

3.6 Document not legally adequate without complete disclosure –Sections 5.1, 5.5

This comment concerns Chapter 5 – Other CEQA Considerations – Section 5.1, and states that the document is "not legally adequate without complete disclosure of the conversion of all the productive lands as a direct result (findings in Section---) (sic) of this project and the cumulative effect on the regional post European agricultural practices that have resulted from past activities of this nature, the currently anticipated actions and the known future actions".

The City owned project site lands have been used for agriculture purposes over the past 100 years. This site still has livestock holding pens used for preparing animals for loading onto trucks. No agricultural use has occurred on Department of Fish and Game lands within the project area since 1988.

Currently, seasonal livestock grazing occurs on City owned lands (approximately 67 acres of the total 240 acre project site). The current lease agreement to the lessee allows for unlimited animal units to graze on the site for $100 dollars/year, and the lease comes up for renewal annually. The lease agreement provides for its termination prior to the beginning of the project's construction phase. The project site is currently subject to seasonal flooding and soil saturation and is available for agricultural uses only during the dry season. The proposed project would cause greater saltwater inundation of the project site, resulting in the loss of grazing vegetation and its replacement by salt tolerant vegetation, according to the Restoration Plan for the McDaniel Slough Tidal Marsh, (PWA Associates, 2002) a vegetative tidal marsh colonized by salt tolerant plants, such as pickleweed or cord grass, is expected to develop within 10 years. Salt tolerant vegetation is not edible by livestock, which would preclude continued grazing on most of the project site.

With respect to impacts on converting prime farmland, unique farmland, or farmland of statewide importance to non-agricultural use the following applies:

In general, the classification for determining prime agricultural land is the Storie Index, a classification system based on soil profile, surface texture, slope, and soil limitations. According to the definitions in the Arcata General Plan (1985) and the Humboldt County General Plan, the proposed project site is not considered prime agricultural land. The Arcata General Plan (1985) states, "Agriculturally suitable land (60% and above on the Storie Index) should be

preserved for agricultural use, wherever possible. Grade1 and Grade 2 agricultural land shall not be developed" (Conservation and Open Space Policy 3). The Humboldt County General Plan lists the Storie Index of prime agricultural land as 80-100.

According to Soils of Western Humboldt County, a soil survey conducted in 1960s, the project site contains Bayside silty clay loam (Ba2 and Ba3) and Loleta loam (Lo3), which are all poorly or imperfectly drained soils with 0-3% slopes. The Ba2 soils have a Storie Index rating of 36 and Ba3 soils have a Storie Index rating of 49. The Storie Index for Lo3 soils is 52; thus, the project area does not qualify as prime agricultural land under either the Arcata General Plan or the Humboldt County General Plan definitions. As described previously, a Storie Index rating of 60 to 100 is required for land to be designated prime farmland, and the project area does not meet this test.

The Humboldt County General Plan has definitions for prime agricultural lands based on livestock capacity and agricultural production. The project area does not qualify as prime agricultural land under these definitions either. Due to seasonal, prolonged wet periods, the project area soils are unable to accommodate year-around livestock or agricultural production. These constraints limit the project site land's viability as prime agricultural land.

For farmland of statewide importance, land must have been used for the production of irrigated crops. To qualify as unique farmland, the land must have been used for the production of high economic value crops such as oranges, olives, or cut flowers. The minimum conditions required for designation of the project site as either farmland of statewide importance or unique farmlands are not present.

The Humboldt County Department of Agriculture data on Agricultural Gross Values for 1993-2000 shows that livestock and poultry values have increased from $15,289,000 in 1993 to $24,872 in 2002. This includes 470,000 harvest acreage in rangeland production and 21,000 in pasture. In 2005 the acreage in rangeland is still 470,000 and acreage in pasture has increased to 21,350 acres.

The 2002 Census of Agriculture - Humboldt County Profile shows that there are 633,931 acres attributed to farms in 2002 up from 619,450 in 1997, an increase of 2%. Market value for crops is up 21% in 2002 over 1997 data. Livestock gross values have increased from 12,443,189 in 1997 to 23,986,000 in 2005. Humboldt County Gross Agricultural values have increased from 318,297,280 in 1997 to 320,174,000 in 2005. All agricultural products with the exception of timber have increased in value over this time period. These reports are attached.

October 2003 correspondence with Gary Markegard, Farm Advisor for Cooperative Extension, on a related project with similar soils indicates that these soils require 3 acres per animal unit. Therefore the conversion of these 67 acres will reduce livestock production in Humboldt County by 22 animals. This information and the reports listed above indicate that Humboldt County agriculture is viable and growing in terms of production and revenues and the conversion of 67 acres of seasonal grazing lands will not have a significant negative impact on the continued viability of agriculture in Humboldt County.

3.7 Section 5.8 Conflict with County General Plan Agriculture Protection policies

This comment concerns the need for the EIR to reflect the provisions of the County General Plan that were considered and the manner in which the project is in direct conflict with the Agriculture Protection policies of the county as certified by the California Coastal Commission.

This project is being conducted on lands owned by the City of Arcata and the State of California, and therefore no county permits are required for this work because the work "is exempt from the county zoning and building regulations under the doctrine of intergovernmental immunity". See Response 3.1 for more detail.

However, restoration of wetlands resources is a permitted use in the Coastal Agriculture land use designations and the site clearly constitutes "Transitional Agriculture lands" or "Farmed Wetlands". Depending on ground and water conditions these designations range from marginal agricultural values to primarily wetlands. This particular site, due to soil and ground water conditions is more closely associated with wetland values than agriculture and is a particularly valuable site for restoration.

4) Commissioner Mike Wilson – May 11 , 2006

4.1 Project impacts on access to coastal resources

This comment concerns the proposed project limiting existing access through both physical (though breaching the levee without a bridge) and programmatic means and this is a significant impact to an important coastal public access resource and states that this impact is not adequately addressed in the DEIR. The comment states that proposed project should include enhancing public access to the entire length of the Arcata Bay Levee on public lands, that a pedestrian bridge is needed to span the levee breech to allow public access to 4,000 feet of levee in the project area, and that all 9,750 feet of the new levee should include pedestrian access not just 1,500 proposed on the project's eastern boundary.

The City allows public access to the City owned lands - however the rest of the levee is owned by the State of California, the Reclamation District and private land owners and as the DEIR correctly states, the levee is not and never has been a public access/hiking area. There are no prescriptive rights for use on public lands - therefore there is no established public access to the trail as the DEIR correctly states. This project provides access to City owned lands. Existing access to adjacent public lands are currently provided by both the City and the California Department of Fish and Game.

4.2 Remove gate at beginning of Arcata Bay levee to enhance public access

This comment suggests removing the gate at the beginning of the Arcata Bay levee to enhance public access to nearly 2 miles of levee on public lands, the first 4,000 which are within the project area.

The City has moved the existing gate to the mouth of Janes Creek/ McDaniel Slough to allow public access to City owned lands along the existing levee. Public Access to DFG lands is

currently provided on the adjacent Mad River Slough Wildlife Area. It is outside the scope of this project to provide access to the entire Bay front levee system.

4.3 No Action Alternative - Public use of the levee

This comment is concerned that the DEIR 's No Action Alternative does not mention that public access to nearly 2 miles of the Arcata Bay levee would be maintained and not disrupted by a breach in the levee as the preferred alternative proposes.

The City allows public access to the City owned lands - however the rest of the levee is owned by the State of California and Reclamation District 768 and as the DEIR correctly states, the levee is not and never has been a public access/hiking area. There are no prescriptive rights for use on public lands - therefore there is no established public access to the trail as the DEIR correctly states.

4.4 Alternatives 2, 3 & 4 Public Access Opportunities

This comment states that Alternatives 2, 3, & 4 do not discuss the opportunity to provide public access to 9,750 feet on the perimeter levee (Pg -13 & 14 c)

The project goal is "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

The DEIR clearly states that the Proposed Project goal, as described above, in combination with the specific objectives listed below, will be used as the basis for evaluating the Proposed Project and alternatives in this EIR.

Primary Objectives

8. Maximize the opportunity for restoring a large area of tidal marsh habitat dominated by pickleweed.
9. Provide unimpeded access for anadromous fish migration between Humboldt Bay and McDaniel Slough.
10. Create a tidal channel system that maximizes the estuarine fisheries habitat in large high-order subtidal channels.
11. Provide connectivity of habitats using "ecolevees" to create a gradation between the salt marsh/mudflat habitats and uplands.
12. Provide connectivity with existing habitats which also include freshwater meadows, riparian, fresh and brackish marsh) at the Arcata Marsh and Wildlife Sanctuary and the CDFG Mad River Slough Wildlife Area.
13. Achieve desired wetland ecologic function as rapidly as possible for the freshwater and brackish water ponds and within a period of a few decades for the establishment of salt marsh habitat.
14. Alleviate rural and urban area flooding due to tidegate restrictions.

Secondary Objectives

1. Create a visually appealing landscape.
2. Provide opportunities for public access, education/interpretation and recreation.
3. Create a passively managed system to the greatest extent possible that minimizes the need for maintenance activities on the site.
4. Breach the Bay-front levee to achieve reduced flooding upstream of Samoa Boulevard and increase tidal scour in lower Janes Creek.

Providing opportunities for public access, education/interpretation and recreation are a secondary goal to the project. These opportunities are provided as outlined in the DEIR. It is outside the scope of this project to provide public access to the 9,750 feet of the perimeter levee.

4.5 DEIR Incorrect with respect to Public Hiking Area - Page 4.2-1

This comment states that the DEIR incorrectly states that the "City's site is not currently a public hiking area, and the access point adjacent to the Arcata Marsh, owned and managed by the Reclamation District #768 (page 4.2-1) (sic). The Arcata Bay levee on the City and state property is currently being used, and in fact has been used for a long time as a public hiking trail. The City not the Reclamation District owns the land on which the levee was built, as it now owns the land on which the gate was erected. In 2000, when the City purchased this land the City Council also adopted a resolution providing for public access to the Arcata Bay levee on its newly acquired property.

The City owns and has opened to public access the levee from I Street to the mouth of McDaniel Slough. The lands beyond that point are owned by the Department of Fish and Game and Reclamation District #768. The State and Reclamation District lands are not and never have been open to the public as a public access hiking trail.

4.6 Coastal Act Policies applicable to access on the levee - *Pg 4.2-1 to 4.2-3*

This comment refers to Coastal Act polices PRC Sections 30530-34 and PRC Section 30211 that require the Coastal Commission to maximize public access and that development shall not interfere with the public's right to access to the sea and states that Section 4.2.2 does not address conflicts with these policies.

As noted on Page 4.2-1 there is multiple Coastal Act policies governing land and marine resources that relate to this project. The project goal is "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

While public access is a component of the project it is balanced with the primary goal to enhance and restore habitat - Policies that apply include:

Coastal Commission Coastal Act *- Maximize public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resource conservation principles and constitutionally protected rights of private property owners.*

Section 30210. In carrying out the requirements of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect the public rights, right of private property owners, and natural resource areas from overuse.

Section 30211. Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30212. (a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) It is inconsistent with public safety, military security needs, or the protection of fragile coastal resources; (2) adequate access exists nearby . . .

Section 30214. (a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on facts and circumstances in each case including, but not limited, to the following:
(1) Topographic and geologic site characteristics.
(2) The capacity of the site to sustain use and at what level of intensity.
(3) The appropriateness of limiting public access to the right to pass and trespass depending on such factors as the fragility of the natural resources in the area . . .

Section 30230. Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Section 30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.
(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly

degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Public resource code 30320 seeks to maintain, enhance and, where feasible restore marine resources. Section 30001.5 requires maximizing public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resources conservation principles…

This project will increase public access through the development of new trails along the newly constructed levee on the east side of the project. The public did not in the past and does not currently have rights of access on the levee west of McDaniel Slough. Therefore this project will not interfere with the public's right to access to the sea.

4.7: Impact to public use of the Arcata Bay levee as a trail from proposed breaching ***Section 4.2.5 pg 4.2.8 & 4.2.9***

This comment states that Section 4.2.5 does not address impacts to public use of the Arcata Bay levee as a trail due to the proposed breaching of the levee without the construction of a pedestrian bridge or providing access on the perimeter levee being proposed.

The public did not in the past and does not currently have rights of access on the levee beyond the City owned lands (South I Street to the mouth of McDaniel Slough). Therefore the project will not impact public use of trails beyond this point. Access is being provided on the new eastern levee being constructed.

4.8 Alternative impact analysis insufficient

This comment states that the alternative impact analysis should address the conflicts and impacts listed in the two prior comments.

See responses to comments 4.7 and 4.8

4.9 Impacts to Arcata Bay levee trail P*g 4.5-1-4*

These comments concern public use of the Arcata Bay levee as a long term established recreational area and states that the project conflicts with public use if the levee is breached without providing a bridge to maintain access to the levee beyond the breach at McDaniel Slough.

No public access trail exists beyond the mouth of McDaniel Slough. The lands west of McDaniel slough are owned by the California Department of Fish and Game and are not open as a public use hiking trail or public recreation area on the Bay front levee.

Therefore there are no impacts do to conflicts with established recreational or educational uses of the site as there are currently no educational uses of the site and no permitted access that will be prevented by the project. The proposed project will increase public access to the area by allowing access on designated public access trails and use areas. New levees on the east side of

the project will allow access to the new shoreline of Arcata Bay that will be established as a result of the project.

4.10 - Impacts to Circulation Section 4.6

This comment states that Section 4.6 - Circulation does not adequately describe existing public use of the Arcata Bay levee as a pedestrian facility.

There are no permitted public uses of the Arcata levee as a pedestrian facility west of the mouth of McDaniel Slough.

4.11 - Environmentally Superior Alternative

This comments states that the proposed project is not the environmentally superior alternative when considering existing recreational use of the project area without a bridge to span the proposed breach.

The project goal is "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

The project includes passive recreation as a secondary goal and provides public access trails on the eastern portion of the site. The proposed project does not prevent a future Bay front trail project.

4.12 Project Impacts to public access to the Arcata Bay levee Page 5-6, 5-7, 5-22, 5-23

These comments refer to impacts of the project to public access to the Arcata Bay levee without a bridge to span the breach.

The project will result in a new shoreline to Arcata Bay that will provide additional permitted public access to the Bay on the east side of the project area. There are no permitted public uses of the Arcata levee as a pedestrian facility west of the mouth of McDaniel Slough.

4.13 Coastal Act, Arcata General Plan and Local Coastal Plan and Draft Humboldt Bay Management Plan Public Access policies

These comments concern the Coastal Act, Arcata General Plan and Local Coastal Plan and Draft Humboldt Bay Management Pan language to preserve and enhance public coastal access.

The project goal is "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

While public access is a component of the project it is balanced with the primary goal to enhance and restore habitat - Policies that apply include:

Coastal Commission Coastal Act *- Maximize public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resource conservation principles and constitutionally protected rights of private property owners.*

Section 30210. In carrying out the requirements of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect the public rights, right of private property owners, and natural resource areas from overuse.

Section 30211. Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30212. (a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) It is inconsistent with public safety, military security needs, or the protection of fragile coastal resources; (2) adequate access exists nearby . . .

Section 30214. (a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on facts and circumstances in each case including, but not limited, to the following:

(1) Topographic and geologic site characteristics.
(2) The capacity of the site to sustain use and at what level of intensity.
(3) The appropriateness of limiting public access to the right to pass and trespass depending on such factors as the fragility of the natural resources in the area . . .

Section 30230. Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Section 30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.
(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Draft Humboldt Bay Management Plan (Humboldt Bay Harbor, Recreation and Conservation District, Mar 2005)

The Draft Humboldt Bay Management Plan includes the following policies, which the McDaniel Slough Project will carry out or be consistent with: CAE1 – Maintain, restore, and enhance aquatic ecosystem integrity; CAE-2 – Protect and maintain environmentally sensitive habitat areas; CAS-1 – Maintain biological diversity throughout Humboldt Bay; and CEP-1 – Impacts to streams, wetlands, estuaries and coastal waters may be authorized for specific purposes or project types, including habitat restoration or enhancement projects.

California Department of Fish and Game

The Department has broad program responsibilities for fish and wildlife. Fish and Game Code §2701(c) vests in the Department: "…the principal responsibility for protecting, conserving, and perpetuating native fish, plants, and wildlife, including endangered species and game animals, for their aesthetic, intrinsic, ecological, educational, and economic values." The Department is designated natural resource trustee with jurisdiction "over the conservation, protection, and populations of those species" (FGC § 1802).

California Department of Fish and Game - Purpose of the Mad River Slough Wildlife Area Acquisition

The Department acquired the Mad River Slough Wildlife Area in order to protect, enhance, and restore coastal wetlands within Humboldt Bay.

Monies used to purchase the MRSWA were secured from Proposition 19 (1984) coastal wetland acquisition funds. Use of these funds required that the primary emphasis in management be directed towards wetland protection, restoration, and enhancement.

Purpose of the MRSWA Management Plan (draft October 1993)

The management plan was prepared with the support of the Mad River Slough Management Plan Advisory Team which included members of North Coast Waterfowl Association, City of Arcata, Livestock Operators, Agricultural Extension Service, Audubon Society and Humboldt County.

The major management objective for the MRSWA includes restoration, enhancement, and protection of remaining coastal wetlands in Humboldt Bay.

The ultimate management intent will be to provide the optimum diversity of habitat types in order to achieve the highest biological productivity. Featured biological elements are identified: waterfowl, shorebirds, wading birds, raptors, riparian habitat, and salt marsh

Arcata 2020 General Plan

Natural Resources – Guiding Principal and Goal
Restore and maintain the physical and biological integrity of publicly owned former tidelands (farmed wetlands) subject to the Public Trust easement, to a diversity of tidal, freshwater, and riparian habitats.

RC-1c ***Habitat value protection.*** *Environmentally sensitive habitat areas (ESHA) shall be protected against any significant disruption of their habitat values, and only uses dependent on and compatible with maintaining those resources shall be allowed within ESHAs. Proposed development in areas adjacent to ESHAs shall be sited and designed to prevent impacts which would significantly degrade such areas, and must be compatible with the continuance of such habitat areas.*

RC-1d ***Sensitive habitat definition.*** *The City declares the following to be ESHAs within the Planning Area:*

1. *Rivers, creeks, sloughs, and associated riparian habitats: Mad River; Jacoby Creek; Beith Creek; Grotzman Creek; Campbell Creek; Jolly Giant Creek; Janes Creek; Gannon Slough; Butcher Slough; and McDaniel Slough.*

2. *Wetlands, estuaries, and associated riparian habitats: Arcata Bay; Mad River Slough; Liscom Slough; Butcher Slough; the Aldergrove marshes and ponds; and the Arcata Marsh and Wildlife Sanctuary.*

3. *Other unique habitat areas: waterbird rookeries; shorebird concentration sites; habitat for all rare, threatened, or endangered species on federal or state lists; and vegetated dunes.*

4. *Public Trust lands such as grazed or farmed wetlands (i.e., diked/reclaimed former tidelands).*

The pedestrian access trails are incorporated into the project and are designed and will be developed with due consideration for protecting the above mentioned resources.

5) Stan Harris – May 4, 2006

5.1 The proposed project is not a restoration or enhancement project

The opening paragraphs of this letter refers to a variety of issues and states that the "establishment of salt marsh will result in stands of exotic *Spartina densiflora* and …to call it a restoration project is a sham…to call it enhancement is also a sham because existing perennial grassland has far more wildlife value than an exotic salt marsh would". Additional issues raised include: elevations for most of the project guarantee an open water area of the bay at high tide and more mud flats at low tide; would preserving a few acres of perennial grassland contribute more to general ecological diversity; mudflats and open water are preferred over salt marshes dominated by *Spartina densiflora* therefore do not fill low areas that would encourage *Spartina densiflora* to dominate; and the project has to be justified on other than wildlife enhancement basis

While there is merit to this comment regarding the potential establishment of Spartina densiflora, the project proponents disagree over the value of the McDaniel Slough Restoration Project relative to restoration for fish and wildlife resources. Benefits will accrue to species such as resident marine fish, crustaceans, and benthic invertebrates that use the bay and estuary (e.g. pipefish, surf perch, and shore crab), as well as nursery areas for juvenile ocean fish (e.g. English sole, lingcod, rockfish). Plant species include salt marsh, marine algae, and the potential for eel grass establishment. In addition, salt marsh also provides cover for marine organisms, and adds to the biomass food chain within the bay. Expected benefits to water birds that use these restored areas for foraging include shorebirds, wading birds, avian predators, etc.

There is no question that there will be a trade off by some wildlife species utilizing the site as it exists today. However, in keeping with the overall goals and objectives of this project, benefits will accrue to fish and wildlife resources albeit not all of the particular species the commenter prefers.

5.2 Elevations are too low for salt marsh development and will be dominated by *Spartina densiflora*

This comment refers to page 1-2, Primary Objectives, and states that the objective to maximize the opportunity to restore tidal marsh dominated by pickle weed is "unrealistic pie in the sky thinking given elevations and vegetation response of former "restoration projects". The elevations too low for any salt marsh and other restoration sites around the bay are dominated by *Spartina densiflora"*.

<u>A Restoration Plan for the McDaniel Slough Tidal Marsh</u> prepared by Philip Williams & Associates, Ltd. for the City of Arcata, included an analysis of the opportunity to restore tidal marsh dominated by pickleweed. To determine the likely rate of estuarine sediment accumulation on the site under restoration alternatives, the MARSH 98 estuarine sedimentation model was applied and calibrated using marshplain core data collected by PWA and other data made available by the City of Arcata. A yearly average suspended sediment concentration value of 125 mg/L was estimated by calibrating the MARSH 98 sedimentation model to subtidal sedimentation data using a historic rate of sea level rise and a density of deposited material from

literature (550 kg/m, Ogden Beeman and Krone, 1992). The increase in the rate of marshplain accretion due to peat formation once vegetation establishes on the mudflat was estimated using marshplain core data. The difference between calibrated subtidal sedimentation rates and observed rates of marshplain accumulation was calculated, yielding an estimated average linear rate of organic peat accumulation of 0.02 feet/year.

The estimated peat accumulation rate was added to the projected sedimentation for the project site at elevations above the vegetation colonization elevation (1.4 ft NGVD). For all areas of the project site with an initial starting elevation above 0 feet NGVD, which represents the majority of the site, accumulation of up to 3 feet is predicted in 50 years. Substantial areas of vegetated marshplain are expected to evolve within 10 years. After 50 years, the project site is expected to develop a fully vegetated marshplain at an elevation between MHW and MHHW (assuming 0.5 feet of future sea level rise, IPCC, 2001)

In Humboldt Bay, pickleweed (Salicornia virginica) dominates young marshes along with the invasive cordgrass species Spartina densiflora. Pickleweed is locally dominant at the leading edge of younger, prograding marsh areas and often vegetates the lowest parts of the marsh as well as higher marsh elevations (P. Baye, pers. comm.). Eicher's (1987) results show that the invasive Spartina densiflora establishes within the same range of elevations as pickleweed. The decline of pickleweed at intermediate elevations corresponds with a peak in the abundance of Spartina densiflora (Eicher, 1987), showing how the invasive cordgrass can out-compete the native vegetation in North Humboldt Bay.

Older salt marshes, such as some of the Mad River Slough marsh islands, are seldom dominated by one species such as pickleweed. Rather, they exhibit uneven fluctuating mosaics of Distichlis spicata, Jaumea carnosa, pickleweed, and other common marsh plant species. Triglochin maritima, Puccinelia nutkanensis, brackish species such as Juncus and Deschampsia cespitosa, and even "rare" plants such as Point Reyes bird's-beak (Cordylanthus maritimus ssp. palustris) can be co-dominant over extensive marsh areas during some years. (P. Baye, pers. comm.)

PWA survey data in the salt marsh on the outboard side of the Bay-front levee shows that the surveyed range of vegetation elevations correspond well with Eicher's results for North Humboldt Bay, which show a wider range due to sampling at additional study sites.

The one exception to this correspondence with Eicher is that pickleweed (Salicornia virginica) was found to grow down to a minimum elevation of 1.4 ft NGVD in the younger outboard marsh adjacent to the project site. These low pickleweed elevations were surveyed in a recently colonized area occupying the location of a historic channel mouth that has sedimented in. An elevation of 1.4 ft NGVD was selected as the minimum elevation for vegetation to colonize on mudflats and within the restored project site.

PWA estimates that a vegetated marsh dominated by pickleweed could develop in less than 10 years and approach full marshplain coverage after 50 years. This estimate is based on the assumption that colonization by the invasive cordgrass will be controlled on the site. Other plant species such as salt grass (Distichlis spicata), Jaumea carnosa, Point Reyes bird's-beak (Cordylanthus maritimus ssp. palustris) and Humboldt Bay owl's clover (Castilleja ambiguq ssp. humboldtiensis) are expected to be mixed or co-dominant along with pickleweed.

The City has been meeting with US Fish and Wildlife Service to develop controls for Spartina as the project is implemented and matures over time. Control options that are being considered as part of the adaptive management strategy include planting preferred native salt marsh species, removal of young cordgrass, scheduled mowing of cordgrass and active cordgrass removal.

5.3 Tidal Marsh Ecological Functions

This comment refers to page 1-7 Section 1.6.1 which states that tidal marshes of Humboldt Bay used to provide "vital ecologic function including nurseries for fish feeding areas for birds…. The comment states that there a no actual studies on the original "native salt marshes at Humboldt Bay that would support a statement as sweeping as this and states that the statement is misleading at best and cannot be supported by facts.

The Ecology of Humboldt Bay, California an Estuarine Profile prepared by the US Fish and Wildlife Service (Barnhart et al, 1992), identifies Humboldt Bay as the only area of appreciable salt marsh acreage between San Francisco and Coos Bay. Studies done by Shapiro and Associates have determined that diking and filling has reduced, by almost 90%, the original salt marsh areas in Humboldt Bay.

The major alterations of Humboldt Bay began in the 1880's, when large scale diking of tidal marshes ringing Humboldt Bay began. The diked and drained wetlands were used primarily for dairy cattle grazing. A levee ringing northern Humboldt Bay was constructed along the edge of the marshplain using material from an inboard borrow ditch. This levee eliminated saltwater marsh habitat, including the historic habitat of the project site. Tide-gates were installed in several locations to allow for freshwater drainage, including those at the mouth of Janes Creek at McDaniel Slough. The intertidal area of Humboldt Bay at high tide has been reduced from 27,000 acres to 18,000 acres. The lost 9,000 acres was almost entirely comprised of tidal salt marsh and today less than 1,000 acres of salt marsh remains (Barnhart et al, 1992).

It is true that the importance of the marshes in the trophic economy of Humboldt Bay are poorly understood. R.H. Chamberlain's 1988 thesis found that fish move onto the flooded marshes at high tide but could not assess the importance of feeding activity in the marshes. Salt marshes are primary producers in the trophic economy of the Bay. While there are no specific studies regarding Humboldt Bay there are numerous studies supporting the vital ecological function of salt marshes.

5.4 Fish Barrier concerns upstream of the project area

This comment asks how to reconcile tide gate removal to remove a barrier for salmon migration in to Janes Creek (Page 1-8 Section 1.6.5) with the statement on page 2.3 paragraph-4 that states the Samoa Blvd. culvert will be too high to allow fish passage.

The tide gates on Janes Creek are a barrier to fish access to McDaniel Slough. Removal will allow fish access to this channel. Caltrans owns the Samoa Blvd culvert and would be the agency to address fish passage issues at the Samoa Blvd. culvert (State Route 255) when/ if they arise. CalTrans staff will be monitoring the 255 culvert for fish passage issues.

5.5 Impact of deepening channels on habitat diversity

This comment refers to page 2.3 – paragraph 6 "deepening" the channels provides increased diversity for native vegetation and wildlife". The comment states that this is untrue and that channelizing streambeds almost always reduces habitat diversity and species richness.

Deepening of channels refers to smaller historic channels will be excavated in the site interior to encourage the development of an appropriate tidal channel network within the project site. Based on previous experience with tidal channel restoration where full tidal exchange is being restored to a site of this size, it is anticipated that the tidal channel network will evolve fully over the 50-year planning horizon. All the tidal flows would be concentrated through McDaniel Slough and a `pilot' channel network would be excavated on the site to accelerate the formation of a dendritic tidal channel system.

5.6 Build Islands rather than raising the area to salt marsh elevations

This comment refers to the last paragraph on page 2.3 and state that there is not enough fill to raise the area to salt marsh elevations and it is not desirable since it will only produce a S*partina* dominated area that is the "worst wildlife habitat short of a paved parking lot". Rather than filling low areas the suggestion is to build and armor islands rather than raising the elevation of the flat areas.

Approximately 30,000-40,000 cubic yards of suitable excavated soil obtained from the freshwater and brackish pond sites will be graded onto 23 acres of low elevation subsided areas within the Proposed Project area to build up the marsh plain and accelerate the development of the desirable pickleweed habitat. Building up the marshplain elevation in selected areas will also serve to break up the wind fetch potential within the project area. Large portions of the project area will be left at their existing elevations. The project will also create islands through partial removal of the levees along the McDaniel Slough channel area.

5.7 Objections to planting salt marsh vegetation

This comment references page 2.4 and the statement regarding planting salt marsh vegetation and suggests that it is an unjustified waste of time and money. The recommendation is to let nature take care of it.

Salt marsh vegetation will be planted to help establish preferred native salt marsh vegetation and to help prevent invasion by Spartina densiflora.

5.8 Brackish Marsh Detail

This comment requests information on where and how fresh and salt water will be introduced in the brackish pond (Page 2-4).

Figure 2.2-5 on page 2-11 shows the inlet and outlet points for the brackish pond. Adaptive management will allow for inlet and outlet volume control.

5.9 Trails and Interpretive Facilities - Page 2-4, 5

This comment raises objections to trails around the brackish pond and Gearheart Marsh on wildlife disturbance grounds. It states that the marshes are not large enough to allow this degree of public use and not disturb the wildlife. The suggestion is made to eliminate the trail on the south and west sides of the brackish and north and west sides of Gearheart Marsh and instead "develop one elevated platform large enough to accommodate a wheelchair and 4-5 people at either the SE corner of the Brackish Pond or at the NW corner of the Brackish Marsh". It also raises objections to bird blinds on remote portions of the trails that cannot be monitored with ease as they may become hotels for homeless.

Public use trails can potentially impact wildlife. To prevent negative impacts to wildlife the project design limits trails and public use to the eastern portion of the project area. The majority of the project area is not accessible to the public. To further reduce potential impacts the City has eliminated the trail that runs between Gearheart Marsh and the brackish marsh that will be constructed. All trails will also be subject to adaptive management which can include seasonal closures and prohibiting dogs should it be determined that public use is negatively impacting wildlife in the eastern portion of the site.

5.10 Levee Design

This comment refers to page 2-7 and asks if the levee construction height and fill requirements account for settling of 10 -50% depending on fill materials and asks where money for long term levee maintenance will come from.

The new levee is designed to protect against the 100-year tide level of 6.5 feet NGVD reported by FEMA (1997). A simple engineered flood control levee is proposed for areas bounding zones that may be incorporated into the restoration site at a future date. These levees would have 4:1 side slopes with a constructed crest elevation of +8.0 feet NGVD allowing for one foot of freeboard and 0.5 ft for subsidence. Benched levees are proposed to protect areas that would not be considered for future wetland expansion. The benched levees are intended to provide a band of transitional high marsh habitat by grading a 10:1 side slope for elevations between MHHW (3.5 feet NGVD) and 4.5 feet NGVD. These levees will also have a crest elevation of +8.0 feet NGVD.

The new levees for this project will require periodic maintenance and raising to counter the effects of subsidence and sea level rise over time. Long term maintenance will be provided by the City of Arcata and the California Department of Fish and Game.

5.11 Wildlife values of the present site are very poorly documented

This comment states that the wildlife values of the present site are very poorly documented in both species list as well as seasonal and numerical use. Omissions include Short-eared owl for perennial grasslands as well as Peregrine, Prairie falcon, Ferruginous and Rough-legged Hawks etc.

The presence of short-eared owls on the Mad River Slough Wildlife Area (MRSWA) is well-documented (fall/winter migrant), however, based on Department of Fish and Game staff observations over the past few years, the location of where these birds roost is not located within the McDaniel Slough Restoration Project Area. This roost is on the "highest" elevational area

of the MRSWA that also support a cover of vegetation of tall rank grass and forbs and is located at least 1,500 feet away from the western portion of the Project Area. During the late fall and winter months, this roost area is above most of the surface area of standing water that covers the majority of the MRSWA. At the present time, this area will be maintained as tall grasslands primarily for short-eared owls roosting.

Existing conditions for habitat that supports short-eared owl roosting during the late fall and winter is virtually non-existent within the Project Area. Currently, water from faulty tide gates and winter precipitation has resulted in standing water to the surface over a good portion of the tall grass wetland precluding the presence of favorable small mammals (voles and mice) numbers. However, the area outside these saturated tall grass wetlands have been host to significant shorebird use and subsequent predation by other raptors such as northern harrier and peregrine falcon.

Other Department of Fish and Game lands within Humboldt Bay provides for tall grasslands (Fay Slough and Elk River Wildlife Areas) where late fall and winter observations for short-eared owls has varied depending the extent and duration of precipitation and cyclic small mammal populations numbers.

In 1990, observations of nesting short-eared owls were reported to occur on the Mad River Slough Wildlife Area. Short-eared owls are opportunistic breeders and given significant increases in small mammal numbers are able to take advantage of this abundant food resource. During the time period in and around 1990 on the Mad River Slough Wildlife Area (and at Fay Slough Wildlife Area as well), this area came into public ownership and livestock grazing was discontinued. It is suspected that the small mammal populations during this time period increased dramatically resulting in significant increases in raptor use. Since that time however, and in the absence of habitat management on these tall rank grasslands, our understanding is that nesting by short-eared owls has not occurred. As stated previously, the roost areas currently occupied by short-eared owls will not be disturbed by this Project.

5.12 Concern about loss of habitat diversity and species richness

This comment disagrees with the DEIR statement on page 3.2.17 that states that flooding 200+ acres with salt water will "fully compensate" for the loss of 6.5 acres of existing wetlands and provide "substantial "qualitative" enhancement. The comment concludes that "you cannot replace one type of wetland (fresh) with another (salt) as equals". Concerns include the invasion of *Spartina densiflora* and creation of a marsh system that will be substantially lower in quality than the existing habitat complex of riparian, wet perennial grassland, fresh and brackish water areas. The comment states that "species richness and densities in the area to be flooded are presently far greater, both vegetatively and critter wise than the *Salicornia* marsh will have".

As with many projects this project involves a trade off of habitat types. Any change in the landscape (whether this project or any other) will benefit some fish and wildlife species over others. However, in keeping with the overall goals and objectives of this project, benefits will accrue to fish and wildlife resources albeit not all of the particular species the commenter prefers.

The more significant habitat types that the commenter mentioned will continue to persist as a result of this project (i.e. riparian, brackish and fresh water areas).

5.13 Use of the area by White-tailed kites, Short-eared owls and other raptors

This comment refers to page 3.2-20 and states that White-tailed kites do not forage in salt-marshes, and that the discussion regarding the loss of perennial grassland ignores that this grassland is allowed to grow and develop thatch that supports small mammals. Loss of this habitat, "one of the rarest habitats we have" is vital to foraging Short-eared owls, Harriers, White-tailed kites, etc. The few known or suspected nesting Short-eared owls were in perennial grasslands of the project area. The end result of the project will be to substantially reduce populations of local raptors. The comment also states that planting riparian cover will not enhance foraging for white tailed kites since kites feed nearly exclusively on meadow voles found only in grassland, not riparian. An attachment includes a paper – *Territory-size Regulation in Black-shouldered Kites - Jeffrey Dunk and Robert Cooper.*

The following paragraph contains a comment stating that planting willows along Janes Creek will not make up for loss of perennial grassland used by kites and states that there will be a "net loss of riparian habitat along Janes creek once patches of riparian along Janes Creek are wiped out by salt water ".

This comment assumes that the City and Department of Fish and Game are looking at north Humboldt Bay around the vicinity of the City of Arcata only. The City and Department of Fish and Game are proposing this project in the context of wetland resources on the north coast as well as Statewide. The Fish and Game Commission has a policy of protection and enhancement of wetland resources as this is one of the most vital and rarest habitat types in the State and even North America. The more significant habitat types that the commenter is concerned with will continue to persist as a result of this project (i.e. riparian, brackish and fresh water areas).

Comments regarding Short-eared owls are addressed in the response to comment 5.12. The statement that suggests that the end result of project will be to substantially reduce populations of local raptors is not supported by any documentation.

The existing rank grassland within the Project Area in its current state does little to support a significant population of small mammals. A large portion of the area has water at or above existing grade making it unsuitable for small mammals such as voles and mice limiting its value for avian raptors which utilize this rodent resource. Implementation of this project will benefit avian raptors (both resident and migratory) that will utilize these habitat types for foraging, e.g. peregrine falcon, Merlin, bald eagle, and northern harrier.

5.14 Objections to proposed snags

This comment refers to page 3.2-21 and states that the present snags erected at the Arcata Marsh and Wildlife Sanctuary are almost unused and suggests planting living trees rather than putting in snags. There is also a question of where willow will be planted if Janes Creek is going to be a salt water system.

Willows grow adjacent to Klopp Lake and Humboldt Bay close to Mad River Slough and will be planted along the north end of the project along Janes Creek and around the freshwater ponds. Red alder and Sitka spruce will also be planted in areas near the freshwater ponds. Snags provide roosting platforms and bat boxes will be affixed to snags.

5.15 Impacts to salamanders and red-legged frogs

This comment refers to Section 3.2.5 and states that there will probably be fewer salamanders and red-legged frogs the currently exist on site when the area becomes salt water dominated.

The DEIR states the muted tide cycle will affect the red-legged frogs and northwestern salamanders found along Janes Creek. These species probably did not occur here prior to the diking of Humboldt Bay. Sufficient freshwater habitat may be created by the ponds adjacent to the AMWS to offset the loss of habitat along McDaniel Slough. Red-legged frogs have been known to breed in the ponds at the Arcata Marsh and Wildlife Sanctuary. The creation of two large additional freshwater ponds will likely benefit these species.

5.16 Use the land to expand the sewage treatment system enhancement marshes

This comment suggests that the city would be better off using the land to expand the sewage treatment system.

This is outside the scope of this project. The City land was purchased with grant funds that do not allow sewage treatment as a use of the property.

|INDIVIDUALS AND ORGANIZATIONS THAT COMMENTED ON THE DRAFT EIR

Aleutian Goose Working Group
Blake Alexandre
Chairman
8371 Lower Lake Road
Crescent City, CA 95531

Redwood Region Audubon Society
Chet Ogan
Conservation Chair
P.O. Box 1054
Eureka, CA 95502

Humboldt County Farm Bureau
John LaBoyteaux
President
5601 South Broadway
Eureka, CA 95503

Humboldt Bay Harbor, Recreation and Conservation District, Division 3
Mike Wilson, P.E.
Commissioner
P.O. Box 165
Arcata, CA 95518

Stan Harris
No address given

COMMENTS FROM STATE AGENCIES

Correspondence from the State Clearinghouse and Planning Unit, dated May 16, 2006, advised that no state agencies submitted comments.

Appendix A
Public Comment Letters with Response Numbers

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Arnold Schwarzenegger
Governor

Sean Walsh
Director

May 16, 2006

RECEIVED
MAY 23 2006
CITY OF ARCATA
Dept. of Environmental Services

Mark Andre
City of Arcata
736 F Street
Arcata, CA 95521

Subject: McDaniel Slough Wetland Enhancement Project
SCH#: 2003022091

Dear Mark Andre:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. The review period closed on May 15, 2006, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Terry Roberts

Terry Roberts
Director, State Clearinghouse

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 2003022091
Project Title McDaniel Slough Wetland Enhancement Project
Lead Agency Arcata, City of

Type EIR Draft EIR

Description The City of Arcata, the California Department of Fish and Game (CDFG), and the California Coastal Conservancy plan to restore tidal wetland functions to 205 acres of 240 acres of former tidal salt/brackish marsh and freshwater wetlands adjacent to Humboldt Bay in northern California. The remaining 35 acres will be managed as freshwater wetlands and brackish ponds. The project area is owned by the City (74 acres). The project site is located adjacent to the existing Arcata Marsh and Wildlife Sanctuary's (AMWS) northwest boundary. This 74 acre, City owned property provides a critical link from the 154-acre AMWS to the CDFG Mad River Slough Wildlife Area (547 acres) located west of Janes Creek/McDaniel Slough. The project includes a trail system for public access. This project proposes to benefit the public trust resources.

Lead Agency Contact

Name Mark Andre
Agency City of Arcata
Phone (707) 822-8184 **Fax**
email
Address 736 F Street
City Arcata **State** CA **Zip** 95521

Project Location

County Humboldt
City Arcata
Region
Cross Streets V Street and Hwy. 255
Parcel No. 505-251-10; 021-191-05; 503-251-02, 03, 10; 506-011-02, 04, 08
Township 6N **Range** 1E **Section** 31&32 **Base** HB&M

Proximity to:

Highways 255
Airports
Railways
Waterways Janes Creek, Humboldt Bay
Schools
Land Use Z: Natural Resources (NR), Agricultural Exclusive (AE), and Industrial Commercial

Project Issues Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Cumulative Effects; Drainage/Absorption; Flood Plain/Flooding; Geologic/Seismic; Noise; Public Services; Soil Erosion/Compaction/Grading; Traffic/Circulation; Water Quality; Wetland/Riparian; Wildlife

Reviewing Agencies Resources Agency; Regional Water Quality Control Board, Region 1; Department of Parks and Recreation; Native American Heritage Commission; Public Utilities Commission; Office of Emergency Services; Reclamation Board; Department of Fish and Game, Region 1; Department of Water Resources; California Highway Patrol; Caltrans, District 1; Air Resources Board, Transportation Projects; State Lands Commission; California Coastal Commission

Date Received 03/29/2006 **Start of Review** 03/30/2006 **End of Review** 05/15/2006

Note: Blanks in data fields result from insufficient information provided by lead agency.

Aleutian Goose Working Group

May 5, 2006

Mr. Mark Andre
Deputy Director
Environmental Services Department
City of Arcata
736 F Street
Arcata, CA 95521

Re: Comments on the McDaniel Slough Wetland Restoration Project
Draft EIR March, 2006

Dear Mr. Andre:

The Aleutian Goose Working Group is comprised of concerned citizens from Northern California and Southern Oregon, including local farmers, State and Federal agency personnel, and non-governmental organizations. Our Mission for the Working Group is to: "Work cooperatively to develop and implement management strategies acceptable on public and private lands on the spring staging area so that the Aleutian Goose is an asset to the community."

It has come to our attention that the City of Arcata intends to reduce potential habitat of the Aleutian Goose by the salt water flooding of approximately 200 acres of land in the Arcata area. Our organization is working to provide public land for goose habitat to reduce the burden on private landowners. Your project concerns us because of the deficit of public land in feeding the growing numbers of Aleutian Geese.

1.1

We would like to recommend that your project address the need for additional habitat for the Aleutian Goose on the north coast. We believe that public lands need to provide additional acreage to accommodate the growing numbers of grazing waterfowl to help share in the community responsibility to provide for recovered species. If our organization can be of any future assistance in providing information please do not hesitate to call.

Sincerely,

Blake Alexandre
Chairman

Contact: Blake Alexandre, Chairman, 8371 Lower Lake Road, Crescent City, CA 95531
Phone: (707) 487-1000 Fax: (707) 487-1001 Email: blake@ecodairyfarms.com

REDWOOD REGION AUDUBON SOCIETY
P.O. BOX 1054, EUREKA, CALIFORNIA 95502

RECEIVED
MAY 08 2006
CITY OF ARCATA
Dept. of Environmental Services

City of Arcata
Environmental Services Department
736 F St.
Arcata, CA 95521

McDaniel EIR

2.1 Trail locations adjacent to the proposed brackish and freshwater marshes.

We realize that the creation of new levees provides an opportunity to create new trails. We would like to point out that one newly proposed trail would create a potential ring of human traffic completely around Gearhart Marsh. Currently Gearhart Marsh has human traffic on two sides. As a result of this limited human presence, when waterfowl are present, they are only seen near the cover of the islands or on the far west side of the marsh, farthest away from or concealed from human disturbance. Even though there is not a formal trail around along the west and north side of Gearhart Marsh evidence of trampled vegetation shows that it is used often enough to have a well defined path. Figure 2.2-4 shows a proposed trail completely around the proposed brackish marsh with a bird blind along the levee on the west side. Brackish marshes often do not develop the concealing vegetation that freshwater marshes have. If the levees were built wide enough that concealing vegetation would completely conceal people from the birds, a trail might be appropriate. But this would defeat the purpose of the trail which would be for interpretation of the project features and for viewing the open space on the pond.

We propose instead that a handicapped-accessible raised platform high enough to view over the vegetation should be built near the current railroad track crossing on I Street that would be more considerate for the birds which use the marsh. This may also put the viewer at eye level with birdwatchers looking at flycatchers and warblers in surrounding vegetation. If it is the desire of the City to eventually link with a greenway along Janes Creek, the appropriate location of the trail for the sake of wildlife should be along the north side of the project. From an asthetic viewpoint building next to an industrial park would not be desireable unless vegetation softens the impact.

We anticipate no problem with a creating a trail to the breach site along Janes Creek with a bird blind to be built there.

2.2 Ongoing issue of lack of mitigation for Short-eared owls, a California species of concern and other winter raptors

Some biologists believe the Arcata Bottoms is the Serengeti Plains of California as far as raptors are concerned. For a city like Arcata that promotes ecotourism and birding, to maintain this attraction is to the economic benefit of the area and to the ecological benefit

of the raptors. Set aside as much area as possible for wet perennial grassland. This is a win-win situation.

Please read the section in Stan Harris' 2005 book Northwestern California Birds, third edition, about short-eared owls. The area that is to be flooded is the only known area where short-eared owl nesting has occurred in current memory in Humboldt County. This was documented by Fred Broerman in June 1990. The Atlas of Breeding Birds of Humboldt County, California by Hunter et al (2005) documents possible short-eared breeding at both the Mad River Slough Wildlife Area and Fay Slough Wildlife Area. Short-eared owls and northern harriers are ground nesters in grassland areas. The following excerpt is from the California Department of Fish and Game document on bird species of special concern by J.V.Remsen, Jr.:

> SHORT_EARED OWL (Asio flammeus)
>
> Status and range: Small numbers once bred locally throughout California where suitable habitat was available (Grinnell and Miller 1944). Now this species has completely vanished as a breeding bird from the southern coastal area (J. Dunn, P. Unitt, pers. comms.) and perhaps the San Joaquin Valley (R. Hansen, pers. comm.). A nest near Davis in 1976 was the first nesting record in many years in the Sacramento Valley (Winter and Erickson 1976, Chandik and Baldridge 1967). The only currently known nesting localities near the coast are Bair Island in San Francisco Bay (Remsen and Gaines 1973a, Gill 1977), the mouth of the Salinas River, Monterey Co. (Greenberg and Stallcup 1974; B. G. Elliott, pers. comm.; Winter and Morlan 1977), and perhaps near Moss Landing (Remsen and Gaines 1973a). Although it nested at the Palo Alto Baylands for at least two years (Greenberg and Stallcup 1974), it has not done so in the last three years (T. Chandik, pers. comm.). This species formally nested in the Mono Lake area but is no longer known to do so (Gaines 1977). A few pairs are presumably nesting at Honey Lake Wildlife Area (T. Manolis, pers. comm.). Status elsewhere in northeastern California is poorly known.
>
> This species is more common in winter, but certainly can no longer be considered "common" as it was by Willett (1912) and Grinnell and Miller (1944), who noted a reduction it wintering populations even by the 1940's. it is now decidedly uncommon in winter in southern California (McCaskie 1974c). The Short_eared Owl has declined in many parts of North America.
>
> Reasons for the decline: Destruction of marsh and tall grassland habitat in lowlands is certainly the main cause for the decline. Grazing of existing marshes and tall grasslands and shooting have apparently eliminated most birds in remaining habitat. This species is especially vulnerable to shooting.
>
> Recommendations: (1) Protect existing marshes and ungrazed grasslands in the lowlands. (2) Educate the public on the value of raptors and the fines for shooting them.

This document is available online at http://www.dfg.ca.gov/hcpb/info/bird_ssc.shtml . One of the premier places to observe short-eared owls and other raptors in Humboldt County is along the so called V-Street Loop especially at the corner of V Street and Old Samoa Road, the precise area which will be type-converted from wet perennial grassland into mud flat and eventually through accretion of sediment into salt marsh. While salt marsh may provide some foraging area for short-eared owls, this perennial grassland where possible nesting habitat exists (Hunter, 2005) for this species of special concern will be lost. (The other area where short-eared owls and other over-wintering raptors are very common locally is the analogous Fay Slough Wildlife Area. Again the local office of the Department of Fish and Game has modified this area by creating a wetland there. This habitat for short-eared owls has been lost. During a Christmas Bird Count before this type conversion I personally saw 11 short-eared owls in the air at one time at Fay

Slough over a similar wet perennial grassland, flushed by a hunter.) Short-eared owls and for that matter northern harriers and white-tailed kites, three species common within the area of this project, are dependent on cyclical populations of small mammals, in the McDaniels Slough particularly vagrant shrews, Botta's pocket gopher, and California voles. Figure 1 in a paper by Dunk and Cooper (1994, Auk 111:588) documents the cyclical populations of rodents and their raptor predators at Fay Slough. Dunk (pers. comm.) feels that you could estimate the raptor population by trapping the voles. Just because raptors are not present during any particular count period does not mean that they are absent from the area; they are following the prey. Voles have an annual cycle which reaches a maximum in the early winter, just when the raptor population needs the nourishment the most. Raptors here do not have to deal with the double whammy that winter raptor populations face on the Great Plains of surviving the cold of the night and searching for small mammals hidden under the snow. Jeff Dunk has counts of white-tailed kites from this area that also include counts of other raptors including short-eared owls and northern harriers. Students of Dr. Matt Johnson have conducted counts of raptors and other birds along this section of the Arcata Bottoms.

Other raptors that are present on this perennial grassland are ferruginous hawks and rough-legged hawks, both northern hawk species that spend the winter in our area, and both dependent on small mammal populations for their survival. We may have 3 or 4 ferruginous hawks spread out between McKinleyville and Centerville each winter, but rough-legged hawks are often much more cyclical, but again dependent on the small mammals. Twenty-four (24) rough-legged hawks were found on the 2000 Arcata Christmas Bird Count, many of these were along V Street/Old Samoa Road.

Okay, so what is the mitigation to these raptors for the loss of winter foraging habitat? Recent studies by Dr. Matt Johnson's wildlife classes have shown that grazing cycles are not the answer. Raptors are not present in large numbers on short grass pastures. They are present on ungrazed pastures. Type conversion to mud flats is not the answer. Short-eared owls have not been known to nest in cordgrass marshes because of the fluctuating tidal cycle. These raptor species need large expanses of perennial or ungrazed grassland.

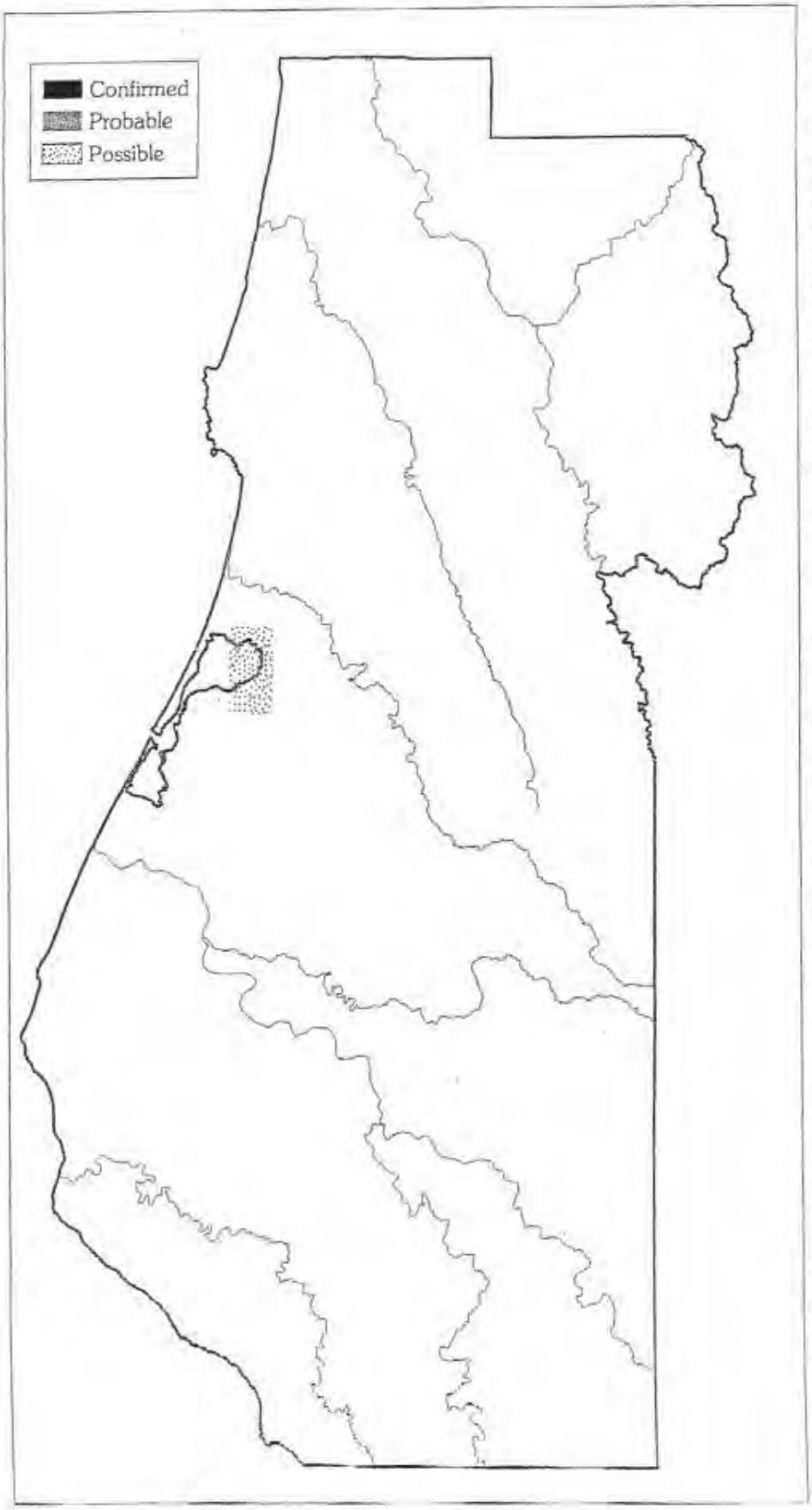
An off-site mitigation may involve a management plan yet to be announced for the Jacoby Creek bottoms. A Savory grazing plan can be adopted here (Jacoby Creek bottoms) that allows for some areas to be left ungrazed, preferably a center core area and an outer ring area. This area would become the source area for voles and harvest mice. Inside of the outer ungrazed ring would be areas at least 5 acres large that could be rotationally managed and/or kept fallow to provide short grass for shorebirds, Aleutian cackling geese, and raptors. During the winter tidal cycles when the mud flats are flooded, shorebirds shift their foraging to flooded agricultural fields.

Chet Ogan

Conservation Chair
Redwood Region Audubon Society

2 attachments

SHORT-EARED OWL *Otus flammeus*



Flight made to look easy distinguish the Short-eared Owl at any distan when on the wing. Deep, slow, uneve wingbeats carry the bird on a wendi path across foraging grounds in ope countryside. The stir-and-wriggle of vole among last year's stiffened gra stems elicits a pouncing dive; the sky suddenly emptied of the tawr ghost-bird it held, what had animate it now unseen within the wind-dabbe sweep of meadow. In the presence Short-eared Owls, more often than n the roar of urban surf is absent, an one can take pleasure in the hush an color of a careless moment. A perso may forget his or her first Short-eare Owl, but the feeling lingers. This exp rience is available to a great man people, as the species occupies po tions of every temperate continent well as some remote Pacific islands.

Short-eared Owls are partial to tre less or tree-dotted country heavil grown to grass or marsh vegetatior As can be imagined given the gre range of this bird, habitat varies i looks and in layout. Natural prairie c grassland parcels, disused or sparsel grazed pastures, sapling-dotted we meadows, marshes, and undeve oped industrial sites attract ther Patches of appropriate habitat of siz or quality sufficient to host these bird are scarce in the rugged interior c Humboldt County, with correspond ingly few reports of Short-ears. Near all of the regularly inhabited sites sup porting one or more of these owls li in little-disturbed open country of th central-coastal lowlands.

Within the record of ornithology i Humboldt County, Short-eared Owl have been recognized to occur annu ally in suitable habitat, typically i very small numbers, in fall, winter, an early spring. Concentrations of up t 30 owls have been encountered i some winters, probably in response t booms in prey populations. Hum boldt's only historical breeding recor followed one such winter, when up t 24 owls were seen 7 Apr 1990 (F Bro

erman) near what is now the Mad River Slough Wildlife Area. Three adults were still present there 3 Jun 1990, one of which was apparently feeding two fledglings (F. Broerman; Harris 1996). Such episodic nesting appears to be quite rare in Humboldt County and was not recorded during the Atlas project.

Each winter of the Atlas period, Short-eared Owls were encountered at any of several spots, at each of which they were more or less expected. These included the Mad River Slough, Fay Slough, and Eel River Wildlife Areas, tidelands of the Eel River estuary, and coastal sandspits. Making a distinction between wintering birds, migrants, and prospective summering birds in early spring was not simple. At the Mad River Slough Wildlife Area in the Arcata Bottoms (F15), three owls were seen 17–19 Apr 1998 (KMS, DFx *et al.*), and in 1999 two were seen 13 Apr (K. Irwin) and one on 14 Jul (B. Cariss). At Fay Slough Wildlife Area (f16), three birds were seen 23 Mar 1999 (TWL) and one was reported 19 Apr 1998 (KMS).

Around Humboldt Bay, Short-eared Owls commonly prey on voles, which comprise about 70% of their diet (Dunk and Cooper 1994). Since these small rodents are virtually absent when grazing reduces the vegetation to less than 4 inches in height (Dunk and Cooper 1994), it is easy to understand why these owls show a preference for fairly tall, rank grasses, sedges, forbs, and similar vegetation that is not impacted by grazing. Ungrazed, old fallow ground and undisturbed dunelands are localized, with practically all of the few truly sizable parcels existing during the Atlas period named within the discussion above. Such places are threatened by planned return to active pasturage, off-road vehicle use, and natural succession. Of particular concern locally are taxpayer-funded burning and grazing schemes that favor waterfowl while compromising habitat for Short-eared Owls and other raptors of ungrazed grasslands. Declines have been documented in many portions of this species' range.

Atlas of the Breeding Birds of Humboldt County, California

Chet - You were a huge help on this project and we appreciate it. John E. Hunter

Chet,
Thanks for all the hard work you put in on this project. Your abilities as a real team player contributed greatly.
David Fix

John E. Hunter

David Fix

Gregory A. Schmidt

Jude Claire Power

Chet,
Thanks a million for your extensive help. This is your Atlas too. I can't thank you enough!
Gregory A. Schmidt

Chet,
thank you for your dedication and steadfastness throughout this entire project.
The birds thank you —
Jude Claire Power

A Publication of Redwood Region Audubon Society

Humboldt County Farm Bureau

5601 So Broadway, Eureka, CA 95503
Serving Agriculture Since 1913

RECEIVED
APR 28 2006
CITY OF ARCATA
Dept. of Environmental Services

Mr. Marc Andre, Deputy Director
Environmental Services Department
City of Arcata
736 F Street
Arcata, CA 95521

April 21, 2006

Subject: Comments on
The McDaniel Slough
Wetland Restoration Project
Draft EIR, March 2006

Dear Mr. Andre:

The purpose of this letter is to provide to you our notes/comments concerning the subject project and associated Draft Environmental Impact Report (DEIR) dated March 2006.

The following are provided in the order in which the comments apply within the Draft EIR:

Chapter 1- Introduction
Section 1.5 Required Permits and Agency Approvals

Based upon the City of Arcata General Plan Map (and Figures 1-1, 1-2 and 1-3, etc.), it appears that a large part of the lands within the project area are outside of the city limits of the City of Arcata and within the County of Humboldt Land Use jurisdiction. We assume that the lands fall within the State's Coastal Development permit jurisdiction.

3.1 However, the County's Land Use Designation and implementing zoning (Agriculture Exclusive) would require at least a Conditional Use Permit for a project of this nature.

In addition, there appears to be a substantial conflict between the County's Plan/zoning and the proposed project (conversion of the transitional agricultural lands to non-agricultural uses), and a plan/zone amendment appears to be needed (if not annexation into the City, preceded by a Coastal Plan Amendment and attendant zoning).

Since the City is proposing to provide services (flood control, recreation and related) outside of its current boundary, it is our understanding that the Local Agency Formation Commission would have to approve this extension/expansion of services outside of your jurisdiction.

3.2

It may be in the City's interest to propose the annexation of the City lands in order to reduce the administrative and procedural burdens of going through the County to obtain Conditional Use or other permit approvals/modifications.

3.3. We also note that the Reclamation District 768, would need to approve activities that effect facilities within its area of responsibility.

Chapter 3, Natural Environment

Section 3.1 Hydrology, Drainage and Water Quality and Section 3.3 Geology

We couldn't locate the information that would indicate that an analysis of the composition of the materials (40,000 cubic yards) that are expected to be released to the bay has been completed. We would assume that the materials would likely contain the many decades of deposition of pollutants owing to the discharges to the creek from the City and its urban activities. Are there any heavy metals, or hydrocarbons, pesticides or herbicides that are being proposed to be discharged into the bay?

3.4

Phone (707) 443-4844 • Fax (707) 443-0926 • e-mail humboldtfb@aol.com

Chapter 4. Community Environment

3.1 & 3.7 Section 4.2 Land Use-Humboldt County General Plan- the applicable part of the County's General Plan is the Humboldt Bay Area Plan. See Section 3.24 Agriculture. See also and the land use designation of Agriculture Exclusive/Prime and Non-Prime Lands (emphasis added)- especially the purpose section. The applicable zoning is found within the County's Zoning Regulations under Agriculture Exclusive. The conditional use permit requirement is found here. The findings that are required to approve a use permit are found in Section.

Chapter 4-Section 4.8 Agricultural Resources and Land Conversion

Section 4.8.1

3.5 Use of the 1985 Arcata General Plan explain why the more recently adopted plan (October 2000) is not being followed/implemented

3.7 The Humboldt County Plan that is applicable is the Humboldt Bay Area Plan and the project directly conflicts with the Agricultural Protection policies and standards contained therein.

Conversion is of the entire parcel, not just the 67 acres reflected.

Chapter 5- Other CEQA Considerations

The findings related to productive agricultural lands and the conversion of this part of the post European regional landscape in not only not adequate, it ignores the importance historically of these lands as a part of the settlement of the County in general and the City of Arcata specifically. Further, it ignores a substantial part of the current economic and social base of our community.

3.6 After all of the times in which we have communicated our concerns about the conversion of the productive agricultural lands of the county to other uses, we are extremely disappointed with the totally inadequate manner in which this issue is treated and not fully discussed.

The document is not legally adequate without a complete disclosure of the conversion of all of the productive lands as a direct result (Findings in Section ----) of this project and the cumulative effects (Section 5.1) on the regional post European agricultural practices that have resulted from past activities of this nature, the currently anticipated actions and the known future actions.

Section 5.5 needs to reflect the conversions proposed.

3.7 Section 5.8 needs to reflect the provision of the County General Plan that were considered and, as indicated above, the manner in which the project is in direct conflict with the Agricultural Protection policies of the County as certified by the California Coastal Commission.

We await the availability and review of the response to comments and their adequacy. Please notify us when they are available.

Sincerely,

John LaBoyteaux

John LaBoyteaux
President

copy: Kirk Girard, Director, Humboldt County Community Development Services
Kirk Gothier, Humboldt County Local Agency Formation Commission
Carolyn Ruth, Deputy County Counsel
Bob Merrill, California Coastal Commission, North Coast District
California Farm Bureau

Commissioner Mike Wilson
Humboldt Bay Harbor Recreation and Conservation District
Division 3

Submitted after the 5/9 Submission and requested that this document supercede the 5/9 document
- JAN

May 11, 2006

Mark Andre, Deputy Director
Environmental Services Department, City of Arcata
736 F St.
Arcata, CA, 95521

Dear Mr. Andre,

Thank you for receiving my comments regarding the Draft EIR for your inclusion in the analysis of the proposed McDaniel Slough Wetland Enhancement Project.

I was recently elected to the position of Division Commissioner for the Humboldt Bay Harbor Conservation and Recreation District. The proposed project is located entirely within the Division 3, which is the Division I represent. During my campaign last fall I spent many weeks talking to my consistency about their concerns and desires regarding Humboldt Bay. Most of the concerns expressed to me were related to the minimization of impacts from industrial and commercial development on the Bay. Desires expressed were for more environmental restoration and the provision of increased public access (i.e. trails) to the Bay. Additionally, their support for a Humboldt Bay Perimeter Trail was almost universal.

Many people I spoke with talked about the Arcata Bay levee, and how that they walked on the levee before (and some after) the existing gate and no trespassing signs were installed and were concerned that their prescriptive rights were being ignored. As anyone who has walked the existing Arcata Bay levee trail knows, it is one of the most beautiful trails on the North Coast. Nowhere else can you really experience the "big sky" and unobstructed view in the Arcata Bay area and its wondrous wildlife. The condition of the trail is currently good and walkable, as such it is often used by wildlife enthusiasts, hunters and walkers.

The current proposed project would limit existing access through both physical (through breaching the levee without a bridge) and programmatic means and thus a significant impact to an important coastal public access resource. I believe this impact is not adequately addressed in the DEIR. I have prepared the following comments so that impacts to existing and future pubic access to the levee and the coastal waterfront are adequately addressed in the FEIR.

4.1
- From the gate at the Arcata Marsh west nearly 3,000 feet (almost the entire project Bay front) of the Arcata Bay levee is within City limits (Figure 1-2, pg. 1-13). Policies in the City's local Coastal program should guide public access and use of the Arcata Bay levee.
- The proposed project should include enhancing public access to the entire length of the Arcata Bay Levee on public lands (approximately 2 miles on City and DFG properties). A pedestrian bridge spanning the levee breach at the mouth of McDaniel Slough is needed to not disrupt the

4.1 public's pre-existing use of nearly 4,000 feet of levee in the project area (pgs. 2-4 and 2-5). The approximately 9,750 feet of new levees being proposed around the perimeter of the project should include pedestrian access, not just 1,500 feet as is being proposed on the project's eastern boundary. Public access should not be limited to only those levee reaches where the City owns the property on both sides of the levee, as the levee will be built on public lands only. The Humboldt Bay National Wildlife Refuge at Hookton Slough provides public access along its levee and is very popular with visitors and residents alike.

4.2
- The very first thing that project should do is to remove the gate at the beginning of the Arcata Bay levee to enhance public access to nearly 2 miles of levee on public lands, the first 4,000 feet are within the project area (pg 2-7).

4.3
- As the DEIR states the No Action Alternative is the baseline from which to measure impacts of alternatives, including the proposed project (pg. 2-13). The public has, and does use the Arcata Bay levee as a trail to enjoy the Public Trust resources found in Arcata Bay and on its former tidelands. In 2000, the Arcata City Council adopted a resolution to provide public access to the Arcata Bay levee from the AMWS to the mouth of McDaniel slough. A significant aspect of the No Action Alternative that is not mentioned (pg. 2-13) is that public access to nearly 2 miles of the Arcata Bay levee would be maintained and not disrupted by a breach in the levee as the preferred project proposes.

4.4
- Alternatives 2 and 3 do not avail themselves of the obvious opportunity to provide public enhanced access to approximately 9,750 feet on the perimeter levee (pgs. 2-13 to 2-14).
- Alternative 4 is similar to the No Action Alternative as far as being able to maintain existing public use of the Arcata Bay levee (pg. 2-14).

4.5
- The DEIR incorrectly states that the "City's site is not currently a public hiking area, and the access point adjacent to the Arcata Marsh, owned and managed by Reclamation District #768" (pg. 4.2-1). The Arcata Bay levee on the City and State property is currently being used, and in-fact has been used for a long time as a public hiking trail. The City not the Reclamation District owns the land on which the levee was built, as it now owns the land on which the gate was erected. In 2000, when the City purchased this land the City Council also adopted a resolution providing for public access to the Arcata Bay levee on its newly acquired property.

4.6
- There are several Coastal Act Policies that are applicable to public access on the Arcata Bay levee and as well as on the proposed perimeter levee: PRC Sections 30530-34 that requires the CCC to prepare and implement a program to maximize public access, and PRC Section 30211 states that development shall not interfere with the public's right of access to the sea. (pgs. 4.2-1 to 4.2-3).
- Section 4.2.2 does not address conflicts with the Coastal Act's Policies regarding maximizing (PRC Sections 30530-34) and interfering (PRC Section 30211) with public access (pg. 4.2-7).

4.7
- Section 4.2.5 does not address impacts to public use of the Arcata Bay levee as a trail from the proposed breaching of the levee without the construction of a pedestrian bridge or providing access on the perimeter levee being proposed (pgs. 4.2.8-4.2.9).

4.8
- The alternative impact analysis on should assess the conflicts and impacts listed in the two previous comments (pgs. 4.2.9-4.2.10).

- The DEIR fails to mention that the Arcata Bay levee is accessed by the public from the AMWS on a well developed "Way" trail that has a long history of public use to enjoy the Arcata Bay shoreline and public trust resources that the Bay and former tidelands provide to the public (pg. 4.5-1). The Arcata Bay levee from McDaniel Slough west has been well maintained including clearing vegetation, and is easily accessible in fact five or more people can walk abreast on the levee; see the attached photograph.
- The DEIR incorrectly finds that there would be no impacts due to conflicts with established recreational or education uses of the site (pg. 4.5-2). As mentioned previously the Arcata Bay levee has a long history of public use and enjoyment, this history of use in-fact renders it an "established" recreational use. The proposed project as well as several alternatives involves breaching of the levee without the construction of a pedestrian bridge which would block public access to nearly 2 miles of the Arcata Bay levee to the west of the breach. Breaching the levee without providing public access would be a significant impact to the public's pre-existing use of the levee to access the shoreline of Arcata Bay. 4.9
- The DEIR incorrectly finds that there would be no impacts due to interfering with public access or due to long-term disruption of access to an established recreational area (pgs. 4.5-3 to 4.5-4). As mentioned previously the Arcata Bay levee has a long history of public use and enjoyment, this history of use in-fact renders it an "established" recreational area. The proposed project as well as several alternatives involves breaching of the levee without the construction of a pedestrian bridge which would create a long-term disruption of public access to nearly 2 miles of the Arcata Bay levee to the west of the breach. Breaching the levee without providing public access would be a significant impact because it would create a long-term disruption of access to an established recreational area, namely the Arcata Bay levee that physically provides public access the shoreline of Arcata Bay.
- Section 4.6 Circulation does not adequately to describe the existing public use, which is certainly not minimal, of the Arcata Bay levee as a pedestrian facility (pg. 4.6-1, 4.6-2 and 4.6-5 to 4.6-6). 4.10
- When considering existing recreation use of the project area the proposed project without a pedestrian bridge to span the proposed breach of the Arcata Bay levee is not the "Environmentally Superior Alternative"; Alternative I and 4 are more superior (pg. 5-4). 4.11
- The DEIR fails to identify the disruption of public access to the shoreline of Arcata Bay via the Arcata Bay levee as a "significant effect that cannot be avoided" (pgs. 5-6 and 5.7). While this impact could be avoided if the proposed project included a pedestrian bridge spanning the breach or included public access on the proposed perimeter levee.
- The DEIR fails to describe, in its discussion balancing short-term use and long-term productivity, the permanent loss of public access on the Arcata Bay levee to the Arcata Bay shoreline by the proposed project without a pedestrian bridge spanning the breach or included public access on the proposed perimeter levee (pg. 5-22). 4.12
- The Findings fails to recognize the proposed project significant impact to public by permanently blocking their access via the Arcata Bay levee to the Arcata Bay shoreline where they can enjoy the public trust resources that the Bay and former tidelands provide to the public (pg. 5-23).

4.13 Not only do the Costal Act, Arcata General Plan and Local Costal Plan as well as the Draft Humboldt Bay Management Plan have specific language to preserve and enhance public costal access but the Arcata Bay Levee trial was outlined as a potential project in the 2001 Humboldt Bay Trails Feasibility Study drafted by Redwood Community Action Agency and funded by the State Costal Conservancy.

In addition to the above comments I have attached two photos of the Arcata Bay Levee Trail. I appreciate this opportunity to comment on the DEIR and look forward to the implementation of a successful project with the desired and appropriate public access that the public deserves and expects.

Best regards,

Mike Wilson, P.E.

Division 3 Commissioner, Humboldt Bay Harbor, Recreation and Conservation District Commissioner
P.O. Box 165
Arcata, CA, 95518

CC: Bob Merrill, California Coastal Commission District Director

Attached: 2 photos

RECEIVED
MAY 04 2012
CITY OF ARCATA
Dept. of Environmental Services

To: Mark Andre and whoever

From: Stan Harris

I am sure you are aware of my long-standing interest in birds and wildlife, but you may not know that my main training and area of expertise has always be as a wetland ecologist. You already know my general (negative) opinions of this project, but to refresh your memory, here are my more salient points, stated strictly from a **wetland ecology and wildlife standpoint, my major opposition to this project all along has been:**

5.1 **(1) That, if successful (extremely doubtful in my opinion) in establishing salt marsh, (rather than open water/mud flat), it is nearly certain that we will end up with more stands of the exotic *Spartina densiflora* cordgrass rather than anything remotely resembling what was here originally. Thus, to call it a "restoration project" is a sham. Also, I would argue that to call it "enhancement" also is a sham because the existing perennial grassland has far more wildlife value that an exotic salt marsh would. Furthermore, contrary to** the accepted general opinion, the particular salt marshes (native or not) present at Humboldt Bay do not seem to have very much, if any, value as a fisheries nursery. These local salt marshes occupy such high elevations that they are high and dry most of the time and are only flooded during the highest tides of the month, with the result that the few fish in them can only live in the deeper channels, not over the vast majority of the marsh. In my daily walks for the past 20 years at the AMP/AOP, I have **never** recorded **any** massive movements into the salt marsh at high tide by fish-eating birds as one would expect if our salt marshes really were important fish habitats or fish foraging areas. The lack of any high-tide movement of fish-eating birds into the salt marsh tells me that the fish do not move in then either. It is true that one occasionally sees Egrets and Herons inside the salt marsh, but they mostly use it only as a high tide resting area when they actually perch on driftwood or the higher land areas. The very few foraging herons in salt marshes are always along the channels, not the marsh itself and if one watches closely, they are not very successful. The monthly flooding during very high tides effectively eliminates successful nesting by birds or development of small mammal populations (and hence no food for even raptors). About the only significant use I have observed of the cordgrass marshes by wildlife happens in early and mid fall when starlings and red-winged blackbirds harvest the annual cordgrass seed crop in a few weeks. Rather than spend what few acres of land we have available for management on a project designed to provide more acreage of an invasive exotic cordgrass with no wildlife value, I would much rather see you adopt Alternative 1. Keep it as perennial grassland, but graze it less.

(2): If you must go forward with the project, the elevations of most of the project area guarantee that what you will get will be an open water arm of the bay at high tide and more mud flats at low tide. One can question, that from a wildlife standpoint (and fisheries?), do we really need more open water and mud flats, or would preserving a few acres of perennial grassland contribute more to our general ecological diversity? I think the latter is a more valid viewpoint than the former. If push comes to shove, I would much rather see more mudflat and open water than salt marshes dominated by *Spartina densiflora,* so would strongly advise **against** adopting measures (such as filling low areas) that would encourage *Spartina densiflora* to dominate. And I also believe most strongly that the project **has to be justified on an other-than-wildlife enhancement** basis; hence I can see no basis whatever for Dept. of Fish and Game to sign off on this project.

I have read only portions of the draft EIR and have a few specific comments that express my concerns with perceived (by me) inadequacies in the draft EIR. As I understand it, the project proposes a complete restoration of full salt water intrusion into the project area with a break in the dike sufficient to allow the full exchange of tidal action and no muted tidal flows (which would necessarily change some of my predictions). So here are a few specific comments on the EIR alone.

5.2 Page 1-2. Under "Primary Objectives", 1 it is stated that the project will maximize the opportunity to restore a tidal marsh dominated by pickleweed.

5.2 *Comment: This is unrealistic pie-in-the-sky thinking, given the elevations of the site and the historical vegetation responses of former "restoration" projects. The elevations of most of the project site is too low to support* ***any*** *salt marsh. It will, in fact, become mud flats at low tide and open water at high tides. The few areas with the proper elevations for salt marsh establishment will become dominated by the exotic cordgrass, Spartina densiflora which has almost no value to wildlife or fisheries. All one need do it examine the "restored" areas along lower Jolly Giant Creek or at the "restoration site" at Park Street in Eureka where sites were dominated by Spartina densiflora within 2 years of salt water inundation. Moreover, most of the historic stands of pickleweed at Humboldt Bay have already been taken over by S. densiflora and I suspect that the elevation relationships shown on page 3.2-29 do not show the true baywide story now. Many of the lower elevation Salicornia beds that were healthy 20 years ago are now dominated by Spartina densiflora, so I would expect a repeat of Eicher's study to show an extension of the Spartina bar into the lower elevations somewhat.*

5.3 Page 1-8: Item 1 states that the tidal marshes at Humboldt Bay used to provide "vital ecologic functions .....including nurseries for fish, feeding areas for birds,....."

Comment: While the statement is generally true of salt marshes elsewhere in North America, I am unaware of any actual studies on the original "native" salt marshes at Humboldt Bay that would support a statement as sweeping as this. As such, the statement is misleading at best and cannot be supported by facts.

Page 1-8: Under item 3, it is stated that the elevations of the site, having subsided only 1 or 2 feet are "still high enough relative to the tide level for plants to colonize".

Comment: If by "plants" you mean "salt marsh plants", I respectively disagree. You will find that the "only 1 or 2" feet of subsidence will act in exactly the opposite way. It will, in fact, ***prevent the colonization of plants*** *and hence the statement in item 3, page 1-8 is patently false.*

5.2 Page 1-8. Item 4 states that it is uncertain "whether the dominant vegetation colonizing the site will be native pickleweed or exotic cordgrass".

Comment: Given the ample evidence from former "restoration" projects at Humboldt Bay, i.e, Park Street, Bracut, lower Jolly Giant Creek, where in every case, the marshes were dominated from the outset by Spartina densiflora, I fail to see where any uncertainty comes from. In the project area on the few areas at the proper elevation for salt marsh to colonize, there is ample local recent historical evidence for one to confidently predict that these areas will, in fact, be colonized and dominated by the exotic cordgrass, Spartina densiflora. All one need do is examine that portion of lower Jolly Giant Creek just north of the Butcher Slough Log Pond to see only the latest example of this process. Or examine the salt marsh at the mouth of Jacoby Creek where I have photos showing a nearly pure pickleweed flat in 1968 and an impenetrable jungle of Spartina densiflora after 2000.

5.4 Page 1-8: 5. States that removal of the tide gate will remove a barrier for salmon migration into Janes Creek.

Comment: True enough, as far as it goes, but look ahead to page 2.3, paragraph 4 where it states that the Samoa Blvd culvert it too high to allow fish passage anyway. How do you reconcile these two statements?

5.5 Page 2.3: Paragraph 6 makes a blanket claim that "deepening" the channels provides increased habitat diversity for native vegetation and wildlife".

Comment: This is patently untrue. Channelizing a streambed almost always ***reduces*** *habitat diversity and species richness.*

Page 2.3: Last paragraph on page:

5.6 *Comment: I do not at all agree with the first sentence. Unless you are going to do massive filling to overcome the subsidence, (where are you going to get the 30,000 to 40,000 cubic yards of fill and the money to pay for its movement? By the way, my calculations show that to raise the level even 18 inches [probably not enough for most of the area], not accounting for further subsidence, or losses to erosion, 35,000 cubic yards would only cover 14 acres, a drop in the bucket). And then again,* ***from a wildlife standpoint****, if you really are going to go ahead with this project, it will be* ***far better to have it develop into a high-tide open water arm of the bay and a low tide mud flat than to encourage it to develop into the biological desert of a Spartina densiflora jungle****. Therefore,* ***I most strongly disagree*** *with the concept of placing 30,000 to 40,000 yards of fill in the low areas because, even if successful, all you will get will be a Spartina densiflora stand, clearly the worst wildlife habitat short of a paved parking lot we have. I thought it was illegal to fill a wetland anyway. If you really do have extra fill material left (30,000-40,000 yards), I recommend building islands with it in areas to be flooded rather than trying to raise the elevations of entire flats. Armor the islands.*

There is no way that most of the area will become anything except a mudflat at low tide and an open water arm of the bay at high tide now matter how long you wait. Further, these problems will only be made worse if and when the sea level really does rise in the future (as you predict later on). In 50 years, if sea levels rise, the entire Arcata Bottoms could be an open water arm of the bay. You are going way out on a limb in predicting what will happen in 50 years, but then again, in 50 years, neither of us will be here to answer critics on why we were so wrong. Also, as stated above, there is ample local evidence that at elevations proper for salt marsh development, Spartina densiflora comes in right away without a pickleweed stage. More pie-in-the sky wishful thinking to justify the project?

Page 2-4: you state you area going to plant salt marsh vegetation:

5.7 *Comment:* ***An unjustified waste of time and money****. Let nature take care of it. Just look at what happened to the plantings done along lower Jolly Giant Creek just north of Butcher Slough Log Pond. The only ones that worked were the alkali bulrush. Try that , but it has to be in brackish, not salt water sites.*

Page 2-4: Brackish Marsh detail:

5.8 *Comment: I see no detail here or on map showing how and where fresh and salt water will be introduced in the pond.*

Page 2.4: Freshwater ponds detail:

5.6 *Comment: Use the dirt from them for dikes, but not to fill wetlands. Build islands instead. Armor the islands.*

Page 2-4; 2-5: Trails and Interpretive facilities.

Comment: Generally, I think the city has done an admirable job with interpretive facilities at AMWS and I hope we can continue in the future. I have no problem with the 800 foot bayfront trail and a blind at its west end.

5.9 ***BUT:*** *The map, Fig 22-4, page 2-10, also shows a trail all the way around the Brackish Pond and also one down the west side of Gearheart Marsh with observation blinds shown midway along the west side of the Brackish Pond and at the SW corner of the western most freshwater pond. These features would result in a trail all the way around not only the Brackish Pond but also all the way around Gearheart Marsh.*

I MOST STRONGLY OBJECT TO THESE FEATURES ON WILDLIFE DISTURBANCE GROUNDS. *At*

present, Hauser Marsh is little used by wildlife even when it is full of food, owing, I am sure to the excessive disturbance caused by its long-narrow shape and the constant foot and auto traffic on its north, west, and south sides and people and dogs on the trail along its east side. Similarly, birds on Gearheart Marsh are frightened away from at least the east half of the pond by foot and auto traffic on I street. The proposed trail all the way around the Brackish Pond with a blind on its far west side and extending the trail system completely around Gearheart Marsh ARE EXTREMELY ILL-ADVISED. The marshes simply are not large enough to allow this degree of public use and still expect much in the way of wildlife to look at. I MOST STRONGLY ADVISE eliminating the trail along the south and west sides of the Brackish Pond and the one along the west and north sides of Gearheart Marsh. In fact erect barricades if you have to to keep people from going anyway. People do not have to have access to every square foot of the landscape. If they do, their disturbance eliminates the reason they wanted to go there anyway. There are plenty of hiking trails for joggers and doggers to use already at AMWS. Lets give the birds a break. Further, I don't think the effort and expense put into bird observation

5.9 ***blinds is worth the effort judging from the little use being made of the ones already in place at AMWS. I would not build blinds (habitat for the homeless) in the remote portions of the trail system that cannot be monitored by the authorities with ease.***

RATHER, I RECOMMEND *an elevated platform* ***(one only)*** *large enough to accommodate a wheelchair and 4-5 people at either the SE (I Street) corner of the Brackish Pond (with no trail on west), or at the NW corner of the Brackish Marsh (where it would overlook not only the Brackish Pond, but also the Freshwater Ponds) I would not extend the trail system beyond that point. The platform at the south end of Butcher Slough Log Pond could be used as a model, but lose the benches to sit on. Just scale it up and raise it just high enough for one to see over the emergent vegetation (perhaps about 4 feet).*

Page 2-7: *Comment: When you state the height of the levees and estimate 60,000 cubic yards of fill for levee construction have you provided for the fact that all new levees settle 10-50 percent depending on the type of fill*

5.10 *material?*

Where is the city going to get the money for long term levee maintenance. Or is this one of those 50-year-in-the-future problems, we won't be here to address?

The project timing seems wildly optimistic.

Page 3.2+: *Generally the wildlife values of the present site are very poorly documented in these sections; not only in species lists but also concerning seasonal and numerical use. Among the many examples of omissions: Short-eared Owl for Perennial Grasslands, not to mention, Peregrine, Prairie Falcon, Ferruginous and Rough-legged Hawks,*

5.11 *etc, etc.*

Page 3.2, 9 Comment: *Under Special Status Wildlife Species, you have Ferruginous Hawk listed in both the second and third paragraphs. Did you really mean to do this?*

Page 3.2-17: Comment: *In the second paragraph of this page it is claimed that flooding 200 acres with salt water will "fully compensate" for the loss of the 6.5 acres of existing wetlands and provide substantial "qualitative" enhancement... Not on your tin type. This statement is gilding the lily too much. You can't replace one type of*

5.12 *wetland (fresh) with another (salt) as equals. That is comparing apples to oranges. I don't see how you can claim qualitative enhancement when, if you are successful in your stated goal, of achieving salt marsh, the resulting Spartina densiflora marsh will be substantially lower in quality than the existing habitat complex of riparian, wet perennial grassland, fresh and brackish water areas, etc. The species richness and densities in the areas to be flooded are presently far greater, both vegetatively and critter wise than a Salicornia marsh will have. This just does not stand up.*

Page 3.2-20: *Last paragraph on page states that the White-tailed Kite is known to forage in Salt Marshes. Not a true statement. At least, not successfully or for long. High dike edges of salt marsh where mice can live, yes, but over the salt marsh proper, definitely not.*

Also in the same paragraph it is claimed that the loss of the perennial grassland in the project area will be less than significant because there is an abundance of perennial grassland in the region. But that totally ignores the fact that most regional perennial grassland is grazed down to nothing constantly and hence is useless for foraging raptors or other wildlife. The statement ignores the thing that is special about the perennial grassland of the project area that will be lost: It has been allowed to grow to maturity and develop a thatch that supports small mammals. This particular growth stage of perennial grassland is one of the rarest regional habitats we have, certainly much rarer than mud flats, open water or even salt marsh, so the claim made in this paragraph is at best wildly bogus and simply not true when one considers the type of perennial grassland we are going to lose, and the fact that it is vital for foraging short-eared owls, harriers, white-tailed kites, etc., etc. Not only that, but much of the area of Mad River Slough Wildlife Area that recently ***was*** *similar habitat has been converted by a policy of grazing into less than ideal goose pasture and is no longer as suitable for foraging raptors, so the end result of this project will be to substantially reduce the populations of our local raptors. Lets see how you mitigate that!*

5.13

The same paragraph claims that planting riparian cover will enhance foraging for white-tailed kites and vaux's swifts. Kites feed nearly exclusively on meadow voles found only in grassland, not riparian. Where, in a salt water world, are you going to plant very much riparian anyway and how could that possibly make up for the loss of all the Perennial Grassland in the project area even if kites used it (which they don't)? I'll bet you end up with a net loss of riparian habitat once the patches along Janes Creek are wiped out by salt water. I don't buy this statement at all.

Page 3.2-21: top paragraph and 3.2- 4c. Comment: *The present snags erected at AMWS are almost unused, so I would not put them in. Better to plant living trees. If you are going to turn Janes Creek into a salt water system, where in the world are you going to plant willows, etc, "along Janes Creek" as claimed in Page 3.2-4c? Not just Harriers, the few known or suspected nestings of short-eared owls were in perennial grassland of the project area. Bat houses in a salt water environment? Come on. Bats feed on flying insects which are nearly unknown in salt water systems.*

5.14

Section 3.2.5: *I'll bet you end up with less salamanders and red-legged frogs when it all goes to salt water than you have now. How can you claim there will be enhanced habitat when it all goes to salt water. Fuzzy reasoning. Here, you say we are going to have a muted tide cycle. Huh?*

5.15

Well, I give up. You know where I stand. If this can't be stopped, please do pay attention to my concerns about the trails system. Keep the south and west sides of Gearheart and the Brackish Pond pristine without people and do not deliberately fill in the low areas with dirt–what a stupid idea. Let's not make the world safe for Spartina densiflora. I would much rather see more mud flat and open water if we can't save the overgrown, thatch-rich perennial grassland. Let the wildlife have a break.

I still think the city would be better off in the long run using the land to expand the sewage treatment enhancement marshes, because sooner or later, Allen, Gearheart and Hauser Marshes will have to be closed down and rehabilitated. (Bull dozed out again), Population growth will, before that magic 50 years from now arrives, require bigger treatment capacity and the Hunt Pasture is the logical place for that to happen.

5.16

THE AUK 111(3):588-595, 1994

aka White-Tailed Kite

TERRITORY-SIZE REGULATION IN BLACK-SHOULDERED KITES

JEFFREY R. DUNK AND ROBERT J. COOPER[1]

Department of Wildlife, Humboldt State University, Arcata, California 95521, USA

ABSTRACT.—We studied the relationship of Black-shouldered Kite (*Elanus caeruleus*) territory size to prey abundance and competitor abundance in northwestern California. Kite territory size ranged from 1.6 to 21.5 ha ($n = 26$). The estimated mean number of California voles (*Microtus californicus*) per territory was 1,483 ± SE of 163 ($n = 25$). Competitor abundance (i.e. total raptor abundance) ranged from 4.8 to 31.0 individuals/km^2 and was strongly correlated with abundance of *M. californicus*. Both estimated prey abundance and competitor abundance were inversely correlated with kite territory size. After developing multiple-regression models using both variables, partial-correlation analysis revealed that once the effects of prey abundance were statistically controlled, competitor abundance continued to be significantly correlated with kite territory size. When the effects of competitor abundance were statistically controlled, prey abundance was no longer significantly correlated with kite territory size. In that it appears that the number of competitors was a function of number of prey, we conclude that kite territory size is proximately regulated by competitor abundance and ultimately regulated by prey abundance. *Received 3 August 1992, accepted 14 March 1993.*

THE RELATIONSHIP BETWEEN raptors and their prey has been studied extensively (e.g. Craighead and Craighead 1956, Village 1982, 1987, 1989, Korpimäki 1984, 1985a, b, 1988, Newton et al. 1986). Most raptor-prey studies have focused either on raptor abundance (Baker and Brooks 1981, Village 1982, Cully 1991) or raptor reproductive success (Hammerstrom 1979, Smith et al. 1981, Korpimäki 1986, 1988, Ridpath and Brooker 1986) in relation to prey abundance. Few studies have examined the relationship between raptor territory size and prey abundance (for exceptions, see Village 1982, 1987, Temeles 1987), probably because of the difficulty of measuring territory size of wide-ranging birds, and in estimating abundance of several types of prey (e.g. rodents, rabbits, and birds) over those relatively large areas.

Generally, theory predicts that territory size should be inversely related to food abundance (for exceptions, see Schoener 1983, 1987, Ebersole 1980). Myers et al. (1979) presented two hypotheses regarding territory-size regulation. First, individuals establish territories of a size that contains adequate resources to meet their energetic needs. Second, an individual will defend as large an area as it can, constrained by competition with other individuals. These hypotheses are not mutually exclusive, although they have generally been viewed as such (Myers et al. 1979).

We studied the relationship of the size of Black-shouldered Kite (*Elanus caeruleus*) hunting territories to prey abundance and competitor abundance. Kites are good subjects for such a study because: (1) they have distinctive hunting habits (hovering), which allows unambiguous descriptions of areas/points used for foraging; (2) they use open to semiopen habitats, facilitating long, continuous observation periods; (3) they are at the top of the food chain, so their territory size is not likely to be influenced by predation; (4) they have relatively small home ranges or territories compared with other raptors (Henry 1983); and (5) they rely almost exclusively on rodents as prey (Waian and Stendell 1970), primarily California voles (*Microtus californicus*) in California (Stendell 1972, Bammann 1975). Thus, estimating kite prey abundance is an easier task than it would be with a more generalist predator.

METHODS

The study was conducted on the Fay Slough Wildlife Area in Eureka, California. The 135-ha area was used for cattle grazing prior to 1987 when it was acquired by the California Department of Fish and Game. It is composed primarily of ungrazed pasture with small patches of alders (*Alnus* spp.) and blackberry bushes (*Rubus* spp.). Alders were planted along slough borders in 1988, providing important perching locations for raptors. A number of freshwater and

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brackish sloughs dissect the area. The topography is flat with elevations ranging from −0.5 m to 2 m. The climate in the area is maritime, with cool summers and mild winters. Summers are characterized by foggy nights and mornings. Precipitation was greatest between November and April though some rain occurred during most months of this study. The growing season is generally between April and July, when grasses develop, then drop their seeds. Vegetation composition and structure were relatively constant throughout the study, although limited (rotational) grazing occurred on approximately 35 ha beginning in December 1989. Primary plant species included Italian ryegrass (*Lolium multiflorum*), perennial ryegrass (*L. perenne*), velvet grass (*Holcus lanatus*), and buttercups (*Ranunculus* spp.).

Kites were captured with a selective pole trap (Dunk 1991), then banded with uniquely colored leg bands. Kite hunting territories were estimated from June 1989 through November 1990. Each territory was delineated by observing a kite and documenting all locations where the bird hovered, perched, or interacted with another kite or some other raptor. Locations were estimated by measuring distance with an optical range finder and direction with a compass from fixed observation spots. The accuracy of the range finder was ±1% at 100 m and ±10% at 1,000 m. For each location, distance, direction, and time (to the nearest 0.05 min) were recorded on a microcassette recorder. Each kite was observed for a minimum of 1.5 h or until the bird left the area to roost. Total observation time per territory ranged from 1.5 to 12.25 h over a one- to seven-day period. Mean number of locations per territory was 64.5 ± SD of 24.2. Adequacy of sampling hunting territories was determined graphically by plotting hunting territory size and number of locations until reaching an asymptote. Hunting territory size was estimated using the 95%-minimum-convex-polygon estimator in program HOME RANGE (Ackerman et al. 1989).

We attempted to delineate as many hunting territories as possible. We did not randomly choose individuals to observe, but selected individuals according to the following priority: (1) color-banded birds with a territory not previously measured; (2) previously unmeasured territories of unbanded individuals that were repeatedly associated with a specific geographic area prior to the sampling time; and (3) color-banded individuals whose territories had been previously estimated. Unbanded birds were identified using one or more of the following criteria: (1) unique molting patterns; (2) perches used; (3) association with (i.e. mates of) banded kites; and (4) age (i.e. whether adult or juvenile).

We sampled vegetation structure and composition within two weeks of delineating each hunting territory. After plotting territory boundaries on a 1:2,400 aerial photograph, 100 vegetation plots were established in a random systematic design for each territory in order to have complete coverage of the territory. In each plot, we measured the percentage of the plot covered by: (1) green grass (Gramineae); (2) brown grass; (3) green herbaceous vegetation; (4) brown herbaceous vegetation; (5) seed heads on grasses; (6) green rush (Cyperaceae); and (7) brown rush. Variables 6 and 7 were estimated beginning in December 1990. These seven variables were estimated by eye and placed into one of six cover classes: 0%, 1–20%, 21–40%, 41–60%, 61–80%, and 81–100%. Cover height, an estimate of the height at which there was 100% cover horizontally, also was measured in the center of each plot by pushing a meter stick through the vegetation, flush to the ground, and recording the height (cm) of the intersection between plot center and the meter stick. Plots falling on flooded areas were classified as flooded with no vegetation characteristics estimated within them.

Potential competitors of kites (other vole-eating raptors) were counted once each month within 14 days of estimating each territory. From a central location, we counted the numbers of each raptor species by scanning the entire study area (approximately 95% of the area could be viewed). Counts were terminated when three consecutive counts yielded identical results. All counts were made within 1 h of sunset because previous observations showed that this was the period of greatest raptor activity. Common Barn-Owls (*Tyto alba*) were counted by looking in the two barns on the study area.

Microtus californicus were trapped monthly within four randomly located permanent trapping grids. Grids consisted of 40 traps spaced 5 m apart and arranged in an 8 × 5 pattern. Traps were locked open for 24 to 36 h prior to being set each month. Before being set, traps were baited with bird seed and polyester pillow stuffing was added. Traps were checked just after first light and just before dark for four consecutive days. Because there was no evidence from our study to suggest that *M. californicus* activity differed between day and night, we did not distinguish between day and night captures. At each capture location, individuals were uniquely toe-clipped, weighed (g), sexed, and released (for more detailed description of small-mammal trapping, see Dunk 1992). Vole densities within grids were estimated by dividing number of individuals caught by grid area. Within one week of trapping, vegetation was sampled in each trapping grid. Vegetation plots were placed within 0.5 m of each trap, and the same parameters were estimated as in kite hunting territories.

To estimate vole abundance within each kite territory, we categorized each vegetation plot within a territory as being of high-, medium-, or low-quality habitat for voles. This was done after modelling vole-vegetation associations using stepwise discriminant analysis each month (see Dunk 1992). This procedure was effective at predicting vole abundance (mean correct classification = 70.03% ± SE of 2.66). Vegetation

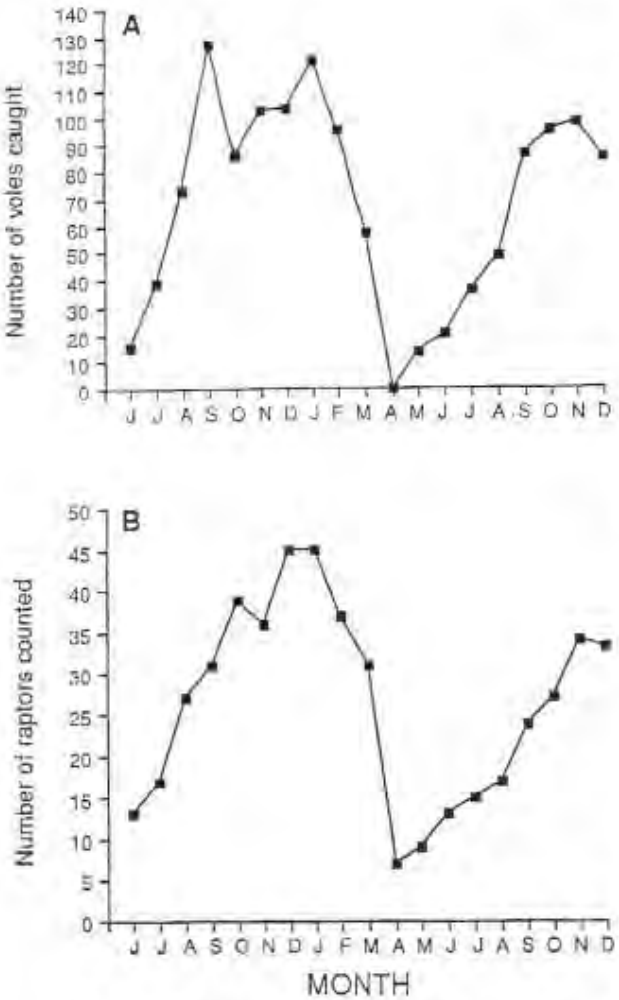

Fig. 1. (A) Number of *Microtus californicus* caught and (B) number of raptors counted each month on Fay Slough Wildlife Area (June 1989–December 1990).

plots from kite territories were classified using the discriminant model developed closest to the time the territory was delineated. Generally, vole populations increased when seeds fell from grasses and became available to them. Vole populations were larger in areas with lower cover height and larger percentage brown grass cover (Dunk 1992). High-, medium-, and low-quality vole habitat was defined relative to the largest number of individuals caught within a month. The percentage of plots in each habitat-quality category was multiplied by territory area, then by naive density (number of individuals caught/grid area) of voles for that category. These were added together to estimate vole abundance for each territory.

Three methods of relating kite territory size to vole abundance were used: (1) regressing territory size on a monthly index of vole abundance expressed as number of individuals caught per 640 trap-nights for the four grids combined; (2) regressing territory size on the estimate of the number of voles within each territory; and (3) regressing territory size on the estimate of vole density within each territory. We also examined the effects of potential competitor abundance on kite territory size by regressing territory size on the estimate of competitor abundance for the month closest to the time the territory was delineated.

We used multiple-regression and partial-correlation analyses to evaluate simultaneously the effects of food abundance and competitor abundance on territory size. Partial-correlation analysis examines the effects of each independent variable while statistically controlling for the effects of variables already entered into the multiple-regression model (Neter et al. 1989); it allows for statistical controls when experimental controls are not feasible (Siegel and Castellan 1988). Partial correlation is useful for examining relationships among a dependent and two or more independent variables when there is a strong relationship between or among independent variables.

RESULTS

In all, 26 kite hunting territories were estimated; three individual's territories were estimated more than once. We were unable to sample vegetation within the territory of one kite. Territory size ranged from 1.6 to 21.5 ha ($\bar{x}$ = 7.8 ± SE of 1.0, n = 26). Vole populations fluctuated annually (Fig. 1A) with populations ranging from 0–914 individuals/ha. Mean estimated number of voles per kite territory was 1,483 ± 163 (n = 25). Vole density within kite territories ranged from 0 to 602/ha ($\bar{x}$ = 277.8 ± 33.2). Potential competitor abundance ranged from 7 to 45 individuals ($\bar{x}$ = 28.9 ± 5.7, n = 26), or 4.8 to 31.0 individuals per km^2 (Table 1).

The correlation between kite territory size and the estimate of prey abundance within each territory was not significant (r = 0.23, P = 0.261, n = 25). Kite territory size was negatively correlated with both total raptor abundance and the index of prey abundance (r = −0.78 and −0.75, respectively; P < 0.001 for both; Fig. 2). Territory size was also negatively correlated with the estimated density of voles within each territory (r = −0.71, P < 0.001, n = 25). A significant negative correlation also was found between territory size and abundance of conspecifics (r = −0.64, P < 0.001, n = 26). We found a significant correlation between total raptor abundance and the index of vole abundance each month (all grids combined; r = 0.90, P < 0.001, n = 19).

Because separate partial correlation analyses of each year's data (June 1989 through May 1990 and June 1990 through December 1990) showed similar results (Table 2), all data were combined

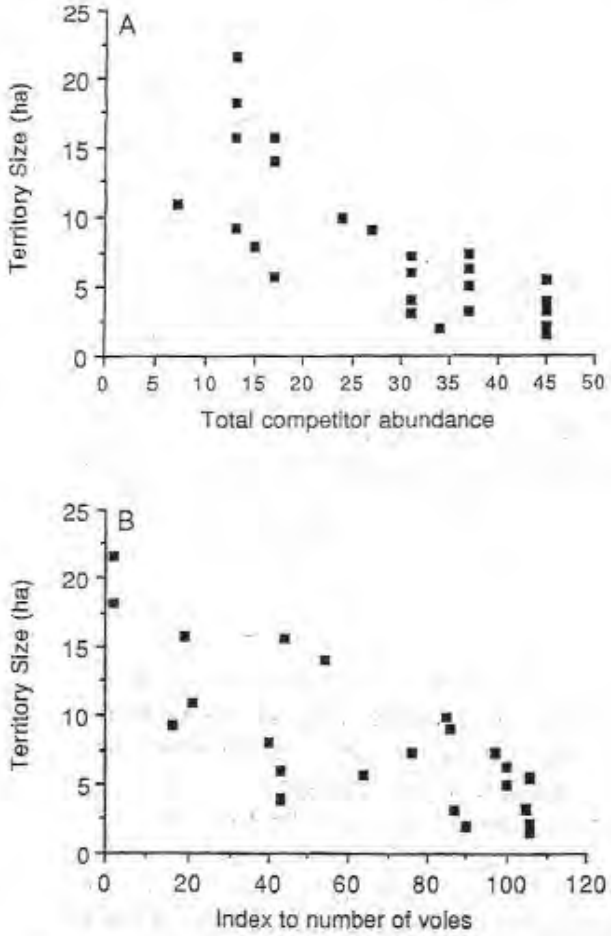

Fig. 2. Relationship of territory size (A) to competitor abundance and (B) to an index of numbers of *Microtus*.

for subsequent analyses. When regressing kite territory size on the estimate of vole density within kite territories and competitor abundance (total raptors), only competitor abundance was entered into the model ($r = -0.76$, $P < 0.001$, $n = 25$). Partial-correlation analysis revealed that once competitor abundance was controlled statistically, prey density did not explain a significant amount ($r = -0.25$, $P > 0.20$, $n = 25$) of the remaining variation in territory size (Table 3). When both variables were forced to enter the model, the partial correlation of competitor abundance remained significant ($r = -0.45$, $P < 0.05$, $n = 25$) when prey density was statistically controlled. Second, we regressed kite territory size on the estimate of prey density and kite abundance (conspecific competitors). Prey density was the only variable entered into the model ($r = -0.71$, $P < 0.001$, $n = 25$). When both variables were forced to enter the model (kite abundance was entered first), partial-correlation revealed prey density

TABLE 1. Monthly raptor counts at Fay Slough Wildlife Area, Eureka, California (June 1989–December 1990).

Species	Month																	
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Black-shouldered Kite (*Elanus caeruleus*)	8	11	15	17	20	17	22	19	14	14	5	4	8	7	10	15	15	12	12
Red-tailed Hawk (*Buteo jamaicensis*)	2	2	3	3	3	2	3	3	3	3	1	2	2	3	2	2	2	3	2
Red-shouldered Hawk (*B. lineatus*)	1	1	2	2	3	3	2	3	1	1	0	2	1	2	2	2	2	3	2
Rough-legged Hawk (*B. lagopus*)	0	0	0	0	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0
Northern Harrier (*Circus cyaneus*)	2	3	4	5	7	7	7	7	8	5	1	1	2	3	3	3	5	6	4
American Kestrel (*Falco sparverius*)	0	0	2	3	3	2	4	4	4	3	0	0	0	0	0	1	2	3	3
Short-eared Owl (*Asio flammeus*)	0	0	0	0	0	3	5	6	6	4	0	0	0	0	0	0	0	6	8
Common Barn-Owl (*Tyto alba*)	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	2
Total	13	17	27	31	39	36	45	45	37	31	7	9	13	15	17	24	27	34	33

TABLE 2. Partial-correlation analysis results, by year, using Black-shouldered Kite territory size as dependent variable, and competitor abundance and prey abundance as independent variables.

Independent variables	r	Partial correlation	P for partial correlation	Adjusted r^2	Model P	n
		Year 1				
Competitor abundance	−0.875			0.748	<0.001	
Microtus density	−0.806	−0.339	0.20 < 0.10			
Competitor abundance	−0.875			0.748	<0.001	16
Index to numbers of *Microtus*	−0.775	−0.217	<0.50			
		Year 2				
Competitor abundance	−0.522			0.169	0.50 < 0.20	9
Microtus density	−0.495	0.003	<0.50			
Competitor abundance	−0.561			0.229	0.20 < 0.10	10
Index to numbers of *Microtus*	−0.532	−0.070	<0.50			

to continue to be significantly correlated with kite territory size ($r = -0.47$, $P < 0.05$, $n = 25$; Table 3). We also regressed kite territory size on the index of vole abundance and competitor abundance. Again, competitor abundance was the only variable entered into this model ($r = -0.780$, $P < 0.001$, $n = 26$). When both variables were forced into the model, partial correlation revealed that raptor abundance continued to be significantly correlated with kite territory size ($r = -0.446$, $P < 0.02$, n = 26, Table 3).

DISCUSSION

Three other investigators used partial correlation analyses to examine the relationships among food abundance, competitor abundance, and territory size of birds. Myers et al. (1979) found that, once the interaction between prey density and intruder (competitor) density was controlled statistically, prey density had no significant effect on territory size of Sanderlings (*Caladris alba*). Those findings are identical to ours when all raptors are considered as competitors. Conversely, McFarland (1986) found that food supply, not intruder pressure, determined territory size of New Holland Honeyeaters (*Phylidonyris novaehollandiae*). During the first year of his study, Temeles (1987) found that both mouse availability and intruder pressure explained some variation in territory size of Northern Harriers, $n = 7$ territories), whereas in the second year mouse availability explained all variation in territory size ($n = 5$ territories). Myers et al. (1979) and Temeles (1987), however, acknowledged that both factors probably play a key role in territory-size regulation. Ours and the study by Temeles (1987) are the only two that have examined relationships among bird territory size, competitors, and prey in more than one year using partial-correlation analysis. Contrasting with Temeles (1987), we observed the same relationships during both years of our study (Table 2).

We suggest that kite territory size is proximately regulated by competitor abundance and

TABLE 3. Partial-correlation analysis results, for both years combined, using Black-shouldered Kite territory size as dependent variable, and competitor abundance and prey abundance as independent variables.

Independent variables[a]	r	Partial correlation	P for partial correlation	Adjusted r^2	Model P	n
Competitor abundance	−0.762	0.448	<0.05	0.569	<0.001	25
Microtus density	−0.711	−0.246	0.20 < 0.50			
Microtus density	−0.711	−0.468	<0.02	0.380	<0.001	25
Kite abundance	−0.637	0.246	0.20 < 0.50			
Competitor abundance	−0.780	−0.446	<0.02	0.618	<0.001	26
Index to numbers of *Microtus*	−0.746	−0.305	0.10 < 0.20			

[a] For each run, only first variable entered into model. Partial correlation for first variable comes from forcing second variable to enter model first.

ultimately regulated b rey abundance, because raptor abundance appeared to be regulated by vole abundance (Fig. 1). Myers et al. (1979) reached the same conclusion about Sanderling territory size. On the beaches inhabited by Sanderlings, food abundance changed rapidly. Myers et al. (1979) suggested that Sanderlings were most influenced by the factor that was least variable (i.e. intruder numbers). Temeles (1987) correctly stated that the strength of a correlation depends partly on the magnitude of variation in the variables examined and that his results could be explained statistically by greater variation in food abundance than intruder variables. Our system is similar in many ways to that studied by Temeles, but we measured both prey and competitor abundance differently. Although we did not examine numbers and types of interactions between territory owners and competitors, we assumed that competitor abundance was positively related to number of interactions between owners and competitors. McFarland (1986) reported a significant positive correlation between numbers of competitors and intrusion rates on his study area. It is unclear when examined over the duration of our study whether vole or competitor abundance is more variable because the two are so closely related (Fig. 1). It is possible that our measure of competitor abundance was more accurate than our measure of prey abundance within territories, which could account for competitor abundance being a better predictor of kite territory size. However, it is unlikely that we would have found such small variation (SE) in our estimate of vole abundance within kite territories if the estimates were not accurate.

We suggest that kites defend as large an area as is energetically feasible at any one time, but that increased competitor abundance reduces the defendable area. Several lines of evidence, some circumstantial, support this contention. Kites can and do adjust territory boundaries with respect to local conditions. Raptors in the Arcata-Eureka area undergo regular annual fluctuations in abundance (Table 1, Fig. 1B), numbers generally increasing in September through October, then remaining relatively constant until March or April, when they decrease dramatically. These fluctuations were closely tied to annual fluctuations of *M. californicus* ($r = 0.90$, $P < 0.001$, $n = 19$, Fig. 1). The largest number of voles estimated to be in a kite territory was 3,340 during mid-August 1990 (territory size was 15.6 ha), w h was a time when vole abundance was relatively high, and when many of the winter resident raptors had not yet arrived on the study area. Also, on one occasion we were able to document the precise day that a territory was abandoned by its owner; on that same day the entire territory was incorporated into the territory of a neighboring kite. Village (1982) reported similar results with naturally caused territory abandonment of European Kestrels (*Falco tinnunculus*). Village (1990) experimentally removed European Kestrels from their territories and found that in four of seven instances neighboring birds used vacated territories, but that none of the vacated territories were permanently occupied by "new" birds. However, kestrel territories on Village's study area were much larger (most were greater than 2 km²; Village 1990) than those of kites on our study area. Thus, dramatic expansions of neighbors into vacated territories might be less likely than on our study area where the largest of 26 territories was 0.22 km².

When all raptors were treated as competitors, competitor abundance but not prey abundance influenced territory size of kites. Conversely, when only kites were considered as competitors, prey abundance but not competitor abundance influenced territory size. We believe it is biologically more meaningful to treat all raptors as competitors, rather than conspecifics only. However, defense costs may depend on competitor identity (Temeles 1989, 1990a, b). Kites were commonly observed attacking Northern Harriers, Red-tailed Hawks, Rough-legged Hawks, Red-shouldered Hawks, and other kites. Also, each of the above species, plus American Kestrels and Short-eared Owls were observed to catch and eat *M. californicus* regularly. *Microtus californicus* was by far the most common item in the diet of kites (99%), Red-tailed Hawks (96%), Common Barn-Owls (84%), Short-eared Owls (70%), and Northern Harriers (50%), based on an assessment using regurgitated pellets collected throughout the Arcata/Eureka grasslands (unpubl. data).

During 19 months of small-mammal trapping only four species of small mammals were captured: *M. californicus*, *Reithrodontomys megalotis* (western harvest mice), *Mus musculus* (house mice), and *Sorex vagrans* (vagrant shrews). *Microtus californicus* consistently was the most abundant small mammal and constituted even more of the small-mammal biomass (94%). This

along with our findings that the index of *M. californicus* abundance explained 81% of the variation in total raptor abundance strongly suggests that they were the major food source for almost all of the raptors on the study area. Also, kleptoparasitism by hawks on kites was regularly observed. Thus, we considered all species that were using the same food sources to be competitors, as opposed to only conspecifics.

One of our most striking findings was the temporal stability of the estimate of vole abundance within territories, suggesting that kites need about 1,500 voles within their territories. Kites should abandon territories that have much fewer than this number of voles. Apparently, prey abundance and prey availability were correlated in this instance. *Microtus* presumably need a minimum level of cover in order for large populations to survive (Birney et al. 1976). On our study area, voles were virtually absent in grazed areas with vegetation less than 10 cm in height (Cooper unpubl. data). Thus, within areas of dense and tall vegetation, kites needed about 1,500 voles (abundance) so that some were available to foraging kites. Dunk (1992) reported larger vole populations in areas with shorter vegetation (all areas were ungrazed), areas that probably simultaneously maximized their abundance and availability to raptors.

Hunting style and perch availability are also likely to influence raptor territory size. Because kites in California primarily hunt by hovering, we believe their relatively small territory size on our study area was a function of both prey abundance and the fact that they can hunt 100% of their territories. Mendelsohn (1981) reported much larger territory sizes for Black-shouldered Kites (though prey abundances were not reported) in South Africa, where the birds hunt primarily from perches.

Previous researchers of Black-shouldered Kites have reported them to be both territorial and nonterritorial (see review in Henry 1983). We only observed territorial birds, and as a result we are unable to address the role of nonterritorial kites on our study area. Mendelsohn (1981) suggested that kite territoriality would break down at some upper threshold of prey density, but found that South African kites abandoned territories most often when prey populations were low. Possibly, prey populations on our study area never reached this lower threshold. Instead, our findings suggest that territories simply become smaller as a result of increasing competitor abundance (the proximate factor regulating territory size), which is strongly correlated with food abundance (the ultimate factor regulating kite territory size).

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LITERATURE CITED

ACKERMAN, B. B., F. A. LEBAN, E. O. GARTON, AND M. D. SAMUEL. 1989. User's manual for program Home Range, 2nd ed. (draft copy). Tech. Rep. 15, Forestry, Wildlife and Range Experiment Station, Univ. Idaho, Moscow, Idaho.

BAKER, J. A., AND R. J. BROOKS. 1981. Raptor and vole populations at an airport. J. Wildl. Manage. 45: 390–396.

BAMMANN, A. R. 1975. Ecology of predation and social interactions of wintering White-tailed Kites. M.S. thesis, Humboldt State Univ., Arcata, California.

BIRNEY, E. C., W. E. GRANT, AND D. D. BAIRD. 1976. Importance of vegetative cover to cycles of *Microtus* populations. Ecology 57:1043–1051.

CRAIGHEAD, J. J., AND F. C. CRAIGHEAD. 1956. Hawks, owls and wildlife. Stackpole Co., Harrisburg, Pennsylvania, and Wildlife Management Institute, Washington, D.C.

CULLY, J. F., JR. 1991. Response of raptors to reduction of a Gunnison's prairie dog population plague. Am. Midl. Nat. 125:140–149.

DUNK, J. R. 1991. A selective pole trap for raptors. Wildl. Soc. Bull. 19:208–210.

DUNK, J. R. 1992. Black-shouldered Kite-small mammal-vegetation relationships in northwestern California. M.S. thesis, Humboldt State Univ., Arcata, California.

EBERSOLE, J. P. 1980. Food density and territory size: An alternative model and test on the reef fish *Eupomacentrus leucostictus*. Am. Nat. 115:492–509.

HAMMERSTROM, F. 1979. Effect of prey on predator: Voles and harriers. Auk 96:370–374.

HENRY, M. E. 1983. Home range and territoriality in breeding White-tailed Kites. M.S. thesis, San Diego State Univ., San Diego, California.

KORPIMÄKI, E. 1984. Population dynamics of birds of prey in relation to fluctuations in small mammal populations in western Finland. Ann. Zool. Fenn. 21:287–293.

KORPIMÄKI, E. 1985a. Prey choice strategies of the

Kestrel *Falco tinnunculus* in relation to available small mammals and other Finnish birds of prey. Ann. Zool. Fenn. 22:91–104.

KORPIMÄKI, E. 1985b. Rapid tracking of microtine populations by their avian predators: Possible evidence for stabilizing predation. Oikos 45:281–284.

KORPIMÄKI, E. 1986. Diet variation, hunting habitat and reproductive output of the Kestrel (*Falco tinnunculus*) in the light of the optimal diet theory. Ornis Fenn. 63:84–90.

KORPIMÄKI, E. 1988. Effects of territory quality on occupancy, breeding performance and breeding dispersal in Tengmalm's Owl. J. Anim. Ecol. 57: 97–108.

MCFARLAND, D. C. 1986. Determinants of feeding territory size in the New Holland Honeyeater *Phylidonyris novaehollandiae*. Emu 86:180–185.

MENDELSOHN, J. M. 1981. A study of the Black-shouldered Kite *Elanus caeruleus*. Ph.D. thesis, Univ. Natal, Pietermaritzburg, South Africa.

MYERS, J. P., P. G. CONNORS, AND F. A. PITELKA. 1979. Territory size in wintering Sanderlings: The effects of prey abundance and intruder density. Auk 96:551–561.

NETER, J., W. WASSERMAN, AND M. H. KUTNER. 1989. Applied linear regression models. Irwin, Inc., Homewood, Illinois.

NEWTON, I., I. WYLLIE, AND R. MEARNS. 1986. Spacing of Sparrowhawks in relation to food supply. J. Anim. Ecol. 55:361–370.

RIDPATH, M. G., AND M. G. BROOKER. 1986. The breeding of the Wedge-tailed Eagle *Aquila audax* in relation to its food supply in arid Western Australia. Ibis 128:177–194.

SCHOENER, T. W. 1983. Simple models of optimal feeding-territory size: A reconciliation. Am. Nat. 121:608–629.

SCHOENER, T. W. 1987. Time budgets and territory size: Some simultaneous optimization models for energy maximizers. Am. Zool. 27:259–291.

SIEGEL, S., AND M. J. CASTELLAN, JR. 1988. Nonparametric statistics for the behavioral sciences. McGraw-Hill Book Co., New York.

SMITH, D. G., J. R. MURPHY, AND N. D. WOFFINDEN. 1981. Relationships between jackrabbit abundance and Ferruginous Hawk reproduction. Condor 83:52–56.

STENDELL, R. C. 1972. The occurrence, food habits, and nesting strategy of White-tailed Kites in relation to a fluctuating vole population. Ph.D. dissertation, Univ. California, Berkeley.

TEMELES, E. J. 1987. The relative importance of prey availability and intruder pressure in feeding territory size regulation by harriers, *Circus cyaneus*. Oecologia 74:286–297.

TEMELES, E. J. 1989. The effect of prey consumption on territorial defense by harriers: Differential responses to neighbors versus floaters. Behav. Ecol. Sociobiol. 24:239–243.

TEMELES, E. J. 1990a. Northern Harriers on feeding territories respond more aggressively to neighbors than to floaters. Behav. Ecol. Sociobiol. 26: 57–63.

TEMELES, E. J. 1990b. Interspecific territoriality of Northern Harriers: The role of kleptoparasitism. Anim. Behav. 40:361–366.

VILLAGE, A. 1982. The home range and density of Kestrels in relation to vole abundance. J. Anim. Ecol. 51:413–428.

VILLAGE, A. 1987. Numbers, territory-size and turnover of Short-eared Owls (*Asio flammeus*) in relation to vole abundance. Ornis Scand. 18:198–204.

VILLAGE, A. 1989. Factors limiting European Kestrel (*Falco tinnunculus*) numbers in different habitats. Pages 193–202 *in* Raptors in the modern world (B.-U. Meyburg and R. D. Chancellor, Eds.). WWGBP, Berlin.

VILLAGE, A. 1990. The Kestrel. T & A D Poyser, London.

WAIAN, L. B., AND R. C. STENDELL. 1970. The White-tailed Kite in California with observations of the Santa Barbara population. Calif. Fish Game 56: 188–198.

Appendix B – Map 2.1
McDaniels Slough EIR Proposed Project

Boundaries

- Project Boundary
- Arcata City Limits

Recreation

- Trail
- Information Kiosk
- Bird Blind
- Boat Launch

Levee Types

- Flood Levee
- Eco-Levee
- Pond Perimeter Levee

Water Features

- Streams
- Freshwater Marsh
- Brackish Pond

Transportation

- Access Road
- Railroad

Other Features

- Potential wastewater flow
- Surface Water Flow
- Drainage Ditch
- Remove Culvert/Tide gate
- Drainage pipe
- PG & E Tower
- Trees
- Remove Levee
- Roosting island
- Parcel

Source: City of Arcata

Figure 2-1

McDaniel Slough EIR

Proposed Project

Appendix C
Humboldt County Crop and Livestock Reports, 2005 & 2003

2002 Census of Agriculture,
County Profile, Humboldt California

DEPARTMENT OF AGRICULTURE
COUNTY OF HUMBOLDT
5630 SOUTH BROADWAY EUREKA, CALIFORNIA 95503
PHONE (707) 441-5260

A. G. Kawamura, Secretary
California Department of Food and Agriculture
and
Honorable Board of Supervisors, Humboldt County
Roger Rodoni, Chairman
Jill Geist
Bonnie Neely
Jimmy Smith
John Woolley

I am pleased to present Humboldt County's Crop and Livestock Report in accordance with Sections 2272 and 2279 of the California Food and Agricultural Code. The following summary represents gross agricultural receipts, but does not reflect production costs or net income to the producers.

Humboldt County recorded a value of $320,174,000 for its total gross agricultural production in 2005. This represents an increase of $24.85 million over 2004 production. Again, Humboldt County leads the state in volume and value of harvested timber. All commodity groups reported production gains in 2005 except in the market and manufacturing milk category.

The 2005 agricultural production ranking for Humboldt County is as follows.

Timber Production . . . . . $	***198,958,000***
Nursery Stock (cut flowers, ornamental and forest tree production) . . . . . $	***43,460,700***
Milk and Milk Products . . . . . $	***42,507,700***
Livestock (beef cattle & calves, dairy cows, Sheep, lambs and misc.) . . . . . $	***23,986,000***
Field Crops (alfalfa, silage, range, etc.) . . . . . $	***9,530,600***
Vegetable Crops . . . . . $	***920,000***
Fruit & Nut Crops . . . . . $	***811,000***

This summary is made possible through the efforts, expertise and cooperation of numerous individuals and agencies, all of which deserve the credit and thanks for this report of crop and livestock production.

Respectfully submitted,

John E. Falkenstrom

John E. Falkenstrom
Acting Agricultural Commissioner

Field Crops

ITEM	YR.	HARVEST ACREAGE	PRODUCTION PER ACRE	TOTAL	UNIT	PER UNIT	VALUE TOTAL
Hay (All)	2005	1,950	3.00	5,850	Ton	135.00	789,800
	2004	1,800	3.35	6,030	Ton	115.00	693,450
Silage (All)	2005	1,050	20.00	21,000	Ton	45.00	945,000
	2004	850	20.00	17,000	Ton	42.00	595,000
Pasture (All)	2005	21,350			Acre	145.00	3,095,800
	2004	21,000			Acre	145.00	3,272,650
Range	2005	470,000			Acre	10.00	4,700,000
	2004	470,000			Acre	10.00	4,700,000

Includes: Alfalfa, grass, clover

Totals		
	2005	**9,530,600**
	2004	9,261,100

ITEM	YEAR	TOTAL VALUE
Vegetable Crops	**2005**	**920,000**
	2004	880,700

Includes: Corn, potatoes, pumpkins, tomatoes, squash, cabbage, beans, peppers, mushrooms, alfalfa sprouts, etc.

Fruit and Nut Crops

ITEM	YEAR	TOTAL VALUE
Miscellaneous Fruits and Nuts	**2005**	**811,000**
	2004	714,300

Includes: apples, berries, cherries, chestnuts, figs, peaches, walnuts and grapes (wine/table)

Nursery Production

ITEM	YEAR	TOTAL VALUE
Cut flowers and decoratives, bedding plants, ornamentals and forest nursery tree production	**2005**	**43,460,700**
	2004	40,793,400

Timber

ITEM	YR.	PRODUCTION	UNIT	TOTAL VALUE
Timber[1] Production	**2005**	**390,333,000**	**Board Feet**	**193,366,400**
	2004	396,500,000	Board Feet	169,122,000
(All)				
Biomass &[2] Composting	**2005**	**422,000**	**Ton**	**5,591,500**
	2004	410,377	Ton	5,334,900

TOTAL:	2005	198,958,000
	2004	174,456,900

[1] Total includes softwood saw logs and miscellaneous products (Christmas trees, cull logs, fuel wood, pulp chips, hardwood logs, poles and pilings and miscellaneous small saw logs).

[2] Biomass and Composting data were compiled for the first time in 2002.

Livestock & Poultry

ITEM	YR.	NO. OF HEAD	TOT. LIVE WT.	UNIT	VALUE PER UNIT	TOTAL
[1]Beef Cattle and Calves	**2005**	**27,800**	**146,000**	**CWT**	**90.80**	**13,257,000**
	2004	27,200	149,600	CWT	88.30	13,209,700
Dairy Cows and Calves (all)	**2005**	**21,300**		**HEAD**		**6,603,000**
	2004	20,500		HEAD		6,336,000
Sheep and Lambs (all)	**2005**	**4,000**	**4,146**	**CWT**	**98.52**	**408,500**
	2004	4,100	4,250	CWT	90.40	384,200
[2]Misc.	**2005**					**3,717,400**
	2004					3,538,900
				TOTAL:	**2005**	**23,986,000**
					2004	23,468,800

[1] **Includes: Cows, calves, bulls, steers**
[2] **Includes: Aquaculture, chickens, turkey, swine, goats, etc.**

Livestock and Poultry Products

ITEM	YEAR	PRODUCTION	UNIT	PER UNIT	VALUE TOTAL
Market Milk	**2005**	**1,973,999**	**CWT**	**14.76**	**29,144,000**
	2004	2,050,181	CWT	15.62	32,024,000
Manufacturing Milk	**2005**	**870,366**	**CWT**	**14.78**	**12,865,000**
	2004	868,561	CWT	15.20	13,202,000
Misc.1	**2005**				**498,700**
	2004				495,000
			TOTAL:	**2005**	**42,507,700**
				2004	45,721,000

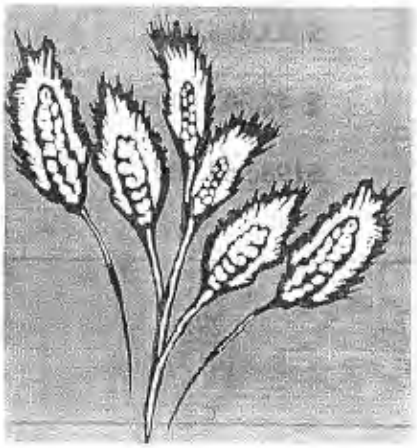
[1] **Includes: Wool, apiary and dairy goat products**

HUMBOLDT COUNTY
2005 SUSTAINABLE AGRICULTURE REPORT

The implementation of agricultural practices and programs which promote the economic viability of agriculture while minimizing the impacts of these practices and programs on natural resources and the environment is sustainable agriculture. The scope of Humboldt County's biological control programs and organic farming practices are summarized below.

County Biological Control

PEST	AGENT/MECHANISM	2005
TANSY RAGWORT (Senecio jacobaea)	Ragwort flea beetle (Longitarsus jacobaeae)	5 sites
YELLOWSTAR THISTLE (Centaurea solstitialis)	Seed-head weevil (Bangasternus orientalis)	14 sites
	Gall fly (Urophora sirunaseva)	5 sites
	Hairy weevil (Eustenopus villosus)	24 sites
	Fungus (Puccinia jaceae var. solstitialis)	2 sites
KLAMATH WEED (Hypericum perforatum)	Leaf & root weevil (Chrysolina quadrigemina) (= C. gemellata)	Countywide
BULL THISTLE (Crisium vulgare)	Bull Thistle Gall Fly (Urophora stylata)	9 sites
CANADA THISTLE (Cilsium arvense)	Gall Fly (Urophora cardui)	2 sites
ITALIAN THISTLE (Carduus pycnocephalus)	Seed weevil (Rhinocyllus conicus)	1 site
PURPLE LOOSESTRIFE (Lythrum solicaria)	Leaf Feeding Beetle (Galeruceila calmariensis)	2 sites



Organic and Certified Producers

ITEM	YEAR	NO. REGISTRANTS	EST. ACRES
Organic Registrants	**2005**	**74**	
	2004	72	
Certified Producers	**2005**	**131**	**715***
	2004	142	624*
Farmer's Markets	**2005**	**12**	
	2004	12	

CROPS: Beans, berries, cabbage, carrots, cherries, corn, cucumbers, garlic, herbs, flowers, lettuce, melons, mushrooms, onions, peaches, peas, potatoes, pumpkins, sprouts, squash, tomatoes, etc.

*Includes acreage associated with organic hay, pasture and silage production.

Recapitulation

ITEM	YEAR	
	2005	2004
Field Crops	**$ 9,530,600**	$ 9,261,100
Vegetable Crops	**$ 920,000**	$ 880,700
Fruit & Nut Crops	**$ 811,000**	$ 714,300
Nursery Production	**$ 43,460,700**	$ 40,793,400
Livestock & Poultry	**$ 23,986,000**	$ 23,468,800
Livestock & Poultry Products	**$ 42,507,700**	$ 45,721,000
Timber	**$198,958,000**	$174,456,900

GRAND TOTALS	**2005**	2004
	$ 320,174,000	$ 295,296,200

PEST EXCLUSION involves the systematic inspection of incoming shipments of plant materials and other high risk articles which enter Humboldt County at post offices and other terminals (truck lines, United Parcel, air freight, and commercial vessels, etc.). The primary objective is to prevent the introduction into Humboldt County of plant diseases, insects, nematodes, weeds or vertebrate pests which are or could prove to be detrimental to the local and state agricultural industry and natural environment.

Pest Exclusion

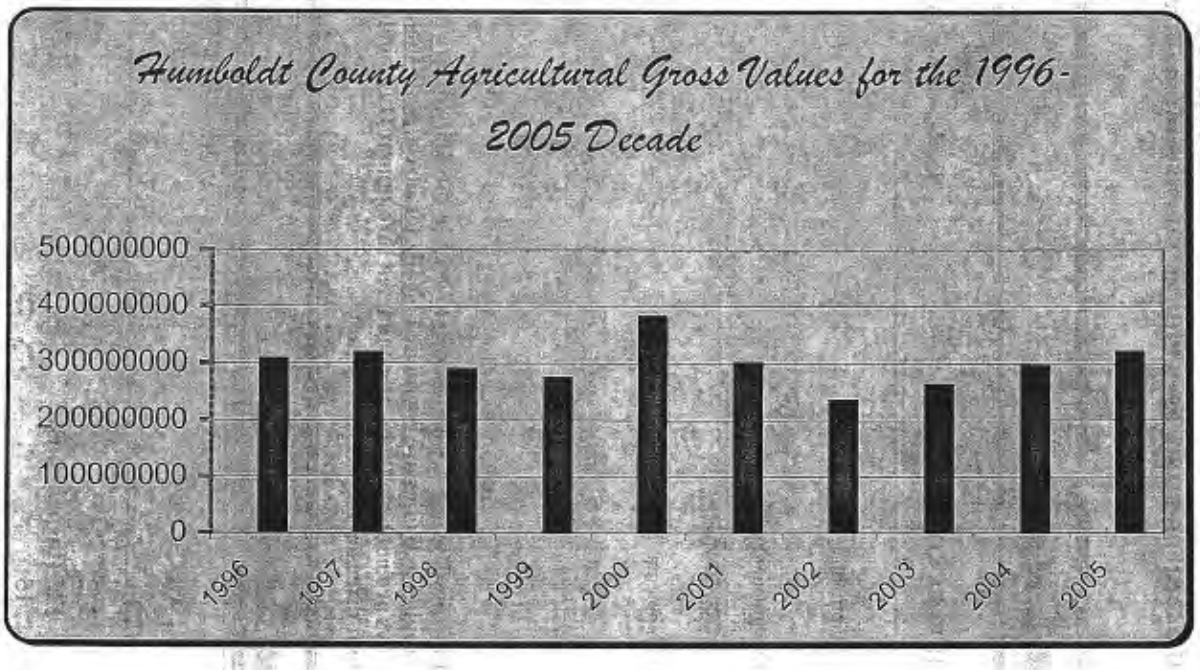
No. Inspections	2005 11,578	METHOD OF CONVEYANCE	2005 No. Rejections	60*
WILD GARLIC (Allium vineale)		UPS/Postal Shipments		0
CERTIFICATION/LABELING VIOLATIONS		UPS/Postal Shipments/FedEx		56
VARIOUS PLANT PESTS		UPS/Postal Shipments/FedEx		4
NOXIOUS WEEDS		UPS/Postal Shipments		0

* Shipments rejected and/or destroyed.

PEST DETECTION activities are focused on the search for pests which are not known to exist in the State or are of limited distribution throughout California. Detection trapping activities are conducted locally for insect pests such as Gypsy Moth and Japanese beetle. In addition, field surveys are continually being conducted throughout Humboldt County in order to locate and identify noxious weeds, plant diseases and vertebrate pests.

Pest Detection

TYPE	INSECT TRAPS	NO. SERVICINGS 2005
Gypsy Moth	272	944
Glassy-Winged Sharpshooter	125 (inspections)	1,524
Japanese Beetle	15	46



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Field Crops	7,039,600	8,223,780	8,177,800	8,200,500	7,972,300	8,998,750	8,977,650	9,326,000	9,261,100	9,530,600
'egetable Crops	836,000	897,000	676,000	763,208	814,190	952,000	987,800	868,000	880,700	920,000
Fruit/Nut Crops	27,000	78,000	91,000	111,567	430,246	506,850	683,100	698,000	714,300	811,000
sery Production	18,319,000	22,576,611	23,226,500	25,806,000	32,859,191	33,952,000	35,321,300	35,858,600	40,793,400	43,460,700
vestock/Poultry	10,830,537	12,443,189	14,548,760	19,936,281	21,020,200	22,347,800	22,579,750	24,872,700	23,468,800	23,986,000
estock/Products	34,709,000	36,067,700	39,055,200	38,283,000	33,636,400	42,972,000	31,734,400	43,170,300	45,721,000	42,507,700
Timber	235,529,000	238,011,000	203,494,572	181,487,821	285,232,953	190,571,200	134,963,400	148,024,400	174,456,900	198,958,000
Total	**307,290,137**	**318,297,280**	**289,269,832**	**274,588,377**	**381,965,480**	**300,300,600**	**235,247,400**	**262,818,000**	**295,296,200**	**320,174,000**

DEPARTMENT OF AGRICULTURE
COUNTY OF HUMBOLDT
5630 SOUTH BROADWAY EUREKA, CALIFORNIA 95503
PHONE (707) 441-5260

Mr. A. G. Kawamura, Secretary
California Department of Food and Agriculture
and
Honorable Board of Supervisors, Humboldt County

I am pleased to present Humboldt County's Crop and Livestock Report in accordance with Sections 2272 and 2279 of the California Food and Agricultural Code. The following summary represents gross agricultural receipts for the year 2003 but does not reflect production costs or net income to the producers.

Humboldt County recorded a value of $262,818,000 for its total gross agricultural production in 2003. This represents an increase of $27,570,600 over 2002 production. Despite some negative economic factors which affected our livestock and dairy producers, these segments both recorded gains this year; however, our greatest increases are related to the value of harvested timber which is up over $13 million and milk & milk products which are up over $11 million. Humboldt County continues to be ranked first in the state for timber production. All other commodity groups, except vegetable crops, also reported production gains. Our leading agricultural commodities are ranked as follows:

Timber Production	***$ 148,024,400***
Nursery Stock (cut flowers, ornamental and forest tree production)	***$ 35,858,600***
Milk and Milk Products	***$ 43,170,300***
Livestock (beef cattle & calves, dairy cows, Sheep & lambs, etc.)	***$ 24,872,700***
Field Crops (alfalfa, silage, range, etc.)	***$ 9,326,000***
Vegetable Crops	***$ 868,000***
Fruit & Nut Crops	***$ 698,000***

A word of personal thanks goes to my office staff, the County's Agricultural Industry, participating agencies and to those individuals whose expertise and cooperation made this report possible.

Respectfully submitted,

John E. Falkenstrom

John E. Falkenstrom
Agricultural Commissioner

FIELD CROPS

ITEM	YR.	HARVEST ACREAGE	PRODUCTION PER ACRE	TOTAL	UNIT	PER UNIT	VALUE TOTAL
Hay (All)	**2003**	**1,956**	**3.60**	**7,042**	**Ton**	**110.00**	**774,600**
	2002	1,500	4.00	6,000	Ton	95.00	570,000
Silage (All)	**2003**	**960**	**22.00**	**19,200**	**Ton**	**42.00**	**806,400**
	2002	870	27.00	23,490	Ton	35.00	822,150
Pasture(All)	**2003**	**21,000**			**Acre**	**145.00**	**3,045,000**
	2002	19,900			Acre	145.00	2,885,500
Range	**2003**	**470,000**			**Acre**	**10.00**	**4,700,000**
	2002	470,000			Acre	10.00	4,700,000

Includes: Alfalfa, grass, clover

Totals	**2003**	**9,326,000**
	2002	8,977,650

VEGETABLE CROPS

ITEM	YEAR	TOTAL VALUE
Vegetable Crops	**2003**	**868,000**
	2002	987,800

Includes: Corn, potatoes, pumpkins, tomatoes, squash, cabbage, beans, peppers, mushrooms, alfalfa sprouts, etc.

FRUIT AND NUT CROPS

ITEM	YEAR	TOTAL VALUE
Miscellaneous Fruits and Nuts	**2003**	**698,000**
	2002	683,100

Includes: apples, berries, cherries, chestnuts, figs, peaches, walnuts and grapes (wine/table)

NURSERY PRODUCTION

ITEM	YEAR	TOTAL VALUE
Cut flowers and decoratives, bedding plants, ornamentals and forest nursery tree production	**2003**	**35,858,600**
	2002	35,321,300

TIMBER

ITEM	YR.	PRODUCTION	UNIT	VALUE TOTAL
Timber [1] Production (All)	**2003**	**383,675,000**	**Board Feet**	**142,830,400**
	2002	374,042,745	Board Feet	130,556,400
Biomass & [2] Composting	**2003**	**346,255**	**Ton**	**5,194,000**
	2002	314,777	Ton	4,407,000

TOTAL:	**2003**	**148,024,400**
	2002	**134,963,400**

[1] Total includes softwood saw logs and miscellaneous products (Christmas trees, cull logs, fuel wood, pulp chips, hardwood logs, poles and pilings and miscellaneous small saw logs).

[2] Biomass and Composting data were compiled for the first time in 2002.

LIVESTOCK & POULTRY

ITEM	YR.	NO. OF HEAD	TOT. LIVE WT.	UNIT	VALUE PER UNIT	TOTAL
[1]Beef Cattle and Calves	**2003**	**29,300**	**161,150**	**CWT**	**89.90**	**14,487,400**
	2002	29,000	159,500	CWT	80.50	12,839,750
Dairy Cows and Calves (all)	**2003**	**22,000**		**HEAD**		**6,336,000**
	2002	21,800		HEAD		6,104,000
Sheep and Lambs (all)	**2003**	**5,800**	**5,800**	**CWT**	**88.00**	**510,400**
	2002	6,000	6,000	CWT	61.00	366,000
[2]Misc.	**2003**					**3,538,900**
	2002					3,270,000

TOTAL:		
	2003	**24,872,700**
	2002	22,579,750

[1] **Includes: Cows, calves, bulls, steers**
[2] **Includes: Aquaculture, chickens, turkey, swine, goats, emus, rabbits, etc.**

LIVESTOCK & POULTRY PRODUCTS

ITEM	YEAR	PRODUCTION	UNIT	PER UNIT	VALUE TOTAL
Market Milk	**2003**	**2,833,550**	**CWT**	**11.76**	**33,323,000**
	2002	2,127,176	CWT	11.24	23,909,000
Manufacturing Milk	**2003**	**823,763**	**CWT**	**11.82**	**9,737,000**
	2002	622,923	CWT	12.33	7,681,000
Wool[1]	**2003**				**110,300**
	2002				144,400

[1] **Includes: Wool, mohair, apiary products**

TOTAL:		
	2003	**43,170,300**
	2002	31,734,400

ORGANIC AND CERTIFIED PRODUCERS

ITEM	YEAR	NO. REGISTRANTS	EST. ACRES
Organic Registrants	**2003**	**70**	
	2002	63	
Certified Producers	**2003**	**133**	**460***
	2002	131	291
Farmer's Markets	**2003**	**9**	
	2002	8	

CROPS: Beans, berries, cabbage, carrots, cherries, corn, cucumbers, garlic, herbs, flowers, lettuce, melons, mushrooms, onions, peaches, peas, potatoes, pumpkins, sprouts, squash, tomatoes, etc.

*Includes acreage associated with organic hay and silage production.

RECAPITULATION

ITEM	YEAR	
	2003	2002
Field Crops	**$ 9,326,000**	$ 8,977,650
Vegetable Crops	**$ 868,000**	$ 987,800
Fruit & Nut Crops	**$ 698,000**	$ 683,100
Nursery Production	**$ 35,858,600**	$ 35,321,300
Livestock & Poultry	**$ 24,872,700**	$ 22,579,750
Livestock & Poultry Products	**$ 43,170,300**	$ 31,734,400
Timber		
GRAND TOTALS	**2003** **$ 262,818,000**	2002 $235,247,400

HUMBOLDT COUNTY
2003 SUSTAINABLE AGRICULTURE REPORT

The implementation of agricultural practices and programs which promote the economic viability of agriculture while minimizing the impacts of these practices and programs on natural resources and the environment is sustainable agriculture. The scope of Humboldt County's biological control programs and organic farming practices are summarized below.

COUNTY BIOLOGICAL CONTROL

PEST	AGENT/MECHANISM	2003
TANSY RAGWORT (Senecio jacobaea)	Ragwort flea beetle (Longitarsus jacobaeae)	4 sites
YELLOWSTAR THISTLE (Centaurea solstitialis)	Seed-head weevil (Bangasternus orientalis)	14 sites
	Gall fly (Urophora sirunaseva)	5 sites
	Hairy weevil (Eustenopus villosus)	24 sites
KLAMATH WEED (Hypericum perforatum)	Leaf & root weevil (Chrysolina quadrigemina) (= C. gemellata)	Countywide
BULL THISTLE (Crisium vulgare)	Bull Thistle Gall Fly (Urophora stylata)	9 sites
CANADA THISTLE (Cilsium arvense)	Gall Fly (Urophora cardui)	2 sites
ITALIAN THISTLE (Carduus pycnocephalus)	Seed weevil (Rhinocyllus conicus)	1 site

PEST EXCLUSION involves the systematic inspection of incoming shipments of plant materials and other high risk articles which enter Humboldt County at post offices and other terminals (truck lines, United Parcel, air freight, and commercial vessels, etc.). The primary objective is to prevent the introduction into Humboldt County of plant diseases, insects, nematodes, weeds or vertebrate pests which are or could prove to be detrimental to the local and state agricultural industry and natural environment.

PEST EXCLUSION

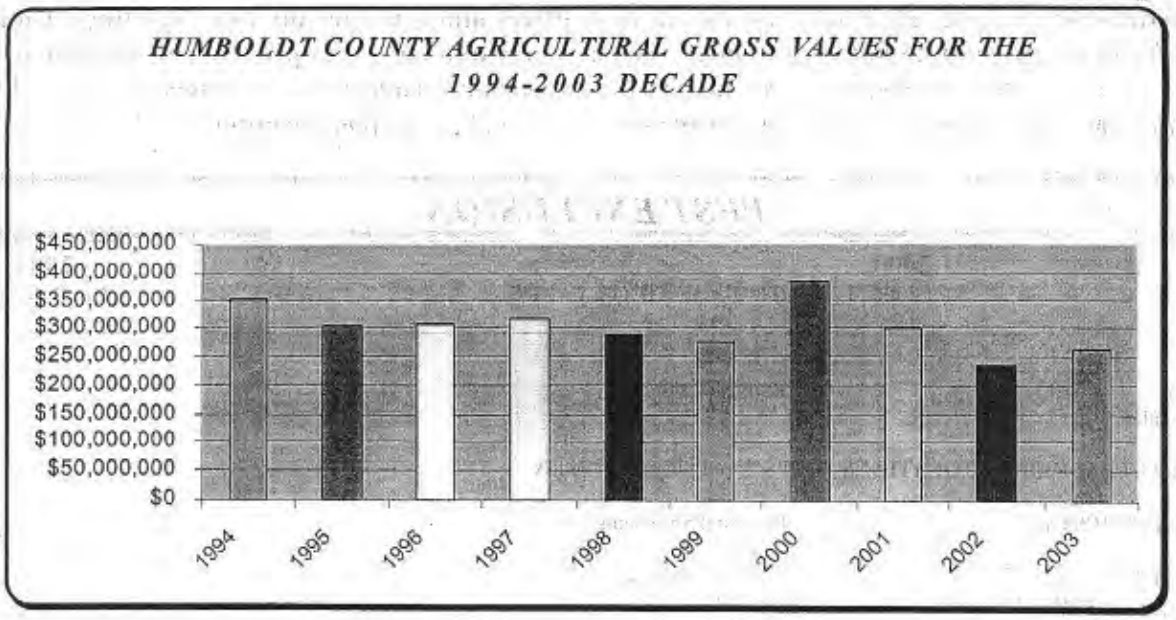
No. Inspections	2003 11,392	METHOD OF CONVEYANCE	2003 No. Rejections 59*
WILD GARLIC (Allium vineale)		UPS/Postal Shipments	1
CERTIFICATION/LABELING VIOLATIONS		UPS/Postal Shipments/FedEx	50
VARIOUS PLANT PESTS		UPS/Postal Shipments/FedEx	5
NOXIOUS WEEDS		UPS/Postal Shipments	1

* Shipments rejected and/or destroyed.

PEST DETECTION activities are focused on the search for pests which are not known to exist in the State or are of limited distribution throughout California. Detection trapping activities are conducted locally for insect pests such as Gypsy Moth and Japanese beetle. In addition, field surveys are continually being conducted throughout Humboldt County in order to locate and identify noxious weeds, plant diseases and vertebrate pests.

PEST DETECTION

TYPE	INSECT TRAPS	NO. SERVICINGS 2003
Gypsy Moth	210	1,260
Glassy-Winged Sharpshooter	117 (inspections)	1,404
Japanese Beetle	24	144



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Field Crops	7,379,000	7,054,000	7,039,600	8,223,780	8,177,800	8,200,500	7,972,300	8,998,750	8,977,650	9,326,000
Vegetable Crops	872,000	836,000	836,000	897,000	676,000	763,208	814,190	952,000	987,800	868,000
Fruit/Nut Crops	32,000	27,000	27,000	78,000	91,000	111,567	430,246	506,850	683,100	698,000
Nursery Production	20,274,000	18,319,000	18,319,000	22,576,611	23,226,500	25,806,000	32,859,191	33,952,000	35,321,300	35,858,600
Livestock/Poultry	12,278,000	11,226,000	10,830,537	12,443,189	14,549,760	19,936,281	21,020,200	22,347,800	22,579,750	24,872,700
Livestock/Products	30,681,000	30,589,000	34,709,000	36,067,700	39,055,200	38,283,000	33,636,400	42,972,000	31,734,400	43,170,300
Timber	281,780,000	235,529,000	235,529,000	238,011,000	203,494,572	181,487,821	285,232,953	190,571,200	134,963,400	148,024,400
TOTAL	353,296,000	303,580,000	307,290,137	318,297,280	289,269,832	274,588,377	381,965,480	300,300,600	235,247,400	262,818,000

NASS
FACT FINDERS FOR AGRICULTURE
UNITED STATES DEPARTMENT OF AGRICULTURE
Washington, D.C.

2002 Census of Agriculture County Profile

Humboldt, California

Number of farms
993 farms in 2002, 989 farms in 1997, up slightly.

Land in farms
633,931 acres in 2002, 619,450 acres in 1997, up 2 percent.

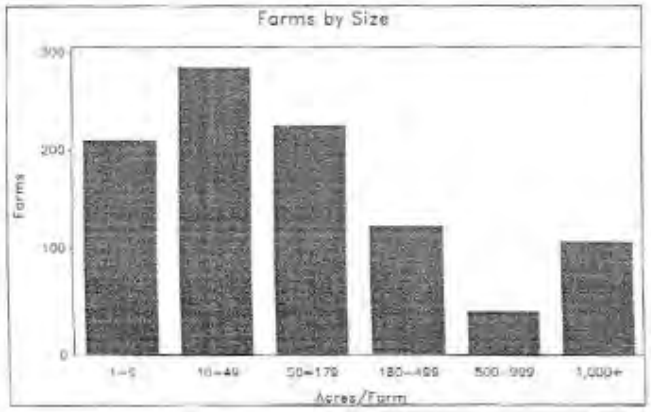
Average size of farm
638 acres in 2002, 626 acres in 1997, up 2 percent.

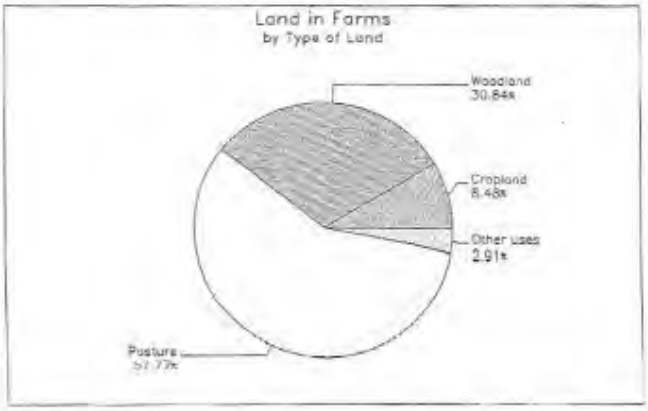
Market Value of Production
$96,920,000 in 2002, $79,881,000 in 1997, up 21 percent.
Crop sales accounted for $44,231,000 of the total value in 2002.
Livestock sales accounted for $52,689,000 of the total value in 2002.

Market Value of Production, average per farm
$97,604 in 2002, $80,769 in 1997, up 21 percent.

Government Payments
$1,605,000 in 2002, $51,000 in 1997, up 3,047 percent.

Government Payments, average per farm receiving payments
$13,715 in 2002, $1,749 in 1997, up 684 percent.





2002 Census of Agriculture
County Profile
United States Department of Agriculture, California Agricultural Statistics Service

Humboldt, California

Ranked items among the 58 state counties and 3,078 U.S. counties, 2002

Item	Quantity	State Rank	Universe [1]	U.S. Rank	Universe [1]
MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD ($1,000)					
Total value of agricultural products sold	96,920	35	58	537	3,075
Value of crops including nursery and greenhouse	44,231	38	58	551	3,070
Value of livestock, poultry, and their products	52,689	16	58	521	3,070
VALUE OF SALES BY COMMODITY GROUP ($1,000)					
Grains, oilseeds, dry beans, and dry peas	191	36	48	2,241	2,871
Tobacco	-	-	-	-	560
Cotton and cottonseed	-	-	17	-	656
Vegetables, melons, potatoes, and sweet potatoes	1,979	36	56	536	2,747
Fruits, tree nuts, and berries	905	45	55	377	2,638
Nursery, greenhouse, floriculture, and sod	40,420	21	55	74	2,708
Cut Christmas trees and short rotation woody crops	21	34	43	931	1,774
Other crops and hay	715	39	57	1,574	3,046
Poultry and eggs	17	43	56	1,774	2,918
Cattle and calves	13,557	21	57	770	3,053
Milk and other dairy products from cows	33,905	14	47	137	2,493
Hogs and pigs	64	23	53	1,618	2,919
Sheep, goats, and their products	(D)	(D)	56	(D)	2,997
Horses, ponies, mules, burros, and donkeys	367	24	56	585	3,014
Aquaculture	(D)	(D)	51	(D)	1,520
Other animals and other animal products	67	45	54	1,033	2,727
TOP LIVESTOCK INVENTORY ITEMS (number)					
Cattle and calves	63,106	20	57	384	3,059
Sheep and lambs	3,601	31	57	307	2,867
All Goats	2,387	16	55	143	2,971
Colonies of bees	1,785	32	54	311	2,392
Horses and ponies	1,578	32	57	701	3,065
TOP CROP ITEMS (acres)					
Forage - land used for all hay and haylage, grass silage, and greenchop	13,180	24	57	1,490	3,059
Corn for silage	914	15	33	1,145	2,307
All Vegetables harvested	543	35	56	610	2,710
Snap beans	179	14	47	195	1,833
Apples	149	29	53	288	2,173

Other County Highlights

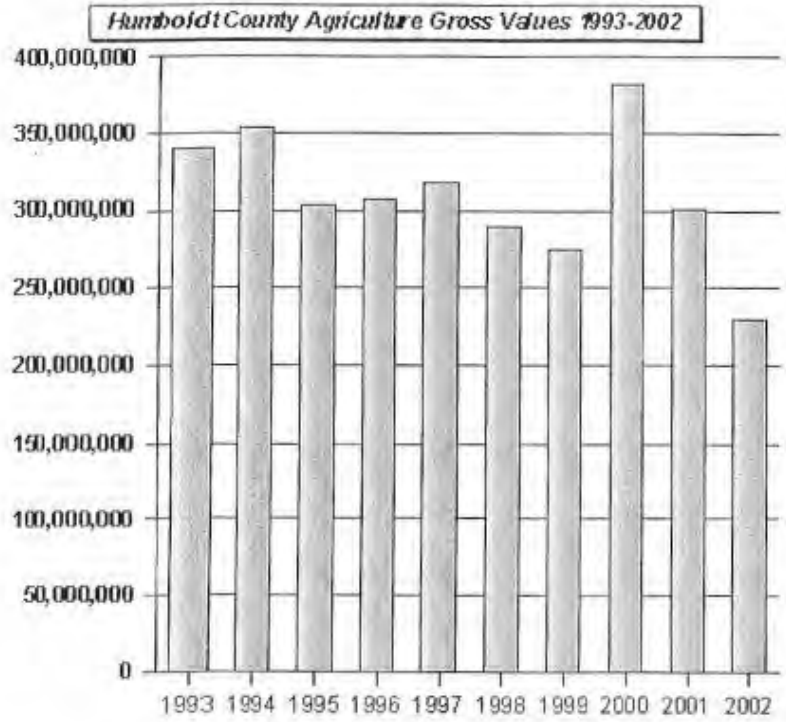
Economic Characteristics	Quantity
Farms by value of sales	
Less than $1,000	264
$1,000 to $2,499	118
$2,500 to $4,999	98
$5,000 to $9,999	92
$10,000 to $19,999	92
$20,000 to $24,999	32
$25,000 to $39,999	60
$40,000 to $49,999	21
$50,000 to $99,999	70
$100,000 to $249,999	88
$250,000 to $499,999	33
$500,000 or more	25
Total farm production expenses ($1,000)	87,938
Average per farm ($)	88,469
Net cash farm income of operation ($1,000)	10,295
Average per farm ($)	10,357

Operator Characteristics	Quantity
Principal operators by primary occupation:	
Farming	591
Other	402
Principal operators by sex:	
Male	778
Female	215
Average age of principal operator (years)	55.1
All operators [2] by race:	
White	1,421
Black or African American	4
American Indian or Alaska Native	60
Native Hawaiian or Other Pacific Islander	8
Asian	9
More than one race	12
All operators [2] of Spanish, Hispanic, or Latino Origin	35

(D) Cannot be disclosed. (Z) Less than half of the unit shown. See "Census of Agriculture, Volume 1, Geographic Area Series" for complete footnotes.
[1] Universe is number of counties in state or U.S. with item.
[2] Data were collected for a maximum of three operators per farm.

HUMBOLDT COUNTY AGRICULTURAL GROSS VALUES FOR THE 1993-2002 DECADE

COMMODITY GROUP	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Field Crops	7,411,000	7,379,000	7,054,000	7, 039,600	8,223,780	8,177,800	8,200,500	7,972,300	8,998,750	8,977,650
Vegetable Crops	1,103,000	872,000	836,000	836,000	897,000	676,000	763,208	814,190	952,000	987,800
Fruit/Nut Crops	100,000	32,000	27,000	27,000	78,000	91,000	111,568	430,246	506,850	683,100
Nursery Stock	20,940,000	20,274,000	18,319,000	18,319,000	22,576,611	23,226,500	25,806,000	32,859,191	33,952,000	35,321,300
Livestock/ Poultry	15,289,000	12,278,000	11,226,000	10,830,537	12,443,189	14,548,760	19,936,281	21,020,200	22,347,800	22,579,750
Livestock/ Poultry Products										
Misc. Products/	27,065,000	30,681,000	30,589,000	34,709,000	36,067,700	39,055,200	38,283,000	33,636,400	42,972,000	31,734,400
Timber	268,010,000	281,780,000	235,529,000	235,529,000	238,011,000	203,494,572	181,487,821	285,232,953	190,571,200	134,963,400
TOTAL	339,918,000	353,296,000	303,580,000	307,290,137	318,297,330	289,269,832	274,588,378	381,965,480	300,198,600	235,247,400



Appendix D – Public Notice

McDaniels Slough
Final Environmental Impact Report
Arcata City Council
Notice of Public Hearing

ARCATA CITY COUNCIL
NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the Arcata City Council will conduct a public hearing on Wednesday, December 20, 2006, beginning at 7:00 p.m. (or as soon thereafter as can be heard) in the City Council Chambers at Arcata City Hall, 736 "F" Street, to receive public input prior to certifying the Final Environmental Impact Report for the McDaniel Slough Wetland Enhancement Project.

Project Location: McDaniel Slough is located at the confluence of Janes Creek and northern Humboldt Bay. A portion of the Proposed Project area occurs on City of Arcata property, the remainder is located on the California Department of Fish and Game Mad River Slough Wildlife Area.

Project Description: The goal of the McDaniel Slough Marsh Enhancement Proposed Project, as specified by the City of Arcata and the California Department of Fish and Game (CDFG) is:

"To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

NOTICE IS FURTHER GIVEN that there is the potential for implementation of the project to have significant impact with relation to the following: Hydrology and Water Quality; Biology; Geology and Soils; Air Quality; Cultural and Historical Resources; Aesthetics; Land Conversion; and Noise. The project has the ability to mitigate all potentially significant effects to a less than significant level.

NOTICE IS FURTHER GIVEN that the Public Review and Comment Period for the draft Environmental Impact Report was March 27, 2006 to May 9, 2006.

NOTICE IS FURTHER GIVEN that any interested person may present oral or written testimony regarding the Final Environmental Impact Report prior to or at the public hearing noticed herein.

NOTICE IS FURTHER GIVEN that The Final Environmental Impact Report for the McDaniel Slough Wetland Enhancement Project may be reviewed at the Arcata Environmental Services Department or the City Manager's Office at City Hall, 736, "F" Street, on weekdays between 8:00 a.m. and noon and 1:00 p.m. to 5:00 p.m. A copy is also available in the Arcata Public Library, 500 7th Street.

NOTICE IS FURTHER GIVEN that the Council action is not appealable.

NOTICE IS FURTHER GIVEN that, pursuant to state law, *"If you challenge City action on a proposed project in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the hearing body at, or prior to, the public hearing."*

Times-Standard, Sunday, December 10, 2006
12/10

Draft
City of Arcata
McDaniel Slough Wetland Enhancement Project
EIR Supplement
Proposed Project Changes
March 24, 2010

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INTRODUCTION

The City of Arcata adopted a Negative Declaration for the McDaniel Slough Wetland Enhancement Project on December 20, 2006. The original project plan was to restore tidal wetland functions to 200 of 240 acres of former tidal salt/brackish marsh and freshwater wetlands adjacent to Humboldt Bay in northern California. The remaining 40 acres will be enhanced and managed as freshwater and brackish ponds, and grassland/riparian areas. The Project includes the enhancement of McDaniel Slough/Janes Creek. The enhancement is designed to remove barriers to fish access and includes deepening historic slough channels, partial removal of failing or obsolete levees, and restoring the tidal estuary. The Proposed Project is shown in Figure 2.2-4 on page 2-10 of the EIR and attached as Figure 1 Original Project. A portion of the McDaniel Slough Project occurs on the City of Arcata property, the remainder is located on the California Department of Fish and Game Mad River Slough Wildlife Area. The City of Arcata and the California Department of Fish and Game (CDFG) have an existing cooperative agreement that provides the framework for this joint undertaking. The City, acting as lead agency, must identify and document the potential environmental impacts of the Proposed Project and any changes to the proposed project in accordance with CEQA, (Public Resources Code Section 21000 et seq.), and the CEQA Guidelines (California Administrative Code Section 15000 et seq.).

Since the adoption of the EIR the Californian Department of Fish and Game has acquired additional lands allowing an expansion of the project to increase restoration/enhancement of tidal and freshwater habitats. The proposed changes to the project will increase the project area by 45.5 acres and will result in an addition 1.19 acres of additional impacts to wetlands that will be fully mitigated through the creation of new wetlands, See Figure 2, Amended Project. This document is a supplement to the EIR prepared for the McDaniel Slough project. This Supplement examines the potential environmental impacts of the proposed changes. The State of California Public Resources Code Article 11 Section 15163 outlines the conditions that must be met for preparation of a supplement to an EIR.

BACKGROUND, GOALS AND OBJECTIVES

The Proposed Project site is located adjacent to the existing Arcata Marsh and Wildlife Sanctuary's (AMWS) northwest boundary. This 88-acre, City owned property provides a critical link from the 154-acre AMWS to the CDFG Mad River Slough Wildlife Area (547 acres) located west of Janes Creek/McDaniel Slough. The Humboldt Bay National Wildlife Refuge is located to the south of the AMWS. These properties form a total area of contiguous public land on north Humboldt Bay of more than 1,000 acres.

The City of Arcata would be responsible for implementing the project and the proposed changes to the project under a cooperative agreement with the California Department of Fish and Game (CDFG).

Goal

The goal of the McDaniel Slough Marsh Enhancement Proposed Project, as specified by the City of Arcata and the Department of Fish and Game is:

> "To restore and enhance coastal and riparian wetland habitats on the northern portion of Humboldt Bay by integrating City and State held lands. The Proposed Project will create a self-sustaining tidal marsh through the restoration of natural geomorphic and biologic processes and create brackish and freshwater wetlands on the eastern portion of the site."

The Proposed Project goal, as described above, in combination with the specific objectives listed below, will be used as the basis for evaluating the Proposed Project changes and alternatives in this EIR Supplement.

Primary Objectives

1. Maximize the opportunity for restoring a large area of tidal marsh habitat dominated by pickleweed.
2. Provide unimpeded access for anadromous fish migration between Humboldt Bay and McDaniel Slough.
3. Create a tidal channel system that maximizes the estuarine fisheries habitat in large high-order subtidal channels.
4. Provide connectivity of habitats using "ecolevees" to create a gradation between the saltmarsh/mudflat habitats and uplands.
5. Provide connectivity with existing habitats which also include freshwater meadows, riparian, fresh and brackish marsh) at the Arcata Marsh and Wildlife Sanctuary and the CDFG Mad River Slough Wildlife Area.
6. Achieve desired wetland ecologic function as rapidly as possible for the freshwater and brackish water ponds and within a period of a few decades for the establishment of saltmarsh habitat.
7. Alleviate rural and urban area flooding due to tidegate restrictions.

Secondary Objectives

1. Create a visually appealing landscape.
2. Provide opportunities for public access, education/interpretation and recreation.
3. Create a passively managed system to the greatest extent possible that minimizes the need for maintenance activities on the site.
4. Breach the Bay-front levee to achieve reduced flooding upstream of Samoa Boulevard and increase tidal scour in lower Janes Creek.

The changes to the project are consistent with the EIR's Proposed Project findings which follow below:

1. The McDaniel Slough restoration site is located entirely on what was part of the extensive tidal saltmarsh that previously bordered Humboldt Bay. These tidal marshes used to provide vital ecologic functions to the estuarine ecosystem, including nurseries for fish, feeding areas for birds, and habitat for a wide variety of organisms.
2. It is feasible to restore tidal marsh habitat on the site by breaching the Bay-front levee provided adjacent properties are protected from coastal flooding by construction of new levees.
3. It is expected that a vegetated tidal marsh will develop at the site in approximately 10 years because the diked former tidal marsh has only subsided one to two feet and is still high enough relative to the tide level for plants to colonize.
4. It is uncertain whether the dominant vegetation colonizing the site will be native pickleweed or exotic cordgrass.
5. Removal of the tidegates at McDaniel Slough will remove a barrier to the migration of salmonids between the Bay and McDaniel Slough/Janes Creek.
6. The bay-front levee along the north shore of Humboldt Bay has deteriorated and is susceptible to overtopping during extreme tides. Construction of a new inboard levee as part of this Proposed Project will improve protection against coastal flooding in some areas immediately adjacent to the site.
7. Removal of the tidegate and reconnecting McDaniel Slough to the Bay will slightly reduce peak flood levels and periods of flooding upstream of Samoa Boulevard during coincident major floods and high tides.
8. Tidal scouring will enlarge McDaniel Slough, improve flood flow conveyance with time, and further reduce flood hazards upstream of Samoa Boulevard.
9. The two freshwater ponds will utilize ground and stormwater and one brackish pond will utilize a mix of treated wastewater discharges and bay water. Islands in the brackish pond are designed to provide roosting and nesting habitat and maximize hydraulic mixing within the ponds. The two freshwater ponds will be excavated to 6- to 10-foot depths. Excavated fill from the fresh and brackish ponds will be used for levee construction.

PROPOSED PROJECT CHANGES

The City of Arcata and the CDFG are proposing changes to the project to increase the number of acres of salt marsh habitat, enhance existing seasonal wetlands and reestablish brackish wetlands on the western portion of the site. The new proposed changes to the project area include:

(1) <u>Reconfiguring the western levee to create an additional 12 acres of tidal habitat.</u> When the EIR was developed the area was not tidally influenced and was perennial grasslands. Since then a tidegate on McDaniel Slough failed, opening this area to tidal activity. A change of 12 additional acres (increasing the area from 200 to 212 acres) will not impact perennial grasslands since the area has already begun to convert to tidal mudflat, salt marsh or tidal channel habitats. The change in the project will not result in new significant environmental effects or a substantial increase in the severity of previously identified significant effects. The additional habitat permanently restores 12 additional acres of marine resources and increases potential habitat for Tidewater goby (Eucyclogobius newberryi) within U.S. Fish and Wildlife Service Designated Critical Habitat for this species.

(2) Create 10 acres of brackish habitat in an area adjacent to the existing bay-front levee ditch by lowering the ground surface an average of 18 inches to access the muted tidal regime within the existing bay-front levee ditch. The muted tidal regime will be maintained by modifying the permitted tidegate through the new western levee to allow leakage into the existing bay-front levee ditch. Seasonal freshwater will be directed to the newly created brackish area from an adjacent seasonal wetland to recreate brackish habitat conditions that historically occurred – with greater freshwater input in the wet winter months. Fill from the excavated areas will be used to build the western portion of the McDaniel levee. Some of this area has been inundated by the failed tidegate and will continue to function as tidal habitat becoming more brackish during the summer months, which is consistent with existing conditions. The 10 acres of brackish marsh will increase potential habitat for Tidewater goby within U.S. Fish and Wildlife Service Designated Critical Habitat for Tidewater Goby.

3) Excavate a 23 acre area adjacent to the western levee, to a depth of approximately 12 inches. This area will be flooded by seasonal rainwater and drain to the brackish wetland area described above. Sod will be replaced to restore existing vegetation to the seasonal wetland area after one foot of fill is removed. The one foot excavation will maintain existing vegetation and uses of the area. This area currently functions as seasonal wetland and will continue to function as seasonal wetland though the excavation will extend the length of time this area is inundated with water. A pilot channel will be constructed through the seasonal and brackish wetlands to direct drainage through these areas to the bay-front levee ditch. A low-head (one to two feet) control structure will be placed between the seasonal wetland and the brackish wetland that will allow management of seasonal flooding and draining of the seasonal freshwater wetland.

The 10 acres of brackish marsh and 23 acres of enhanced seasonal freshwater wetlands are designed as a combined system that replicates historical patterns of ecosystems and the ecotone transitions between them. This will reestablish historic coastal geomorphic functions where the uplands gradually transitioned to the bay through seasonal freshwater and brackish wetlands. The changes are designed to improve habitat for coastal aquatic and avian species, and improve water quality.

Construction and mitigation measures described in the original EIR will apply to all activities associated with the proposed project changes. No changes to project timing or mitigations are proposed.

5.1 Cumulative Effects

Cumulative impacts refer to "two or more individual impacts that, when considered together, are considered to compound or increase other environmental impacts." The combined effects of the original Restoration Plan, proposed changes to the plan and other reasonably foreseeable future projects have been evaluated in terms of potential cumulative effects. The results of consultation with interested parties, field observations, and comparison with similar developments were used as baseline data to identify and evaluate cumulative effects.

CEQA § 15130 Discussion of Proposed Changes to the Project on the Cumulative Impacts Discussed in the EIR

EIRs are required by CEQA to describe any cumulative impacts, which could result from the proposed action. The cumulative impact of several projects is the change in the environment that results from the incremental impact of the proposed changes to the project when added to other, closely related past, present, or reasonably foreseeable, probable future projects. Cumulative impacts may result from individually minor but collectively significant projects taking place over a period of time. (CEQA Guidelines § 15355.)

In analyzing cumulative impacts for an EIR, a lead agency may create a list of all the past, present, and foreseeable future projects that could contribute to a significant cumulative impact, or may utilize the "projection" approach which bases the analysis upon a summary of projections contained in a prior certified environmental document, an adopted general plan, or a related planning document. (Public Resources Code § 21100(d).)

The EIR for the McDaniel Slough Marsh Enhancement proposed changes to the project considers past, present and foreseeable future projects to assess cumulative impacts. The proposed changes do not change the project's impact to the Arcata Marsh and Wildlife Sanctuary (AMWS) located directly adjacent to McDaniel Slough. The proposed marsh enhancement is an extension of the public trust enhancement marsh system already established at AMWS. The City owned portion of the project area is now part of the AMWS. The proposed changes to the project occur on the California Department of Fish and Game (CDFG) Mad River Slough Wildlife Area. Part of this 500-acre state owned area is within the project boundary. The CDFG Mad River Slough Wildlife Area Management Plan's (MRSWAMP) intent is to provide the optimum diversity of habitat types to achieve the highest biological productivity.

There are other sites surrounding Humboldt Bay that are also suitable for similar restoration projects. They include portions of the Gannon Slough/Jacoby Creek Wildlife Area and Rocky Gulch. Both of these areas have hosted habitat restoration projects and are anticipated to see additional habitat work in the future. The City of Arcata recently completed construction of a 2.5-acre freshwater pond on South I Street. This pond and associated native plants and trees has been completed and will serve to buffer the project area from nearby industrial land. The City of Arcata is working upstream on Janes Creek to improve fish passage, high flow capacity and in stream and riparian habitat at the confluence of the north and south forks of Janes Creek and improve riparian and instream habitat on a section of Sunset Creek. After site work is completed the area will be revegetated with native riparian revegetation. The projects incorporate best management practices to prevent potential short-term impacts to water quality and biological resources and provide long term benefits. The City also recently accepted a conservation easement in the upper Janes Creek watershed on 185 acres of forest lands for the preservation and protection of conservation values relating to fish and wildlife habitat, watershed, aesthetic enjoyment and the long-term sustainable production of high quality forest products - consistent with maintaining forest and agricultural soils and the productive viability of the property's forestland in perpetuity. Continued implementation of the City of Arcata Stormwater Master Plan

and Stormwater Pollution Reduction Plan is expected within the Janes Creek watershed. Both of these adopted plans provide for net improvements to water quality in the area.

Improvements outlined in the Humboldt Bay Master Plan and the proposed Humboldt Bay Trail are two reasonably foreseeable future projects within the project vicinity. The project amendment does not impact the proposed levee breach associated with the original project design. The new City levees in the McDaniel Slough project will serve as trails for the public. No public access is proposed in CDFG lands. Development of the twelve acre Little Lake Industries site could increase recreational use of the AMWS and the McDaniel Slough trails. This development would also likely increase traffic on South I Street and influence stormwater runoff to the proposed project. Proposed development on adjacent parcels located on Samoa Boulevard could also increase recreational use of the AMWS and the McDaniel Slough trails, increase traffic on Samoa Boulevard, and influence stormwater runoff to the proposed project. Also considered in the analysis of cumulative effects, is the City of Arcata Greenhouse Gas Reduction Plan that lays the foundation for citywide reduction of carbon dioxide emissions.

Public Utilities/Public Facilities

Impacts associated with the proposed project changes are short term and specific to a particular location and time. They would neither contribute to nor cause a significant cumulative impact since it is unlikely that other projects would impact the same utilities and facilities at the same time.

Geology/Soils

Construction of the amended McDaniel Slough Restoration project may occur simultaneously with construction and grading of other nearby cumulative projects, however, potential erosion associated with the proposed changes to the project will likely not contribute to cumulative erosion impacts due to implementation of standard erosion control measures.

Hydrology/Water Quality

Motor vehicles and parking lots are sources for metals and combusted and non-combusted petroleum hydrocarbons. Consequently, urban runoff represents a potentially significant source for watershed inputs of contaminants and excess sediments and nutrients to the McDaniel Slough estuary and wetlands. This can cause progressive impairment to water and sediment quality within the restoration area.

Although some impervious surfaces are proposed by the McDaniel Slough restoration (i.e. trail staging areas and hardened trail surfaces), the proposed project changes will not increase the area of impervious surfaces and the overall proposed project changes are expected to produce net beneficial impacts to water quality by providing natural filtering as the water flows through the seasonal wetlands prior to entering Humboldt Bay via the brackish marsh. In contrast, impacts from the other planned projects are potentially significant but mitigable to levels of insignificance by requirements for pollution prevention plans, best management practices, herbicide/pesticide and fertilizer use restrictions, effective hazardous waste collection and

recycling programs, and frequent street and parking lot cleaning. The project's incremental contribution to these water quality impacts are therefore defined as *de minimis* under CEQA. 37

Biological Resources

Wetlands

Overall, the proposed project changes preserve and restore/enhance biologically significant areas. There are however certain aspects of the proposed project changes that impact wetlands, including construction of levees, and possible disposal of excavated materials. Impacts from construction of the original configuration of the levee (6.5 acres) were addressed in the original EIR. With the new levee configuration, the project will impact 7.69 acres of agricultural wetland. The City and California Department of Fish and Game are providing 7.72 acres of mitigation by removing fill from upland areas, removing structures, and conversion of upland areas to wetland through tidal restoration to the site. Restoration of tidal function and construction of the fresh water and brackish wetlands west of the levee will provide additional mitigation for wetland loss caused by levee construction. An updated map, showing Wetland and Upland Impacts is attached as Figure III.

The calculations for areas that will be converted to wetlands is based on data provided by Conor Shea Ph.D., P.E. Hydrologist with the U.S. Fish and Wildlife Service Arcata Office. According to Conor Shea the "U.S. Fish and Wildlife Service deployed data sondes to record water levels in McDaniel Slough for one tidal month from April 24, 2007 to May 24, 2007. One data sonde (referred to as the Bayfront) was located just outside the McDaniel Slough tide-gates. This data sonde represents water level conditions in the bay, unimpeded by levees. A second data sonde was deployed in the levee ditch (referred to as the Levee Ditch) inside the marsh about 1300 feet from the tidegate. This data sonde represents typical water level conditions in the marsh."

Water level extremes were as follows:

	Bayfront	Levee Ditch
Maximum Water Level (Feet - NGVD 1929	4.66	1.61
Minimum Water Level (Feet - NGVD 1929)	-4.49	-2.83
Average Water Level (Feet - NGVD 1929)	-0.32	-0.32
Range (Feet)	9.15	4.44

This data shows that upland areas on existing levees will convert to wetlands as the water surface elevation will change from 1.61 (Feet - NGVD 1929) to 4.66 (Feet - NGVD 1929). Since wetland criteria include saturation in the upper 12 inches of the soil wetland conversion will occur to areas up to elevation 5.66 feet. The levees are steep sided and human made with limited existing wetlands. To be conservative the City has identified all areas at elevations below 2.61 feet on the interior bayfront levee as wetlands and areas below 4 feet on the levees that parallel McDaniel Slough. This accounts for up to 12 inches of saturation in the upper 12 feet of soil.

The project would result in impacts to U.S. Army Corps of Engineers jurisdictional wetlands, and California Coastal Commission EHSA – wetlands. The project would involve removal of sediment deposits from wetlands and stream channels, and placement of fill into existing wetlands and drainage ditches. In addition, heavy equipment would be required to operate within areas defined as wetlands.

Mitigation for these impacts is shown in the attached Wetland and Upland Impacts map (Figure 3). The City and CDFG have provided greater than 1:1 mitigation for wetland impacts. In addition the 222 acres of tidal wetland restored through excavation, new and enhanced channel configurations, and the re-introduction of a natural tidal regime provides substantial qualitative enhancement for the future 285 acre site. The project represents a significant gain through restoration/enhancement of the site's wetland values.

Listed Species – Potential special status plant and animal species in the Humboldt Bay area could include:

Species	Resource Agency or NGO Concerned with the Species	Species Status
Western lily (*Lilium occidentale*)	US Fish and Wildlife Service	Endangered
Tidewater goby (*Eucylogobius newberryi*)	US Fish and Wildlife Service	Endangered
Western yellow-billed cuckoo (*Coccyzus americanus)*	US Fish and Wildlife Service	Candidate
Short-tailed albatross (*Phoebastris albatrus*)	US Fish and Wildlife Service	Endangered
Northern spotted owl (*Strix occidentalis caurina*)	US Fish and Wildlife Service	Threatened
Marbled murrelet (*Brachyramphus marmoratus*)	US Fish and Wildlife Service	Threatened
Bald eagle (*Haliaeetus leucocephalus*)	US Fish and Wildlife Service	Threatened
Southern Oregon/Northern California coho salmon ESU (*Oncorhynchus kisutch*)	NOAA Fisheries	Threatened
California coastal chinook salmon ESU (*O. tshawytscha*)	NOAA Fisheries	Threatened
Northern California steelhead ESU (*O. mykiss*)	NOAA Fisheries	Threatened
Humboldt Bay owl's clover (*Castilleja ambigua ssp. humboldtiensis*)	California Native Plant Society	List 1B
Point Reyes bird's beak (*Cordylanthus maritimus ssp. palustris*)	California Native Plant Society	List 1B
Lyngbye's sedge (*Carex lyngbyei*)	California Native Plant Society	List 2
Western sand spurry – (*Spergularia Canadensis* var. *occidentalis)*	California Native Plant Society	List 2.1

According to the California Native Plant Society, plants on their 1B list are considered "rare, threatened, or endangered in California and elsewhere" (CNPS, 2004). Plants on List 2 are considered "rare, threatened, or endangered in California, but more common elsewhere."

The project is located on the CDFG Mad River Slough Wildlife Area which lacks late seral-stage conifer forest, favored by Marbled murrelet and Northern spotted owl. Since riparian cover is non-existent in pasture areas where work is proposed there is no suitable habitat for Western yellow-billed cuckoo. There are no known foraging or nesting sites of Bald eagles on the project site, due to the absence of appropriate nesting habitat or concentrations of prey species. The area does not contain suitable structure for nesting Peregrines and no known nesting sites exist for Peregrine falcons in this area (communication with Charles Bartolotta – April 21, 2009 - CDFG). Because the project area lacks suitable habitat for Short-tailed albatross, Marbled murrelet, California brown pelican, Bald eagle, Northern spotted owl, or suitable nesting habitat for Peregrine falcons, these species are not evaluated further. Migrating Aleutian cackling geese will not be impacted as they leave this area by mid- to late April and return on their way south in late October. The timing of work during the dry season also minimizes impacts to breeding birds that might be using the area and will occur after the Aleutian Canada geese have left the area.

The project will increase salt marsh or brackish habitat and therefore will potentially increase populations of Tidewater goby, Humboldt Bay owl's clover, Point Reyes bird's beak, western sand spurry, and Lyngbye's sedge.

Western Lily *(Lilium occidentale)* has never been observed in the project area. As most of the area was historic tidelands there is a low probability that Western lily was ever present in this area. However to avoid and minimize disturbance of special status plant populations, areas subject to disturbance during wetland and riparian enhancement activities will be surveyed and avoided as provided in the EIR mitigation measures.

The City will be preventing/mitigating impacts to amphibians, fish, and other aquatic species by working during the dry season when drainages are dry and other remnant channels are also dry or in a low flow condition. If work in or near wetted channels occurs, the City will install silt fences adjacent to the work sites to isolate those areas from the creek.

Short term, temporary adverse effects from construction activities are likely to occur to seasonal wet grasslands where seasonal wetland and levee construction work will occur. Access/staging areas for construction equipment (backhoe, excavator, 10 and 20 cubic yard truck, etc) may affect wetland habitats during summer/fall if these areas are saturated, via ground compaction and/or crushing vegetative cover. Wherever possible, sensitive areas will be avoided by heavy equipment. Any project induced adverse affects will be short-term, and with the proposed Mitigation Measures listed in the EIR less than significant.

Apart from the proposed project impacts described above, cumulative projects in the lower McDaniel Slough and adjacent Arcata South of Samoa area generally involve residential or commercial development of much of the remaining undeveloped land. The effects of the proposed changes to the restoration project, however, are in contrast with, and in most respects tend to lessen, the adverse effects of cumulative development.

Historic diking and development in and around Humboldt Bay have resulted in losses to all types of coastal wetland resources. Prior to levee construction and filling of wetlands in the adjacent bottom lands, small ephemeral streams provided freshwater flows to Humboldt Bay (See

attached Analysis of Mad River Delta 1854-1862 and Arcata Bottoms Pilot Land Use Study Maps, Figures IV and V). The Arcata bottoms/north Humboldt Bay area was historically a connected wetland system of fresh, brackish and salt water habitats. The proposed seasonal freshwater and brackish water habitats are intended to recreate/restore this lost habitat and hydrologic function. It is not feasible to restore all these resources to pre-European contact conditions. However, the McDaniel Slough project provides one of the best opportunities in the north-bay area to restore the coastal landscape processes that require a transition from fresh to brackish/salt water wetland habitat and that are critical to supporting fish, water fowl, shorebirds and other water associated coastal wildlife.

Protection and restoration of marine, brackish and palustrine seasonal wetlands associated with this project will provide direct benefits to many resident and migratory bird species. It is believed that nearly all of the more than a million shorebirds migrating along the California coast spend part of their migration foraging for the abundant invertebrates in these wetlands. Numbers of shorebirds utilizing the bay and surrounding seasonally wet palustrine wetlands are higher than those for any other bay or estuary in California, except San Francisco Bay (PCJV 2004).

The proposed tidal, brackish and freshwater wetland enhancements improve habitat at a Site of International Importance for Shorebirds, benefiting shorebirds using Humboldt Bay and surrounding seasonally-wet pasturelands. The project also supports the Southern Pacific Coast Regional Shorebird Conservation Plan, which calls for maintaining numbers of all migrant and wintering shorebirds at current levels and protecting seasonal wetlands and pastures from development in the Humboldt Bay region.

All of the coastal lowlands, including the Humboldt Bay/Eel River area and the Lake Earl/Smith River bottoms are important migration and wintering areas for approximately two dozen species of waterfowl and host anywhere from 25,000 to 100,000 birds on any given day from fall through spring. Among the most evident and numerous species are Tundra swan, Brant, Aleutian cackling goose, American wigeon, Northern pintail, Green-winged teal, Mallard, Northern shoveler, Canvasback, Redhead, Ruddy duck, Greater and Lesser scaup, and Bufflehead. (PCJV 2004). Waterfowl use the area for nesting, feeding and resting. Six species of herons and egrets are common to the project site, including large numbers of Great blue herons and Great egrets. Eighteen State-listed bird species ("endangered" or "species of special concern") are found in or adjacent to this area.

This project is also consistent with the Pacific Coast Joint Venture – Coastal Northern California Component – Strategic Plan Update – 2004 which recommended measures that call for enhancing existing wetland habitats where feasible and appropriate.

The State Water Resources Control Board Resolution no. 2008-0026 concerning development of a policy to protect wetland and riparian areas references the loss of over 85% of historic wetland and riparian acreage in California. The Resolution also states that remaining resources continue to be vulnerable to future impacts from projected population growth, land development, sea level rise, and climate change in California. The value of wetlands and riparian areas has been recognized in California through the enactment of the California Wetlands Conservation Policy that sets a goal to ensure no overall net loss and achieve a long-term net gain in the quantity,

quality, and permanence of wetlands acreage and values in California in a manner that fosters creativity, stewardship, and respect for private property (Executive Order W-59-93)

The proposed project changes also allows for future restoration of additional tidal habitat on CDFG lands should the Department wish to pursue that by altering water control structures or levee modification. The muted tide-gate design maintains existing drainage and flood protection for adjacent agricultural operations.

The seasonal wetlands also provide water quality benefits to Humboldt Bay by increasing retention of stormwater, providing settling of solids and biological treatment of potential pollutants prior to waters entering the brackish wetlands and Humboldt Bay.

Noise

Noise impacts from the proposed project changes would be short-term and highly localized and will not involve additional impacts since fill for the levees will be generated adjacent to the site where the levee will be built. A cumulative noise impact would only occur if noise sources from two projects occurred at the same time in the same general area, and this would not necessarily be a significant impact. No cumulative noise impacts would result from implementation of the proposed project changes as the changes do not require using different equipment or a longer duration. Since fill from the proposed freshwater seasonal and brackish wetlands will be used to construct the levee, noise impacts may be lessened from those expected under the original project design do the proximity of the proposed freshwater and brackish wetlands to the western levee resulting in reduced transport of fill material.

Cultural Resources

Based on all available evidence, the proposed project changes are not expected to have an effect on significant cultural resources. Additional excavation will occur on the western portion of the project area, an area that was Humboldt Bay prior to the construction of the Reclamation District Levee and adjacent to areas that have recently been excavated to similar depths. Therefore, with existing mitigations in place, significant cumulative impacts also are not expected and would meet CEQA's definition of a de minimis impact.

Air Quality

Impacts from construction or implementation of proposed project changes, in combination with any reasonably foreseeable future emission source, would not differ substantially from those identified for the project specific impacts in section 3.4 of the EIR.

Determination

In summary, the proposed project changes when viewed cumulatively with other projects will not have a significant impact.

5.2 Growth Inducing Impacts

EIRs are required by CEQA to describe any growth inducing impacts that would result from the proposed action. Growth-inducing impacts can be either direct or indirect. The analysis must discuss the ways in which the proposed changes could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this analysis are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas).

Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discussed are characteristics, which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little environmental significance (§ 15126.2(d)).

The proposed project changes do not change the EIR's findings that the McDaniel Slough Project does not exceed the development and population projections in the adopted Arcata General Plan and Land Use and Development Guide. In fact, the proposed changes provide less than the required density for this zoning designation.

The proposed changes are located west of the city, beyond the urban services boundary, and would not extend infrastructure or build municipal capacity. There are no features of the proposed changes to the project which cause secondary or growth inducing impacts.

5.3 The Environmentally Superior Alternative

The proposed project changes are consistent with the Environmentally Superior Alternative as stated in the EIR since the proposed changes involve the restoration of the site to more natural conditions through conversion of 22 acres of diked former tidelands to salt and brackish marsh. The proposed changes will also enhance existing seasonal wetland habitat.

Alternative Options Considered for Proposed Project Changes

Providing a larger area of marine habitat enhancement in this area was considered. It was found not to be feasible since it would require tidal flooding of existing habitat infrastructure owned and operated by the CDFG and would be in conflict with the CDFG Mad River Slough Wildlife Area Management Plan (MRSWAMP). The MRSWAMP's intent is to provide the optimum diversity of habitat types to achieve the highest biological productivity. Objectives to meet this intent include protection of remnant salt marsh, enhancement of wetlands, restoration of riparian vegetation and habitat management to benefit waterfowl, shorebirds, wading birds and raptors. The Coastal Wetlands Funds used to purchase the wildlife area emphasis is management directed toward wetland protection, restoration, and enhancement.

The McDaniel Slough project with the proposed amendments devotes 227 of the MRSWA's 548 acres to tidal habitat protection and restoration. This leaves 321 acres to meet the remaining goals in the Management Plan. Pastures and seasonal freshwater wetlands provide habitat for wading birds, mammals, shorebirds, geese and waterfowl. Raptors require tall grass habitat as well as pasture and riparian areas.

Restoring additional tidal action would reduce and possibly eliminate the property's viability for short grass habitat for migrating Aleutian cackling geese. The Aleutian cackling goose is a developing conservation problem in the north coast region of California due to the current population increase of the once endangered subspecies. The Washington, Oregon, and California population of Aleutian cackling goose was listed as Endangered by the U.S. Fish and Wildlife Service in 1967 (32 FR 4001) (USFWS 2001). A variety of conservation initiatives resulting from the Aleutian Cackling Goose Recovery Program enabled the Aleutian cackling goose population to began a remarkable recovery and the subspecies was finally delisted in 2001 (66 FR 15643).

According to the Pacific Coast Joint Venture, both the Crescent City and Humboldt Bay areas of the north coast serve as important spring staging areas for Aleutian cackling geese preparing for migration to their breeding grounds. Controversy has arisen among community members on the north coast as a result of the late winter/early spring use of agricultural land by flocks of thousands of Aleutian cackling geese. Foraging pressure on agricultural lands has intensified in recent years with increased use of the Crescent City and Humboldt Bay areas by both Canada and Aleutian cackling Geese (Black et al. 2003 *in* Bachman 2003). Such extensive use of agricultural land by geese has prompted the initiation of a hazing program in the Crescent City area. Presumably as a result of such efforts in Crescent City, researchers have documented a shift in habitat use from the traditional spring staging area for Aleutian cackling geese in the Crescent City area to the Humboldt Bay area, causing similar issues to arise there (Bachman 2003). Public lands, such as the CDFG Mad River Slough Wildlife Area, are critical to helping alleviate pressure on private agricultural lands.

The proposed McDaniel Slough amendment provides a mix of seasonal fresh, brackish and salt marsh habitat to benefit waterfowl, shore birds and wading birds as well as other water associated wildlife while maintaining grazing use for these species on adjacent grasslands. The proposed enhancements together with the original 240 acres of salt marsh, brackish marsh and freshwater pond and riparian habitats provides habitat for a wide variety of estuarine, intertidal and terrestrial organisms. The restored habitats will provide a mosaic of deep to shallow in-water and emergent shoreline areas where anadromous salmonids, tidewater goby and a wide assortment of amphibian and other aquatic wildlife can hold, feed, rest and rear their young. Careful consideration of the benefits and constraints for this property, and its relationship to other public lands in the North Humboldt Bay area, are why the California Department of Fish and Game in cooperation with the City of Arcata and the U.S. Fish and Wildlife Service North Coast Office designed and selected the new McDaniel Slough levee configuration which adds 12 acres of salt marsh habitat (with potential beneficial impacts to salt marsh plants of limited distribution such as Point Reyes bird's beak *Cordylantus maritimus* ssp. *palustris,* and Humboldt Bay owl's clover- *Castilleja ambigua* ssp. *humboldtensis*, Western sand spurry – *Spergularia Canadensis* var. *occidentalis*), 10 acres of brackish habitat (providing additional

habitat for Tidewater goby – *Eucyclogobius newberryi*) and 23.5 acres of seasonal wetland enhancements as the preferred alternative for the amended McDaniel Slough project.

A no action alternative would eliminate the possibility of enhancing 45.5 additional acres of coastal fresh, brackish, and marine habitat eliminating the additional habitat benefits described above. It also limits CDFG's ability to provide the optimum diversity of habitat types to achieve the highest biological productivity.

5.4 Effects Found Not to be Significant

This section covers those potential effects listed in Appendix F of the CEQA *Guidelines* (Environmental Checklist Form) that were determined to be less than significant effects of the proposed project, and therefore were not discussed previously in the EIR. The changes to the project would also have potential effects that are less than significant for the following:

Geology and Soils

- The proposed changes to the project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.
- The proposed changes to the project do not require sewers or wastewater disposal.
- The proposed changes to the project would not result in the loss of a unique geologic feature.
- The proposed changes to the project are not located on expansive soil and therefore would not create substantial risks to life or property.

Public Safety, Hazards, and Hazardous Materials

- The proposed changes to the project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- The proposed changes to the project would not reasonably be anticipated to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- The proposed changes to the project are not located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment.
- The proposed changes to the project are not located within the vicinity of a private airstrip, and therefore would not result in a safety hazard for people residing or working in the proposed changes to the project area.
- The proposed changes to the project would not be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would therefore not result in a safety hazard for people residing or working in the proposed changes to the project area.
- The proposed changes to the project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

- The proposed changes to the project would not expose people or structures to the risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Cultural and Historical Resources

- The proposed changes to the project would not cause a substantial adverse change in the significance of unique archaeological resources.
- Based on all available evidence, the proposed changes to the project are not expected to have an effect on significant cultural resources. The excavation associated with proposed changes occur in areas that were originally part of Humboldt Bay and proposed excavation activities are very shallow (less than 2 feet). Therefore it is anticipated that the work will not disturb any human remains, including those interred outside of formal cemeteries. Mitigation measures identified in the original EIR reduce impact to less than significant.

Public Facilities and Services

- The proposed changes to the project do not change the project's solid waste disposal needs.
- The proposed changes to the project comply with federal, state, and local statutes and regulations related to solid waste.

Circulation

- The proposed changes to the project would not result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that would result in substantial safety risks

Population and Housing

- The proposed changes to the project would not displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.
- The proposed changes to the project would not displace a substantial number of people, necessitating the construction of replacement housing elsewhere.

Noise

- The proposed changes to the project would not be within the vicinity of a private airstrip, and therefore would not expose people residing or working in the project area to excessive noise levels.
- The proposed changes to the project would not be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would therefore not expose people residing or working in the project area to excessive noise levels.

Mineral Resources

- There are no known mineral resources beneath the project site with economic value, or sources for aggregate or other mineral resources. Therefore, the proposed changes to the project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

Determination

Based on the above analysis the proposed project changes will result in a less than significant impact.

5.5 Significant Effects that Cannot Be Avoided

The proposed changes to the project will not change the level of impact described in the EIR and have the ability to mitigate all potentially significant effects to a less than significant level for the resources addressed in the original EIR. These resources are:

- **Hydrology and Water Quality** The EIR found there is the potential for impacts to surface water quality during construction activities (impact 3.1.4).
- **Biology** The EIR found there is the potential for impacts to fish and their habitat during construction activities (impact 3.2.2). The EIR found there is the potential for impacts to avian species and their habitat during construction of the project (impact 3.2.4).
- **Geology and Soils** The EIR found there is the potential for impacts related to tsunami inundation (impact 3.3.1). The EIR found there is the potential for impacts related to soils and erosion (impact 3.3.2).
- **Air Quality** The EIR found there is potential for a significant amount of particulates to be released during proposed project construction (impact 3.4.1).
- **Cultural and Historical Resources** The EIR found there is the potential for impacts related to archaeological and paleontological resources during the project construction (impact 4.1.1). The EIR found there is the potential for impacts related to historical resources (impact 4.1.2).
- **Aesthetics** The EIR found there is the potential for short and long-term impacts related to aesthetics (impacts 4.3.1 and 4.3.2).
- **Land Conversion** The EIR found there is the potential for impacts related to the conversion of agricultural land (impact 4.8.1).
- **Noise** The EIR found there is the potential for short-term impacts related to project construction (impact 4.9.1).

Table 1. Mitigation Measures

Impact Discussed in the EIR	Original EIR Mitigation Measure	Original EIR FINDINGS: Significance after Mitigation	Responsible Agency	Impacts due to Proposed Changes to Project
HYDROLOGY AND WATER QUALITY				
3.1.1 Drainage Impacts	3.1.1a A culvert and tidegate will be installed in the newly constructed western levee at the location of the existing borrow ditch north of the Bay front levee. This culvert and tidegate will mitigate the potential negative impact of preventing runoff from the Arcata Bottoms from discharging to McDaniel Slough. The culvert will be designed to preserve the existing capacity of the borrow ditch.	Less than significant with mitigation measures.	City of Arcata	The Culvert and tidegate will still be installed as described in the EIR. The tidegate will be designed to allow an equivalent volume of bay water to enter the levee ditch to maintain the existing brackish conditions found in the levee ditch to protect designated habitat for Tidewater goby.
3.1.4 Surface Water Quality Impacts *Construction Related Impacts*	Construction work occurs during the dry season from May 15 through November 15 to prevent ground disturbance during rainstorms. In the event of unseasonable rainfall, construction will not occur during periods when any surface runoff occurs on exposed soil due to rainfall. All exposed soil that could erode to a channel leading to Janes Creek will be mulched with weed-free straw mulch. Bare soil surfaces will be allowed to vegetate prior to the breach of the bay front levee. All vehicles and construction equipment shall be parked and equipment refueling and maintenance shall take place only in designated areas where potential spills of fuel, lubricants, or coolants can be contained and cleaned up without impacts to aquatic habitats. Erosion control plan will include seeding and mulching of exposed bare soil including new drainage swales prior to Nov. 15.	Less than significant with mitigation measures.	City of Arcata	All mitigation measures as provided in the EIR apply.
3.1.4 Surface Water Quality Impacts	3.1.4a The Erosion and Sediment Control Plan shall include stormwater pollution prevention measures applicable to the scope of construction activities proposed and shall include Best Management Practices (BMPs) as provided in the CalTrans *Storm Water Quality Handbook* or an	Less than significant with mitigation measures	City of Arcata	All mitigation measures as provided in the EIR apply.

Proposed Changes to the Project Related Impacts	equivalent approved by the City. 3.1.4b A Stormwater Pollution Prevention Plan (SWPPP) would be prepared as required by the Regional Water Quality Control Board.			
BIOLOGY				
.2.1 Impacts to Wetlands	3.2.1a The locations of habitats and species to be avoided will be clearly identified in the contract documents (plans and specifications). 3.2.1b Construction activities in wetlands will be restricted to the dry season. 3.2.1c Before clearing and grubbing commences construction and staging areas will be flagged to clearly define the limits of the work area. These areas will be clearly identified on the contract documents (plans and specifications). 3.2.1d Sensitive areas outside of the construction corridor will be so labeled on construction documents (plans and specifications) as "Sensitive Biological Resources—Do Not Disturb." 3.2.1e Watering of exposed earth will be conducted consistent with good construction practices to minimize dust production. 3.2.1f A qualified biologist will be on-site to observe construction activities as appropriate when construction in or adjacent to sensitive habitat occurs. 3.2.1g Contractors awarded contract packages will sign a document stating that they have read, agree to, and understand the required resource avoidance measures, and will have construction crews participate in a training session on sensitive area resources. 3.21h All haul roads and portions of construction staging areas that are no longer required for construction and maintenance of the restoration proposed changes to the project and have not been converted to a new use shall be restored to pre-proposed changes to the project conditions.	Less than significant with mitigation measures	City of Arcata	The original configuration of levees in the project area constituted 6.5 acres of "fill" onto wetlands. The new configuration adds 1.19 acres of wetland impacts. Mitigation for these impacts is shown in the attached Wetland and Upland Impacts map. The City and CDFG have provided greater than 1:1 mitigation for wetland impacts. In addition the 222 acres of tidal wetland restored through excavation, new and enhanced channel configurations, and the re-introduction of a natural tidal regime provides substantial qualitative enhancement for the future 285 acre site. The project represents a significant gain through restoration/ enhancement of the site's existing wetland values. Additionally all the same mitigation measures as provided in the EIR apply.
3.2.2 Impacts to Fish and Associated Habitat	3.2.2a Construction activities occurring within the watercourse would occur following recommendations from qualified California Department of Fish and Game biologists. 3.2.2b In stream work will be done during the dry	Less than significant with mitigation measures	City of Arcata	All the same mitigation measures as provided in the EIR apply.

	season at low tide with a fish biologist on site during in stream operations to monitor for the presence of anadromous fish and other wildlife species. 3.2.2c Tidegates would be removed from the pipes one year prior to breaching the levee and removing the pipes. This will allow for development of erosion control vegetation on the levees prior to the breach thus minimizing sediment inputs. The breach would occur during low flow and low tide. 3.2.2d Consult with the U.S. Fish and Wildlife Service regarding Tidewater goby. 3.2.2e Consult with the NOAA Fisheries regarding salmonids. 3.2.2f Install outlets from brackish pond that allow for controlling outflow to adjust for optimal salinity ranges.			
3.2.4 Impacts to Avian Species and Associated Habitat	3.2.4a Construction activities would occur during the breeding and nesting season only following pre-construction site-specific surveys that find an absence of nesting Northern harrier. 3.2.4b Following pre-construction surveys, work would begin following recommendations of a qualified biologist. 3.2.4c Riparian habitat will be enhanced by planting willow, alder and native conifers along Janes Creek. Near the freshwater ponds, large logs suitable for roosting will be buried upright to serve as snags.	Less than significant with mitigation measures	City of Arcata	All the same mitigation measures as provided in the EIR apply.
3.2.6 Impacts to Mammal Species	3.2.6a Installation of snags, bat boxes and retention of some tall grass perennial uplands on City property landward of the dikes with a mosaic of new upland forest areas.	Less than significant with mitigation measures.	City of Arcata	Proposed project changes will not impact these areas
GEOLOGY AND SOILS				
3.3.1 Impacts Due to Tsunami Inundation	3.3.1a Place tsunami warning and evacuation route signs on trails within the the project area.	Less than significant with mitigation measures.	City of Arcata	Proposed project changes will not impact these areas

<table>
<tr><td>3.3.2 Impacts Due to Soil Stability and Erosion</td><td>3.3.2a The City will use California Best Management Practices to minimize erosion during construction of the project. Table 3-1 lists erosion control practices that could be used.
Table 3-1 Erosion Control BMPs
<table>
<tr><td>BMP #</td><td>BMP Name</td></tr>
<tr><td>EC-1</td><td>Scheduling</td></tr>
<tr><td>EC-2</td><td>Preservation of Existing Vegetation</td></tr>
<tr><td>EC-3</td><td>Hydraulic Mulch</td></tr>
<tr><td>EC-4</td><td>Hydroseeding</td></tr>
<tr><td>EC-5</td><td>Soil Binders</td></tr>
<tr><td>EC-6</td><td>Straw Mulch</td></tr>
<tr><td>EC-7</td><td>Geotextiles & Mats</td></tr>
<tr><td>EC-8</td><td>Wood Mulching</td></tr>
<tr><td>EC-9</td><td>Earth Dikes and Drainage Swales</td></tr>
<tr><td>EC-10</td><td>Velocity Dissipation Devices</td></tr>
<tr><td>EC-11</td><td>Slope Drains</td></tr>
<tr><td>EC-12</td><td>Stream bank Stabilization</td></tr>
</table>
Source: California BMP Handbook

3.3.2b A geotechnical report would be prepared to describe options for levee construction. The report would describe the conditions at the site that could affect levee stability. The report would include design recommendations for levee construction to reduce the potential impacts due to levee failure to a less than significant level.</td><td>Less than significant with mitigation measures</td><td>City of Arcata</td><td>All mitigation measures as provided in the EIR apply.</td></tr>
<tr><td>*3.3.3 Impacts Due to Geologic Hazards*</td><td>Levees and roadbeds should be constructed with upper clay/silt soil.
To limit saltwater intrusion, sandy material below the clay should be mixed with the clay at a minimum ratio of 1:1.
Levees and roadbeds should be raised in lifts not exceeding eight inches.
A geotechnical report would be prepared to describe options for levee construction. The report would describe the conditions at the site that could affect levee stability. The report would include design recommendations for levee construction to reduce the potential impacts due to levee failure to a less than significant level.</td><td>Less than significant with mitigation measures.</td><td>City of Arcata</td><td>All mitigation measures as provided in the EIR apply.</td></tr>
<tr><td>*3.4.1 Release of Particulate Matter*</td><td>3.4.1a All active construction areas shall be watered at a rate sufficient to keep soil moist</td><td>Less than significant</td><td>City of Arcata</td><td>All mitigation measures as provided in the EIR</td></tr>
</table>

During Construction Activities	and prevent formation of wind-blown dust. 3.4.1b 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. 3.4.1c All unpaved access roads, parking areas, and construction staging areas shall be paved, watered daily, or treated with non-toxic soil stabilizers during construction. 3.4.1d All paved access roads, parking areas, and construction staging areas shall be cleaned daily with water sweepers during construction. 3.4.1e If visible soil is carried out onto adjacent streets, the area shall be washed with water or by a water sweeper truck. 3.4.1f Hydroseeding or non-toxic soil stabilizers shall be applied to inactive construction areas (previously graded areas inactive for ten days or more). 3.4.1g Exposed stockpiles of dirt, sand, and similar material shall be enclosed, covered, watered daily, or treated with non-toxic soil binders. 3.4.1h Traffic speeds on unpaved roads shall be limited to 15 miles per hour. 3.4.1i Sandbags, hay bales, or other erosion control measures shall be installed to prevent silt runoff to public roadways. 3.4.1j Vegetation in disturbed areas shall be replanted as quickly as possible. 3.4.1k Outdoor dust-producing activities shall be suspended when high winds create visible dust plumes in spite of control measures.	with mitigation measures.		apply. Since the proposed changes to the project will provide fill for the western levee in close proximity to the levee, the changes should further reduce the impacts associated with hauling fill from other areas to the western levee area.
AIR QUALITY, PUBLIC HEALTH, HAZARDS, AND HAZARDOUS MATERIALS				
3.5.1 Accidental Release of Hazardous Materials During Construction or Ongoing Maintenance.	*See mitigation measure 3.1.4*	Less than significant with mitigation measures.	City of Arcata	All mitigation measures as provided in the EIR apply
3.5.2 Expose the Public to Disease Vectors (e.g. mosquitoes).	Bat boxes and swallow nesting boards will be installed and mounted on the "snags" placed vertically in the ground for bird roosting platforms. In time, when the planted trees are large enough, additional bat boxes and swallow nesting structures can be mounted on trees.	Less than significant with mitigation measures.	City of Arcata	No changes to this measure will result from the proposed project changes

3.5.3 Impacts Due to an Increased Risk to Public Safety from Design, Implementation, and Construction Activity	3.5.3a Laminated informational signs would be placed at major public access points, such as trails and roads, to the project informing the public of the safety hazards related to heavy equipment, and requesting that no trespassing occur. 3.5.3b During operation of heavy equipment, the construction manager would ensure that someone is on site at all times to monitor for approaching visitors. On-site personnel would be responsible for maintaining safe working conditions at the site. 3.5.3c Because of the recreational use of the AMWS, all loaded vehicles would be required to travel a maximum of 15 mph on South I Street.	*Less than significant with mitigation measures.*	*City of Arcata*	*All mitigation measures as provided in the EIR apply. Impact should be less as the work will be occurring further from public access areas and truck traffic will be lessened since fill will be obtained on site.*
CULTURAL AND HISTORIC RESOURCES				
4.1.1 Impacts to archaeological and Paleontological Resources	4.1.1a Should concentrations of archaeological materials, paleontological resources, or human remains be encountered during construction, all ground-disturbing work would be temporarily halted in that area. Work near the archaeological finds would not be resumed until a qualified archaeologist has evaluated the materials and offered recommendations for further action. Proposed changes to the project personnel shall not collect cultural resources. In the event human remains are discovered, the County Coroner shall be contacted immediately and all work would cease until further instruction from qualified personnel. 4.1.1b. A representative from the Wiyot Tribe or a trained archaeological monitor would be on site to oversee excavations of the ponds and levees in the eastern most portion of the project. A cultural resources monitor would ensure that any significant subsurface cultural deposits are quickly recognized and recorded.	Less than significant impact with mitigation measures.	City of Arcata	All mitigation measures as provided in the EIR apply. Additionally the City will work with the local tribes to determine whether a qualified monitor must be on-site during excavation activities. Should any paleontological, archaeological, historical or unique ethnic or sacred resources be encountered during construction or grading operations, all ground-disturbing work shall be temporarily halted on site. Work on site shall not be resumed until a qualified archeologist has evaluated the materials and offered recommendations for further action. Since additional excavation will occur in former tide lands the proximity to Humboldt Bay and previously excavated areas indicates that the potential for encountering archaeological materials is considered low.

4.1.2 Impacts to Historic Resources	4.1.2a The City shall officially record the levee sections proposed for removal (for example, as recorded in the Cultural Resources Investigation).	Less than significant impact with mitigation measure	City of Arcata	Changes to the project will not change impacts this resource.
AESTHETICS AND VISUAL RESOURCES				
4.3.1 Impacts Due to Short-Term Effects on Existing Visual Character or Quality of Site During Construction	4.3.1a All temporary roads or routes used for transportation of levee construction fill material would be de-compacted with rippers or tilling equipment prior to completion of the proposed changes to the project to allow for rapid revegetation to cover over vehicle tracks. 4.3.1b Exposed soil would be mulched with a weed-free straw or planted with native materials to disguise areas of disturbance. 4.3.1c Any sites affected by heavy equipment that do not have natural vegetation recovery one year following construction would be seeded or planted with vegetation that would blend with the surrounding features.	Less than significant with mitigation measures.	City of Arcata	All mitigation measures as provided in the EIR apply. Impacts should be less as the changes to the project will reduce the length and amount of truck traffic needed to implement the project.
4.3.2 Impacts Due to Potential Long-term Effects on Scenic Vistas, Highways, or Scenic Resources	4.3.2a Levees would be graded, curved, and smoothed to blend with the surrounding features. Native vegetation planted on levees will help structures blend in with the natural environment. 4.3.2b The existing bay front levee from South I Street to the mouth of Janes Creek will be improved visually by removing existing concrete slabs from the levee sides. 4.3.2c The proposed bird blinds will be constructed with weathered barn lumber and will be placed in areas that are planted with heavy vegetation in order to obscure them from view. The blinds will be constructed with a low profile as well.	Less than significant with mitigation measures.	City of Arcata	All mitigation measures as provided in the EIR apply.
PUBLIC UTILITIES AND SERVICES				
4.4.3 Impacts to Utility Transmission Systems	The City in cooperation with PG&E, will provide access and prevent damage to towers by: 4.4.3a Developing a soil fill buttress surrounding the tower foundations. The buttress would be composed of material excavated from the pond areas. The buttress would be a	Less than significant with mitigation measures.	City of Arcata	Towers will be incorporated into the levee where possible as a means of reducing impacts further.

	circular mound of material surrounding the foundation to provide additional stability to the site, as well as provide a zone above flood elevations from which crews can perform maintenance. 4.4.3b Constructing a boardwalk for pedestrian access to the towers. 4.4.3c Extending the concrete base foundations to a higher elevation to protect against corrosion.			
NOISE				
4.9.1 Impacts Due to Increased Noise Levels.	4.9.1a (1985 Noise Element 4.6) Construction activities that generate noticeable sound offsite would be limited from 7 a.m. to 7 p.m., Monday through Friday, and 9 a.m. to 7 p.m. on Saturday. No work will be allowed on Sunday. 4.9.1b (1985 Noise Element 4.6) Construction equipment would be maintained in proper condition to prevent excessive noise 4.9.1c Backup beepers would be no louder than necessary.	Less than significant with mitigation measures	City of Arcata	All mitigation measures as provided in the EIR apply. Impacts should be less as the changes to the project will reduce the length and amount of truck traffic needed to implement the project.

Determination Based on the above analysis, proposed project changes will result in a less than significant impact with the incorporation of the mitigation measures described above.

5.6 Significant Irreversible Effects

Significant irreversible environmental changes that would result from implementing the McDaniel Slough Restoration Plan are described in the EIR. The proposed changes to the project would irreversibly commit an additional 22 acres of diked former tideland back to tidelands. Twelve of the 22 acres has already begun to convert to tidal mudflat, salt marsh or tidal channel habitats due to a leaking tidegate. It would also extend seasonal inundation on 23.5 acres of grasslands which are already seasonally wet. Implementation of the proposed changes would indirectly result in irretrievable commitment and use of energy resources for the construction of levees and wetlands at the same level as the original project. The level and amount of commitment of such resources is commensurate with similar restoration projects undertaken in the Humboldt Bay area.

5.7 Draft Mitigation Monitoring Program

The EIR includes mitigation and monitoring reports that summarize impacts, mitigation, and monitoring in a table format. The proposed project changes will be included in the monitoring and mitigations outlined in the EIR.

Adaptive Management

The proposed project changes incorporates post-construction monitoring and adaptive management as outlined in the EIR Section 5.7 to assess whether the natural processes can sustain the long-term evolution of the site to the desired conditions. The freshwater wetlands are an exception as success of those habitat types should be measurable within a 5-year period.

Monitoring

Monitoring of the McDaniel Slough Wetland Enhancement project with the proposed changes will be consistent with those outlined in the EIR Section 5.7.

5.8 Consistency with Adopted Plans, Policies and Legislation

The proposed changes to the project are consistent with the following adopted plans and policies:

Relevant Plans and Ordinances of the City of Arcata

City of Arcata General Plan 2020

Policy RC-4a. "Tidal marshes shall be enhanced and maintained especially in the areas of McDaniel Slough....."

Arcata General Plan --Final Program EIR—2000

"Conversion of Agricultural Land (Hunt property)—The City will prepare a resource enhancement plan for the Hunt property, to restore up to 274 acres of former salt marsh, known as the McDaniel Slough, and additional freshwater wetlands adjacent to Humboldt Bay. The enhancement plan will have three primary goals: restore rare salt marsh habitat; alleviate flooding and restoration of natural hydrologic functions; and create passive recreational opportunities.....The Hunt parcel has been redesignated to Natural Resource zoning from Agricultural Exclusive" page 3-17.

Arcata Creeks Master Plan 1991

V.1. Fish and Wildlife – 1. Policy: The City Shall promote restoration of creek and healthy conditions for fish and wildlife.

Arcata Stormwater Master Plan 1997

Capital Improvement proposed changes to the project #J1E)—"Develop plan to alter or remove tidegates at Janes Creek and Humboldt Bay, providing dike protection for private properties. This will restore flushing flows to the lower half-mile of creek as well as provide for anadromous fish access. This plan includes moving the location of existing dike structures and securing maintenance access easements...."

Arcata Open Space Program 2004

Serves as a mechanism for implementing the policies of the General Plan Open Space Element of Arcata's General Plan and integrating the goals of the Resource Conservation and Land Use Elements and other City plans that relate to the designation, maintenance, enhancement, and increasing the amount of permanently protected open space in and around Arcata. While the General Plan provides for open space protection through land use and zoning policies, the Open Space Protection Program primarily guides the City and its citizens in protecting and maintaining open spaces via purchase of land or easements that will enrich the lives of Arcata's residents in harmony with the needs and goals of the community.

Arcata Best Management Practices (BMP) Manual 2004

Is intended to provide guidance for Best Management Practices pollution control/good housekeeping information for industrial, commercial, municipal, and construction activities. This manual is not intended to substitute for requirements set forth by permit conditions of approval or requirements by other agencies.

Arcata Erosion and Sediment Control Ordinance No. 1255

Establishes minimum standards and regulations for grading activities. The intent is to promote the public safety and general welfare by preventing unreasonable or unnecessary erosion and sediment production and related degradation of natural resources and the City's stormwater drainage systems.

Arcata Water Quality Ordinance No. 1319

Sets forth standards for discharge into the stormwater drainage facilities for the City of Arcata, and establishes a stormwater pollution control program in compliance with the Clean Water Act (33 USC 1251 *et seq.*) and the United States Environmental Protection Agency (EPA) Phase II stormwater regulations (40 CFR Parts 9, 122-124).

Arcata Draft Greenhouse Gas Reduction Plan 2005

Requires the City of Arcata to reduce greenhouse gas output City-wide by 20% from year 2000 levels by the year 2010. The proposed project changes likely increases carbon sequestration levels by planting additional trees and shrubs. Converting some existing freshwater wetlands (agricultural fields) to salt marsh also likely increases new carbon sequestration on the site over time.

California Coastal Act

The proposed project changes are located within the boundaries of the California Coastal Zone and are therefore subject to the requirements of the California Coastal Act of 1976 (California Public Resources Code Sections 30000 – 30900). The California Coastal Commission retains permitting authority over the proposed changes to the project site; therefore, the California

Coastal Commission will have final permitting authority for the proposed changes to the project. The basic goals of the state for the coastal zone, as described in Section 30001.5 of the Act, are to:

- Protect, maintain, and, where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources.
- Assure orderly, balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of the people of the state.
- Maximize public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resource conservation principles and constitutionally protected rights of private property owners.
- Assure priority for coastal-dependent and coastal-related development over other development on the coast.
- Encourage state and local initiatives and cooperation in preparing procedures to implement coordinated planning and development for mutually beneficial uses, including educational uses, in the coastal zone. Applicable sections of the Act include the following:

Section 30210. In carrying out the requirements of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect the public rights, right of private property owners, and natural resource areas from overuse.

Section 30211. Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30212. (a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) It is inconsistent with public safety, military security needs, or the protection of fragile coastal resources; (2) adequate access exists nearby . . .

Section 30213. Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided Developments providing public recreational opportunities are preferred.

Section 30214. (a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on facts and circumstances in each case including, but not limited, to the following:

(1) Topographic and geologic site characteristics.
(2) The capacity of the site to sustain use and at what level of intensity.

(3) The appropriateness of limiting public access to the right to pass and trespass depending on such factors as the fragility of the natural resources in the area . . .

Section 30230. Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30231. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of wastewater discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging wastewater reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Section 30233. (a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(7) Restoration purposes,
(8) Nature study, aquaculture, or similar resource-dependent activities,
(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable longshore current systems.
(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the coastal wetlands identified in it report entitled, "Acquisition Priorities for the Coastal Wetlands of California", shall be limited to very minor incidental public facilities, restorative measures, nature study, . . .

Section 30236. Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (1) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the floodplain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.

Section 30240. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.
(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Section 30241. The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas' agricultural economy . . .

Section 30242. All other lands suitable for agricultural use shall not be converted to nonagricultural uses unless (1) continued or renewed agricultural use is not feasible . . .

Section 30244. Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

Section 30251. The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural landforms, to be visually compatible with the character of surrounding areas, and where feasible, to restore and enhance visual quality in visually degraded areas.

Section 30253. New development shall: (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard . . .

Humboldt Bay Watershed Salmon and Steelhead Conservation Plan- A Humboldt Bay Watershed Advisory Committee (HBWAC) Document –2004

The *Humboldt Bay Watershed Salmon and Steelhead Conservation Plan* contains goals and objectives aimed at protecting and restoring watershed processes to preserve and enhance salmon and steelhead habitat in the sub-watersheds of Humboldt Bay.

Draft Humboldt Bay Management Plan (Humboldt Bay Harbor, Recreation and Conservation District, March 2005)

The *Draft Humboldt Bay Management Plan* includes the following policies, which the McDaniel Slough project and changes to the project will carry out or be consistent with: CAE1 – Maintain, restore, and enhance aquatic ecosystem integrity; CAE-2 – Protect and maintain environmentally sensitive habitat areas; CAS-1 – Maintain biological diversity throughout Humboldt Bay; and CEP-1 – Impacts to streams, wetlands, estuaries and coastal waters may be authorized for specific purposes or proposed changes to the project types, including habitat restoration or enhancement projects.

Humboldt County General Plan – Conservation and Open Space Element

Which guides long range preservation and conversation of open space lands and conservation of natural resources…

Department of Fish and Game Mad River Slough Wildlife Area –Draft Management Plan

Pursuant to the *Charles Brown Fish and Game Reorganization Act of 1951* (Statutes of 1951, chapter 715), the Department was created within the Resources Agency (Fish and Game Code, § 700) from the Division of Fish and Game within the former Department of Natural Resources. The legislative delegations to the Department are codified in division 2 of the Fish and Game Code, which concerns the organization and general functions of the Department. The Director administers the Department (FGC § 700), and is appointed by the Governor (FGC § 701); the Department also administers and enforces the provisions of the Fish and Game Code (FGC § 702). Consistent with section 702, the Attorney General has found that it was the intent of the Legislature to leave the Department in full control of the execution and enforcement of fish and game laws (17 Ops. Cal. Atty. Gen. 72 (1951).

The Department has broad program responsibilities for fish and wildlife. Fish and Game Code § 2701 (c) vests in the Department: "…the principal responsibility for protecting, conserving, and perpetuating native fish, plants, and wildlife, including endangered species and game animals, for their aesthetic, intrinsic, ecological, educational, and economic values." The Department is designated natural resource trustee with jurisdiction "over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species" (FGC § 1802).

Mad River Slough Wildlife Area Acquisition

The Department acquired the Mad River Slough Wildlife Area to protect, enhance, and restore coastal wetlands within Humboldt Bay.

Mad River Slough Wildlife Area (MRSWA) Management Plan

The management plan was prepared with the support of the Mad River Slough Management Plan Advisory Team, which included members of North Coast Waterfowl Association, City of Arcata, Livestock Operators, Agricultural Extension Service, Audubon Society and Humboldt County.

The major management objectives for the MRSWA include restoration, enhancement, and protection of remaining coastal wetlands in Humboldt Bay.

The ultimate management intent will be to provide the optimum diversity of habitat types in order to achieve the highest biological productivity. Featured biological elements are identified: waterfowl, shorebirds, wading birds, raptors, riparian habitat, and salt marsh.

5.9 Balance of Short-term Use and Long-term Productivity

Implementation of the proposed changes to the project would result in both short- and long-term impacts as outlined in the original EIR.

Short-Term Impacts

Short-term impacts would occur to land use, water quality, geology, biological resources, landforms/visual quality, traffic, air quality, public utilities, and noise, although most of these impacts would be reduced to a less than significant level by mitigation. Long-term impacts would occur to land use, hydrology, geology, biological resources, natural resources, landforms/visual quality, traffic, noise, and public safety.

Short-term land use impacts from the project changes include restricted public access to the project area (including the CDFG lands); incompatibilities with general construction activities, the use of construction staging areas and access roads with nearby industrial/commercial areas; All of these impacts are mitigable to a less than significant level and would cease once constructed was completed.

Significant impacts during the construction period would occur to some biological resources in the wetland and upland restoration and disposal areas. These impacts would include alteration of existing habitats and displacement or inadvertent extirpation of some organisms, particularly bottom- and soil-dwelling invertebrates and plants in the additional 22 acres of the project region that will be converted to tidal habitats. These impacts are generally less than significant or avoidable by mitigation measures identified above.

Short-term water quality impacts include potential spills or leaks of oils or fluids onto ground and into aquifers or wetlands.

Construction-related increases in traffic due to short-term movement of large trucks and excavation/grading equipment into the project staging and work areas, and work-day use of public streets during worker commutes to the site could be significant during periods of seasonal congestion, but would be mitigable to a less than significant level.

Long Term Impacts

Excavation/dredging and filling of the area for additional restoration of tidal salt and brackish marsh and seasonal freshwater wetland habitats would permanently, for practical purposes, result in a permanent loss of grasslands the project region.

The hydrology changes would involve (1) levee construction to protect public and private property while protecting restored wetland areas; (2) tidal inundation of 22 additional acres of former tide lands (3) deepening of existing seasonal wet grassland habitat to extend the inundation period. These changes would not cause adverse changes in flooding potential, scour, or sediment delivery and are essential to allow the creation of wetland habitats and the enhancement of long-term productivity of biological resources in the project area.

Determination Regarding Short-term Use and Long-term Productivity

The proposed changes to the project would result in a permanent loss of grasslands and create long-term visual changes and alter hydrology. Overall, however, the proposed changes to the project would create a net benefit to many resources, as stated in the EIR and summarized below:

• Helping to restore aquatic functions by opening the tidal channel and maintaining tidal exchange between the bay and wetlands, thereby improving water quality and health of wetland habitat.
• Restoring habitat and improving existing habitat values, thereby benefiting listed species (Pt. Reyes bird's beak, Humboldt Bay owl's clover, Tidewater goby, Coho salmon, Chinook salmon).
• Increasing acreage of tidal habitats with beneficial impacts on associated species.
• Improving functions and values of existing tidal habitats with beneficial impacts on associated species.
• Enhancing functions and values of seasonal wetlands with beneficial impacts on associated species.
• Enhancing freshwater wetland habitat.
• Preserving the site in open space and restoring a number of filled and otherwise degraded areas with native vegetation, thereby improving the overall aesthetic qualities of the site.

5.10 Findings

CEQA sets forth certain mandatory findings of significance. The proposed changes to the project have been analyzed, and been found that they will not change the EIR findings that the McDaniel Slough Restoration Plan will not:

- Substantially degrade environmental quality;
- Substantially reduce fish or wildlife habitat;
- Cause a fish or wildlife habitat to fall below self-sustaining levels;
- Threaten to eliminate a plant or animal community;
- Reduce the numbers or range of a rare, threatened, or endangered species;
- Eliminate important examples of the major periods of California history or pre-history;
- Achieve short term goals to the disadvantage of long term goals;
- Have possible environmental effects that are individually limited but cumulatively considerable when viewed in connection with past, current, and reasonably anticipated future projects; or
- Have environmental effects that will directly or indirectly cause substantial adverse effects on humans.

Guidelines for California Environmental Quality Act – Article 11 Section 15163. Supplement to an EIR

(a) The Lead or Responsible Agency may choose to prepare a supplement to an EIR rather than a subsequent EIR if:

(1) Any of the conditions described in Section 15162 would require the preparation of a subsequent EIR, and

(2) Only minor additions or changes would be necessary to make the previous EIR adequately apply to the the project in the changed situation.

(b) The supplement to the EIR need contain only the information necessary to make the previous EIR adequate for the proposed changes to the project as revised.

(c) A supplement to an EIR shall be given the same kind of notice and public review as is given to a draft EIR under Section 15087.

(d) A supplement to an EIR may be circulated by itself without recirculating the previous draft or final EIR.

(e) When the agency decides whether to approve the project, the decision-making body shall consider the previous EIR as revised by the supplemental EIR. A finding under Section 15091 shall be made for each significant effect shown in the previous EIR as revised.

Note: Authority cited: Section 21083, Public Resources Code; Reference: Section 21166, Public Resources Code.

15162. Subsequent EIRs and Negative Declarations

(a) When an EIR has been certified or a negative declaration adopted for a project, no subsequent EIR shall be prepared for that project unless the lead agency determines, on the basis of substantial evidence in the light of the whole record, one or more of the following:

1) Substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;

2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or Negative Declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or

3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was

certified as complete or the Negative Declaration was adopted, shows any of the following:

(A) The project will have one or more significant effects not discussed in the previous EIR or negative declaration;

(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;

(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or

(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.

(b) If changes to a project or its circumstances occur or new information becomes available after adoption of a negative declaration, the lead agency shall prepare a subsequent EIR if required under subdivision (a). Otherwise the lead agency shall determine whether to prepare a subsequent negative declaration, an addendum, or no further documentation.

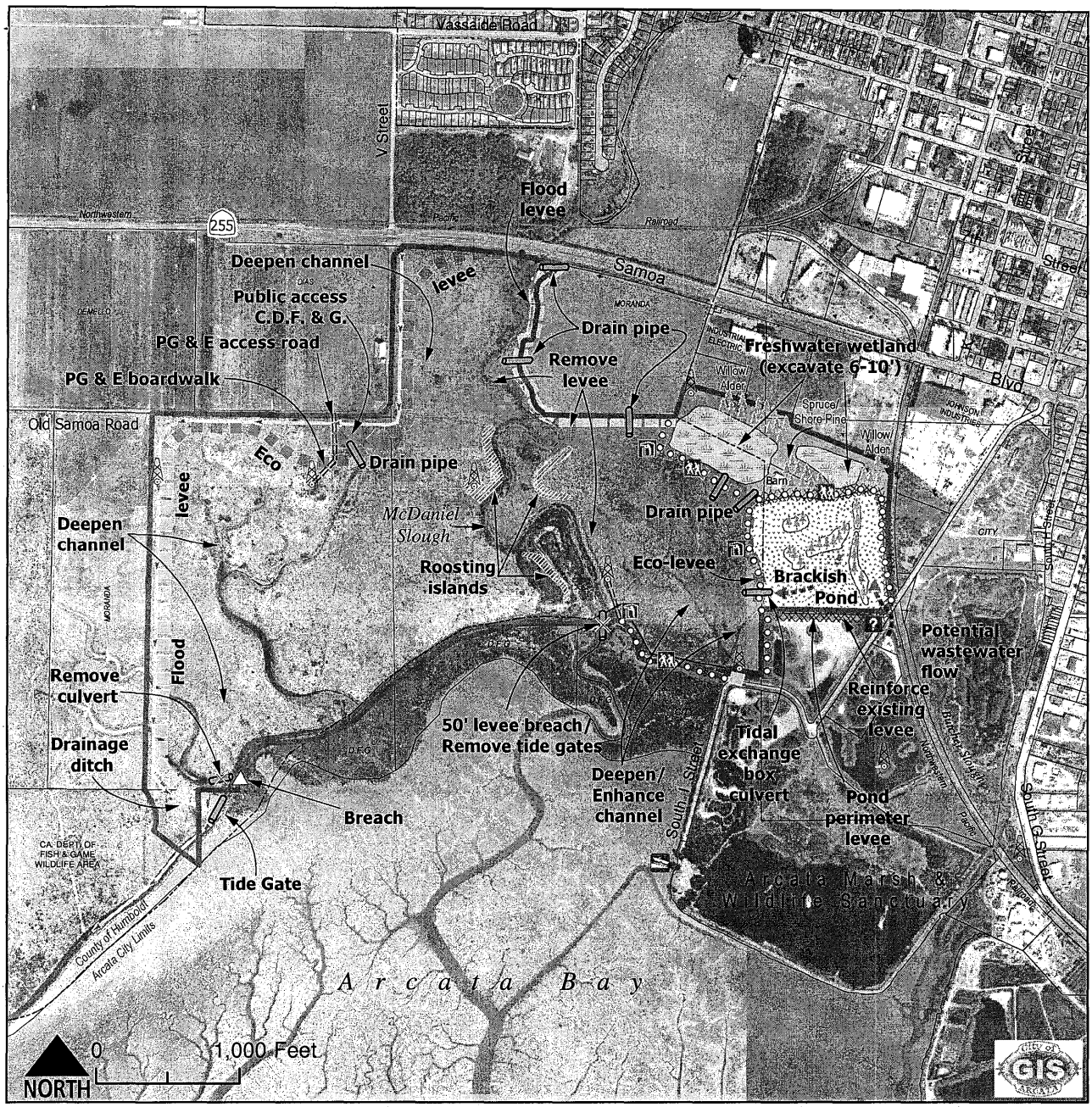
(c) Once a project has been approved, the lead agency's role in the project approval is completed, unless further discretionary approval on that project is required. Information appearing after an approval does not require reopening of that approval. If after the project is approved, any of the conditions described in subdivision (a) occurs, a subsequent EIR or negative declaration shall only be prepared by the public agency which grants the next discretionary approval for the project, if any. In this situation no other responsible agency shall grant an approval for the project until the subsequent EIR has been certified or subsequent negative declaration adopted.

(d) A subsequent EIR or subsequent negative declaration shall be given the same notice and public review as required under Section 15087 or Section 15072. A subsequent EIR or negative declaration shall state where the previous document is available and can be reviewed.

Note: Authority cited: Public Resources Code Section 21083; Reference: Section 21166, Public Resources Code; *Bowman v. City of Petaluma* (1986) 185 Cal.App.3d 1065; *Benton v. Board of Supervisors* (1991) 226 Cal.App.3d 1467; and *Fort Mojave Indian Tribe v. California Department of Health Services et al.* (1995) 38 Cal.App.4th 1574.

References

1) Arcata Land Use and Development Guide
2) Arcata General Plan 2020 and Local Coastal Plan, as applicable
3) Arcata Creeks Management Plan
4) Arcata Bayland Monitoring Surveys February-March 2009.
5) Bachman, D. C. 2003. Aleutian Cackling Goose monitoring program winter-spring 2002-03:progress report for the northcoast of California and southern Oregon. Humboldt Bay. National Wildlife Refuge Complex, unpublished report, 34 pp.
6) California Department of Fish and Game Natural Diversity Data Base- Special Animals - February 2006
7) Colwell, M. A. 1994. Shorebirds of Humboldt Bay, California: abundance estimates and conservation implications. W. Birds 25:137-146.
8) Colwell, M. A. – site visit March 2009.
9) Dahl, A. L., Stabins, C. H., Grue, C. E., and Manuwal, D. A. 1999. Management of migratory and wintering habitat for Aleutian Canada Geese. United States Fish and Wildlife Service, Ecological Services, Anchorage Field Office, Alaska, USA.
10) Harris, Stan, Professor Emeritus - Humboldt State University
11) Kovacs, Karen- California Department of Fish and Game Supervising Biologist
12) Long Linda L. & Ralph, C. John, Dynamics Of Habitat Use By Shorebirds In Estuarine And Agricultural Habitats In Northwestern California, The Wilson Bulletin, Article: Pp. 41–52, Volume 113, Issue 1 (March 2001)
13) McDaniel Slough Wetland Enhancement Project, State Clearinghouse # 2003022091 – City of Arcata, December 2006
14) McLaughlin, James and Harradine, Frank, November 1965, *Soils of Western Humboldt County California,* University of California, Davis
15) Nature Serve Explorer DataBase – www.natureserve.org/explorer
16) North American Waterfowl Management Plan - Implementation Framework – 2004
17) North American Waterfowl Management Plan - 2004 Strategic Guidance
18) North American Waterfowl Management Plan, 2004 Update
19) Pacific Coast Joint Venture - Coastal Northern California Components – Strategic Plan Update -2004
20) Thom, Ronald M., Blanton, Susan L., Woodruff, Dana L, Williams, Gregory, D., Borde, Amy, B. Carbon Sinks in Nearshore Marine Vegetated Ecosystems *Pacific Northwest National Laboratory,Marine Sciences Laboratory, 1529 W. Sequim Bay Road, Sequim, WA 98382.*



Boundaries
- Project Boundary
- Arcata City Limits

Recreation
- Trail
- Bird Blind
- Information Kiosk
- Boat Launch

Levee Types
- Flood Levee
- Eco-Levee
- Pond Perimeter Levee

Water Features
- Streams
- Freshwater Marsh
- Brackish Pond

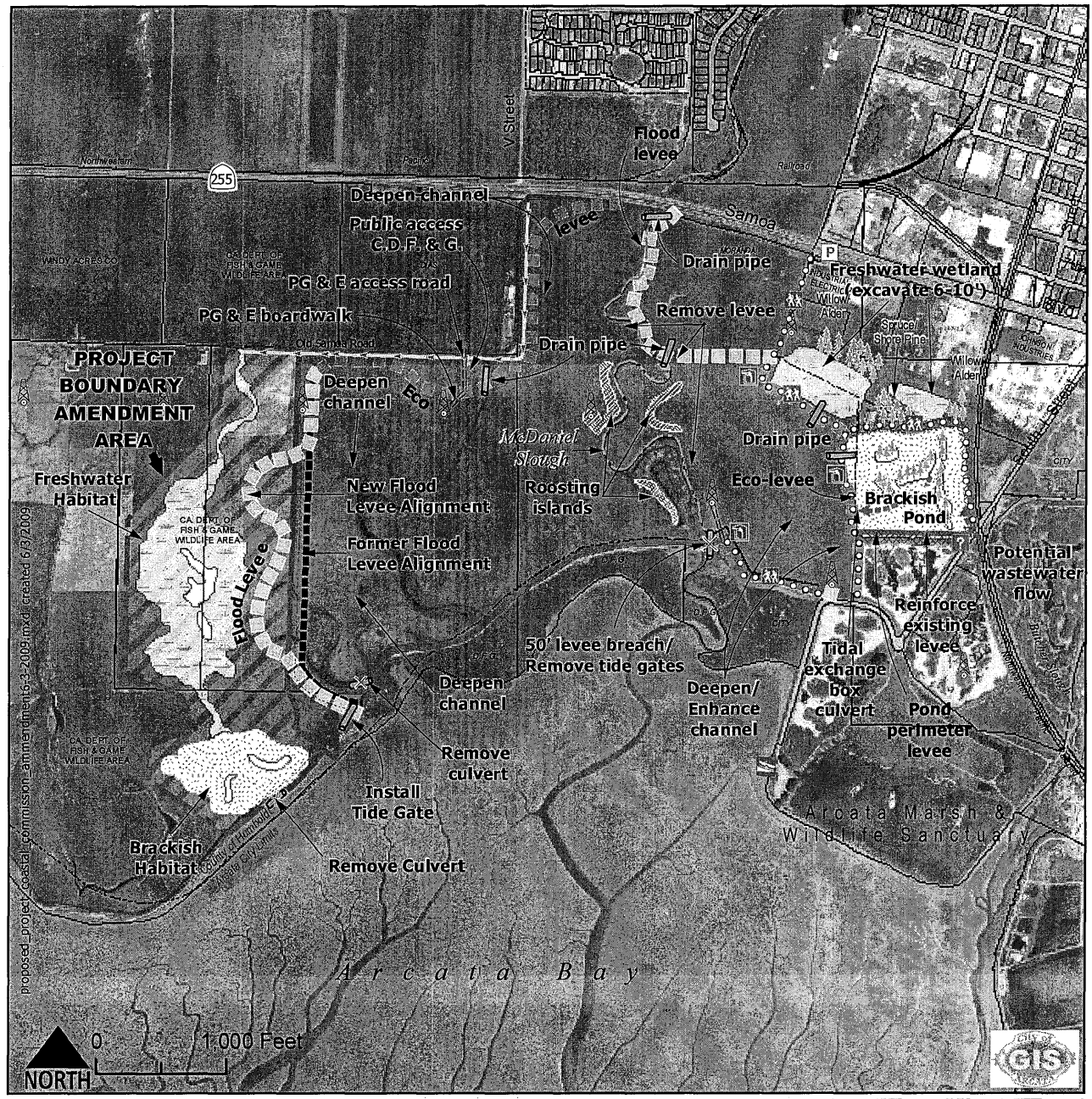
Transportation
- Access Road
- Railroad

Other Features
- Potential wastewater flow
- Surface Water Flow
- Drainage Ditch
- Remove Culvert/Tide gate
- Drainage pipe
- PG & E Tower
- Trees
- Remove Levee
- Roosting island
- Parcel

Source: City of Arcata

Figure 2-1
McDaniel Slough EIR
PROPOSED PROJECT

Figure I -McDaniel Slough Wetland Enhancement Project EIR Supplement



Boundaries
- Project Boundary
- Project Boundary Ammendment Area
- Arcata City Limits

Recreation
- Trail
- Bird Blind
- Information Kiosk
- Boat Launch

Levee Types
- Flood Levee
- Eco-Levee
- Pond Perimeter Levee
- Former Flood Levee Alignment

Water Features
- Streams
- Freshwater Marsh
- Brackish Pond

Transportation
- Access Road
- Railroad

Other Features
- Potential wastewater flow
- Surface Water Flow
- Drainage Ditch
- Remove Culvert/Tide gate
- Drainage pipe
- PG & E Tower
- Trees
- Remove Levee
- Roosting island
- Parcel

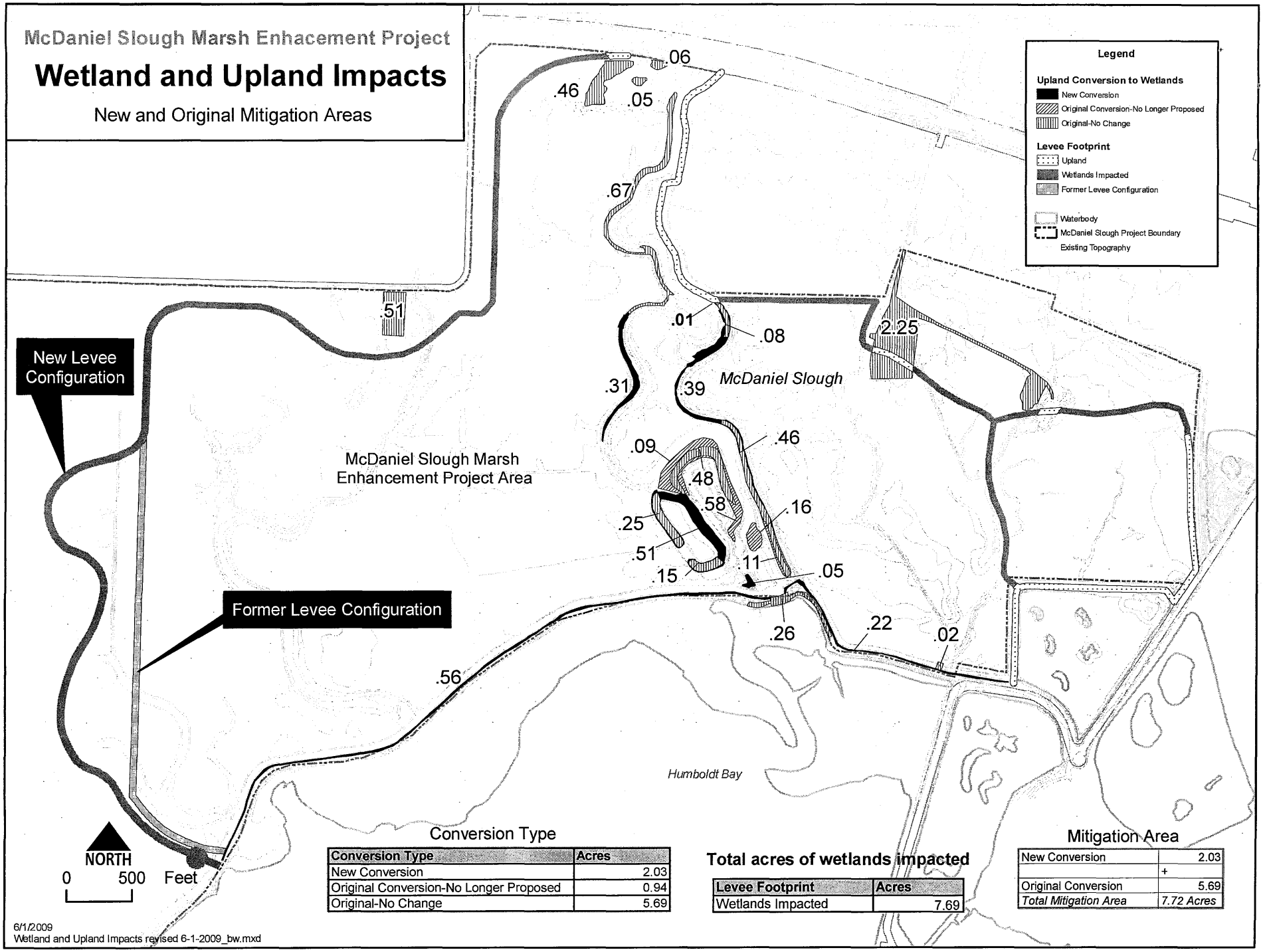
Source: City of Arcata

City of Arcata

McDaniel Slough

McDaniel Slough Project Area Amendment

Figure II - McDaniel Slough Wetland Enhancement Project EIR Supplement



Conversion Type

Conversion Type	Acres
New Conversion	2.03
Original Conversion-No Longer Proposed	0.94
Original-No Change	5.69

Total acres of wetlands impacted

Levee Footprint	Acres
Wetlands Impacted	7.69

Mitigation Area

New Conversion	2.03
	+
Original Conversion	5.69
Total Mitigation Area	*7.72 Acres*

Figure III- McDaniel Slough Wetland Enhancement Project EIR Supplement

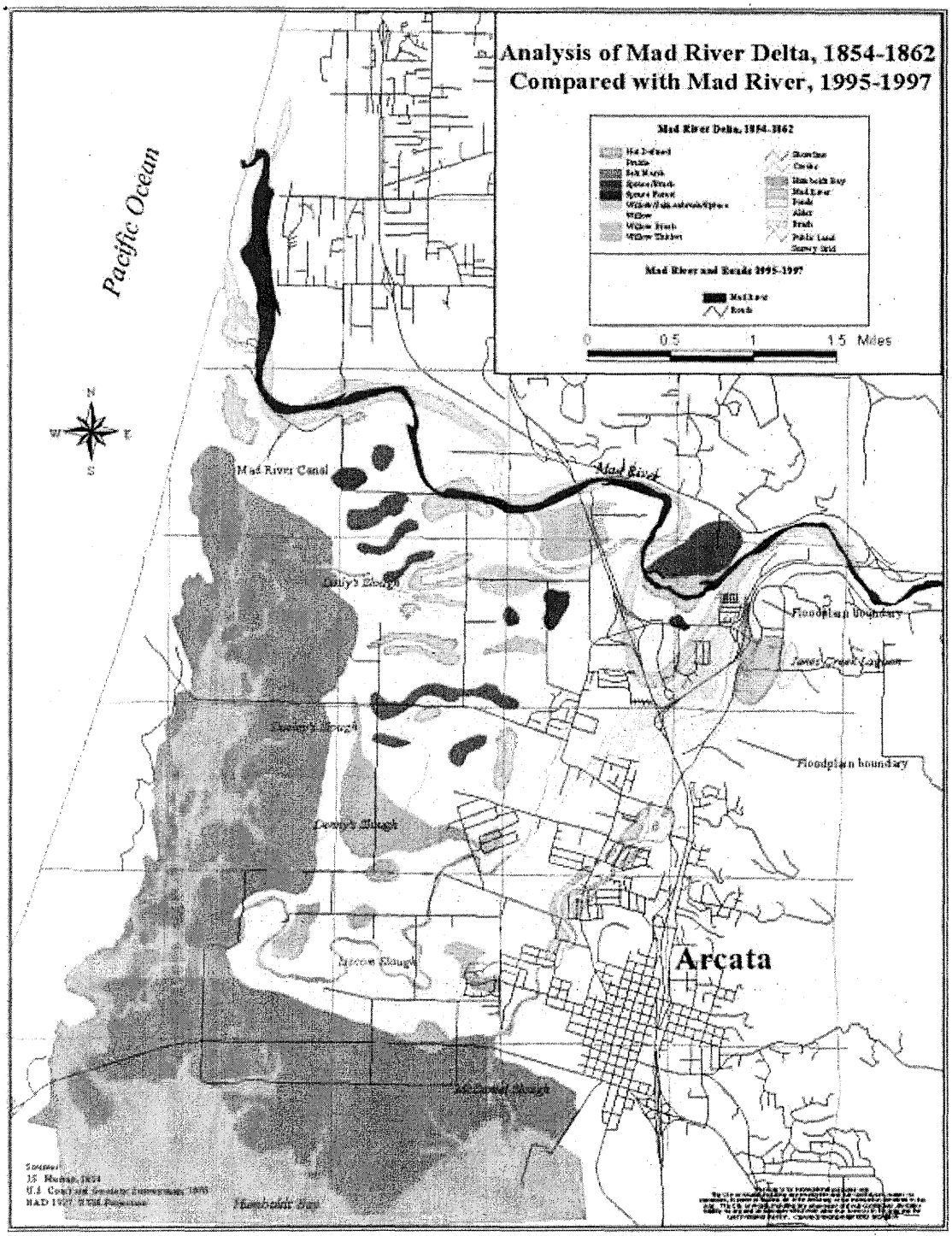
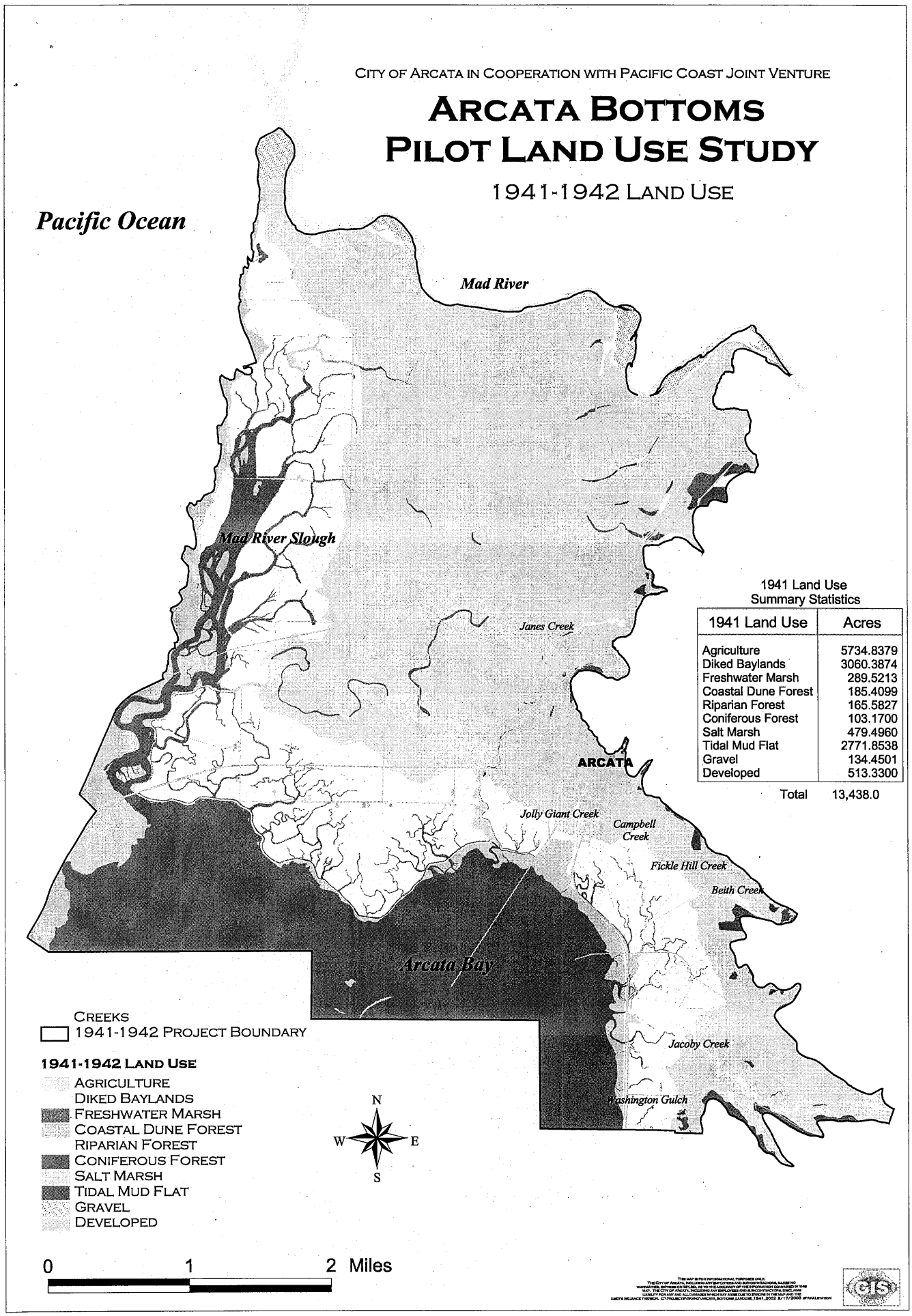


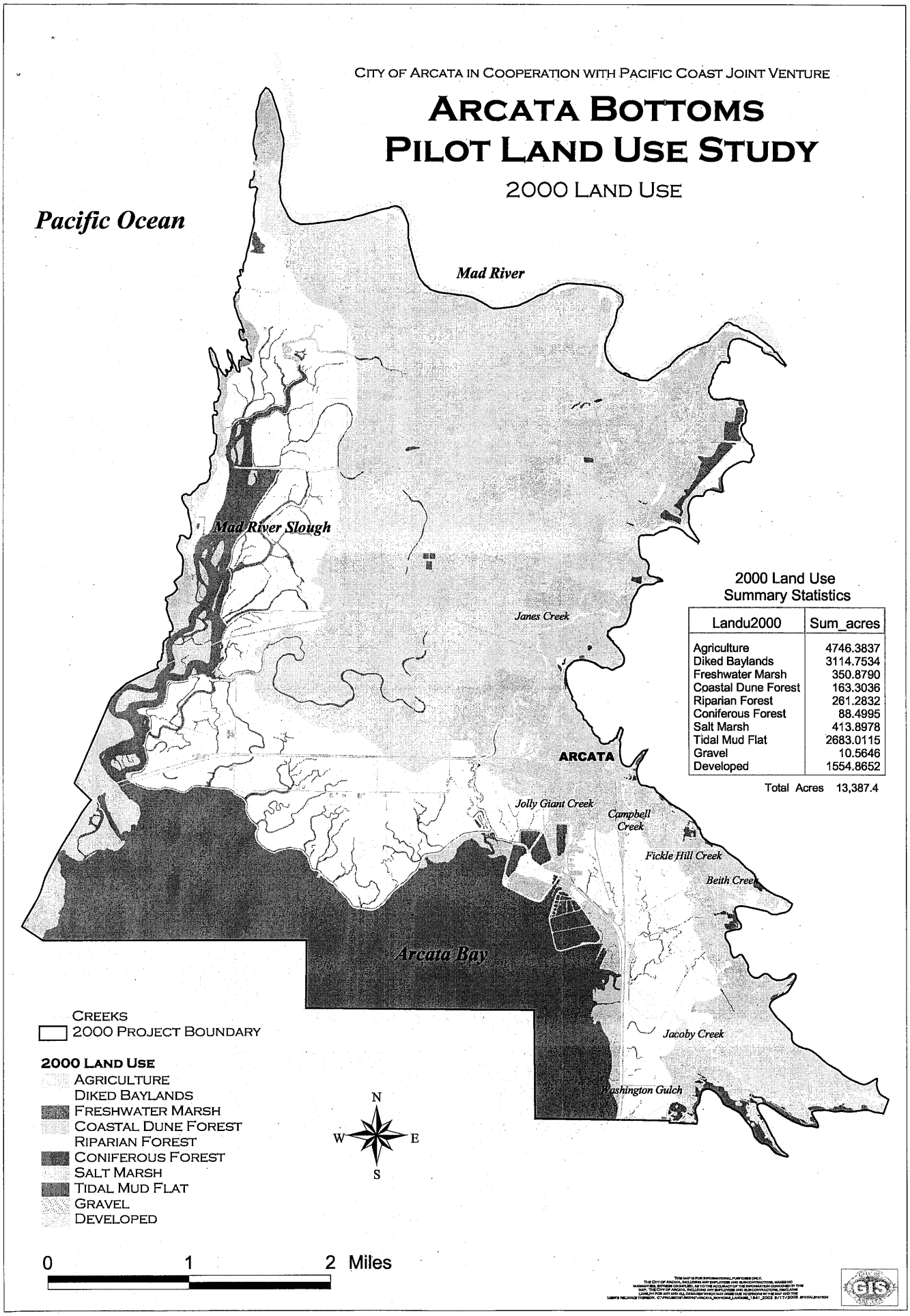
Figure IV – McDaniel Slough Wetland Enhancement Project EIR Supplement



1941 Land Use
Summary Statistics

1941 Land Use	Acres
Agriculture	5734.8379
Diked Baylands	3060.3874
Freshwater Marsh	289.5213
Coastal Dune Forest	185.4099
Riparian Forest	165.5827
Coniferous Forest	103.1700
Salt Marsh	479.4960
Tidal Mud Flat	2771.8538
Gravel	134.4501
Developed	513.3300
Total	13,438.0

Figure VA - McDaniel Slough Wetland Enhancement Project EIR Supplement



2000 Land Use
Summary Statistics

Landu2000	Sum_acres
Agriculture	4746.3837
Diked Baylands	3114.7534
Freshwater Marsh	350.8790
Coastal Dune Forest	163.3036
Riparian Forest	261.2832
Coniferous Forest	88.4995
Salt Marsh	413.8978
Tidal Mud Flat	2683.0115
Gravel	10.5646
Developed	1554.8652

Total Acres 13,387.4

Figure VB - McDaniel Slough Wetland Enhancement Project EIR Supplement