Joint Permit Application

This is a joint application, and must be sent to both agencies, who administer separate permit programs. Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.

Date Stamp

U.S. Army Corps of Engineers Portland District	Oregon Department of State Lands
Corps Action ID Number	DSL Number

(1) APPLICANT AND LANDOWNER CONTACT INFORMATION

	Applicant	Property Owner (if different)	Authorized Agent (if applicable) ☑ Consultant ☐ Contractor
Contact Name	Aaron Palter	See Attachment A -	Shane Latimer
Business Name	Port of Tillamook Bay	List of Property Owners	Latimer Environmental LLC
Mailing Address 1	4000 Blimp Blvd		35 SE 76th Avenue
Mailing Address 2	Suite 100		
City, State, Zip	Tillamook, OR 97141		Portland, OR 97215
Business Phone	(503) 842-2413		(503) 208-3706
Cell Phone	(503) 842-3680		(503) 867-1780
Fax			(503) 549-8711
Email	apalter@potb.org		shane@latimer-environmental.com

(2) PROJECT INFORMATION

A. Provide the project location.

Project Name	Tax Lot #	Latitude & Longitude*
Southern Flow Corridor Project	See Attachment B	45.47, -123.87
Project Address / Location	**City (nearest)**	**County**
See Figure 1 of Attachment C	Tillamook, OR	Tillamook

Township	Range	Section	Quarter/Quarter
1 South	10 West	14, 22, 23, 24, 25, 25AC	

Brief Directions to the site

Site access via Goodspeed Road N, east from U.S. Route 101; various other perimeter access points and by boat.

B. What types of waterbodies or wetlands are present in your project area? (Check all that apply.)

☑ River / Stream ☑ Non-Tidal Wetland ☐ Lake / Reservoir / Pond
☑ Estuary or Tidal Wetland ☐ Other ☐ Pacific Ocean

Waterbody or Wetland Name**	River Mile	6th Field HUC Name	6th Field HUC (12 digits)
numerous. Oregon Solutions – Tillamook Southern Flow Corridor Project Area (hereafter, "project area")	2.2 (Trask River)	-Tillamook Bay-Frontal Pacific Ocean -Lower Trask River	171002030800 171002030406

C. Indicate the project category. (Check all that apply.)

☐ Commercial Development	☐ Industrial Development	☐ Residential Development
☐ Institutional Development	☑ Agricultural	☐ Recreational
☐ Transportation	☑ Restoration	☐ Bank Stabilization
☐ Dredging	☐ Utility lines	☐ Survey or Sampling
☑ In- or Over-Water Structure	☐ Maintenance	☐ Other:

* In decimal format (e.g., 44.9399, -123.0283)
** If there is no official name for the wetland or waterway, create a unique name (such as "Wetland 1" or "Tributary A").

(3) PROJECT PURPOSE AND NEED

Provide a statement of the purpose and need for the overall project.
The purpose of the Tillamook Bay SFC project is to reduce life safety risk from floods and reduce flood damages to property and other economic losses from floods while also contributing to the recovery of federally listed Oregon Coast coho and restoring habitat for other native fish and wildlife species.

The need for the project results from the area's history of severe repetitive flooding with widespread damage to property, road closures, and other economic losses. In addition, several fish and wildlife species that historically depended on the wetland, tidal marsh, and aquatic habitats of the estuary, such as coastal coho and marbled murrelet, have been federally listed as threatened or endangered, which is due, in part, to agricultural and other development that resulted in loss of habitat for such species.

(4) DESCRIPTION OF RESOURCES IN PROJECT AREA

A. Describe the existing physical and biological characteristics of each wetland or waterway. Reference the wetland and waters delineation report if one is available. Include the list of items provided in the instructions.

The project area contains a variety of habitat types, mainly consisting of wetlands managed for agricultural uses (e.g., haying and grazing), with additional areas of herbaceous, scrub-shrub, and forested wetlands and uplands typical of coastal lowlands. See Attachment C – Wetland Delineation Report and the Project Draft Environmental Impact Statement ("Draft EIS"; included as a separate submittal*) for details.

Elements of the project will take place along the Wilson and Trask Rivers, Tillamook bay, and numerous sloughs, canals, and manmade ditches within the project area.

* United States Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region X. Southern Flow Corridor Project; Draft Environmental Impact Statement. Bothell, Washington, FEMA Region X, 2015. Print.

EIS URL: www.southernfloweis.org/content/eis-overview

B. Describe the existing navigation, fishing and recreational use of the waterway or wetland.
The Wilson and Trask Rivers, as well as Tillamook bay, and their associated facial tributaries and watercourses, are used for recreational fishing and boating. Tillamook Bay also has numerous commercial uses.

(5) PROJECT SPECIFIC CRITERIA AND ALTERNATIVES ANALYSIS

Describe project-specific criteria necessary to achieve the project purpose. Describe alternative sites and project designs that were considered to avoid or minimize impacts to the waterway or wetland.

The Draft EIS details the evaluation for the various project alternatives to meet the project purpose and need.

In Summary, in order to provide flood relief sufficient to address the project purpose and need, the project must be located in the Tillamook valley such that flooding associated with the Wilson, Trask and Tillamook rivers may be managed. Thus, the "Proposed Action" project is situated in the area where all three rivers enter Tillamook bay.

The Proposed Action would restore approximately 522 acres of tidal wetlands and associated fish and wildlife habitat; would have major, long-term beneficial effects on wildlife and threatened and endangered species, including the threatened coastal coho salmon; and would reduce flooding during both small and larger flood events, including the 100-year flood.

(6) PROJECT DESCRIPTION

A. Briefly summarize the overall project including work in areas both in and outside of waters or wetlands.

Flood elevation reduction will be achieved by removing approximately 6.9 miles of existing levees and 74.1 acres (243,000 cubic yards) of fill to create a more unobstructed flood pathway out to Tillamook Bay (see Attachment E – Design Drawing Set).

Further inland, some new levees will be constructed and some existing levees improved to (1) protect existing agricultural areas, (2) allow river flood flows to pass through, and (3) block high tides and coastal storm surges. Additionally, the project will restore approximately 522 acres of tidal wetlands, contribute to the recovery of federally listed species, and restore habitat for other native fish and wildlife species.

B. Describe work within waters and wetlands.

Approximately 1.4 miles of levee will be constructed and 2.9 miles of existing levees improved to protect agricultural land. Most of these activities will include fill in wetlands or waters and are within jurisdictional high tide areas.

C. Construction Methods. Describe how the removal and/or fill activities will be accomplished to minimize impacts to waters and wetlands.

See Attachment F – Erosion Control Plan

D. Describe source of fill material and disposal locations if known.

Soils resulting from removal of levees and other fills will be used to construct new levees and for filling drainage ditches. Any remaining fill material will be spread on site in subsided areas to speed restoration to natural salt marsh elevations.

(6) PROJECT DESCRIPTION

E. Construction timeline.

What is the estimated project start date? **February 2016**

What is the estimated project completion date? **October 2017**

Is any of the work underway or already complete? ☐ Yes ☑ No
If yes, describe.

F. Fill Volumes and Dimensions (if more than 4 impact sites, include a summary table as an attachment)

Wetland / Waterbody Name *	Fill Dimensions					Duration of Impact**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq.ft. or ac.)	Volume (c.y.)		
See Attached Summary Sheet for Sections F, G, H and I							

G. Total Fill Volumes and Dimensions

Fill Impacts to Waters	Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)
Total Fill to Wetlands			
Total Fill Below Ordinary High Water	N/A		
Total Fill Below Highest Measured Tide			
Total Fill Below High Tide Line	N/A		
Total Fill Below Mean High Water Tidal Elevation	N/A		

H. Removal Volumes and Dimensions (if more than 4 impact sites, include a summary table as an attachment)

Wetland / Waterbody Name*	Removal Dimensions					Duration of Impact**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq. ft. or ac.)	Volume (c.y.)		
See Attached Summary Sheet for Sections F, G, H and I							

I. Total Removal Volumes and Dimensions

Removal Impacts to Waters	Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)
Total Removal to Wetlands			
Total Removal Below Ordinary High Water			
Total Removal Below Highest Measured Tide			
Total Removal Below High Tide Line			
Total Removal Below Mean High Water Tidal Elevation			

* If there is no official name for the wetland or waterway, create a unique name (such as "Wetland 1" or "Tributary A").
** Indicate the days, months or years the fill or removal will remain. Enter "permanent" if applicable. For DSL, permanent removal or fill is defined as being in place for 24 months or longer.
*** Example: soil, gravel, wood, concrete, pilings, rock etc.

SHEET 1

Removal-Fill Summary Table

Tillamook Southern Flow Corridor Project

NOTES

1) Joint Corps and DSL Jurisdiction: Highest Measured Tide - 11.9 Feet Above Mean Sea Level (MSL)
2) Fill and removal calculations exclude areas above 11.9 feet MSL
3) All fill and removal volumes below 11.9 MSL are considered jurisdictional regardless of wetland status
4) Volumes are approximate as they are based on LIDAR data (error ± 20%)

TABLES

F. Fill Volumes and Dimensions

SEE SHEET 2 for DETAILS

G. Total Fill Volumes and Dimensions	**Area (ac)**	**Volume (cu yd)**
Fill to build new levees	12.3	108,000
Fill to improve levees within jurisdictional waters	1.2	4,000
Fill to fill ditches and other drainage features	200	149,000
Total Fill Below Highest Measured Tide	213.5	261,000

H. Removal Volumes and Dimensions

SEE SHEET 2 for DETAILS

I. Total Removal Volumes and Dimensions	**Area (ac)**	**Volume (cu yd)**
Removal to construct new channels and similar features	11	46,000
All other removal below 11.9 MSL (including non-wetlands)	54	189,000
Total Removal Below Highest Measured Tide	65	235,000

SHEET 2

Removal-Fill Summary Table

Tillamook Southern Flow Corridor Project

Project Element	Total Volume (cy)*	Total Area (ac)	Total Length (ft)	Levee Road Aggregate (cy)	Stripping/ Topsoil Volume (cy)**	Contaminated Volume (cy)	3' Summer Levee Volume (cy)	Clean Fill Volume (cy)
CUT								
North Levee	20	-	-	-	13,300	-	-	-
Middle Levee	0	-	-	-	2,200	-	-	-
South Levee	100	-	-	-	4,200	-	-	-
Trask Levee	10	-	-	-	700	-	-	-
Hall Slough Levee	50	-	-	-	1,200	-	-	-
Northern Dredge Piles	36,000	14.9	-	-	24,000	-	2,400	9,600
Western Dredge Piles	26,000	8.3	-	-	13,000	-	2,400	10,600
Southern Levee Fill Removal	22,000	7.4	-	-	12,000	-	2,700	7,300
South-Central Levee Fill Removal	14,500	5.6	-	-	9,000	-	800	4,700
Hoquarton South Fill Removal	23,000	5.4	-	-	9,000	-	1,700	12,300
Hoquarton North Fill Removal	21,000	3.3	-	-	5,000	-	1,700	14,300
Old Mill Site Fill Removal	43,000	7.8	-	-	13,000	21,000	300	8,700
Tidal Channels	35,000	5.4	29,200	-	9,000	-	-	26,000
Drainage Channels	11,000	5.6	3,500	-	4,000	-	-	7,000
Rip-Rap	3,000	1.0	2,800	-	-	-	-	-
TOTAL	**234,680**	**65**	**-**	**-**	**119,600**	**21,000**	**12,000**	**100,500**
FILL								
North Levee	79,000	8.3	4,991	2,800	3,900	-	-	72,300
Middle Levee	10,000	1.4	1,044	600	500	-	-	8,900
South Levee	19,000	2.6	2,764	1,500	600	-	-	16,900
Trask Levee	2,000	0.4	1,001	600	0	-	-	1,400
Hall Slough Levee	2,000	0.8	1,179	700	300	-	-	1,000
Old Mill Site Contaminated Soil	21,000	0.6	-	-	900	21,000	-	?
Ditch Fill	27,000	6.8	250,000	-	27,000	-	-	0
Topsoil Disposal Area	98,400	192.0	-	-	98,400	-	-	0
Rip Rap	3,000	-	1,044	-	-	-	-	-
TOTAL	**261,400**	**213**	**-**	**6,200**	**131,600**	**21,000**	**-**	**100,500**
Wood Slash Access Roads	3,000	0.9		-	-	-	-	-

**Volumes are based on Lidar surface data, which may be off as much as +-20%.*

***Assuming 12" stripping (cut) depth and 6" topsoil (fill) depth*

(7) ADDITIONAL INFORMATION

Are there any state or federally listed species on the project site?	☑ Yes	☐ No	☐ Unknown
Is the project site within designated or proposed critical habitat?	☑ Yes	☐ No	☐ Unknown
Is the project site within a national Wild and Scenic River?	☐ Yes	☑ No	☐ Unknown
Is the project site within the 100-year floodplain?	☑ Yes	☐ No	☐ Unknown

*** If yes to any of the above, explain in Block 4 and describe measures to minimize adverse effects to these resources in Block 5.**

Is the project site within the Territorial Sea Plan (TSP) Area?	☐ Yes	☑ No	☐ Unknown

*** If yes, attach TSP review as a separate document for DSL.**

Is the project site within a designated Marine Reserve?	☐ Yes	☑ No	☐ Unknown

*** If yes, certain additional DSL restrictions will apply.**

Will the overall project involve construction dewatering or ground disturbance of one acre or more?	☑ Yes	☐ No	☐ Unknown

*** If yes, you may need a 1200-C permit from the Oregon Department of Environmental Quality (DEQ).**

Is the fill or dredged material a carrier of contaminants from on-site or off- site spills?	☐ Yes	☑ No	☐ Unknown
Has the fill or dredged material been physically and/or chemically tested?	☑ Yes	☐ No	☐ Unknown

***If yes, explain in Block 4 and provide references to any physical/chemical testing report(s).**

Has a cultural resource (archaeological) survey been performed on the project area?	☑ Yes	☐ No	☐ Unknown

*** If yes, provide a copy of the survey with this application. Do not describe any resources in this document.**

Identify any other federal agency that is funding, authorizing or implementing the project.

Agency Name	Contact Name	Phone Number	Most Recent Date of Contact
FEMA Region X	Mark Eberlein	425-487-4735	Ongoing

List other certificates or approvals/denials required or received from other federal, state or local agencies for work described in this application. For example, certain activities that require a Corps permit also require 401 Water Quality Certification from Oregon DEQ.

Approving Agency	Certificate/ approval / denial description	Date Applied
Oregon DEQ	401 Water Quality Certification	With this JPA
ODFW	Fish Passage Certification	With this JPA

Other DSL and/or Corps Actions Associated with this Site (Check all that apply.)

☐ Work proposed on or over lands owned by or leased from the Corps		
☑ State owned waterway	DSL Waterway Lease #	
☐ Other Corps or DSL Permits	Corps #	DSL #
☐ Violation for Unauthorized Activity	Corps #	DSL #
☐ Wetland and Waters Delineation	Corps #	DSL #

☑ A wetland / waters delineation has been completed (if so, provide a copy with the application)

☐ The Corps has approved the wetland / waters delineation within the last 5 years

☐ DSL has approved the wetland / waters delineation within the last 5 years

(8) IMPACTS, RESTORATION/REHABILITATION, COMPENSATORY MITIGATION

A. Describe unavoidable environmental impacts that are likely to result from the proposed project. Include permanent, temporary, direct, and indirect impacts.

See Draft EIS URL: www.southernfloweis.org/content/eis-overview

B. For temporary removal or fill or disturbance of vegetation in waterways, wetlands or riparian (i.e., streamside) areas, discuss how the site will be restored after construction.

See Draft EIS.

Compensatory Mitigation

C. Proposed mitigation approach. Check all that apply:

☑ Permittee-responsible Onsite Mitigation	☐ Permittee-responsible Offsite mitigation	☐ Mitigation Bank or in-lieu fee program	☐ Payment to Provide (not approved for use with Corps permits)

D. Provide a brief description of mitigation approach and the rationale for choosing that approach. If you believe mitigation should not be required, explain why.

The proposed project essentially involves restoration of an estuarine system and represents substantial lift in wetland function (See Attachment D – Functional Assessment). The approximate ratio of conversion from (a) functional uplands to functional estuarine wetlands to (b) wetland fill is greater than 50 to 1.
See Draft EIS.

Mitigation Bank / In-Lieu Fee Information:
Name of mitigation bank or in-lieu fee project:
Type of credits to be purchased:

If you are proposing permittee-responsible mitigation, have you prepared a compensatory mitigation plan?
☐ Yes. Submit the plan with this application and complete the remainder of this section.
☐ No. A mitigation plan will need to be submitted (for DSL, this plan is required for a complete application).

Mitigation Location Information (Fill out only if permittee-responsible mitigation is proposed)

Mitigation Site Name/Legal Description	Mitigation Site Address	Tax Lot #
Southern Flow Corridor	Numerous, see draft EIS	Numerous, see draft EIS
County	**City**	**Latitude & Longitude (in DD.DDDD format)**
Tillamook	Tillamook	45.47, -123.87

Township	Range	Section	Quarter/Quarter
1 South	10 West	14, 22, 23,24, 25, 25AC	

(9) ADJACENT PROPERTY OWNERS FOR PROJECT AND MITIGATION SITE

☑ Pre-printed mailing labels of adjacent property owners attached	Project Site Adjacent Property Owners	Mitigation Site Adjacent Property Owners
ALEXANDER, DEAN 7835 FAWCETT CREEK RD TILLAMOOK, OR 97141	ALLEN, GEORGE VICTOR & RUTH MA 2805 OLD LATIMER RD TILLAMOOK, OR 97141	AUFDERMAUER, BARBARA L TRUSTE 1845 WILSON RIVER LP RD TILLAMOOK, OR 97141
AVERILL, DON G & JOLYNN PO BOX 417 TILLAMOOK, OR 97141	AVERILL, DONALD G & JO LYNN 8510 BEWLEY ST BAY CITY, OR 97107	BARCLAY, BEATRICE M 4212 MAROLF PL #APT 118 TILLAMOOK, OR 97141
BLUE SPRUCE INVESTMENTS INC 10125 FAIRVIEW RD TILLAMOOK, OR 97141	BRABHAM, EDWARD L TRUSTEE & PO BOX 5738 PAHRUMP, NV 89041-5738	CHELONE, SUSAN M TRUSTEE 4845 SUNSET DR TILLAMOOK, OR 97141
CITY OF TILLAMOOK 210 LAUREL AVE TILLAMOOK, OR 97141	DCJ LLC 4103 BEECH ST TILLAMOOK, OR 97141	FILBECK, JOHN R & ROBIN S 460 GOODSPEED RD TILLAMOOK, OR 97141
GIENGER FARMS INC 4000 BOQUIST RD TILLAMOOK, OR 97141	HOLGATE, THOMAS R CO-TRUSTEE 21762 CONTADO RD BOCA RATON, FL 33433	HUBLOU, GREG PO BOX 3500 BAY CITY, OR 97107
HUBLOU, WALLACE F & BETTY J PO BOX 3500 BAY CITY, OR 97107	JOHNSON, DENNIS T & CONNIE 4103 BEECH ST TILLAMOOK, OR 97141	LH & JH LLC 2 N MAIN TILLAMOOK, OR 97141
LOPEZ, VICTORIA MATA 1160 MAIN AVE N TILLAMOOK, OR 97141-7712	MAKINSTER, RONALD A 805 MAKINSTER RD TILLAMOOK, OR 97141	MAROLF, RON A & CLAUDIA K 720 3RD ST W TILLAMOOK, OR 97141
MATA-LOPEZ, VICTORIA 1160 MAIN AVE TILLAMOOK, OR 97141	NORTHWEST MEDICAL FOUNDATION O 1000 THIRD ST TILLAMOOK, OR 97141	PERKINS INVESTMENTS LLC PO BOX 420 ASTORIA, OR 97103
PETERSON, ERIC & LORETTA Y (C) 105 BAYOCEAN RD TILLAMOOK, OR 97141	RICHARDSON, BYRON & LINDA 9780 KILCHIS RIVER RD TILLAMOOK, OR 97141	ROCHA, JODY M 510 3RD ST TILLAMOOK, OR 97141

ROSENBERG, DOUGLAS & ANDREA T
PO BOX 224
TILLAMOOK, OR 97141

ROSENBERG, DOUGLAS S CO-TRUST
PO BOX 224
TILLAMOOK, OR 97141

SMITH, BRYCE W
PO BOX 3082
BAY CITY, OR 97107-3082

TILLA-BAY FARMS INC
40 FENK RD
TILLAMOOK, OR 97141

TILLAMOOK COUNTY CREAMERY ASSN
4185 HWY 101 N
TILLAMOOK, OR 97141

(10) CITY/COUNTY PLANNING DEPARTMENT LAND USE AFFIDAVIT (TO BE COMPLETED BY LOCAL PLANNING OFFICIAL)

I have reviewed the project described in this application and have determined that:

- ☐ This project is not regulated by the comprehensive plan and land use regulations.
- ☐ This project is consistent with the comprehensive plan and land use regulations.
- ☒ This project will be consistent with the comprehensive plan and land use regulations when the following local approval(s) are obtained:
  - ☐ Conditional Use Approval
  - ☒ Development Permit
  - ☐ Other Permit (see comment section)
- ☐ This project is not consistent with the comprehensive plan. Consistency requires:
  - ☐ Plan Amendment
  - ☐ Zone Change
  - ☐ Other Approval or Review (see comment section)

An application ☐ has ☒ has not been filed for local approvals checked above.

Local planning official name (print)	Title	City / County (circle one)
Sarah Absher	Senior Planner	Tillamook

Signature	Date
Sarah Absher	May 20, 2015

Comments:

(11) COASTAL ZONE CERTIFICATION

If the proposed activity described in your permit application is within the Oregon coastal zone, the following certification is required before your application can be processed. A public notice will be issued with the certification statement, which will be forwarded to the Oregon Department of Land Conservation and Development (DLCD) for its concurrence or objection. For additional information on the Oregon Coastal Zone Management Program, contact DLCD at 635 Capitol Street NE, Suite 150, Salem, Oregon 97301 or call 503-373-0050.

CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed in a manner consistent with the program.

Print /Type Name	Title
Aaron Patton	Project Coordinator

Signature	Date
	5/26/2015

(10) CITY/COUNTY PLANNING DEPARTMENT LAND USE AFFIDAVIT
(TO BE COMPLETED BY LOCAL PLANNING OFFICIAL)

I have reviewed the project described in this application and have determined that:

☐ This project is not regulated by the comprehensive plan and land use regulations.

☐ This project is consistent with the comprehensive plan and land use regulations.

☒ This project will be consistent with the comprehensive plan and land use regulations when the following local approval(s) are obtained:

- ☐ Conditional Use Approval
- ☐ Development Permit
- ☒ Other Permit (see comment section)

☐ This project is not consistent with the comprehensive plan. Consistency requires:

- ☐ Plan Amendment
- ☐ Zone Change
- ☐ Other Approval or Review (see comment section)

An application ☐ has ☐ has not been filed for local approvals checked above.

Local planning official name (print)	Title	City / County (circle one)
David Mattison	City Planner	Tillamook

Signature	Date
	5-12-15

Comments:
Wetlands / Riparian Area Use Permit (through a City Zoning Clearance Permit),
Beautification Committee approval for trees removed in City park areas.

(12) SIGNATURES

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or DSL staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish supplemental information in support of this permit application. I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that payment of the required state processing fee does not guarantee permit issuance.

To be considered complete, the fee must accompany the application to DSL. The fee is not required for submittal of an application to the Corps.

Fee Amount Enclosed	$

Applicant Signature

Print Name	Title
Michele Bradley	General Manager
Signature	Date
Michele Bradley	6/17/15

Authorized Agent Signature

Print Name	Title
Signature	Date

Landowner Signature(s)	
Landowner of the Project Site (if different from applicant)	
Print Name LH. OH, LLC.	Title Owners
Signature Anthony Horley	Date 5/26/15
Print Name BARBARA AUFDERMAUER	Title Owner
Signature Barbara Aufdermauer	Date 5-29-15
Print Name Paul Levesque	Title Chief of Staff, Tillamook County
Signature Paul Levesque	Date 5-14-15
Print Name Paul Wuntergreen	Title City Manager
Signature [illegible]	Date 5/12/15
Print Name	Title
Signature	Date
Print Name DOUG ROSENBERG	Title Owner
Signature Doug Rosenberg	Date 6/16/15
Print Name	Title

Department of State Lands, Property Manager (to be completed by DSL)	
If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.	
Print Name	Title
Signature	Date

(13) ATTACHMENTS

- ☑ **Drawings (items in bold are required)**
  - ☑ **Location map with roads identified**
  - ☑ **U.S.G.S topographic map**
  - ☑ **Tax lot map**
  - ☑ **Site plan(s)**
  - ☑ **Cross section drawing(s)**
  - ☑ **Recent aerial photo**
  - ☑ Project photos
  - ☑ Erosion and Pollution Control Plan(s), if applicable
  - ☐ DSL/Corps Wetland Concurrence letter and map, if approved and applicable
- ☑ Pre-printed labels for adjacent property owners (Required if more than 5)
- ☑ Restoration plan or rehabilitation plan for temporary impacts
- ☑ Mitigation plan
- ☑ Wetland functional assessment and/or stream functional assessment
- ☑ Alternatives analysis
- ☑ Biological assessment (if requested by Corps project manager during pre-application coordination.)
- ☐ Stormwater management plan (may be required by the Corps or DEQ)
- ☑ Other:
  - ☑ Wetland delineation report
  - ☐

Send Completed form to:

U.S. Army Corps of Engineers
ATTN: CENWP-OD-GP
PO Box 2946
Portland, OR 97208-2946
Phone: 503-808-4373

Counties:
Baker, Clackamas, Clatsop, Columbia, Gilliam, Grant, Hood River, Jefferson, Lincoln, Malheur, Marion, Morrow, Multnomah, Polk, Sherman, Tillamook, Umatilla, Union, Wallowa, Wasco, Washington, Wheeler, Yamhill

OR

U.S. Army Corps of Engineers
ATTN: CENWP-OD-GE
211 E. 7th AVE, Suite 105
Eugene, OR 97401-2722
Phone: 541-465-6868

Counties:
Benton, Coos, Crook, Curry, Deschutes, Douglas Jackson, Josephine, Harney, Klamath, Lake, Lane, Linn

Send Completed form to:

DSL - West of the Cascades:

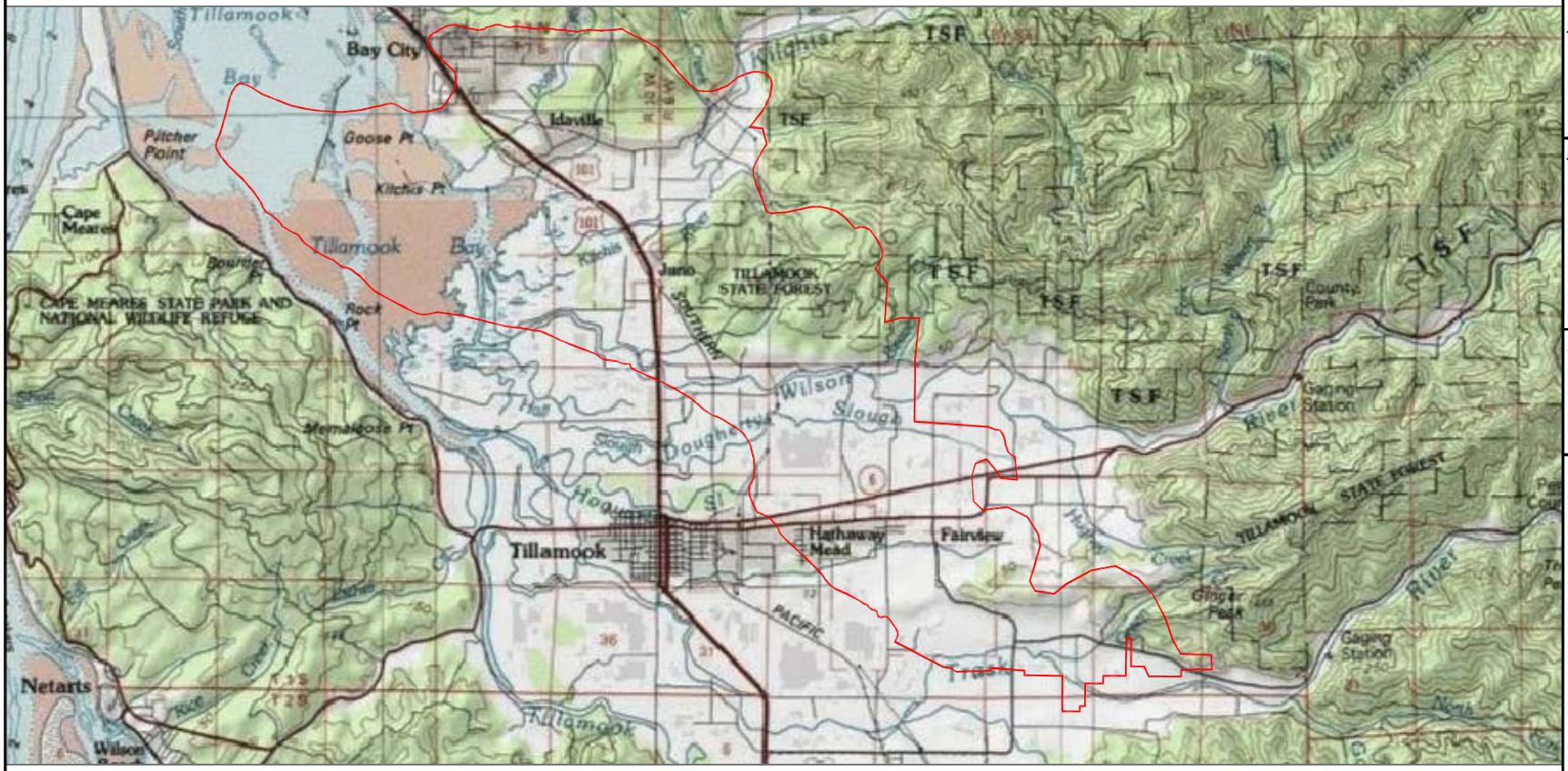
Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
Phone: 503-986-5200

OR

DSL - East of the Cascades:

Department of State Lands
1645 NE Forbes Road, Suite 112
Bend, Oregon 97701
Phone: 541-388-6112

Send all Fees to:
Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
Pay by Credit Card by Calling 503-986-5253



MCS Corp

3895 SW 94th Ave
Portland, OR 97225

latimer environmental LLC

35 SE 76th Ave
Portland OR 97215
503-208-3706

CLIENT:

Northwest Hydrological Consultants

PROJECT:

Tillamook Southern Flow Corridor

TITLE:

Location Map and USGS Topographic Map

LEGEND:

Study Area

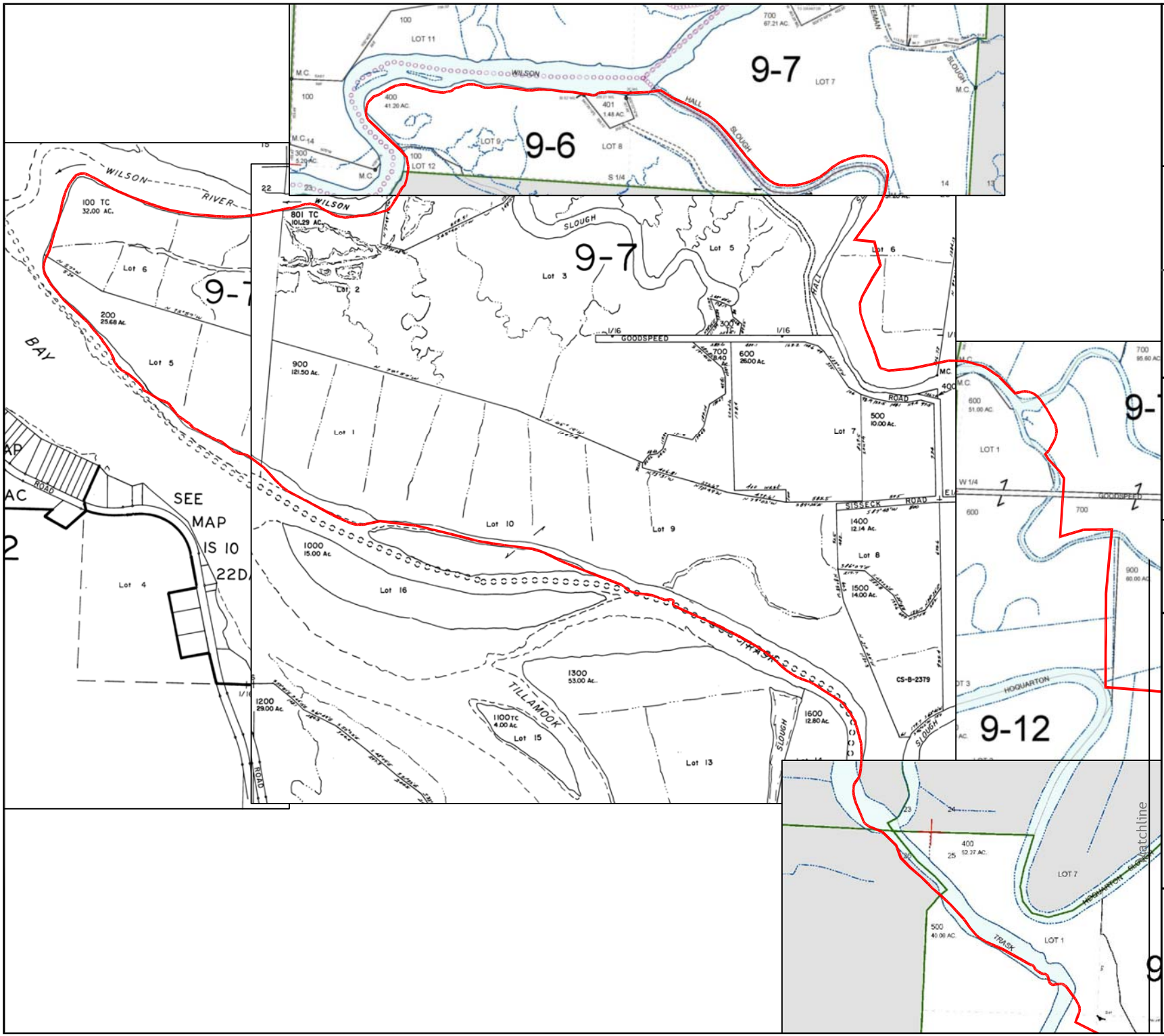
N

0' FEET 8800'

Plotted: 5/30/2015

FIGURE NO.

1



MCS Corp
3895 SW 94th Ave
Portland, OR 97225

latimer environmental LLC
35 SE 76th Ave
Portland OR 97215
503-208-3706

CLIENT:
Northwest Hydrological Consultants

PROJECT:
Tillamook Southern Flow Corridor

TITLE:
Tax Map

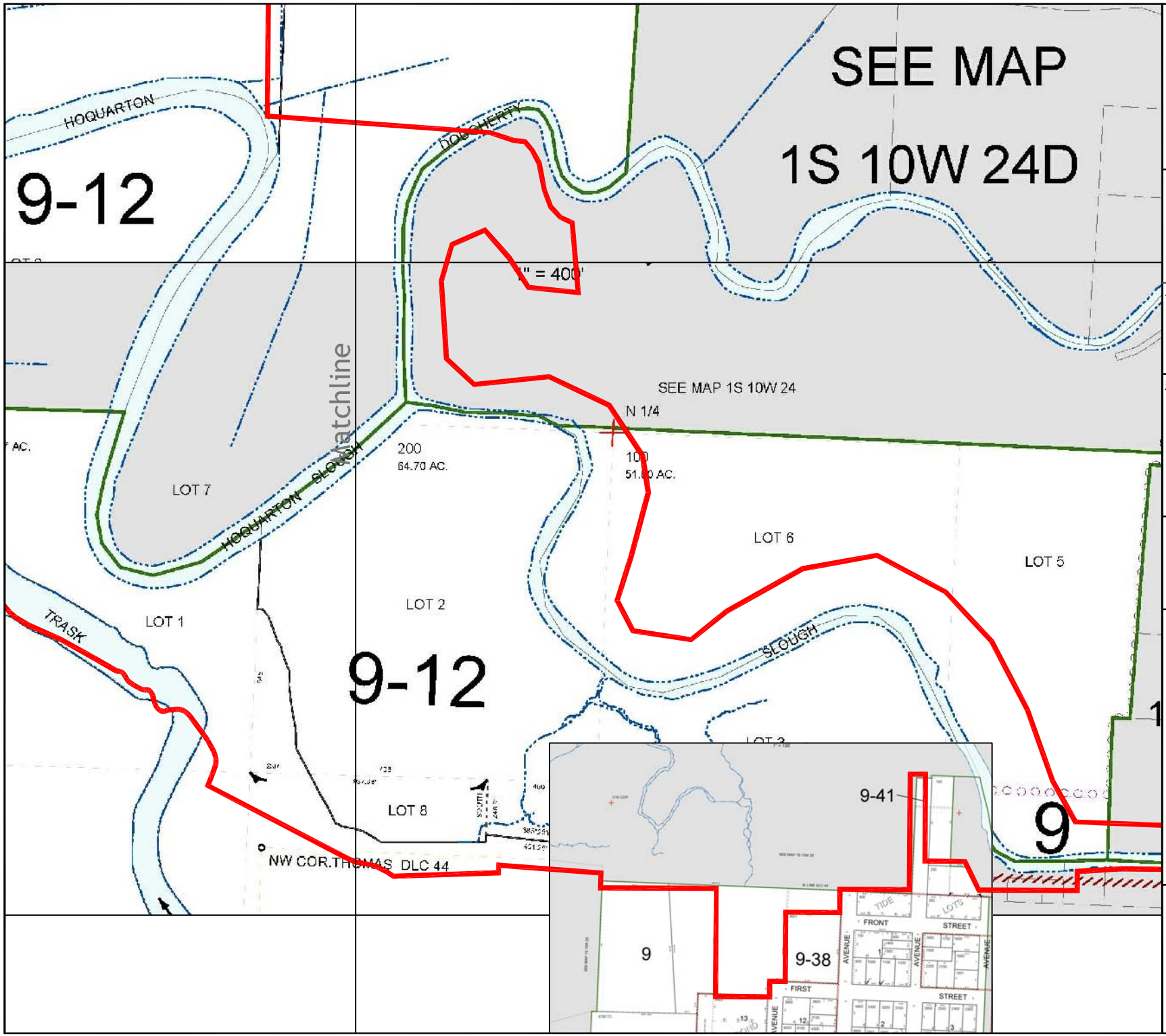
LEGEND:
Study Area

N

0' FEET 1000'

Plotted: 3/18/2015

FIGURE NO.
2a



MCS Corp
3895 SW 94th Ave
Portland, OR 97225

latimer environmental LLC
35 SE 76th Ave
Portland OR 97215
503-208-3706

CLIENT:
Northwest Hydrological Consultants

PROJECT:
Tillamook Southern Flow Corridor

TITLE:
Tax Map

LEGEND:
Study Area

N
0' FEET 500'

Plotted: 3/18/2015

FIGURE NO.
2b

MCS Corp
3895 SW 94th Ave
Portland, OR 97225

latimer environmental LLC
35 SE 76th Ave
Portland OR 97215
503-208-3708

CLIENT:

Northwest Hydrological Consultants

PROJECT:

Tillamook Southern Flow Corridor

TITLE:

Aerial Photograph

LEGEND:

Study Area

DWG DATA:

The study area boundary was determined by FEMA and Tillamook County and was professionally land surveyed by Tillamook County to an approximate accuracy of 0.01 ft and digitally mapped using AutoCAD®.

Plotted: **5/30/2015** Revised:

FIGURE NO.

3

ATTACHMENT A

List of Property Owners

ALEXANDER, DEAN
7835 FAWCETT CREEK RD
TILLAMOOK, OR 97141

ALLEN, GEORGE VICTOR & RUTH MA
2805 OLD LATIMER RD
TILLAMOOK, OR 97141

AUFDERMAUER, BARBARA L TRUSTE
1845 WILSON RIVER LP RD
TILLAMOOK, OR 97141

AVERILL, DON G & JOLYNN
PO BOX 417
TILLAMOOK, OR 97141

AVERILL, DONALD G & JO LYNN
8510 BEWLEY ST
BAY CITY, OR 97107

BARCLAY, BEATRICE M
4212 MAROLF PL #APT 118
TILLAMOOK, OR 97141

BLUE SPRUCE INVESTMENTS INC
10125 FAIRVIEW RD
TILLAMOOK, OR 97141

BRABHAM, EDWARD L TRUSTEE &
PO BOX 5738
PAHRUMP, NV 89041-5738

CHELONE, SUSAN M TRUSTEE
4845 SUNSET DR
TILLAMOOK, OR 97141

CITY OF TILLAMOOK
210 LAUREL AVE
TILLAMOOK, OR 97141

DCJ LLC
4103 BEECH ST
TILLAMOOK, OR 97141

FILBECK, JOHN R & ROBIN S
460 GOODSPEED RD
TILLAMOOK, OR 97141

GIENGER FARMS INC
4000 BOQUIST RD
TILLAMOOK, OR 97141

HOLGATE, THOMAS R CO-TRUSTEE
21762 CONTADO RD
BOCA RATON, FL 33433

HUBLOU, GREG
PO BOX 3500
BAY CITY, OR 97107

HUBLOU, WALLACE F & BETTY J
PO BOX 3500
BAY CITY, OR 97107

JOHNSON, DENNIS T & CONNIE
4103 BEECH ST
TILLAMOOK, OR 97141

LH & JH LLC
2 N MAIN
TILLAMOOK, OR 97141

LOPEZ, VICTORIA MATA
1160 MAIN AVE N
TILLAMOOK, OR 97141-7712

MAKINSTER, RONALD A
805 MAKINSTER RD
TILLAMOOK, OR 97141

MAROLF, RON A & CLAUDIA K
720 3RD ST W
TILLAMOOK, OR 97141

MATA-LOPEZ, VICTORIA
1160 MAIN AVE
TILLAMOOK, OR 97141

NORTHWEST MEDICAL FOUNDATION O
1000 THIRD ST
TILLAMOOK, OR 97141

PERKINS INVESTMENTS LLC
PO BOX 420
ASTORIA, OR 97103

PETERSON, ERIC & LORETTA Y (C)
105 BAYOCEAN RD
TILLAMOOK, OR 97141

RICHARDSON, BYRON & LINDA
9780 KILCHIS RIVER RD
TILLAMOOK, OR 97141

ROCHA, JODY M
510 3RD ST
TILLAMOOK, OR 97141

ROSENBERG, DOUGLAS & ANDREA T
PO BOX 224
TILLAMOOK, OR 97141

ROSENBERG, DOUGLAS S CO-TRUST
PO BOX 224
TILLAMOOK, OR 97141

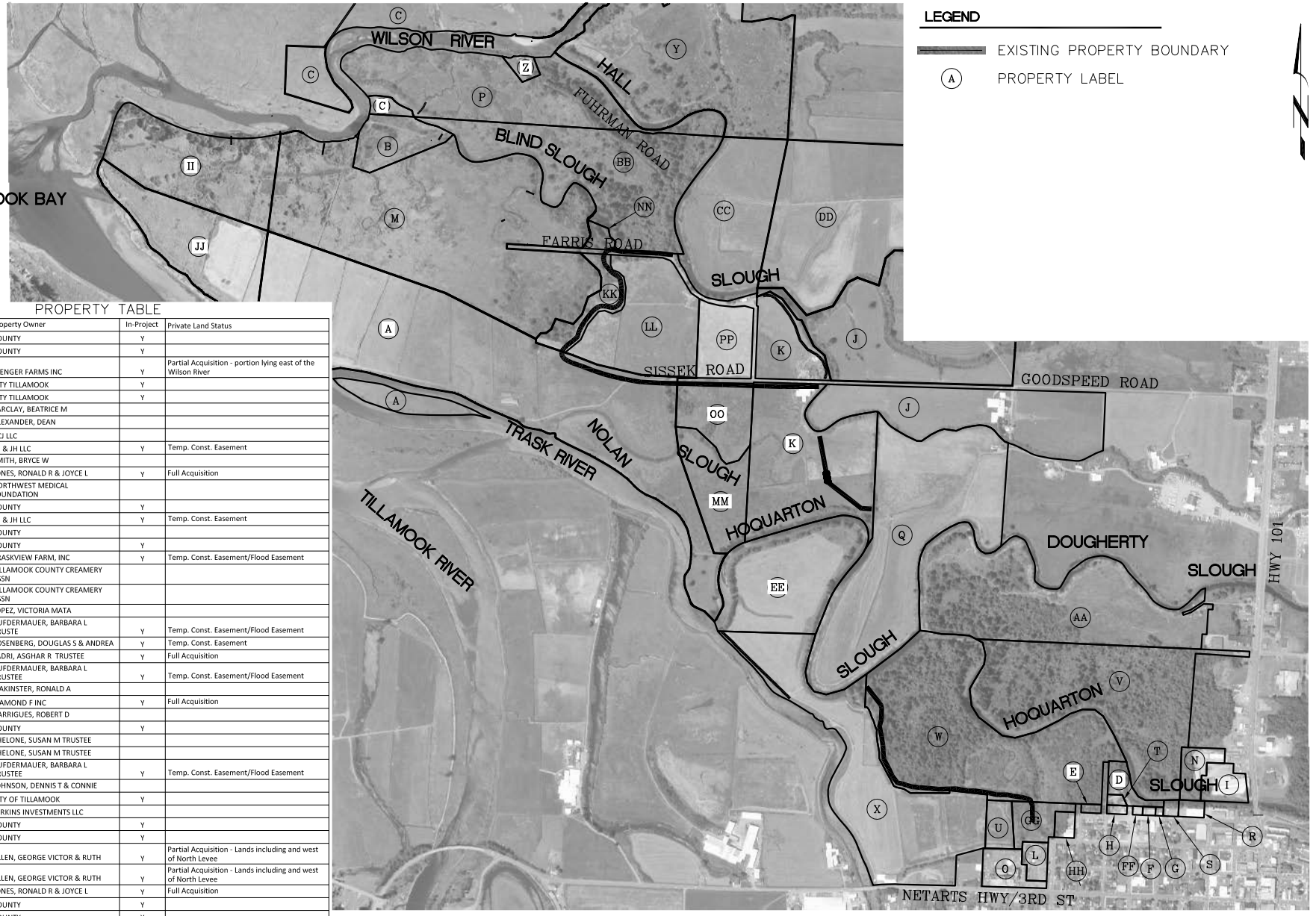
SMITH, BRYCE W
PO BOX 3082
BAY CITY, OR 97107-3082

TILLA-BAY FARMS INC
40 FENK RD
TILLAMOOK, OR 97141

TILLAMOOK COUNTY CREAMERY ASSN
4185 HWY 101 N
TILLAMOOK, OR 97141

ATTACHMENT B

Tax Lot Numbers



PROPERTY TABLE

Label	Taxlot #	Property Owner	In-Project	Private Land Status
A	900	COUNTY	Y	
B	800	COUNTY	Y	
C	100	GIENGER FARMS INC	Y	Partial Acquisition - portion lying east of the Wilson River
D	190	CITY TILLAMOOK	Y	
E	400	CITY TILLAMOOK	Y	
F	700	BARCLAY, BEATRICE M		
G	600	ALEXANDER, DEAN		
H	300	DCJ LLC		
I	1300	LH & JH LLC	Y	Temp. Const. Easement
J	700	SMITH, BRYCE W		
K	600	JONES, RONALD R & JOYCE L	Y	Full Acquisition
L	4400	NORTHWEST MEDICAL FOUNDATION		
M	801	COUNTY	Y	
N	1400	LH & JH LLC	Y	Temp. Const. Easement
O	4700	COUNTY		
P	400	COUNTY	Y	
Q	900	TRASKVIEW FARM, INC	Y	Temp. Const. Easement/Flood Easement
R	501	TILLAMOOK COUNTY CREAMERY ASSN		
S	502	TILLAMOOK COUNTY CREAMERY ASSN		
T	200	LOPEZ, VICTORIA MATA		
U	4600	AUFDERMAUER, BARBARA L TRUSTE	Y	Temp. Const. Easement/Flood Easement
V	100	ROSENBERG, DOUGLAS S & ANDREA	Y	Temp. Const. Easement
W	200	SADRI, ASGHAR R TRUSTEE	Y	Full Acquisition
X	400	AUFDERMAUER, BARBARA L TRUSTEE	Y	Temp. Const. Easement/Flood Easement
Y	700	MAKINSTER, RONALD A		
Z	401	DIAMOND F INC	Y	Full Acquisition
AA	2200	GARRIGUES, ROBERT D		
BB	200	COUNTY	Y	
CC	100	CHELONE, SUSAN M TRUSTEE		
DD	500	CHELONE, SUSAN M TRUSTEE		
EE	1000	AUFDERMAUER, BARBARA L TRUSTEE	Y	Temp. Const. Easement/Flood Easement
FF	701	JOHNSON, DENNIS T & CONNIE		
GG	4500	CITY OF TILLAMOOK	Y	
HH	4501	PERKINS INVESTMENTS LLC		
II	100	COUNTY	Y	
JJ	200	COUNTY	Y	
KK	700	ALLEN, GEORGE VICTOR & RUTH	Y	Partial Acquisition - Lands including and west of North Levee
LL	600	ALLEN, GEORGE VICTOR & RUTH	Y	Partial Acquisition - Lands including and west of North Levee
MM	1500	JONES, RONALD R & JOYCE L	Y	Full Acquisition
NN	300	COUNTY	Y	
OO	1400	COUNTY	Y	
PP	500	JONES, RONALD R & JOYCE L	Y	Full Acquisition
Right-of-Way		COUNTY	Y	Portions of Goodspeed, Sissek & Farris Rd.
Right-of-Way		CITY	Y	Douglas Ave Extension

PROPERTY BOUNDARIES AND MONUMENTS

SCALE: 1" = 1000'

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 1000 ft.

REGISTERED PROFESSIONAL ENGINEER
OREGON
JANUARY 09, 2015
MARK R. CHERNICHO
EXPIRES: 12/31/2016

PRELIMINARY

nhc northwest hydraulic consultants
2316 Portland Road, Suite H
Newberg, Oregon 97132
Ph: 503/554-9553
fax: 503/537-9554
mail@hbh-consulting.com
H B H Consulting Engineers

Designed By: ARC | Drawn By: ARC | Checked By: MDH | Submittal No: | Layout: PRELIMINARY ACCESS
File: L:\2009-003-03\dwg\Permit Set\OVERVIEW

BY	DESCRIPTION	DATE	REV.

0" 0.5" IF THIS LINE IS NOT 0.5 INCH SCALE IS NOT AS SHOWN

OREGON SOLUTIONS
500 SW MILL STREET - PORTLAND, OREGON 97201

SOUTHERN FLOW CORRIDOR
TILLAMOOK, OREGON
PROPERTY BOUNDARIES AND MONUMENTS

Date: 06-04-15
Sheet No.: 3 of 29
2009-003-03

ATTACHMENT C

Wetland Delineation Report

ATTACHMENT D

Functional Assessment

Tillamook Southern Flow Corridor

HGM Functional Assessment Report

June 2015

Prepared for:

Tillamook County
201 Laurel Ave
Tillamook, OR 97141
(503) 842-1809

and

Port of Tillamook Bay
4000 Blimp Blvd. Suite 100
Tillamook, OR 97141
(503) 842-2413

Prepared by:

3895 SW 94th Ave
Portland, OR 97225
Contact: Greta Presley
(503) 349-4470

and

latimer
environmental LLC

35 SE 76th Avenue
Portland, Oregon 97215
phone 503.867.1780
fax 503.549.8711

Contents

Appendices

Acronyms and Abbreviations

DSL	Oregon Department of State Lands
HGM	Hydrogeomorphic
NWI	National Wetlands Inventory (U.S. Department of Agriculture [USDA])
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 Introduction

MCS Corp and Latimer Environmental LLC conducted an assessment of wetland functions and values using the Hydrogeomorphic (HGM) Assessment Guidebook for Tidal Wetlands of the Oregon Coast, Part 1: Rapid Assessment Method (Adamus 2006) for the Tillamook Southern Flow Corridor Project (SFC)[1]. HGM is a tool to help stakeholders understand the consequences of projects in terms of effects to various environmental functions, sometimes referred to as "ecosystem services," i.e., how various functions may be raised or lowered in magnitude by the project. It should be noted that while these functions are rated in terms of numerical values, all values are actually qualitative in nature and should be considered to vary substantially about those values both spatially and temporally.

The Southern Flow Corridor project is part of the OSP (Oregon Solutions Program), providing flooding solutions for the Wilson River to reduce flood levels and prevent future flood damages. The Southern Flow Corridor is the largest area in the OSP designated for restoration by removing extensive levees and fill to create a more unobstructed flood pathway out to Tillamook Bay. New levees will be constructed and some existing levees improved further inland to protect existing agricultural areas while also allowing river flood flows to pass through and blocking high tides and coastal storm surges. This project will return a large area (approximately 500 acres) of agricultural wetlands to functioning tidal wetlands by connecting the area back to the influence of Tillamook Bay.

The purpose of this functions and values assessment is to document the pre existing conditions of the project wetlands and estimate the pre- and post-restoration functions and values. For the purpose of this analysis, compensatory wetland mitigation for unavoidable wetland impacts associated with the fill and removal related to levee construction and enhancement is considered self-mitigating.

This report describes the methodology used to conduct the functions and values assessment, describes the assessed wetlands, and discusses the results of the assessment. Appendix A includes the figures and reference maps; assessment data forms are included in Appendix B. Literature citations may be found in Appendix C.

1.1 Project Description

The primary purpose of the SFC project is to reduce flood damages in the Wilson River Floodplain through the reduction in flood levels and durations. With the removal of existing levees, tidegates, and fill material, the proposed project will restore approximately 500 acres of tidal wetland habitat at the confluence of Tillamook Bay's two most productive salmon systems, the Wilson and Trask Rivers.

1.2 Summary of Wetland Delineation

MCS Corp and Latimer Environmental conducted wetland delineation fieldwork on May 16, July 14-16, August 22, and September 15-17, 2014. Wetlands were delineated using the criteria outlined in the U.S. Army Corps of Engineers (USACE) 1987 Wetland Delineation Manual (USACE Manual) and the *Regional*

[1] The approximately 500-acre restoration site is northwest of Tillamook, Oregon (Appendix A, Figure 1); tax lots maps 1S 10W 22, 1S 10W 23, 1S 10W 24, 1S 10W 25, and 1S 10W 25AC (Appendix A, Figures 2a, 2b, 2c).

Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coastal Areas (2010 Supplement). Because the study area is tidally influenced, regulatory jurisdiction by the Oregon Department of State Lands (DSL) and USACE are governed by OAR 141-085-0515 and 33 CFR Part 328, respectively. Both agencies agreed to use the Highest Observed Tide (HOT) as the regulatory wetland boundary which is documented as occurring at elevation 11.9 feet above mean sea level (DSL 2010).

Based on this investigation, the jurisdictional area within the study area was approximately 709.4 acres. The 2015 Tillamook Southern Flow Corridor Wetland Delineation Report (MCS Corp 2015) provides further details for the most current wetland delineation.

Environmental Setting

The project is located in the Coastal Lowlands subregion of the Coast Range ecoregion, sitting above Tillamook Bay on a flat terrace below the western flank of the Coastal Mountain Range. It is located in the Trask River watershed (hydrologic unit code [HUC] 1710020304) and the Tillamook Bay-Frontal Pacific Ocean watershed (HUC 1710020308), in the Northern Oregon Coast subbasin.

The study area is bordered to the north by the Wilson River and to the northeast by Hall Slough, to the west and southwest by Tillamook Bay and the Trask River, and to the east by agricultural fields. The City of Tillamook forms the southeast border of the study area. The study area is topographically located close to sea level and mostly flat with variations generally originating from human manipulation (e.g., levees and other fills). Elevations in the study area range from approximately -2 to 10 feet above mean sea level (MSL).

2.0 Methods

The functions and values of the wetlands within the SFC study area were evaluated according to the methods and procedure prescribed in the Hydrogeomorphic (HGM) Assessment Guidebook for Tidal Wetlands of the Oregon Coast, Part 1: Rapid Assessment Method (HGM manual). The HGM methodology evaluates 12 wetland functions based upon various hydrological and geomorphic attributes within the wetlands. This method compares tidal wetlands of the same subclass.

The HGM methodology evaluates functions separately from the values because a function may have multiple, sometimes conflicting values. The assessment of values is also considerably more subjective than the assessment of functions.

HGM provides a standardized process for scoring indicators of wetland functions and provides a score for the relative value of each function. Since the protocol baseline analyzed wetlands of diverse types throughout the state, it allows for a qualitative comparison of wetlands of any type anywhere in Oregon. The previous assessment was conducted prior to this method and used a combination of available methodologies that resulted in a qualitative assessment. Therefore, no direct comparison of scores is available. However, due to our extensive knowledge of the project and its original state, the HGM

spreadsheets were processed for the pre-mitigation condition to provide approximate scores to compare with the current assessment scores.

2.1 Office Component

Prior to the functions and values assessment site visit, MCS Corp collected background information for each wetland and the contributing area (Figure 2). Surrounding land use and historic land cover were also researched and used to supplement the site visit. The office portion of HGM also includes resource mapping and air photo interpretation.

Background information includes the U.S. Geological Survey (USGS) Topographic Quadrangle Maps (USGS, Tillamook, OR 1985); U.S. Fish and Wildlife Service (USFWS) NWI Mapping (Tillamook quad, USFWS 1982); and the Soil Survey of Tillamook County, Oregon, (Fillmore 2006).

2.2 Field Component

A site visit to collect data on wetland functions was conducted by MCS Corp and Latimer Environmental on April 20, 2015. During the site visit, the team evaluated the agricultural high tide wetlands, the non-agricultural high tide wetlands, and the forested wetland community.

Due to the large size of the wetlands, the entire wetland was not practical to visit, but much of the wetland was walked or driven over the course of the wetland delineation and functional assessment site visits. Key assessment elements were also identified with aerial photograph interpretation and then ground-truthed during the functional assessment site visit. The HGM method suggests visiting during both the highest tide and lowest tide of the year. The April 20 2015 site visit was considered a very high tide day (but not the highest tide).

3.0 Results

For the purpose of this functional assessment, the agricultural emergent, non-agricultural emergent, and forested wetlands were evaluated as separate wetlands, but could be considered one large high marsh wetland due to multiple hydrologic connections. In order to show which areas will benefit most from the restoration activities, the large wetland complex was divided into the above land cover categories.

Appendix A includes the figures and reference maps. Appendix B includes the assessment data forms completed for the assessment area (AA). Literature citations may be found in Appendix C.

3.1 Functions and Values of the Southern Flow Corridor Wetlands

A total of approximately 415 acres of wetlands within the study area was targeted for evaluating under the HGM assessment protocol. Approximately 178.2 acres was considered agricultural emergent River-Sourced Tidal wetland, 167.5 acres was considered non-agricultural emergent River-Sourced Tidal wetland and 69.1 acres was considered forested River-Sourced Tidal wetland. However, most of this site is at an elevation that would be considered low marsh save for the levees that have drastically reduced the tidal influence over the wetlands.

Of the 415 acres, approximately 304.7 acres of River-Sourced Tidal wetlands were assessed as part of the SFC wetlands site evaluation (Appendix A, Figure 2). The large, 178.2 acre agricultural emergent wetland was evaluated as one assessment unit. Of the 167.5 acres non-agricultural emergent, 41 acres was considered a scrub-shrub and emergent mosaic and was not evaluated as part of the 126.5-acre emergent assessment unit. The southern forested wetlands were evaluated separately as Forested Wetland West (27.3 acres) and Forested Wetland East (16.6 acres) due to the difference in connectivity to Hoquarten Slough (a tidally influenced channel).

The HGM was used to derive the functional values presented below in Tables 1-6 for both the pre-restoration wetlands and the post-restoration (estimated) emergent and forested wetlands. The scores that were generated from the comparison to best reference tidal wetlands were used to compare to post-restoration scores. Values were not assessed.

Table 1. HGM Assessment Scores for Southern Flow Corridor Wetlands

Specific Functions	Ag Wetland			Non-Ag Wetland		
	Existing Function	Post-restoration	Δ	Existing Function	Post-restoration	Δ
Aboveground Organic Matter Production (Aprod)	0.13	0.00	dec	0.14	0.18	inc
Aboveground Plant and Animal Production Export (XPT)	0.09	0.29	inc	0.12	0.42	inc
Sediment Stability and Water Quality (WQ)	0.72	0.66	dec	0.78	0.70	dec
Habitat for Native Invertebrates Maintenance (INV)	0.18	0.35	inc	0.36	0.42	inc
Habitat for Anadromous Fish Maintenance (AF)	0.37	0.63	inc	0.39	0.66	inc
Habitat for Visiting Marine Fish Maintenance (MF)	0.14	0.65	inc	0.24	0.67	inc
Habitat for Other Visiting & Resident Fish Maintenance (RF)	0.00	0.29	inc	0.00	0.32	inc
Habitat for Nekton-feeding Wildlife Maintenance (NFW)	0.27	0.64	inc	0.42	0.65	inc
Habitat for Ducks and Geese Maintenance (DG)	0.75	0.79	inc	0.85	0.80	dec
Habitat for Shorebirds Maintenance (SB)	0.39	0.88	inc	0.44	0.90	inc
Habitat for Native Landbirds, Small Mammals, & their Predators Maintenance (LBM)	0.70	0.29	inc	0.76	0.48	dec
Natural Botanical Conditions Maintenance (BC)	0.50	0.50		0.50	0.50	

Table 2. HGM Assessment Scores for Southern Flow Corridor Forested Wetlands

Specific Functions	Forested Wetland West			Forested Wetland East		
	Existing Function	Post-restoration	Δ	Existing Function	Post-restoration	Δ
Aboveground Organic Matter Production (Aprod)	0.35	0.14	dec	0.40	0.14	dec
Aboveground Plant and Animal Production Export (XPT)	0.18	0.17	dec	0.28	0.17	dec
Sediment Stability and Water Quality (WQ)	0.73	0.63	dec	0.78	0.63	dec
Habitat for Native Invertebrates Maintenance (INV)	0.27	0.33	inc	0.37	0.36	dec
Habitat for Anadromous Fish Maintenance (AF)	0.67	0.73	inc	0.83	0.87	inc
Habitat for Visiting Marine Fish Maintenance (MF)	0.20	0.45	inc	0.27	0.46	inc
Habitat for Other Visiting & Resident Fish Maintenance (RF)	0.51	0.44	dec	0.44	0.44	
Habitat for Nekton-feeding Wildlife Maintenance (NFW)	0.41	0.57	inc	0.50	0.59	inc
Habitat for Ducks and Geese Maintenance (DG)	0.87	0.95	inc	0.92	0.95	inc
Habitat for Shorebirds Maintenance (SB)	0.56	0.74	inc	0.56	0.77	inc
Habitat for Native Landbirds, Small Mammals, & their Predators Maintenance (LBM)	0.51	0.45	dec	0.51	0.36	dec
Natural Botanical Conditions Maintenance (BC)	0.50	0.5		0.50	0.50	

Table 3. Summary of HGM Assessment Results for Agricultural Wetland

Specific Functions	Assessed Estuarine Wetland Function Capacity Scores - Best Reference*		Assessed Estuarine Wetland Function Capacity Scores - Highest**		Reference Wetland (964) Function Capacity
Aboveground Organic Matter Production (Aprod)	0.13	Low	0.26	Low	0.37
Aboveground Plant and Animal Production Export (XPT)	0.09	Low	0.17	Low	0.51
Sediment Stability and Water Quality (WQ)	0.72	High	0.69	High	0.72
Habitat for Native Invertebrates Maintenance (INV)	0.18	Low	0.39	Mod	0.41
Habitat for Anadromous Fish Maintenance (AF)	0.37	Mod	0.23	Low	0.35
Habitat for Visiting Marine Fish Maintenance (MF)	0.14	Low	0.16	Low	0.43
Habitat for Other Visiting & Resident Fish Maintenance (RF)	0.00		0		0.12
Habitat for Nekton-feeding Wildlife Maintenance (NFW)	0.27	Low	0.32	Low	0.44
Habitat for Ducks and Geese Maintenance (DG)	0.75	High	0.57	Mod	0.75
Habitat for Shorebirds Maintenance (SB)	0.39	Mod	0.52	Mod	0.51
Habitat for Native Landbirds, Small Mammals, & their Predators Maintenance (LBM)	0.70	High	0.59	Mod	0.57
Natural Botanical Conditions Maintenance (BC)	0.50	Mod	n/a		0.27

* Compared to best reference tidal wetland (of all subclasses)

**Compared to theoretical highest score for this function

Table 4. Summary of HGM Assessment Results for Non-Agricultural Wetland

Specific Functions	Assessed Estuarine Wetland Function Capacity Scores - Best Reference*		Assessed Estuarine Wetland Function Capacity Scores - Highest**		Reference Wetland (964) Function Capacity
Aboveground Organic Matter Production (Aprod)	0.14	Low	0.27	Low	0.37
Aboveground Plant and Animal Production Export (XPT)	0.12	Low	0.19	Low	0.51
Sediment Stability and Water Quality (WQ)	0.78	High	0.73	High	0.72
Habitat for Native Invertebrates Maintenance (INV)	0.36	Mod	0.47	Mod	0.41
Habitat for Anadromous Fish Maintenance (AF)	0.39	Mod	0.29	Low	0.35
Habitat for Visiting Marine Fish Maintenance (MF)	0.24	Low	0.23	Low	0.43
Habitat for Other Visiting & Resident Fish Maintenance (RF)	0.00		0.00		0.12
Habitat for Nekton-feeding Wildlife Maintenance (NFW)	0.42	Mod	0.42	Mod	0.44
Habitat for Ducks and Geese Maintenance (DG)	0.85	High	0.62	Mod	0.75
Habitat for Shorebirds Maintenance (SB)	0.44	Mod	0.55	Mod	0.51
Habitat for Native Landbirds, Small Mammals, & their Predators Maintenance (LBM)	0.76	High	0.62	Mod	0.57
Natural Botanical Conditions Maintenance (BC)	0.50	Mod	#N/A		0.27

* Compared to best reference tidal wetland (of all subclasses)

**Compared to theoretical highest score for this function

Table5. Summary of HGM Assessment Results for the Forested Wetland - West

Specific Functions	Assessed Estuarine Wetland Function Capacity Scores - Best Reference*		Assessed Estuarine Wetland Function Capacity Scores - Highest**		Reference Wetland (964) Function Capacity
Aboveground Organic Matter Production (Aprod)	0.35	Mod	0.33	Mod	0.37
Aboveground Plant and Animal Production Export (XPT)	0.18	Low	0.23	Low	0.51
Sediment Stability and Water Quality (WQ)	0.73	High	0.70	High	0.72
Habitat for Native Invertebrates Maintenance (INV)	0.27	Low	0.43	Mod	0.41
Habitat for Anadromous Fish Maintenance (AF)	0.67	High	0.49	Mod	0.35
Habitat for Visiting Marine Fish Maintenance (MF)	0.20	Low	0.20	Low	0.43
Habitat for Other Visiting & Resident Fish Maintenance (RF)	0.51	Mod	0.46	Mod	0.12
Habitat for Nekton-feeding Wildlife Maintenance (NFW)	0.41	Mod	0.42	Mod	0.44
Habitat for Ducks and Geese Maintenance (DG)	0.87	High	0.64	Mod	0.75
Habitat for Shorebirds Maintenance (SB)	0.56	Mod	0.62	Mod	0.51
Habitat for Native Landbirds, Small Mammals, & their Predators Maintenance (LBM)	0.51	Mod	0.49	Mod	0.57
Natural Botanical Conditions Maintenance (BC)	0.50	Mod	#N/A		0.27

* Compared to best reference tidal wetland (of all subclasses)

**Compared to theoretical highest score for this function

Table 6. Summary of HGM Assessment Results for Forested Wetland - East

Specific Functions	Assessed Estuarine Wetland Function Capacity Scores - Best Reference*		Assessed Estuarine Wetland Function Capacity Scores - Highest**		Reference Wetland (964) Function Capacity
Aboveground Organic Matter Production (Aprod)	0.40	Mod	0.35	Mod	0.37
Aboveground Plant and Animal Production Export (XPT)	0.28	Low	0.31	Low	0.51
Sediment Stability and Water Quality (WQ)	0.78	High	0.72	High	0.72
Habitat for Native Invertebrates Maintenance (INV)	0.37	Mod	0.47	Mod	0.41
Habitat for Anadromous Fish Maintenance (AF)	0.83	High	0.60	Mod	0.35
Habitat for Visiting Marine Fish Maintenance (MF)	0.27	Low	0.25	Low	0.43
Habitat for Other Visiting & Resident Fish Maintenance (RF)	0.44	Mod	0.40	Mod	0.12
Habitat for Nekton-feeding Wildlife Maintenance (NFW)	0.50	Mod	0.47	Mod	0.44
Habitat for Ducks and Geese Maintenance (DG)	0.92	High	0.66	Mod	0.75
Habitat for Shorebirds Maintenance (SB)	0.56	Mod	0.62	Mod	0.51
Habitat for Native Landbirds, Small Mammals, & their Predators Maintenance (LBM)	0.51	Mod	0.49	Mod	0.57
Natural Botanical Conditions Maintenance (BC)	0.50	Mod	#N/A		0.27

* Compared to best reference tidal wetland (of all subclasses)

**Compared to theoretical highest score for this function

4.0 Discussion

For the purposes of this functional assessment report, the scores derived from the comparison to the best reference wetland data were used to compare and evaluate the wetland functions. Assessment scores were further grouped into the following categories: Low = 0-0.32, Moderate = 0.33-0.66, High = 0.67-1.00.

Numerous assumptions were made in order to assess the wetlands post-restoration activities. No changes were made to the channel proportions data form (Data Form A2) because widths and depths of the existing largest internal channels will likely not change significantly. Best professional judgment was used in concert with knowledge of the restoration plan to arrive at the hypothetical post-restoration function scores.

Aboveground Organic Matter Production

This function describes the capacity of marsh plants to use sunlight to create particulate organic matter (e.g., leaves, wood, detritus) above the surface of the soil, to a degree that is characteristic of their HGM subclass. The Aboveground Organic Matter Production scored low for the emergent wetlands and moderate for the forested wetlands. The levees surrounding the majority of all assessed wetlands limits their ability to transport (export) material. However, the forested wetlands scored higher for this function likely due to their ability to provide shade and their lower source for nutrient load.

The post-restoration scores show a decrease for this function, except for the non-agricultural emergent wetland. The decrease in function is likely due to the assumption that less vegetation will be present after the restoration activities because of more extensive tidal flooding. The slight increase in function for the non-agricultural emergent wetland is likely due to relatively small changes from pre- to post-restoration conditions for the parameters of this function.

Aboveground Plant and Animal Production Export

This function describes the capacity to export organic matter from the marsh to adjoining waters that are inundated permanently. If measured quantitatively, this function could be expressed as grams of carbon exported per year. The Aboveground Plant & Animal Production Export scored low for all assessed wetlands. The levees surrounding the majority of all assessed wetlands limits their ability to transport (export) material.

The post-restoration scores show an increase for this function for the emergent wetlands and a decrease for the forested wetlands when converted to an estuarine condition. This is likely due to the assumption that pollution and nutrient sources will be reduced and more diffuse throughout the restored wetland, making the opportunity for these wetlands to break down particulate matter and subsequent conversion to dissolved organic matter lower than that of the pre-restoration condition.

Sediment Stability and Water Quality

The variety of particles, elements, and compounds that can be processed by tidal marshes is substantial, as is the variety of forms to which they may be converted. The capacity of tidal marshes to entrain many substances is influenced by geomorphology, hydrology, and vegetation. The processing capacity of marsh wetlands is also influenced by the bacterial and fungal flora. Due to extensive organic deposition in marshes, bacteria and fungi are often present at much greater densities and diversities than adjoining waters.

The Sediment Stability and Water Quality functions scored high for all assessed wetlands. The slight decrease in the restored wetlands may be due to the assumption that less vegetation will be present after the restoration activities because of more extensive tidal flooding.

Habitat for Native Invertebrates Maintenance

Tidal marshes support a variety of invertebrate species (some which occur in few other habitats) and the availability of certain habitats for native invertebrates have been used as indicators of the health of wetland systems. The contribution of invertebrates to regional biodiversity is an important factor in ecological stability and the food web. This function measures the diversity and abundance of native resident or transient invertebrates that use marsh soils and plants (above and below ground).

All assessed wetlands scored low to moderate for this function. This may be due to the low diversity of tidally-influenced vegetation. Much of the assessed wetlands contain typical northwest freshwater vegetation with only minor tidal inputs each year. Little to no benthic crustaceans or polychaete worms are likely to inhabit the existing wetlands. The post-restoration wetlands will be reconnected with the tidal network and therefore scored higher for this function. The Forested Wetland - East showed a slight decrease in this function, which is likely tied to the decrease in chemical exposure and nutrient overload potential which may reduce some habitat for invertebrates, but the overall restoration project will likely increase habitat for a much greater diversity of invertebrates.

Habitat for Anadromous Fish Maintenance

Anadromous fish use tidal marshes and tidal channels for periods lasting from days to months. During this time, anadromous fish can transition gradually to the ocean, acclimating slowly to seawater while feeding on an abundance of invertebrates and finding shelter from predators.

The emergent wetlands scored low to moderate for this function likely due to their limited (open) connectivity to the larger sloughs and main channels and the low vegetative structure. The forested wetlands scored moderate to high due to their open connection to a tidally-influenced channel and ability to provide a high degree of shade to internal channels.

This function will increase for all of the assessed wetlands due to the removal of dikes and restoration of connections with the tidally-influenced sloughs and main channels.

Habitat for Visiting Marine Fish Maintenance

Marine fish that normally breed in the ocean may find food or refuge in marshes and their channels during part of the year. All of the assessed wetlands scored low for this function, likely due to their limited (open) connectivity to the larger sloughs and main channels.

This function will increase for all of the assessed wetlands due to the removal of dikes and restoration of connections with the tidally-influenced larger sloughs and main channels.

Habitat for Other Visiting & Resident Fish Maintenance

This group of fish are non-anadromous, mostly non-marine species that visit and/or reside for much of the year in the marsh and its channels. Native, resident fish species are important to the local food chain and can be an indicator of a healthy riparian or wetland system. The emergent wetlands scored zero for this function because they are mostly disconnected from tidal channels. The forested wetlands scored moderate for this function due to their open connection to Hoquarten Slough and their high score for water quality.

The post-restoration emergent wetlands will be connected to the larger sloughs and return to tidal conditions. The forested wetlands showed either no change or a decrease in functions. This likely comes from the score of one or more parameter decreasing as a cause of levee removal and the estimate that the restored wetlands will have a wetland or tidal edge instead of an upland perimeter.

Habitat for Nekton-feeding Wildlife Maintenance

This function describes the capacity to sustain life requirements of a diversity and abundance of birds, seals, otter, and other species that feed on nekton (mobile invertebrates and fish). By virtue of their diversity, size, and numbers, they contribute to the ecological and functional stability of Oregon's estuarine systems. All of the assessed wetlands scored low to moderate for this function due to their limited connectivity to healthy tidal systems. Moderate scores were likely generated from the large size and diversity of the un-managed wetlands.

The post-restoration wetlands scored higher than the existing wetlands due to the removal of the levees and connectivity to the tidal system.

Habitat for Ducks and Geese Maintenance

This function describes the capacity to sustain life requirements of a diversity and abundance of duck and goose species (and swans), primarily during winter and migration. Waterfowl are valuable to estuarine food webs as transformers and transporters of both terrestrial and aquatic organic matter. Waterfowl also can influence plant cover, species composition, and other functions within individual tidal marshes. All of the assessed wetlands scored moderate to high for this function, likely due to the large size of the wetlands and the open, undeveloped character of the surrounding landscape.

Most of the assessed wetlands showed an increase in this function when the area is returned to tidal conditions and the dense overstory shifts to low and high marsh. The restored wetlands will have greater opportunity and plant diversity to support ducks and geese.

Habitat for Shorebirds Maintenance

The ability of a wetland or riparian system to support waterbirds during their reproductive period is measured as the availability of nesting, feeding, or refuge areas. Waterbird populations are economically, socially, and ecologically important on both regional and local scales. All of the assessed wetlands scored moderate for this function, likely due to the large size of the wetlands and the open, undeveloped character of the surrounding landscape.

All of the assessed wetlands showed a significant increase in this function when the area is returned to tidal conditions and low marsh habitat is formed. The restored wetlands will have better opportunity and plant diversity to support shorebirds.

Habitat for Native Landbirds, Small Mammals, & their Predators Maintenance

The ability of a wetland or riparian system to support native landbirds is measured as the availability of breeding, roosting, feeding, and/or refuge areas. Landbird populations contribute to regional biodiversity and support significant recreational interest. All of the assessed wetlands scored moderate to high for this function because of the diversity of vegetation and structure. The emergent wetlands scored higher than the forested wetlands due to their large size and the open, undeveloped character of the surrounding landscape.

Only the agricultural wetland showed an increase for this function after the restoration activities. This is the only wetland system that is currently maintained and actively farmed and will therefore receive the most impact from the restoration efforts. The other assessed wetlands showed a decrease in this function likely due to the decrease in vertical structure and increase in open, relatively unprotected low marsh.

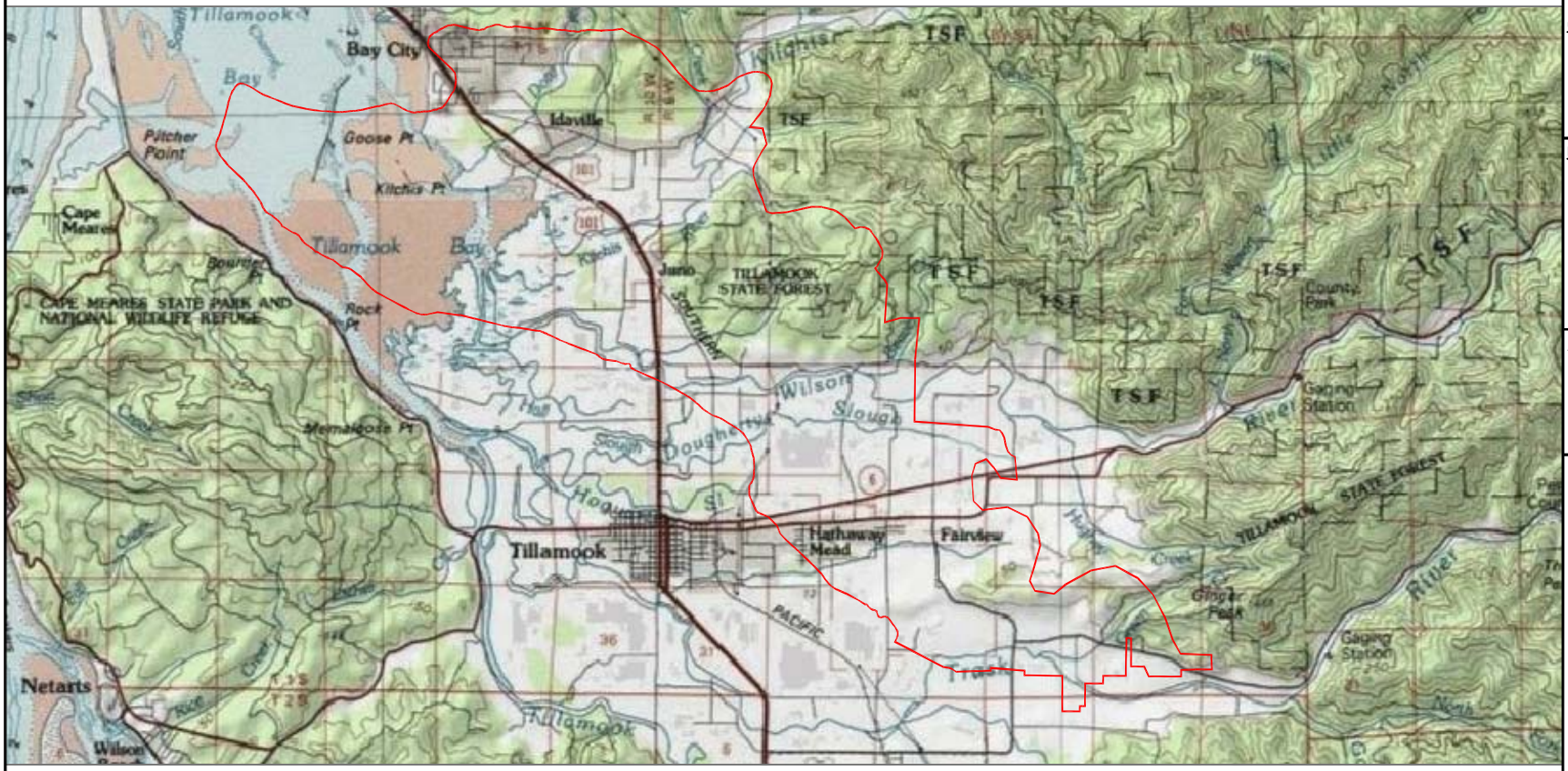
Natural Botanical Conditions Maintenance

Plant communities are major influences on local species diversity and are also one of the largest contributors to regional biodiversity. Different types of communities (such as forested, scrub/shrub, grasslands) play a variety of roles on economical and ecological scales. All of the assessed wetlands scored moderate for this function. The intensive botanical survey was not conducted for this functional assessment due to time and scale limitations. The pre and post restoration scores show no change, but using Best Professional Judgment, an increase in vegetation functions for tidal conditions will occur when the connectivity is restored to the wetlands and the levee fill is removed. The cessation of farming and maintenance of the agricultural wetlands will also provide a significant lift due to increased plant diversity and associated productivity.

Appendix A.

Figures

- Figure 1: Location Map
- Figure 2a-b: Pre Restoration Wetland Habitat Types and HGM Assessment Areas
- Figure 3: Post Restoration Wetland Habitat Types



MCS Corp

3895 SW 94th Ave
Portland, OR 97225

latimer environmental LLC

35 SE 76th Ave
Portland OR 97215
503-208-3706

CLIENT:

Northwest Hydrological Consultants

PROJECT:

Tillamook Southern Flow Corridor

TITLE:

Location Map and USGS Topographic Map

LEGEND:

Study Area

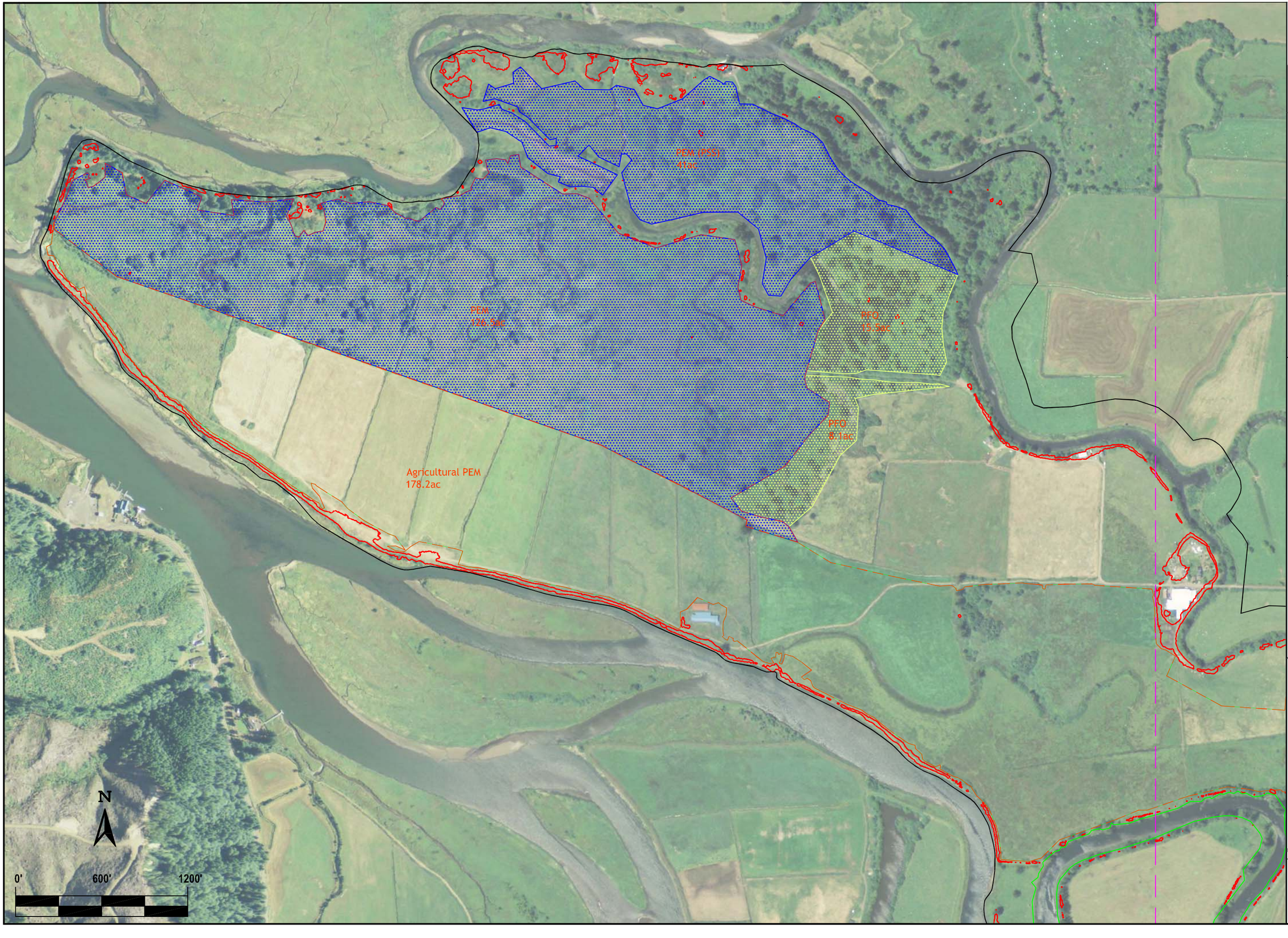
N

0' FEET 8800'

Plotted: 5/30/2015

FIGURE NO.

1



MCS Corp
3895 SW 94th Ave
Portland, OR 97225

CLIENT:

Northwest Hydrological Consultants

PROJECT:

Tillamook Southern Flow Corridor

TITLE:

Pre and Post Restoration Habitat Types

LEGEND:

- Highest Observed Tide (11.9 feet)
- Study Area

Pre-Restoration
All are River-Sourced Tidal Wetlands

- Non-agricultural Emergent
- Agricultural Emergent
- Forested
- Assessment Units
- Matchlines

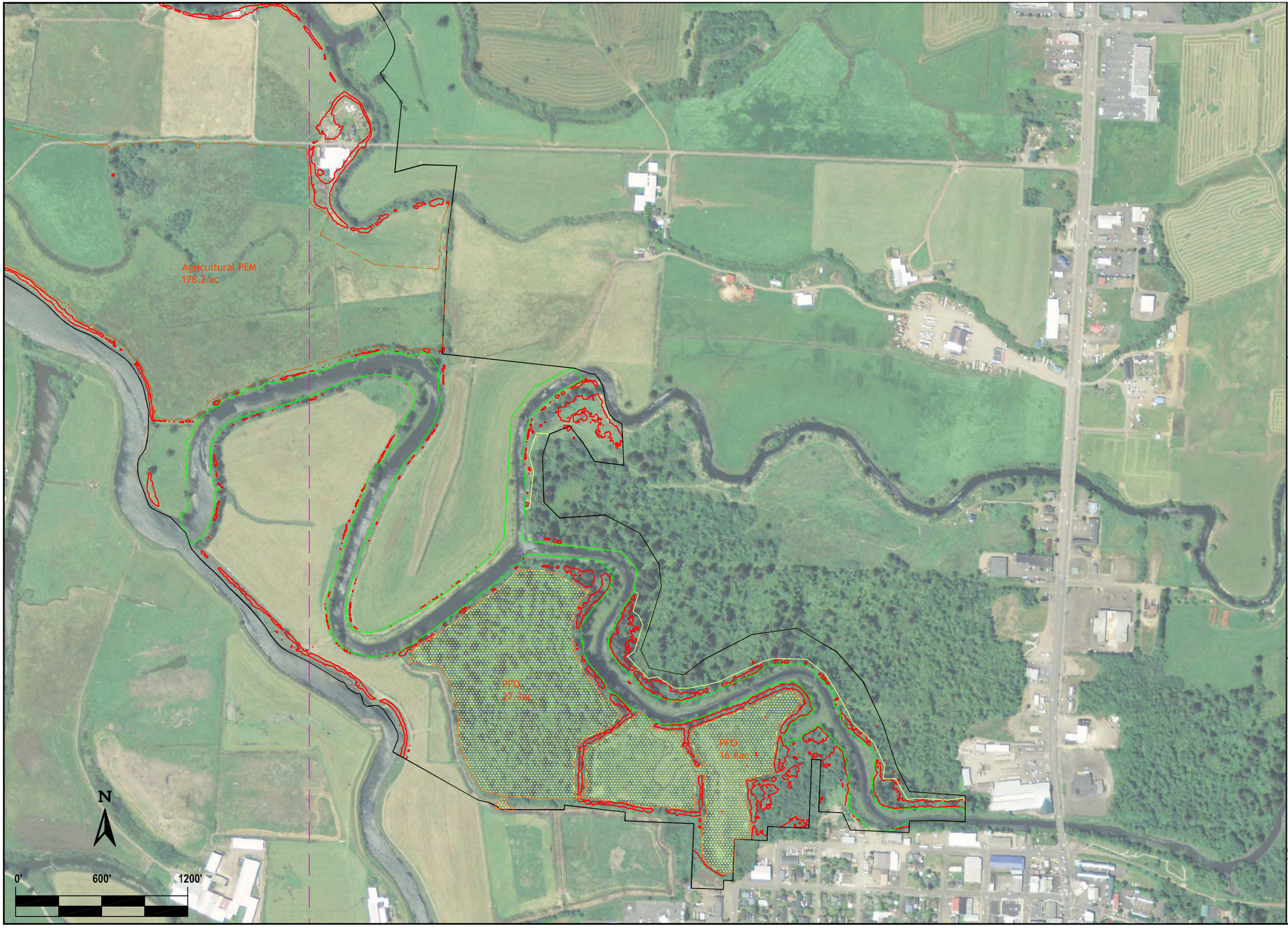
DWG DATA:

The study area boundary was determined by FEMA and Tillamook County and was professionally land surveyed by Tillamook County to an approximate accuracy of 0.01 ft and digitally mapped using AutoCAD®.

Plotted: 6/19/2015 Revised:

FIGURE NO.

2a



MCS Corp
3895 SW 94th Ave
Portland, OR 97225

CLIENT:

Northwest Hydrological Consultants

PROJECT:

Tillamook Southern Flow Corridor

TITLE:

Pre-Restoration Wetland Habitat Types and HGM Assessment Areas

LEGEND:

- Highest Observed Tide (11.9 feet)
- Study Area

Pre-Restoration
All are River-Sourced Tidal Wetlands

- Non-agricultural Emergent
- Agricultural Emergent
- Forested
- Assessment Units
- Matchlines

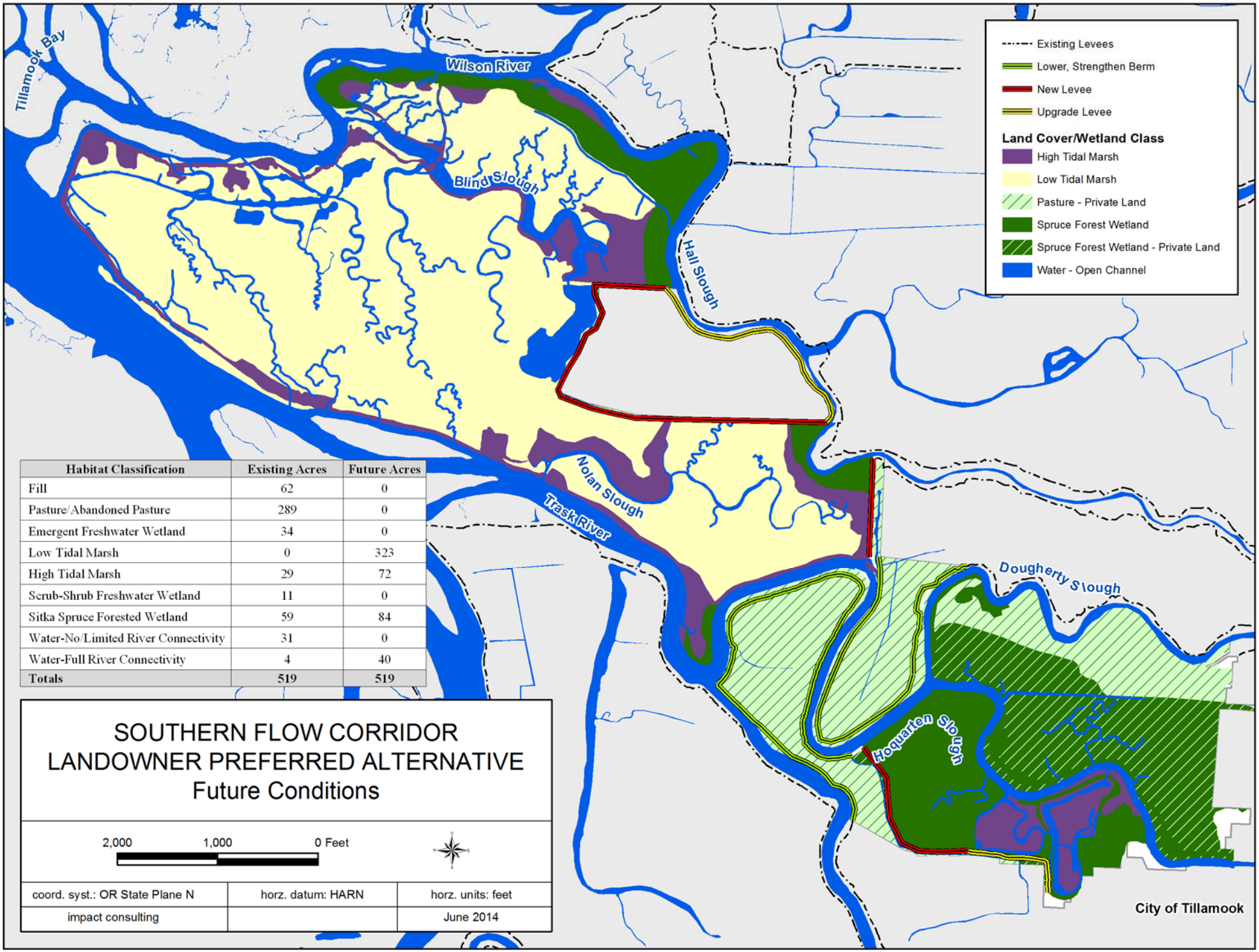
DWG DATA:

The study area boundary was determined by FEMA and Tillamook County and was professionally land surveyed by Tillamook County to an approximate accuracy of 0.01 ft and digitally mapped using AutoCAD®.

Plotted: 6/19/2015 Revised:

FIGURE NO.

2b



Habitat Classification	Existing Acres	Future Acres
Fill	62	0
Pasture/Abandoned Pasture	289	0
Emergent Freshwater Wetland	34	0
Low Tidal Marsh	0	323
High Tidal Marsh	29	72
Scrub-Shrub Freshwater Wetland	11	0
Sitka Spruce Forested Wetland	59	84
Water-No/Limited River Connectivity	31	0
Water-Full River Connectivity	4	40
Totals	**519**	**519**

SOUTHERN FLOW CORRIDOR
LANDOWNER PREFERRED ALTERNATIVE
Future Conditions

2,000 1,000 0 Feet

coord. syst.: OR State Plane N	horz. datum: HARN	horz. units: feet
impact consulting		June 2014

Appendix B.

Assessment Data Forms

Calculator for Indices of HGM Tidal Wetland Functions, Values, Risk, and Integrity

INPUTS FOR RISK & FUNCTION INDICATORS (numbered items 1-55, columns C &D)

	A1. Risk Indicators (see Data Form in Guidebook)	Score	Certainty	Weight (0-1, optional)
1	BuffAlt	0.10	0.00	1.00
2	ChemIn	0.33	0.00	1.00
3	NutrIn	0.66	0.00	1.00
4	SedShed	0.01	0.00	1.00
5	SoilX	1.00	0.00	1.00
6	DikeDry	1.00	0.00	1.00
7	DikeWet	0.33	0.00	1.00
8	FootVis	0.33	0.00	1.00
9	Boats	1.00	0.00	1.00
10	HomeDis	0.01	0.00	1.00
11	RoadX	0.01	0.00	1.00
12	Invas	1.00	0.00	1.00
13	Instabil	0.40	0.00	1.00
	A2. Measured Wetland Integrity Indicators	**Calculated automatically. Must first enter data in T**		
		Score	Certainty	Weight (0-1, optional)
14	RatioC	0.20	0.00	1.00
15	SpPerQd	0.01	0.00	1.00
16	SpDeficit	0.01	0.00	1.00
17	All90PC	1.00	0.00	1.00
18	DomDef	0.01	0.00	1.00
19	NN20PC	1.00	0.00	1.00
20	Nndef	1.00	0.00	1.00
21	AnnSp	0.75	0.00	1.00
22	TapSp	1.00	0.00	1.00
23	StolSp	1.00	0.00	1.00
24	TuftSp	0.01	0.00	1.00

B1. Function Indicators (see Data Form in Guidebook)

25	Flood	0.01	0.00	
26	Shade	0.50	0.00	
27	ShadeLM		0.00	
28	Bare	0.01	0.00	
29	Pannes	0.01	0.00	
30	TranAng	0.01	0.00	
31	UpEdge	1.00	0.00	
32	LWDchan	0.01	0.00	
33	LWDmarsh	0.01	0.00	
34	LWDline	0.01	0.00	
35	TribL	0.01	0.00	0.00
36	Fresh	0.01	0.00	
37	Width	1.00	0.00	
38	MudW	0.01	0.00	
39	Roost		0.00	
40	Island	1.00	0.00	
41	Fetch	0.01	0.00	
42	Pform	0.01	0.00	
43	FormDiv	0.40	0.00	
44	Alder	0.01	0.00	
45	Eelg	0.01	0.00	
46	SoilFine	1.00	0.00	1.00
47	EstuSal	0.66	0.00	
48	SeaJoin	1.00	0.00	
49	Estu%WL	0.60	0.00	

B2. Measurement-based Indicators of Function

50	WetField%	1.00	0.00		
51	BuffCov	0.50	0.00	0.00	The value in colu BuffCov when us
52	BlindL	0.80	0.00		
53	Exits	0.01	0.00		In E62 enter the a
54	Jcts	0.50	0.00		In E63 enter the a
55	FreshSpot	0.50	0.00		

135	NFW & LBM value indicator			1.00
136	NFW & LBM value indicator			1.00
137	NFW & LBM value indicator			1.00
138	NFW & LBM value indicator			1.00
139	NFW & LBM value indicator			1.00
140	NFW & LBM value indicator			1.00
141	BC value indicator			1.00
142	BC value indicator			1.00
143	BC value indicator			1.00
144	BC value indicator			1.00
145	BC value indicator			1.00
146	OTHER value indicator			1.00
147	OTHER value indicator			1.00
148	OTHER value indicator			1.00
149	OTHER value indicator			1.00
150	OTHER value indicator			1.00
151	OTHER value indicator			1.00

TABLE A2a. CHANNEL DATA INPUTS & COMPUTATIONS (RatioC)

In columns C and D, enter your data for incision and topwidth as measured at each of the 5 locations prescribed in the Guidebook. Columns F, G, and H will compute automatically. Leave blank if wetland contains no tidal channels.

	Incision (in meters)	Topwidth (in meters)	Actual Ratio*	Expected Ratio
Location 1 (lowest)	1.83	18.30	2.85	2.36
Location 2	1.83	18.30	2.85	2.00
Location 3	1.22	18.30	3.71	2.11
Location 4	0.61	18.30	6.22	2.34
Location 5 (highest)	0.61	4.60	3.62	3.25

If measured in feet, you must multiply by 0.3048 before inserting number in cells above. mean =

TABLE A2b. SPECIES PERCENT-COVER INPUTS & BOTANICAL COMPUTATIONS

TransL	Length (m) of your transects (total) =		in meters
Positn	Estuarine position of this wetland. Indicate: 1= lower, 2= mid, 3= upper.		Estimated as a proportion of the water distance bet
HGM	Predominant HGM subclass. Indicate: 1= Marine-sourced LOW marsh; 2= Marine-sourced HIGH marsh; 3= River-sourced Tidal		

Calculator for Indices of HGM Tidal Wetland Functions, Values, Risk, and Integrity

INPUTS FOR RISK & FUNCTION INDICATORS (numbered items 1-55, columns C &D)

	A1. Risk Indicators (see Data Form in Guidebook)	Score	Certainty	Weight (0-1, optional)
1	BuffAlt	0.10	0.00	1.00
2	ChemIn	0.01	0.00	1.00
3	NutrIn	0.01	0.00	1.00
4	SedShed	0.01	0.00	1.00
5	SoilX	0.10	0.00	1.00
6	DikeDry	0.66	0.00	1.00
7	DikeWet	0.33	0.00	1.00
8	FootVis	0.33	0.00	1.00
9	Boats	0.40	0.00	1.00
10	HomeDis	0.50	0.00	1.00
11	RoadX	0.01	0.00	1.00
12	Invas	1.00	0.00	1.00
13	Instabil	0.30	0.00	1.00
	A2. Measured Wetland Integrity Indicators	**Calculated automatically. Must first enter data in T**		
		Score	**Certainty**	Weight (0-1, optional)
14	RatioC	0.40	0.00	1.00
15	SpPerQd	0.01	0.00	1.00
16	SpDeficit	0.01	0.00	1.00
17	All90PC	1.00	0.00	1.00
18	DomDef	0.01	0.00	1.00
19	NN20PC	1.00	0.00	1.00
20	Nndef	1.00	0.00	1.00
21	AnnSp	0.50	0.00	1.00
22	TapSp	1.00	0.00	1.00
23	StolSp	1.00	0.00	1.00
24	TuftSp	0.01	0.00	1.00

B1. Function Indicators (see Data Form in Guidebook)

25	Flood	0.01	0.00	
26	Shade	1.00	0.00	
27	ShadeLM	0.00	0.00	
28	Bare	0.25	0.00	
29	Pannes	0.01	0.00	
30	TranAng	0.01	0.00	
31	UpEdge	1.00	0.00	
32	LWDchan	0.01	0.00	
33	LWDmarsh	0.25	0.00	
34	LWDline	0.01	0.00	
35	TribL	0.01	0.00	0.00
36	Fresh	0.10	0.00	
37	Width	1.00	0.00	
38	MudW	0.10	0.00	
39	Roost		0.00	
40	Island	1.00	0.00	
41	Fetch	0.01	0.00	
42	Pform	0.50	0.00	
43	FormDiv	0.90	0.00	
44	Alder	0.01	0.00	
45	Eelg	0.01	0.00	
46	SoilFine	1.00	0.00	1.00
47	EstuSal	0.66	0.00	
48	SeaJoin	1.00	0.00	
49	Estu%WL	0.60	0.00	

B2. Measurement-based Indicators of Function

50	WetField%	1.00	0.00		
51	BuffCov	0.50	0.00	0.00	The value in colu BuffCov when us
52	BlindL	1.00	0.00		
53	Exits	0.01	0.00	0.00	In E62 enter the a
54	Jcts	0.50	0.00	3.00	In E63 enter the a
55	FreshSpot	0.50	0.00		

135	NFW & LBM value indicator			1.00
136	NFW & LBM value indicator			1.00
137	NFW & LBM value indicator			1.00
138	NFW & LBM value indicator			1.00
139	NFW & LBM value indicator			1.00
140	NFW & LBM value indicator			1.00
141	BC value indicator			1.00
142	BC value indicator			1.00
143	BC value indicator			1.00
144	BC value indicator			1.00
145	BC value indicator			1.00
146	OTHER value indicator			1.00
147	OTHER value indicator			1.00
148	OTHER value indicator			1.00
149	OTHER value indicator			1.00
150	OTHER value indicator			1.00
151	OTHER value indicator			1.00

TABLE A2a. CHANNEL DATA INPUTS & COMPUTATIONS (RatioC)

In columns C and D, enter your data for incision and topwidth as measured at each of the 5 locations prescribed in the Guidebook. Columns F, G, and H will compute automatically. Leave blank if wetland contains no tidal channels.

	Incision (in meters)	Topwidth (in meters)	Actual Ratio*	Expected Ratio
Location 1 (lowest)	2.44	33.53	2.87	2.36
Location 2	2.44	16.76	2.33	2.11
Location 3	1.83	10.67	2.36	2.11
Location 4	2.10	19.81	2.68	1.95
Location 5 (highest)	0.61	12.20	5.42	3.25

If measured in feet, you must multiply by 0.3048 before inserting number in cells above. mean =

TABLE A2b. SPECIES PERCENT-COVER INPUTS & BOTANICAL COMPUTATIONS

TransL	Length (m) of your transects (total) =		in meters
Positn	Estuarine position of this wetland. Indicate: 1= lower, 2= mid, 3= upper.		Estimated as a proportion of the water distance bet
HGM	Predominant HGM subclass. Indicate: 1= Marine-sourced LOW marsh; 2= Marine-sourced HIGH marsh; 3= River-sourced Tidal		

Pre-Restoration Forested Wetland - West

Calculator for Indices of HGM Tidal Wetland Functions, Values, Risk, and Integrity

INPUTS FOR RISK & FUNCTION INDICATORS (numbered items 1-55, columns C &D)

	A1. Risk Indicators (see Data Form in Guidebook)	Score	Certainty	Weight (0-1, optional)
1	BuffAlt	0.20	0.00	1.00
2	ChemIn	0.33	0.00	1.00
3	NutrIn	0.33	0.00	1.00
4	SedShed	0.01	0.00	1.00
5	SoilX	0.10	0.00	1.00
6	DikeDry	0.66	0.00	1.00
7	DikeWet	0.33	0.00	1.00
8	FootVis	0.33	0.00	1.00
9	Boats	0.01	0.00	1.00
10	HomeDis	0.50	0.00	1.00
11	RoadX	0.01	0.00	1.00
12	Invas	1.00	0.00	1.00
13	Instabil	0.30	0.00	1.00

A2. Measured Wetland Integrity Indicators **Calculated automatically. Must first enter data in T**

		Score	Certainty	Weight (0-1, optional)
14	RatioC	0.20	0.00	1.00
15	SpPerQd	0.01	0.00	1.00
16	SpDeficit	0.01	0.00	1.00
17	All90PC	1.00	0.00	1.00
18	DomDef	0.01	0.00	1.00
19	NN20PC	1.00	0.00	1.00
20	Nndef	1.00	0.00	1.00
21	AnnSp	0.75	0.00	1.00
22	TapSp	1.00	0.00	1.00
23	StolSp	1.00	0.00	1.00
24	TuftSp	0.01	0.00	1.00

B1. Function Indicators (see Data Form in Guidebook)

25	Flood	0.70	0.00	
26	Shade	1.00	0.00	
27	ShadeLM		0.00	
28	Bare	0.01	0.00	
29	Pannes	0.01	0.00	
30	TranAng	0.01	0.00	
31	UpEdge	0.75	0.00	
32	LWDchan	0.50	0.00	
33	LWDmarsh	0.25	0.00	
34	LWDline	0.01	0.00	
35	TribL	0.01	0.00	0.00
36	Fresh	0.10	0.00	
37	Width	1.00	0.00	
38	MudW	0.01	0.00	
39	Roost		0.00	
40	Island	1.00	0.00	
41	Fetch	0.01	0.00	
42	Pform	0.25	0.00	
43	FormDiv	1.00	0.00	
44	Alder	0.01	0.00	
45	Eelg	0.01	0.00	
46	SoilFine	1.00	0.00	1.00
47	EstuSal	0.66	0.00	
48	SeaJoin	1.00	0.00	
49	Estu%WL	0.60	0.00	

B2. Measurement-based Indicators of Function

50	WetField%	1.00	0.00		
51	BuffCov	0.50	0.00	0.00	The value in colu BuffCov when us
52	BlindL	0.01	0.00		
53	Exits	0.01	0.00		In E62 enter the a
54	Jcts	0.01	0.00		In E63 enter the a
55	FreshSpot	1.00	0.00		

135	NFW & LBM value indicator			1.00
136	NFW & LBM value indicator			1.00
137	NFW & LBM value indicator			1.00
138	NFW & LBM value indicator			1.00
139	NFW & LBM value indicator			1.00
140	NFW & LBM value indicator			1.00
141	BC value indicator			1.00
142	BC value indicator			1.00
143	BC value indicator			1.00
144	BC value indicator			1.00
145	BC value indicator			1.00
146	OTHER value indicator			1.00
147	OTHER value indicator			1.00
148	OTHER value indicator			1.00
149	OTHER value indicator			1.00
150	OTHER value indicator			1.00
151	OTHER value indicator			1.00

TABLE A2a. CHANNEL DATA INPUTS & COMPUTATIONS (RatioC)

In columns C and D, enter your data for incision and topwidth as measured at each of the 5 locations prescribed in the Guidebook. Columns F, G, and H will compute automatically. Leave blank if wetland contains no tidal channels.

	Incision (in meters)	Topwidth (in meters)	Actual Ratio*	Expected Ratio
Location 1 (lowest)	4.57	4.57	1.00	2.36
Location 2	1.52	1.83	1.13	2.00
Location 3			#DIV/0!	2.11
Location 4			#DIV/0!	2.34
Location 5 (highest)			#DIV/0!	3.25

If measured in feet, you must multiply by 0.3048 before inserting number in cells above. mean =

TABLE A2b. SPECIES PERCENT-COVER INPUTS & BOTANICAL COMPUTATIONS

TransL	Length (m) of your transects (total) =		in meters
Positn	Estuarine position of this wetland. Indicate: 1= lower, 2= mid, 3= upper.		Estimated as a proportion of the water distance bet
HGM	Predominant HGM subclass. Indicate: 1= Marine-sourced LOW marsh; 2= Marine-sourced HIGH marsh; 3= River-sourced Tidal		

Calculator for Indices of HGM Tidal Wetland Functions, Values, Risk, and Integrity

INPUTS FOR RISK & FUNCTION INDICATORS (numbered items 1-55, columns C &D)

	A1. Risk Indicators (see Data Form in Guidebook)	Score	Certainty	Weight (0-1, optional)
1	BuffAlt	0.20	0.00	1.00
2	ChemIn	0.33	0.00	1.00
3	NutrIn	0.33	0.00	1.00
4	SedShed	0.01	0.00	1.00
5	SoilX	0.20	0.00	1.00
6	DikeDry	0.66	0.00	1.00
7	DikeWet	0.33	0.00	1.00
8	FootVis	0.33	0.00	1.00
9	Boats	0.01	0.00	1.00
10	HomeDis	0.75	0.00	1.00
11	RoadX	0.01	0.00	1.00
12	Invas	1.00	0.00	1.00
13	Instabil	0.30	0.00	1.00

A2. Measured Wetland Integrity Indicators **Calculated automatically. Must first enter data in T**

		Score	Certainty	Weight (0-1, optional)
14	RatioC	0.20	0.00	1.00
15	SpPerQd	0.01	0.00	1.00
16	SpDeficit	0.01	0.00	1.00
17	All90PC	1.00	0.00	1.00
18	DomDef	0.01	0.00	1.00
19	NN20PC	1.00	0.00	1.00
20	Nndef	1.00	0.00	1.00
21	AnnSp	0.75	0.00	1.00
22	TapSp	1.00	0.00	1.00
23	StolSp	1.00	0.00	1.00
24	TuftSp	0.01	0.00	1.00

B1. Function Indicators (see Data Form in Guidebook)

25	Flood	0.60	0.00	
26	Shade	1.00	0.00	
27	ShadeLM		0.00	
28	Bare	0.01	0.00	
29	Pannes	0.01	0.00	
30	TranAng	0.01	0.00	
31	UpEdge	0.75	0.00	
32	LWDchan	1.00	0.00	
33	LWDmarsh	0.25	0.00	
34	LWDline	0.01	0.00	
35	TribL	0.01	0.00	0.00
36	Fresh	0.10	0.00	
37	Width	1.00	0.00	
38	MudW	0.01	0.00	
39	Roost		0.00	
40	Island	1.00	0.00	
41	Fetch	0.01	0.00	
42	Pform	0.50	0.00	
43	FormDiv	1.00	0.00	
44	Alder	0.01	0.00	
45	Eelg	0.01	0.00	
46	SoilFine	1.00	0.00	1.00
47	EstuSal	0.66	0.00	
48	SeaJoin	1.00	0.00	
49	Estu%WL	0.60	0.00	

B2. Measurement-based Indicators of Function

50	WetField%	1.00	0.00		
51	BuffCov	0.35	0.00	0.00	The value in colu BuffCov when us
52	BlindL	0.20	0.00		
53	Exits	0.01	0.00		In E62 enter the a
54	Jcts	0.50	0.00		In E63 enter the a
55	FreshSpot	1.00	0.00		

135	NFW & LBM value indicator			1.00
136	NFW & LBM value indicator			1.00
137	NFW & LBM value indicator			1.00
138	NFW & LBM value indicator			1.00
139	NFW & LBM value indicator			1.00
140	NFW & LBM value indicator			1.00
141	BC value indicator			1.00
142	BC value indicator			1.00
143	BC value indicator			1.00
144	BC value indicator			1.00
145	BC value indicator			1.00
146	OTHER value indicator			1.00
147	OTHER value indicator			1.00
148	OTHER value indicator			1.00
149	OTHER value indicator			1.00
150	OTHER value indicator			1.00
151	OTHER value indicator			1.00

TABLE A2a. CHANNEL DATA INPUTS & COMPUTATIONS (RatioC)

In columns C and D, enter your data for incision and topwidth as measured at each of the 5 locations prescribed in the Guidebook. Columns F, G, and H will compute automatically. Leave blank if wetland contains no tidal channels.

	Incision (in meters)	Topwidth (in meters)	Actual Ratio*	Expected Ratio
Location 1 (lowest)	4.57	9.10	1.35	2.36
Location 2	2.44	3.05	1.13	2.00
Location 3	2.44	3.66	1.25	2.11
Location 4	1.22	20.42	3.84	2.34
Location 5 (highest)	0.61	9.14	4.86	3.25

If measured in feet, you must multiply by 0.3048 before inserting number in cells above. mean =

TABLE A2b. SPECIES PERCENT-COVER INPUTS & BOTANICAL COMPUTATIONS

TransL	Length (m) of your transects (total) =		in meters
Positn	Estuarine position of this wetland. Indicate: 1= lower, 2= mid, 3= upper.		Estimated as a proportion of the water distance bet
HGM	Predominant HGM subclass. Indicate: 1= Marine-sourced LOW marsh; 2= Marine-sourced HIGH marsh; 3= River-sourced Tidal		

Post-Restoration Agricultural PEM Wetland

Calculator for Indices of HGM Tidal Wetland Functions, Values, Risk, and Integrity

INPUTS FOR RISK & FUNCTION INDICATORS (numbered items 1-55, columns C &D)

	A1. Risk Indicators (see Data Form in Guidebook)	Score	Certainty	Weight (0-1, optional)
1	BuffAlt	0.10	0.00	1.00
2	ChemIn	0.01	0.00	1.00
3	NutrIn	0.01	0.00	1.00
4	SedShed	0.01	0.00	1.00
5	SoilX	0.20	0.00	1.00
6	DikeDry	0.01	0.00	1.00
7	DikeWet	1.00	0.00	1.00
8	FootVis	0.01	0.00	1.00
9	Boats	0.60	0.00	1.00
10	HomeDis	0.75	0.00	1.00
11	RoadX	0.01	0.00	1.00
12	Invas	1.00	0.00	1.00
13	Instabil	0.40	0.00	1.00
	A2. Measured Wetland Integrity Indicators	**Calculated automatically. Must first enter data in T**		
		Score	Certainty	Weight (0-1, optional)
14	RatioC	0.20	0.00	1.00
15	SpPerQd	0.01	0.00	1.00
16	SpDeficit	0.01	0.00	1.00
17	All90PC	1.00	0.00	1.00
18	DomDef	0.01	0.00	1.00
19	NN20PC	1.00	0.00	1.00
20	Nndef	1.00	0.00	1.00
21	AnnSp	0.75	0.00	1.00
22	TapSp	1.00	0.00	1.00
23	StolSp	1.00	0.00	1.00
24	TuftSp	0.01	0.00	1.00

B1. Function Indicators (see Data Form in Guidebook)

25	Flood	0.80	0.00	
26	Shade	0.50	0.00	
27	ShadeLM	0.01	0.00	
28	Bare	0.50	0.00	
29	Pannes	0.01	0.00	
30	TranAng	0.01	0.00	
31	UpEdge	0.25	0.00	
32	LWDchan	1.00	0.00	
33	LWDmarsh	0.25	0.00	
34	LWDline	0.50	0.00	
35	TribL	0.01	0.00	0.00
36	Fresh	0.01	0.00	
37	Width	1.00	0.00	
38	MudW	0.50	0.00	
39	Roost	0.25	0.00	
40	Island	1.00	0.00	
41	Fetch	0.80	0.00	
42	Pform	0.25	0.00	
43	FormDiv	0.20	0.00	
44	Alder	0.01	0.00	
45	Eelg	0.01	0.00	
46	SoilFine	1.00	0.00	1.00
47	EstuSal	0.66	0.00	
48	SeaJoin	1.00	0.00	
49	Estu%WL	0.60	0.00	

B2. Measurement-based Indicators of Function

50	WetField%	1.00	0.00		
51	BuffCov	0.50	0.00	0.00	The value in colu BuffCov when us
52	BlindL	1.00	0.00		
53	Exits	1.00	0.00		In E62 enter the a
54	Jcts	1.00	0.00		In E63 enter the a
55	FreshSpot	0.01	0.00		

135	NFW & LBM value indicator			1.00
136	NFW & LBM value indicator			1.00
137	NFW & LBM value indicator			1.00
138	NFW & LBM value indicator			1.00
139	NFW & LBM value indicator			1.00
140	NFW & LBM value indicator			1.00
141	BC value indicator			1.00
142	BC value indicator			1.00
143	BC value indicator			1.00
144	BC value indicator			1.00
145	BC value indicator			1.00
146	OTHER value indicator			1.00
147	OTHER value indicator			1.00
148	OTHER value indicator			1.00
149	OTHER value indicator			1.00
150	OTHER value indicator			1.00
151	OTHER value indicator			1.00

TABLE A2a. CHANNEL DATA INPUTS & COMPUTATIONS (RatioC)

In columns C and D, enter your data for incision and topwidth as measured at each of the 5 locations prescribed in the Guidebook. Columns F, G, and H will compute automatically. Leave blank if wetland contains no tidal channels.

	Incision (in meters)	Topwidth (in meters)	Actual Ratio*	Expected Ratio
Location 1 (lowest)	1.83	18.30	2.85	2.36
Location 2	1.83	18.30	2.85	2.00
Location 3	1.22	18.30	3.71	2.11
Location 4	0.61	18.30	6.22	2.34
Location 5 (highest)	0.61	4.60	3.62	3.25

If measured in feet, you must multiply by 0.3048 before inserting number in cells above. mean =

TABLE A2b. SPECIES PERCENT-COVER INPUTS & BOTANICAL COMPUTATIONS

TransL	Length (m) of your transects (total) =		in meters
Positn	Estuarine position of this wetland. Indicate: 1= lower, 2= mid, 3= upper.		Estimated as a proportion of the water distance bet
HGM	Predominant HGM subclass. Indicate: 1= Marine-sourced LOW marsh; 2= Marine-sourced HIGH marsh; 3= River-sourced Tidal		

Calculator for Indices of HGM Tidal Wetland Functions, Values, Risk, and Integrity

INPUTS FOR RISK & FUNCTION INDICATORS (numbered items 1-55, columns C &D)

	A1. Risk Indicators (see Data Form in Guidebook)	Score	Certainty	Weight (0-1, optional)
1	BuffAlt	0.10	0.00	1.00
2	ChemIn	0.01	0.00	1.00
3	NutrIn	0.01	0.00	1.00
4	SedShed	0.01	0.00	1.00
5	SoilX	0.01	0.00	1.00
6	DikeDry	0.01	0.00	1.00
7	DikeWet	1.00	0.00	1.00
8	FootVis	0.01	0.00	1.00
9	Boats	0.60	0.00	1.00
10	HomeDis	0.50	0.00	1.00
11	RoadX	0.01	0.00	1.00
12	Invas	1.00	0.00	1.00
13	Instabil	0.40	0.00	1.00
	A2. Measured Wetland Integrity Indicators	**Calculated automatically. Must first enter data in T**		
		Score	Certainty	Weight (0-1, optional)
14	RatioC	0.40	0.00	1.00
15	SpPerQd	0.01	0.00	1.00
16	SpDeficit	0.01	0.00	1.00
17	All90PC	1.00	0.00	1.00
18	DomDef	0.01	0.00	1.00
19	NN20PC	1.00	0.00	1.00
20	Nndef	1.00	0.00	1.00
21	AnnSp	0.75	0.00	1.00
22	TapSp	1.00	0.00	1.00
23	StolSp	1.00	0.00	1.00
24	TuftSp	0.01	0.00	1.00

B1. Function Indicators (see Data Form in Guidebook)

25	Flood	0.80	0.00	
26	Shade	0.50	0.00	
27	ShadeLM	0.01	0.00	
28	Bare	0.50	0.00	
29	Pannes	0.01	0.00	
30	TranAng	0.01	0.00	
31	UpEdge	0.25	0.00	
32	LWDchan	1.00	0.00	
33	LWDmarsh	0.75	0.00	
34	LWDline	0.50	0.00	
35	TribL	0.01	0.00	0.00
36	Fresh	0.10	0.00	
37	Width	1.00	0.00	
38	MudW	0.50	0.00	
39	Roost	0.25	0.00	
40	Island	1.00	0.00	
41	Fetch	0.80	0.00	
42	Pform	0.50	0.00	
43	FormDiv	0.20	0.00	
44	Alder	0.01	0.00	
45	Eelg	0.01	0.00	
46	SoilFine	1.00	0.00	1.00
47	EstuSal	0.66	0.00	
48	SeaJoin	1.00	0.00	
49	Estu%WL	0.60	0.00	

B2. Measurement-based Indicators of Function

50	WetField%	1.00	0.00		
51	BuffCov	0.50	0.00	0.00	The value in colu BuffCov when us
52	BlindL	1.00	0.00		
53	Exits	1.00	0.00		In E62 enter the a
54	Jcts	1.00	0.00		In E63 enter the a
55	FreshSpot	0.01	0.00		

135	NFW & LBM value indicator			1.00
136	NFW & LBM value indicator			1.00
137	NFW & LBM value indicator			1.00
138	NFW & LBM value indicator			1.00
139	NFW & LBM value indicator			1.00
140	NFW & LBM value indicator			1.00
141	BC value indicator			1.00
142	BC value indicator			1.00
143	BC value indicator			1.00
144	BC value indicator			1.00
145	BC value indicator			1.00
146	OTHER value indicator			1.00
147	OTHER value indicator			1.00
148	OTHER value indicator			1.00
149	OTHER value indicator			1.00
150	OTHER value indicator			1.00
151	OTHER value indicator			1.00

TABLE A2a. CHANNEL DATA INPUTS & COMPUTATIONS (RatioC)

In columns C and D, enter your data for incision and topwidth as measured at each of the 5 locations prescribed in the Guidebook. Columns F, G, and H will compute automatically. Leave blank if wetland contains no tidal channels.

	Incision (in meters)	Topwidth (in meters)	Actual Ratio*	Expected Ratio
Location 1 (lowest)	2.44	33.53	2.87	2.36
Location 2	2.44	16.76	2.33	2.00
Location 3	1.83	10.67	2.36	2.11
Location 4	2.10	19.81	2.68	2.34
Location 5 (highest)	0.61	12.20	5.42	3.25

If measured in feet, you must multiply by 0.3048 before inserting number in cells above. mean =

TABLE A2b. SPECIES PERCENT-COVER INPUTS & BOTANICAL COMPUTATIONS

TransL	Length (m) of your transects (total) =		in meters
Positn	Estuarine position of this wetland. Indicate: 1= lower, 2= mid, 3= upper.		Estimated as a proportion of the water distance bet
HGM	Predominant HGM subclass. Indicate: 1= Marine-sourced LOW marsh; 2= Marine-sourced HIGH marsh; 3= River-sourced Tidal		

Post-Restoration Forested Wetland - West

Calculator for Indices of HGM Tidal Wetland Functions, Values, Risk, and Integrity

INPUTS FOR RISK & FUNCTION INDICATORS (numbered items 1-55, columns C &D)

	A1. Risk Indicators (see Data Form in Guidebook)	Score	Certainty	Weight (0-1, optional)
1	BuffAlt	0.20	0.00	1.00
2	ChemIn	0.01	0.00	1.00
3	NutrIn	0.01	0.00	1.00
4	SedShed	0.01	0.00	1.00
5	SoilX	0.10	0.00	1.00
6	DikeDry	0.01	0.00	1.00
7	DikeWet	0.66	0.00	1.00
8	FootVis	0.01	0.00	1.00
9	Boats	0.01	0.00	1.00
10	HomeDis	0.50	0.00	1.00
11	RoadX	0.01	0.00	1.00
12	Invas	1.00	0.00	1.00
13	Instabil	0.40	0.00	1.00

A2. Measured Wetland Integrity Indicators **Calculated automatically. Must first enter data in T**

		Score	Certainty	Weight (0-1, optional)
14	RatioC	0.20	0.00	1.00
15	SpPerQd	0.01	0.00	1.00
16	SpDeficit	0.01	0.00	1.00
17	All90PC	1.00	0.00	1.00
18	DomDef	0.01	0.00	1.00
19	NN20PC	1.00	0.00	1.00
20	Nndef	1.00	0.00	1.00
21	AnnSp	0.75	0.00	1.00
22	TapSp	1.00	0.00	1.00
23	StolSp	1.00	0.00	1.00
24	TuftSp	0.01	0.00	1.00

B1. Function Indicators (see Data Form in Guidebook)

25	Flood	0.80	0.00	
26	Shade	1.00	0.00	
27	ShadeLM		0.00	
28	Bare	0.25	0.00	
29	Pannes	0.01	0.00	
30	TranAng	0.01	0.00	
31	UpEdge	0.25	0.00	
32	LWDchan	1.00	0.00	
33	LWDmarsh	0.50	0.00	
34	LWDline	0.25	0.00	
35	TribL	0.01	0.00	0.00
36	Fresh	0.10	0.00	
37	Width	1.00	0.00	
38	MudW	0.01	0.00	
39	Roost		0.00	
40	Island	1.00	0.00	
41	Fetch	0.01	0.00	
42	Pform	0.50	0.00	
43	FormDiv	1.00	0.00	
44	Alder	0.01	0.00	
45	Eelg	0.01	0.00	
46	SoilFine	1.00	0.00	1.00
47	EstuSal	0.66	0.00	
48	SeaJoin	1.00	0.00	
49	Estu%WL	0.60	0.00	

B2. Measurement-based Indicators of Function

50	WetField%	1.00	0.00		
51	BuffCov	0.50	0.00	0.00	The value in colu BuffCov when us
52	BlindL	0.40	0.00		
53	Exits	0.25	0.00		In E62 enter the a
54	Jcts	0.50	0.00		In E63 enter the a
55	FreshSpot	0.50	0.00		

135	NFW & LBM value indicator			1.00
136	NFW & LBM value indicator			1.00
137	NFW & LBM value indicator			1.00
138	NFW & LBM value indicator			1.00
139	NFW & LBM value indicator			1.00
140	NFW & LBM value indicator			1.00
141	BC value indicator			1.00
142	BC value indicator			1.00
143	BC value indicator			1.00
144	BC value indicator			1.00
145	BC value indicator			1.00
146	OTHER value indicator			1.00
147	OTHER value indicator			1.00
148	OTHER value indicator			1.00
149	OTHER value indicator			1.00
150	OTHER value indicator			1.00
151	OTHER value indicator			1.00

TABLE A2a. CHANNEL DATA INPUTS & COMPUTATIONS (RatioC)

In columns C and D, enter your data for incision and topwidth as measured at each of the 5 locations prescribed in the Guidebook. Columns F, G, and H will compute automatically. Leave blank if wetland contains no tidal channels.

	Incision (in meters)	Topwidth (in meters)	Actual Ratio*	Expected Ratio
Location 1 (lowest)	4.57	4.57	1.00	2.36
Location 2	1.52	1.83	1.13	2.00
Location 3			#DIV/0!	2.11
Location 4			#DIV/0!	2.34
Location 5 (highest)			#DIV/0!	3.25

If measured in feet, you must multiply by 0.3048 before inserting number in cells above. mean =

TABLE A2b. SPECIES PERCENT-COVER INPUTS & BOTANICAL COMPUTATIONS

TransL	Length (m) of your transects (total) =		in meters
Positn	Estuarine position of this wetland. Indicate: 1= lower, 2= mid, 3= upper.		Estimated as a proportion of the water distance bet
HGM	Predominant HGM subclass. Indicate: 1= Marine-sourced LOW marsh; 2= Marine-sourced HIGH marsh; 3= River-sourced Tidal		

Post-Restoration Forested Wetland - East

Calculator for Indices of HGM Tidal Wetland Functions, Values, Risk, and Integrity

INPUTS FOR RISK & FUNCTION INDICATORS (numbered items 1-55, columns C &D)

	A1. Risk Indicators (see Data Form in Guidebook)	Score	Certainty	Weight (0-1, optional)
1	BuffAlt	0.10	0.00	1.00
2	ChemIn	0.01	0.00	1.00
3	NutrIn	0.01	0.00	1.00
4	SedShed	0.01	0.00	1.00
5	SoilX	0.10	0.00	1.00
6	DikeDry	0.01	0.00	1.00
7	DikeWet	0.01	0.00	1.00
8	FootVis	0.01	0.00	1.00
9	Boats	0.01	0.00	1.00
10	HomeDis	0.75	0.00	1.00
11	RoadX	0.01	0.00	1.00
12	Invas	1.00	0.00	1.00
13	Instabil	0.30	0.00	1.00

A2. Measured Wetland Integrity Indicators **Calculated automatically. Must first enter data in T**

		Score	Certainty	Weight (0-1, optional)
14	RatioC	0.20	0.00	1.00
15	SpPerQd	0.01	0.00	1.00
16	SpDeficit	0.01	0.00	1.00
17	All90PC	1.00	0.00	1.00
18	DomDef	0.01	0.00	1.00
19	NN20PC	1.00	0.00	1.00
20	Nndef	1.00	0.00	1.00
21	AnnSp	0.75	0.00	1.00
22	TapSp	1.00	0.00	1.00
23	StolSp	1.00	0.00	1.00
24	TuftSp	0.01	0.00	1.00

B1. Function Indicators (see Data Form in Guidebook)

25	Flood	0.80	0.00	
26	Shade	1.00	0.00	
27	ShadeLM	0.50	0.00	
28	Bare	0.25	0.00	
29	Pannes	0.01	0.00	
30	TranAng	0.01	0.00	
31	UpEdge	0.25	0.00	
32	LWDchan	1.00	0.00	
33	LWDmarsh	0.50	0.00	
34	LWDline	0.25	0.00	
35	TribL	0.01	0.00	0.00
36	Fresh	0.10	0.00	
37	Width	1.00	0.00	
38	MudW	0.01	0.00	
39	Roost	0.50	0.00	
40	Island	1.00	0.00	
41	Fetch	0.01	0.00	
42	Pform	0.50	0.00	
43	FormDiv	1.00	0.00	
44	Alder	0.01	0.00	
45	Eelg	0.01	0.00	
46	SoilFine	1.00	0.00	1.00
47	EstuSal	0.66	0.00	
48	SeaJoin	1.00	0.00	
49	Estu%WL	0.60	0.00	

B2. Measurement-based Indicators of Function

50	WetField%	1.00	0.00		
51	BuffCov	0.35	0.00	0.00	The value in colu BuffCov when us
52	BlindL	0.40	0.00		
53	Exits	0.25	0.00		In E62 enter the a
54	Jcts	0.50	0.00		In E63 enter the a
55	FreshSpot	0.50	0.00		

135	NFW & LBM value indicator			1.00
136	NFW & LBM value indicator			1.00
137	NFW & LBM value indicator			1.00
138	NFW & LBM value indicator			1.00
139	NFW & LBM value indicator			1.00
140	NFW & LBM value indicator			1.00
141	BC value indicator			1.00
142	BC value indicator			1.00
143	BC value indicator			1.00
144	BC value indicator			1.00
145	BC value indicator			1.00
146	OTHER value indicator			1.00
147	OTHER value indicator			1.00
148	OTHER value indicator			1.00
149	OTHER value indicator			1.00
150	OTHER value indicator			1.00
151	OTHER value indicator			1.00

TABLE A2a. CHANNEL DATA INPUTS & COMPUTATIONS (RatioC)

In columns C and D, enter your data for incision and topwidth as measured at each of the 5 locations prescribed in the Guidebook. Columns F, G, and H will compute automatically. Leave blank if wetland contains no tidal channels.

	Incision (in meters)	Topwidth (in meters)	Actual Ratio*	Expected Ratio
Location 1 (lowest)	4.57	9.10	1.35	2.36
Location 2	2.44	3.05	1.13	2.00
Location 3	2.44	3.66	1.25	2.11
Location 4	1.22	20.42	3.84	2.34
Location 5 (highest)	0.61	9.14	4.86	3.25

If measured in feet, you must multiply by 0.3048 before inserting number in cells above. mean =

TABLE A2b. SPECIES PERCENT-COVER INPUTS & BOTANICAL COMPUTATIONS

TransL	Length (m) of your transects (total) =		in meters
Positn	Estuarine position of this wetland. Indicate: 1= lower, 2= mid, 3= upper.		Estimated as a proportion of the water distance bet
HGM	Predominant HGM subclass. Indicate: 1= Marine-sourced LOW marsh; 2= Marine-sourced HIGH marsh; 3= River-sourced Tidal		

Appendix C.

Literature Citations and References

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ATTACHMENT E

Design Drawing Set