Final Environmental Impact Statement

Southern Flow Corridor Project

DR-1733-OR

Tillamook County, Oregon

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FEMA

Federal Emergency Management Agency
Region X
Department of Homeland Security
130 – 228th Street SW
Bothell, WA 98021

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Final Environmental Impact Statement

Lead Agency: U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region X

Cooperating Agencies:
National Oceanic and Atmospheric Administration (NOAA) Restoration Center, U.S. Fish and Wildlife Service (USFWS), United States Army Corps of Engineers

Title: Southern Flow Corridor Project, Tillamook County, Oregon

Designation: Final Environmental Impact Statement

Location: Tillamook County, Oregon

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Abstract:
The Southern Flow Corridor Project Final Environmental Impact Statement (EIS) evaluates the environmental effects that could occur if activities to reduce flood damage and restore Coastal Coho habitat in the Tillamook Bay estuary are implemented. FEMA received a Public Assistance grant program application from the Port of Tillamook Bay (POTB) for the Southern Flow Corridor project as an alternate project to the repair of its rail line that was damaged by flooding and severe storms in December 2007. Funding for the project is proposed to come from FEMA, NOAA Restoration Center, USFWS, and other state and local partners. The Proposed Action would remove approximately 6.9 miles of levees, modify 2.9 miles of levees, construct 1.5 miles of new setback levees, and restore tidal wetlands on 522 acres. The proposed project area is located west of the City of Tillamook and is intended to provide flood reduction benefits over a broad area in the lower Tillamook Valley. The Proposed Action would include work in floodplains and wetlands. Alternatives include the Hall Slough Alternative, which would provide some flood reduction and habitat restoration benefits in a different location, and the Southern Flow Corridor – Initial Alternative, which would encompass a slightly larger area than the Proposed Action, or the No Action Alternative. The EIS addresses direct, indirect, and cumulative impacts on the physical, natural, and socioeconomic environment of the region resulting from construction and long-term implementation of the Proposed Action and alternatives.

The official comment period on the draft EIS was from May 29, 2015, to July 13, 2015. The Notice of Availability of the Final EIS will be published in the *Federal Register* on or about October 30, 2015. After release of this Final EIS, FEMA will document its decision on the proposed project in a record of decision (ROD) that will be issued no earlier than December 2015.

Responsible Officials for Final EIS:
Kenneth D. Murphy, Regional Administrator, FEMA Region 10
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Table of Contents

Appendices

Figures

Tables

Acronyms and Abbreviations

µm	micrometers
µs	microsiemens
AADT	annual average daily traffic
ACS	American Community Survey
ADCIRC	ADvanced CIRCulation hydraulic model
ADT	average daily traffic
APE	area of potential effect
ATR	automatic traffic recorder
BA	biological assessment
BMP	best management practice
BO	biological opinion
CAA	Clean Air Act
CCMP	Comprehensive Conservation Management Plan
CD	compact disc
CDC	Centers for Disease Control and Prevention
CELCP	Coastal and Estuarine Land Conservation Program
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
cm	centimeter
CMMP	Contaminated Media Management Plan
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
Co-op	Tillamook Creamery Cooperative Association

CSZ	Cascadia Subduction Zone
CTSI	Confederated Tribes of Siletz Indians
cy	cubic yard
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
db	decibel
dBA	A-weighted decibel
dbh	diameter at breast height
DLCD	Department of Land Conservation and Development
DO	dissolved oxygen
DOGAMI	Oregon Department of Geology and Mineral Industries
DPS	distinct population segment
EC	estuary conservation
ECA	estuary conservation aquaculture
ED	estuary development
EDR	Environmental Data Resources
EFH	essential fish habitat
EIS	environmental impact statement
EN	estuary natural
EO	Executive Order
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	flood insurance rate map
FPPA	Farmland Protection Policy Act

FR	Federal Register
ft	feet
GHG	greenhouse gas
GIS	geographic information system
GPS	global positioning system
GWP	global warming potential
HEC-RAS	Hydraulic Engineering Center's River Analysis System
HMGP	Hazard Mitigation Grant Program
IDP	inadvertent discovery plan
IPCC	Intergovernmental Panel on Climate Change
LiDAR	light detection and ranging
LWI	local wetland inventory
m	meter
Ma	mega-annum
MBTA	Migratory Bird Treaty Act of 1918
MeHg	methylmercury
mg/L	milligram per liter
MHHW	mean higher high water
mL	milliliter
mm	millimeter
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
$MTCO_{2e}$	metric tons carbon dioxide equivalent
M_w	moment magnitude
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NEP	National Estuary Program

NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NH_3	ammonia
NHC	Northwest Hydraulic Consultants
NHPA	National Historic Preservation Act
NHS	National Highway System
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
N_2O	nitrous oxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O_3	ozone
OAR	Oregon Administrative Rules
OCCRI	Oregon Climate Change Research Institute
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
ODSL	Oregon Department of State Lands
OEM	Oregon Office of Emergency Management
OHP	Oregon Highway Plan
ORBIC	Oregon Biodiversity Information Center

ORS	Oregon Revised Statutes
OWEB	Oregon Watershed Enhancement Board
PA	Public Assistance program
Pb	lead
PCE	Primary Constituent Element
PFMC	Pacific Fishery Management Council
P.L.	Public Law
$PM_{2.5}$	particulate matter 2.5 μm or less in diameter
PM_{10}	particulate matter 10 μm or less in diameter
PNWR	Portland Northern & Western Railroad
POTB	Port of Tillamook Bay
PROJECTS	Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Services
PSD	Prevention of Significant Deterioration
PW	Project worksheet
ROD	Record of decision
RV	recreational vehicle
SFC	Southern Flow Corridor
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SO_x	sulfur oxide
SOC	species of concern
sq ft	square feet
SWCD	Soil and Water Conservation District
TBHEID	Tillamook Bay Habitat and Estuary Improvement District
TBNEP	Tillamook Bay National Estuary Project
TEP	Tillamook Estuaries Partnership

TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TSP	Transportation System Plan
UGB	urban growth boundary
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGCRP	United States Global Change Research Program
USGS	United States Geological Survey
v/c	volume-to-capacity
VOC	volatile organic compound
WSDOT	Washington State Department of Transportation

Executive Summary

This environmental impact statement (EIS) evaluates the environmental effects that could occur with construction and implementation of the proposed Tillamook Southern Flow Corridor (SFC) project. The SFC project would include floodplain and wetland restoration actions near the confluence of the Wilson and Trask Rivers in the lower Tillamook Valley. Implementation of this project would reduce flooding in the lower Trask, Tillamook, and Wilson river floodplains, including the U.S. Highway 101 (Highway 101) business corridor in Tillamook, Oregon, and restore tidal marsh habitats along Tillamook Bay. **Figure ES-1** shows the project vicinity.

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) proposes to fund the SFC project through FEMA's Public Assistance (PA) grant program. The project proposed by the Port of Tillamook Bay (POTB) and Tillamook County would also receive funding from the National Oceanic and Atmospheric Administration (NOAA) Restoration Center, U.S. Fish and Wildlife Service (USFWS), State of Oregon lottery funds, Oregon Watershed Enhancement Board (OWEB), Tillamook County, and other public and private entities. FEMA is the federal lead agency for the National Environmental Policy Act (NEPA). Cooperating agencies include the NOAA Restoration Center, USFWS, and the U.S. Army Corps of Engineers (USACE). The NOAA Restoration Center and USFWS are the lead agencies for compliance with the Endangered Species Act (ESA).

Flooding occurs frequently in the lower portions of the Wilson, Trask, and Tillamook rivers, typically between October and April. High tides combine with storm surges, heavy rainfall, and snowmelt, causing coastal and inland flooding. The storms that produce coastal flooding often bring heavy rain, which causes high river flows at estuaries and the mouths of rivers. These flows are held back by high ocean levels, creating flood hazards in the Tillamook Valley.

The County suffers significant losses because of disruptions to Highway 101, the major north-south arterial along the Pacific Coast, from flooding. Losses in the past have been primarily economic, but the potential for loss of life exists if the main arterial across the valley is closed due to flooding. The lower portions of the rivers overflow their banks frequently because the channel gradients are low in the delta and estuary areas. In addition, channel capacity is inadequate to handle heavy flows during severe rainstorms, particularly when combined with high tides. Flood losses in Tillamook County exceeded $60 million from 1996 through 2000 and included damages to homes, farmland, businesses, and infrastructure (Tillamook County 2014a). Additional flood losses have been incurred by the Tillamook community since 2000. In response to these frequent flood events, POTB, Tillamook County, the City of Tillamook, several state and federal agencies, non-profit organizations, and local business interests have been working together to identify solutions to Tillamook Valley's ongoing flood problem.

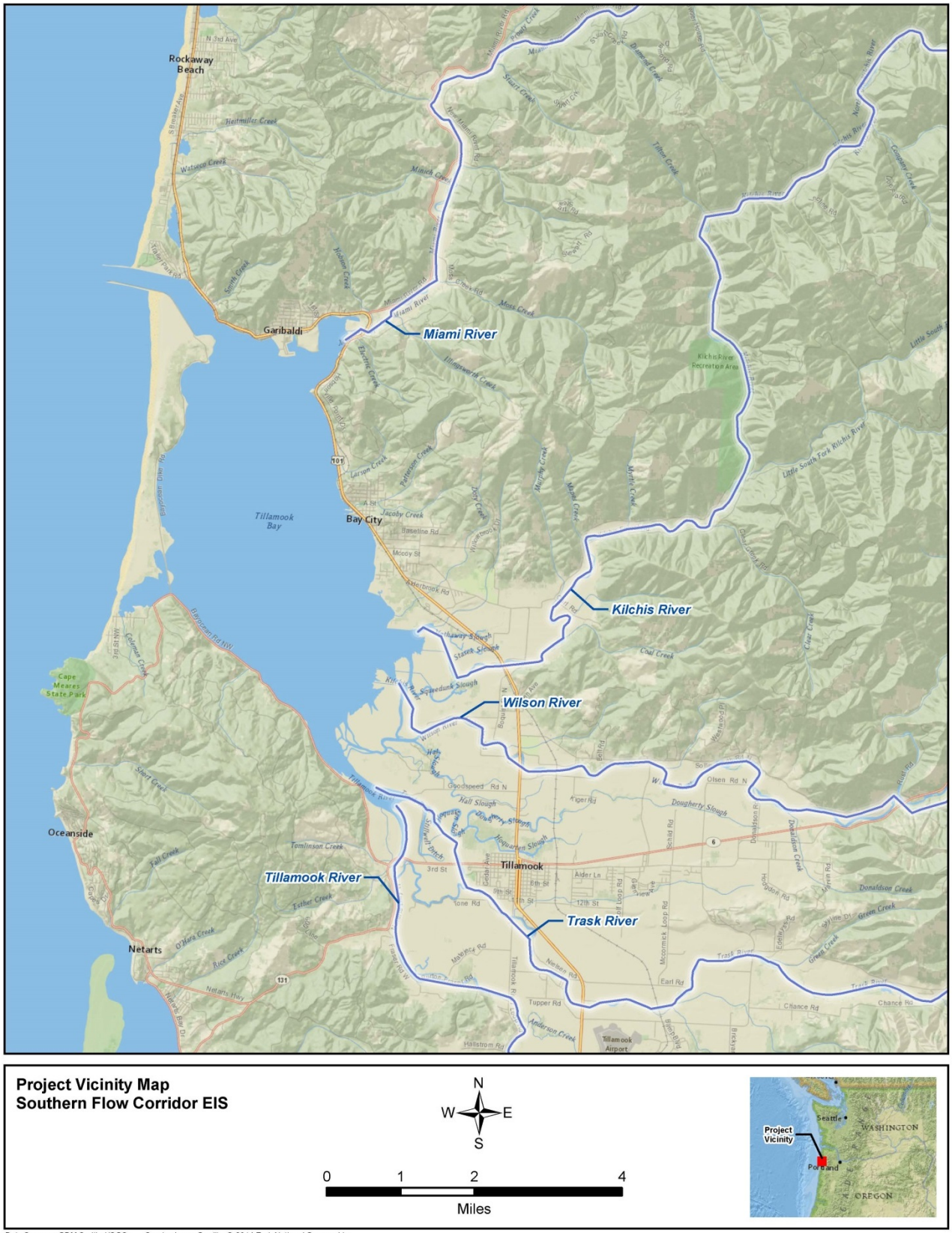

Figure ES-1. Project Vicinity

Without implementation of the SFC project, future unmitigated flooding in the Tillamook Valley would continue to contribute to potential future life safety risks and physical and economic damages to property and businesses in the floodplains. Continued degradation of important fish and wildlife habitats in the estuary through blockages to fish passage, historical losses of aquatic and wetland habitats, and altered sediment erosion and deposition regimes may hamper recovery plans for currently listed species that use the study area and lead to listing of additional species under the ESA.

The objectives for this action are to reduce flood damage in the lower Wilson River floodplain, including portions of Tillamook, Oregon, near the Highway 101 business corridor, and to re-establish a properly functioning and self-sustaining estuarine tidal marsh ecosystem that will provide critical rearing habitat for salmonids and other native fish and wildlife species in the Tillamook Bay estuary.

ES.1 Public Involvement

Public involvement on this project has been ongoing since 2000 when USACE conducted public scoping meetings for a proposed EIS on flood damage reduction and ecosystem restoration alternatives in the Tillamook Valley. The USACE EIS process was never completed, but early public involvement was focused on many of the same areas and concerns as the current studies. Prior public involvement activities also include the extensive outreach conducted as a part of the Oregon Solutions Project initiated in 2007.

A public scoping process as required by 40 Code of Federal Regulations (CFR) 1501.7 was completed for the SFC project. FEMA published a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on May 6, 2014. The NOI included a description of the project purpose and need and the alternatives and invited the public to attend a public meeting and submit comments on the project. The 30-day scoping period lasted from May 14, 2014 to June 13, 2014. Appendix B contains a copy of the scoping report, including comments received. The scoping report is also available on the project website at http://southernfloweis.org.

FEMA published a Notice of Availability (NOA) of the Draft EIS to provide the public an opportunity to review and comment on the Draft EIS. The public comment period extended from May 29, 2015 to July 13, 2015. A public open house was held on June 17, 2015, to solicit comments from the community about the findings presented in the Draft EIS.

Opportunities to participate in the review process included attendance at the open house and review of the materials online or at several locations where hard copies were made available. Comments could be made verbally at the public meeting where verbal testimony was captured by a court reporter, or they could have been submitted in a written format. Comments were collected at the meeting and by mail, email, and fax. All comments received during the 45-day public comment period, along with responses thereto, have been incorporated into the Final EIS. Responses to comments are published as part of the Final EIS in Appendix L.

The Final EIS will be distributed to agencies, non-governmental entities, individuals, and organizations for review. A final decision on the Proposed Action will not be made until at least 30 days after the Final EIS is made available for review; that is, not before November 30, 2015. The final decision will be documented in a record of decision (ROD).

Each cooperating agency, including NOAA, USFWS, and USACE, will independently review the Final EIS and issue its own NEPA decision document addressing the decision each agency would need to make with respect to the Proposed Action.

ES.2 Alternatives Considered

The project alternatives evaluated in this EIS are described in Section 3 of the EIS and include the No Action Alternative, the Southern Flow Corridor – Landowner Preferred Alternative (Proposed Action), Hall Slough Alternative, and the Southern Flow Corridor – Initial Alternative. The three action alternatives are analyzed at a project level, and the potential direct, indirect, and cumulative impacts are presented for each alternative. **Figure ES-2** shows features of the Proposed Action.

The Southern Flow Corridor – Landowner Preferred Alternative is referred to as Alternative 1 or the Proposed Action. It was designed to remove manmade impediments to flood flows to the maximum extent possible in the lower Wilson and Trask rivers floodplain for both flood hazard mitigation and for habitat restoration. The project would accomplish this by removing existing levees and fills along the edges of the sloughs and rivers that border the project area. New setback levees would be required to protect adjacent private lands. Areas outside the setback levees would be restored to tidal wetlands.

Alternative 2, the Hall Slough Alternative, would reconnect the upper end of Hall Slough to the Wilson River in order to increase the capacity of Hall Slough to carry some floodwaters out to Tillamook Bay. This alternative was designed to focus on the area near where the Wilson River overtops first during a flood event, frequently inundating Highway 101. Levees along Hall Slough would be set back or modified, and a portion of the channel would be widened and deepened.

Alternative 3, the Southern Flow Corridor – Initial Alternative, shares a number of characteristics in common with the Proposed Action although it features somewhat different levee, floodgate, and drainage network configurations. This alternative would also function in a similar fashion to the Proposed Action in that it would also remove manmade impediments to flood flows in the lower Wilson River floodplain and restore tidal wetlands and channels.

ES.3 Scope of EIS

Selection of topics to be addressed in the EIS was based on concerns raised during public scoping (see Section 1.5 of the EIS) and on regulatory and FEMA policy requirements. These issues involve resources that could be beneficially or adversely affected by the action alternatives. As described in this EIS, the action alternatives are generally expected to have some adverse construction-related, short-term, and/or localized effects, but the long-term effects are expected to be beneficial for most resource areas evaluated.

Resource topics evaluated include the following:

- Construction Impacts
    a. Noise
    b. Traffic

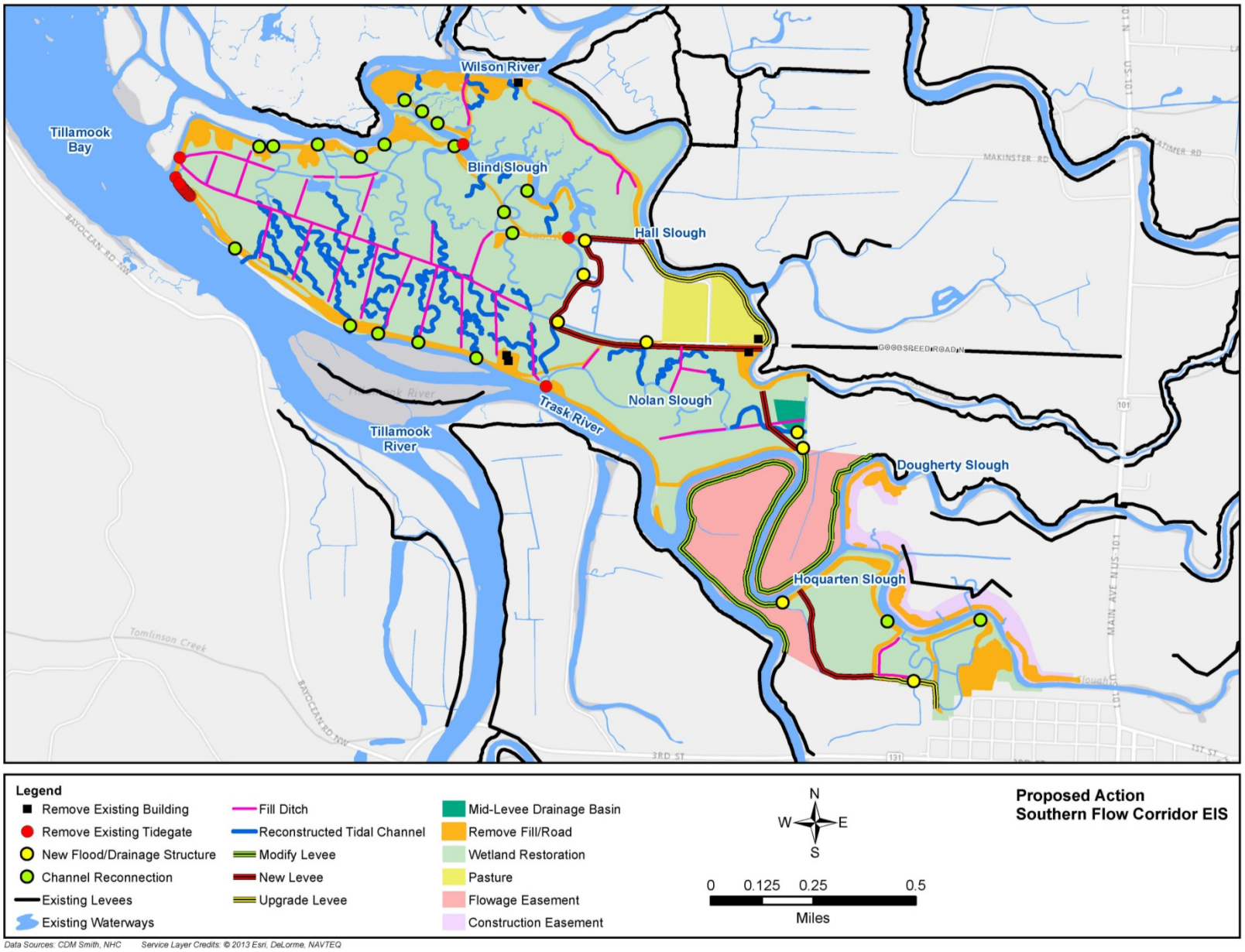

Figure ES-2. Proposed Action

- Water Resources
    a. Floodplains
    b. Wetlands
    c. Hydrology
    d. Water Quality
    e. Groundwater Resources
- Biological Resources
    a. Vegetation
    b. Fish and Wildlife
    c. Threatened and Endangered Species
- Physical Resources
    a. Geology and Soils
    b. Coastal Resources
    c. Air Quality
    d. Climate Change
    e. Hazardous Materials
    f. Visual Quality and Aesthetics
- Cultural Resources
- Socioeconomics
    a. Regional Economics
    b. Environmental Justice
    c. Public Health and Safety
    d. Recreation

The NEPA review of the alternatives and the final decision must be conducted within the framework of numerous laws, regulations, and executive orders. Some of these authorities pertain directly to FEMA grant funding authorities. Others establish regulatory compliance standards for environmental resources or provide guidance for management of environmental resources (e.g., ESA for the protection of threatened and endangered species). Construction and implementation of the Proposed Action could have effects on cultural resources, water resources, fish and wildlife and their habitats, or on the agricultural economy of the Tillamook area. Applicable regulations that guide the evaluation for each of these resource categories are described in the appropriate subsections of Section 4 and in Appendix C.

ES.4 Summary of Potential Effects

Table ES-1 summarizes the conclusions of the EIS regarding the environmental effects of the No Action Alternative and each action alternative. Proposed mitigation measures are listed in Section 6 of the EIS.

The overall effects of the action alternatives would be beneficial. The Proposed Action would restore approximately 522 acres of tidal wetlands and associated fish and wildlife habitat. The Proposed Action would have major long-term beneficial effects on wildlife and threatened and

endangered species, including the threatened Coastal coho salmon. The Proposed Action would reduce flooding during small flood events as well as the 100-year flood.

The Hall Slough Alternative would restore up to 90 acres of riparian flow-through and tidal wetlands and associated vegetation but would not be as beneficial to wildlife and threatened and endangered species as the Proposed Action. The Hall Slough Alternative would reduce damages related to small annual floods but would not provide flood hazard reduction for larger floods.

The SFC - Initial Alternative (Alternative 3) would restore 568 acres of tidal wetland and associated fish and wildlife habitat and would have similar benefits and impacts as the Proposed Action. The flood-reduction benefits of the Initial Alternative would not be as great as the Proposed Action.

The Proposed Action would have unavoidable impacts that would remain despite mitigation. Construction activities in the southeastern portion of the project area would be adjacent to a sensitive receptor, the Tillamook Regional Medical Center, and would result in adverse noise impacts.

Under the Proposed Action, there would be a conversion of freshwater wetlands to tidal wetlands. There would be short-term, construction-related impacts due to the removal of vegetation, including native vegetation associated with the existing freshwater wetlands and riparian vegetation along channels where levees would be removed or modified. Over the long term, there would be a net increase in wetland functions and acres.

Because of the amount of fill that would be distributed on the floodplain under the Proposed Action, there is a major potential for erosion to create adverse impacts on water quality through increased turbidity. Turbidity could remain elevated during a transition period of several years while the existing vegetation transitions to emergent tidal marsh communities. Best management practices and careful construction sequencing would be used to reduce this effect where possible.

Although extensive mitigation measures would be implemented to protect wildlife, some wildlife would inevitably be harmed during construction. Some individuals may be displaced by construction activity, and noise and habitat for terrestrial and freshwater aquatic species would be reduced following construction. Removal of fish from the work zone, and potentially fish handling, which can result in inadvertent mortality, could occur during construction. The threatened Oregon Coastal coho salmon could be adversely affected through the mechanisms that would affect fish during construction. Nesting habitat for the threatened Marbled murrelet could be adversely affected by the loss of large diameter Sitka spruce along levees in the project area; although, that habitat impact would be offset by improvement in foraging habitat.

Farmland of statewide importance soils would be converted to tidal wetlands under the action alternatives although this is considered an indirect conversion because the land would not be developed.

During construction, visual contrast would be unavoidably increased as levees and their associated vegetation is removed. This contrast would be visible from few viewpoints and would decrease over time as tidal wetlands become vegetated and blend with adjacent tidal habitats.

Many potential effects would not be significant with the implementation of best management practices (BMPs) or mitigation measures. The proposed BMPs and mitigation measures are listed in Section 6 of the EIS. Most of the mitigation measures would apply to all of the alternatives. Because the Hall Slough Alternative would include dredging, additional mitigation measures would be required to reduce the adverse impacts of dredging Hall Slough.

Table ES-1. Summary of Potential Effects

Resource Category	No Action Alternative	Proposed Action Alternative 1	Hall Slough Alternative Alternative 2	SFC – Initial Alternative Alternative 3
Construction Impacts				
Noise	No effect	Moderate, local, adverse impact from short-term, intermittent noise during construction at one sensitive receptor; impacts would be significant and unavoidable at the sensitive receptor. Transition-period and long-term impacts would be minor, local, adverse, and less than significant.	Moderate, local, adverse impact from short-term, intermittent noise during construction would be less than significant. Minor, local, adverse impact from maintenance dredging would be less than significant. Transition-period and long-term impacts would be minor, local, adverse, and less than significant.	Moderate, local, adverse impact from short-term, intermittent noise during construction at one sensitive receptor; impacts would be significant and unavoidable at the sensitive receptor. Transition-period and long-term impacts would be minor, local, adverse, and less than significant.
Traffic	No effect	Minor, local, adverse impacts from temporary increases in construction-related traffic on Highway 101, Goodspeed Road, and OR 131 would be less than significant. No transition period or long-term effects.	Minor, local, adverse impacts from temporary increases in construction-related traffic on Highway 101 and Wilson River Loop would be less than significant. No transition period or long-term effects.	Minor, local, adverse impacts from temporary increases in construction-related traffic on Highway 101, Goodspeed Road, and OR 131 would be less than significant. No transition period or long-term effects.
Water Resources				
Floodplains	Major local and moderate regional, adverse short- and long-term impacts on floodplain functions would be significant.	Moderate, local, adverse construction-related and transition-period impacts would be less than significant. Moderate, regional, beneficial long-term effect on flood elevations. Major, local, beneficial long-term effect on floodplain functions.	Moderate, local, adverse construction-related and transition-period impacts would be less than significant. Minor, local, beneficial long-term effect on flood elevations. Minor, regional, beneficial long-term effect on floodplain functions.	Moderate, local, adverse construction-related and transition-period impacts would be less than significant. Moderate, regional, beneficial long-term effect on flood elevations. Major, local, beneficial long-term effect on floodplain functions.

Resource Category	No Action Alternative	Proposed Action Alternative 1	Hall Slough Alternative Alternative 2	SFC – Initial Alternative Alternative 3
Wetlands	Moderate, local, short-term beneficial effects on wetlands. Major regional, long-term adverse impacts from continued degraded functional conditions would be significant.	Moderate, local, construction-related adverse impacts would be less than significant. Major, local, transition period adverse impacts on freshwater wetlands would not be significant. Major, local and regional, long-term beneficial effects on wetland function and area with the restoration of 522 acres of tidal wetland.	Minor, local, construction-related and transition period adverse impacts would be less than significant. Moderate, local, long-term beneficial effects on wetland function and area with the restoration of 90 acres of riparian flow-through and tidal wetlands between the new setback levees along the Hall Slough channel.	Moderate, local, construction-related adverse impacts would be less than significant. Major, local, transition period adverse impacts on freshwater wetlands would not be significant. Major, local and regional, long-term beneficial effects on wetland function and area with the restoration of 568 acres of tidal wetland.
Hydrology	Major, local, short- and long-term adverse impacts on hydrology from continued flooding would be significant.	Minor, local, adverse construction-related effects on hydrology would be less than significant. Major, regional, short- and long-term beneficial effects on hydrology.	Moderate, local, adverse construction-related effects on hydrology due to dredging would be significant. Minor, local adverse transition-period impacts would be less than significant. Minor, regional long-term beneficial effects on hydrology.	Minor, local, adverse construction-related effects on hydrology would be less than significant. Major, regional, short- and long-term beneficial effects on hydrology.
Water Quality	Minor, local, short- and long-term beneficial effects from the passive conversion from agricultural use to freshwater wetlands. Moderate, local, long-term adverse impact from the contaminated materials on the Sadri property would be significant.	Moderate, local, adverse construction-related and transition-period impacts due to turbidity in surface waters could potentially occur; however, with implementation of BMPs and mitigation measures, most impacts would be minor and less than significant. Some unavoidable, adverse, short-term impacts from turbidity and sedimentation would remain during the transition period. Moderate, regional, long-term beneficial effects on water quality.	Moderate, local, adverse impacts due to turbidity in surface waters during construction and periodic maintenance dredging would be less than significant. Moderate, local, transition period and long-term beneficial effects on water quality due to increased floodplain connectivity, riparian shade, and filtration by wetland vegetation. Moderate, local, long-term adverse impact from the contaminated materials on the Sadri property would be significant.	Moderate, local, adverse construction-related and transition-period impacts due to turbidity in surface waters could potentially occur; however with implementation of BMPs and mitigation measures, most impacts would be minor and less than significant. Some unavoidable, adverse, short-term impacts from turbidity and sedimentation would remain during the transition period. Moderate, regional, long-term beneficial effects on water quality.

Resource Category	No Action Alternative	Proposed Action Alternative 1	Hall Slough Alternative Alternative 2	SFC – Initial Alternative Alternative 3
Groundwater Resources	Minor, local, short- and long-term beneficial effects.	Negligible, local, adverse construction-related impacts would be less than significant. Minor, local, long-term groundwater quality benefits due to discontinued use of two septic systems in project area.	Negligible, local, adverse construction-related impacts would be less than significant. Minor, local, short- and long-term beneficial effects.	Negligible, local, adverse construction-related impacts would be less than significant. Minor, local, long-term groundwater quality benefits due to discontinued use of one septic system in project area.
Biological Resources				
Vegetation	No construction impacts. Minor, local, long-term, beneficial effects from the transition to freshwater wetlands.	Moderate, local, adverse construction-related and short-term impacts from the removal of Sitka spruce trees and loss of riparian vegetation. This impact would not be considered significant because the alternative would transition to the native, historical vegetation condition. Major, local and regional, long-term beneficial effects from the restoration of 522 acres of tidal marsh vegetation.	Minor, local, adverse, construction-related impacts from the removal of riparian vegetation along Hall Slough. Moderate, local, transition period and long-term beneficial effects from the restoration of up to 90 acres of riparian and tidal wetlands and conversion of pasture to freshwater wetlands on County land in the SFC area.	Moderate, local, adverse construction-related and short-term impacts from the removal of Sitka spruce trees and loss of riparian vegetation. This impact would not be considered significant because the alternative would transition to the native, historical vegetation condition. Major, local and regional, long-term beneficial effects from the restoration of 568 acres of tidal marsh vegetation.

Resource Category	No Action Alternative	Proposed Action Alternative 1	Hall Slough Alternative Alternative 2	SFC – Initial Alternative Alternative 3
Fish and Wildlife	Moderate, regional, long-term adverse impacts related to continued reductions in floodplain connectivity and potential rearing habitat for anadromous and migratory fish species would be significant. Continued sediment accumulation within channels located inside the diked portion of the study area.	Moderate, local, adverse impacts to terrestrial and aquatic wildlife during construction and in the short term would not be significant with use of BMPs and other mitigation measures. Major, local and regional, long-term, beneficial effects on fish and wildlife would be expected, including beneficial effects from: • Expansion of floodplain connectivity • Increased aquatic cover and habitat complexity for juvenile salmonids, forage fish, juvenile marine fish, and bay residents • Increased use by shorebirds and wading birds and foraging opportunities for migratory and wintering waterfowl • Increased productivity in the Tillamook Bay ecosystem as a whole with the expansion in estuarine habitat, leading to increased fish, bird, and invertebrate abundance and increases in habitat and foraging opportunities	Moderate, local, adverse impacts on fish and wildlife during construction as vegetation becomes re-established would be less than significant. Moderate, local, beneficial effects during the transition period. Moderate, local and regional, long-term beneficial effects to fish and wildlife habitat from the restoration of riverine flow-through wetlands along the banks of Hall Slough. Periodic, minor, local, short-term, adverse impacts from maintenance dredging would not be significant with the use of BMPs.	Moderate, local, adverse impacts to terrestrial and aquatic wildlife during construction and in the short term would not be significant with use of BMPs and other mitigation measures. Major, local and regional, long-term, beneficial effects on fish and wildlife would be expected, including beneficial effects from: • Expansion of floodplain connectivity • Increased aquatic cover and habitat complexity for juvenile salmonids, forage fish, juvenile marine fish, and bay residents • Increased use by shorebirds and wading birds and foraging opportunities for migratory and wintering waterfowl • Increased productivity in the Tillamook Bay ecosystem as a whole with the expansion in estuarine habitat, leading to increased fish, bird, and invertebrate abundance and increases in habitat and foraging opportunities

Resource Category	No Action Alternative	Proposed Action Alternative 1	Hall Slough Alternative Alternative 2	SFC – Initial Alternative Alternative 3
Threatened and Endangered Species and Critical Habitat	Moderate, regional, long-term adverse impacts related to the continued degradation of designated critical habitat for coho salmon would be significant. Potential nesting habitat for Marbled murrelet would remain, and trees with suitable structure could improve with age.	Moderate, local, adverse impacts on coho salmon during construction not significant with use of BMPs and mitigation measures. Major, regional, long-term, beneficial effects on coho salmon and critical habitat for coho, including an increase in aquatic habitats, productivity, foraging, and refuge. Moderate adverse impact related to the loss of potential Marbled murrelet nesting trees in both the short and long term; however, a moderate, regional, long-term, beneficial effect from an increase in foraging habitat would result in a net beneficial effect on the species.	Moderate, local, adverse impacts on coho salmon during construction would not be significant with the use of BMPs and mitigation measures. Minor long-term beneficial effects on coho salmon and critical habitat for coho because additional rearing habitat would be created. Periodic, minor, local, short-term, adverse impacts from maintenance dredging would not be significant with the use of BMPs. No effect on Marbled murrelet because there would be no loss of potential nesting trees.	Moderate, local, adverse impacts on coho salmon during construction not significant with use of BMPs and mitigation measures. Major, regional, long-term beneficial effects on coho salmon and critical habitat for coho, including an increase in aquatic habitats, productivity, foraging, and refuge. Moderate adverse impact related to the loss of potential Marbled murrelet nesting trees in both the short and long term; however, a moderate, regional, long-term, beneficial effect from an increase in foraging habitat would result in a net beneficial effect on the species.
Physical Resources				
Geology and Soils – Seismic	No effect	No change from existing conditions.	No change from existing conditions.	No change from existing conditions.
Geology and Soils – Fluvial Geomorphology	Moderate, regional, adverse, long-term impacts on fluvial geomorphology from continued disruption of natural fluvial processes would be less than significant.	Major, local, adverse impacts during construction and in the short term from soil erosion could potentially occur; however, with implementation of BMPs and mitigation measures, impacts would be moderate and less than significant. Minor, local, long-term adverse impacts would be less than significant, with some beneficial aspects of more natural channel formation.	Major, local, adverse impacts during construction and in the short term from soil erosion could potentially occur; however, with implementation of BMPs and mitigation measures, impacts would be moderate and less than significant. Minor, local, long-term adverse impacts would be less than significant, with some beneficial aspects of more natural channel formation.	Major, local, adverse impacts during construction and in the short term from soil erosion could potentially occur; however, with implementation of BMPs and mitigation measures, impacts would be moderate and less than significant. Minor, local, long-term adverse impacts would be less than significant, with some beneficial aspects of more natural channel formation.

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Geology and Soils – Farmland Protection	Minor, local, adverse long-term impact from indirect conversion of 285 acres of farmland soils (152 acres currently farmed) to freshwater wetland would be less than significant.	Minor, local, adverse long-term impact from the indirect conversion of an additional 69 acres of farmland soils of statewide importance (68 acres currently farmed) to wetlands would be less than significant.	Minor, local, adverse long-term impact from the indirect conversion of an additional 86 acres of farmland of statewide importance would be less than significant (92 acres of currently farmed land would be converted).	Minor, local, adverse long-term impact from the indirect conversion of an additional 102 acres (102 acres currently farmed) of farmland of statewide importance to wetlands would be less than significant.
Coastal Resources	No adverse effects related to compliance with the Coastal Zone Management Act (CZMA). Moderate, regional, long-term significant impact from not meeting the goals of the County Comprehensive Plan or the state planning goals.	No adverse effects related to compliance with CZMA. Major, regional, long-term beneficial effects from restoration of tidal marsh ecosystem.	No adverse effects related to compliance with CZMA. Moderate, regional, long-term beneficial effects from restoration of riparian and tidal wetlands along Hall Slough.	No adverse effects related to compliance with CZMA. Major, regional, long-term beneficial effects from restoration of tidal marsh ecosystem.
Air Quality	No effect	Minor, local, adverse impacts during construction would be less than significant. No transition period or long-term impacts.	Minor, local, adverse impacts during construction would be less than significant. No transition period or long-term impacts.	Minor, local, adverse impacts during construction would be less than significant. No transition period or long-term impacts.

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Climate Change	No impacts on climate change. Minor, local, adverse short-term impacts from climate change would be less than significant. Potential moderate to major, regional, long-term adverse effects from climate change could be significant.	Minor, regional, adverse impact of project construction on climate change would be less than significant. Moderate, regional, transition period and long-term beneficial effects on climate change from the restored floodplain, which may help the community to adapt to sea level rise that would occur from climate change. Minor, regional, short- and long-term beneficial effects against impacts from climate change.	Minor, regional, adverse impact of project construction on climate change would be less than significant. Moderate, regional, transition period and long-term beneficial effects on climate change from restored Hall Slough channel, which may help the community to adapt to sea level rise that would occur from climate change. Minor, regional, short- and long-term beneficial effects against impacts from climate change.	Minor, regional, adverse impact of project construction on climate change would be less than significant. Moderate, regional, transition period and long-term beneficial effects on climate change from the restored floodplain, which may help the community to adapt to sea level rise that would occur from climate change. Minor, regional, short- and long-term beneficial effects against impacts from climate change.
Hazardous Materials	Moderate, local, long-term adverse impact from the potential for release of contaminants from the Sadri property would be significant.	Moderate, local, adverse impacts during construction at the Sadri property could potentially occur; however, impacts would be minor and less than significant after implementation of BMPs and mitigation measures. Minor, local, transition period and long-term adverse impacts from the potential for release of hazardous materials from heavy equipment used for maintenance activities would be less than significant.	Minor, local, adverse impacts during construction, transition period, and long term from the potential for release of hazardous materials from heavy equipment used for construction and maintenance activities would be less than significant. Moderate, local, long-term adverse impact from the potential for release of contaminants from the Sadri property would be significant.	Moderate, local, adverse impacts during construction at the Sadri property could potentially occur; however, impacts would be minor and less than significant after implementation of BMPs and mitigation measures. Minor, local, transition period and long-term adverse impacts from the potential for release of hazardous materials from heavy equipment used for maintenance activities would be less than significant.
Visual Quality and Aesthetics	Generally no effect. Major flooding has potential to result in major, local, adverse short-term impacts that would be significant.	Moderate to major, local, adverse construction and transition-period impacts would be significant. Minor to moderate, local, adverse long-term impact related to tree removal would be less than significant.	Moderate to major, local, adverse construction and transition-period impacts would be significant. Minor to moderate, local, adverse long-term impact related to tree removal would be less than significant.	Moderate to major, local, adverse construction and transition-period impacts would be significant. Minor to moderate, local, adverse long-term impact related to tree removal would be less than significant.

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Cultural Resources				
Cultural Resources	No effect	Minor, local, adverse impacts due to a low potential to encounter cultural resources during construction; with implementation of mitigation measures, impacts would be less than significant. No transition period or long-term impacts.	Minor, local, adverse impacts due to a low potential to encounter cultural resources during construction; with implementation of mitigation measures, impacts would be less than significant. No transition period or long-term impacts.	Minor, local, adverse impacts due to a low potential to encounter cultural resources during construction; with implementation of mitigation measures, impacts would be less than significant. No transition period or long-term impacts.
Socioeconomics				
Economics	Generally no effect; however, flooding has potential for major, regional, adverse long-term economic impacts that would be significant.	Minor to moderate, regional, temporary beneficial effects to the economy during construction. Moderate to major, regional, transition-period and long-term beneficial effects from the reduced potential for flooding, including reduced flood impacts on adjacent farmlands. Major, regional, long-term benefit to coastal fisheries. Negligible, regional, long-term adverse impact related to conversion of farmland would be less than significant.	Minor to moderate, regional, temporary beneficial effects to the economy during construction. Minor, regional, transition-period and long-term beneficial effects from the reduced potential for flooding. Negligible, regional, long-term adverse impact related to conversion of farmland would be less than significant.	Minor to moderate regional temporary beneficial effects to the economy during construction. Moderate to major regional, transition-period and long-term beneficial effects from the reduced potential for flooding, including reduced flood impacts on adjacent farmlands. Major regional long-term benefit to coastal fisheries. Negligible regional long-term adverse impact related to conversion of farmland would be less than significant.
Environmental Justice	Generally no effect; however, flooding has potential for major, local, adverse impacts.	No adverse impacts during construction. Major, regional, long-term beneficial effects related to reduced flooding.	No adverse impacts during construction. Moderate, regional, long-term beneficial effects related to reduced flooding.	No adverse impacts during construction. Major, regional, long-term beneficial effects related to reduced flooding.

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Public Health and Safety	Major, local, adverse impacts related to continued potential for disruption of public services and increased demand for public safety services during floods would be significant.	Major, local, adverse construction-period impacts on safety could occur; however, with implementation of mitigation measures, impacts would be minor and less than significant. No effect on emergency services. Long-term, local, beneficial effects from reduced flooding risk and decrease in manure application. Minor, local, long-term impacts from increased mosquitos although more study is needed to verify; this would be less than significant.	No effect on emergency services. Major, local, adverse construction period impacts to safety would be significant; with implementation of mitigation measures, impacts would be minor and less than significant. Long-term beneficial effects from reduced flooding risk.	Major, local, adverse construction-period impacts on safety could occur; however, with implementation of mitigation measures, impacts would be minor and less than significant. No effect on emergency services. Long-term, local, beneficial effects from reduced flooding risk and decrease in manure application. Minor, local, long-term impacts from increased mosquitos although more study is needed to verify; this would be less than significant.
Recreation	Moderate, local, adverse impacts on populations of recreational fish and shellfish would be significant. Minor, local, beneficial effect from the limited recreational access.	Minor, local, adverse impacts related to closure of recreational trails during construction would be less than significant. Minor, local, adverse impacts on fishing during construction would be less than significant. Moderate to major short- and long-term beneficial effects on recreational fish and shellfish populations. No effect on water-based recreational access or use.	Minor, local, adverse impacts related to closure of recreational areas during construction would be less than significant. Minor, local, adverse impacts on fishing during construction would be less than significant. Moderate short- and long-term beneficial effects on recreational fish and shellfish populations. Minor, local adverse impact on water-based recreational use of Hall Slough during construction and periodic maintenance dredging.	Minor, local, adverse impacts related to closure of recreational trails during construction would be less than significant. Minor, local, adverse impacts on fishing during construction would be less than significant. Moderate to major short- and long-term beneficial effects on recreational fish and shellfish populations. No effect on water-based recreational access or use.