Conceptual Wetland Mitigation Plan

Smith Island Terminal
Everett, Washington

for
Cedar Grove Composting

February 7, 2014

GeoEngineers
Earth Science + Technology

Conceptual Wetland Mitigation Plan

Smith Island Terminal
Everett, Washington

for
Cedar Grove Composting

February 7, 2014

GeoEngineers

Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674

Conceptual Wetland Mitigation Plan

Smith Island Terminal
Everett, Washington

File No. 10625-001-28

February 7, 2014

Prepared for:

Cedar Grove Composting
9010 East Marginal Way South, Suite 200
Seattle, Washington 98108

Attention: John Brigham

Prepared by:

GeoEngineers, Inc.
Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674

Wayne S. Wright, PWS Principal Wetland Scientist

Jonathan Ambrose, Senior Hydrologist

FMM:JLD:WW:leh

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Copyright© 2014 by GeoEngineers, Inc. All rights reserved.

GeoEngineers

Table of Contents

1.0 EXECUTIVE SUMMARY 1

2.0 PREVIOUS STUDIES 2

3.0 SITE LOCATION AND EXISTING CONDITIONS 2

3.1. Site Drainage 3
3.2. Wetlands 4
3.3. Buffers 5

4.0 PROJECT DESCRIPTION 6

5.0 WETLAND AND DITCH IMPACTS 7

6.0 MITIGATION PLAN 8

6.1. Impact Avoidance and Minimization Sequencing 9
6.1.1. Avoidance 10
6.1.2. Minimization 10
6.2. Goals and Objectives 11
6.3. Site Selection Rational 11
6.4. Wetland Mitigation Areas 12
6.4.1. Mitigation Area 1 13
6.4.2. Mitigation Area 2 14
6.4.3. Mitigation Area 3 15
6.4.4. Mitigation Area 4 15
6.5. Mitigation Ratio Calculations 16
6.5.1. Conversion of Palustrine Wetlands to Salt Marsh Habitat 16
6.5.2. Palustrine Creation to Compensate for Palustrine Loss 16
6.5.3. Restoration of Salt Marsh Habitat to Compensate for Palustrine Wetland Loss 17
6.5.4. Total Compensatory Requirements 17
6.6. Grading Plans 18
6.7. Water Regime 18
6.8. Soils 18
6.9. Planting/Landscape Plans 19

7.0 POST CONSTRUCTION MAINTENANCE, MONITORING AND CONTINGENCY 20

7.1. Mitigation Areas Maintenance 20
7.2. Monitoring Plan 20
7.2.1. Data Collection 21
7.2.2. Performance Standards 22
7.3. Contingency Plan 22

8.0 SUMMARY AND CONCLUSIONS 23

9.0 REFERENCES 23

Table of Contents (continued)

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Smith Island Terminal Wetland Exhibit
Figure 3. Site Plan
Figure 4. Smith Island Terminal Wetlands Mitigation Area Footprint

LIST OF APPENDICES

Appendix A. Jurisdictional Determination Concurrence Letter
Appendix B. Conceptual Mitigation Plans
- Figure B-1 – Cover Sheet
- Figure B-2 – Mitigation Site Plan
- Figure B-3 – Mitigation Area 1 Site Plan and Typical Cross Section
- Figure B-4 – Mitigation Area 2 Site Plan and Typical Cross Sections
- Figure B-5 – Mitigation Area 3 Site Plan and Typical Cross Section
- Figure B-6 – Mitigation Area 4 Site Plan and Typical Cross Section
- Figure B-7 – Mitigation Area 2, Self Regulating Tide Gate Details

1.0 EXECUTIVE SUMMARY

Smith Island Terminal LLC (SIT) is proposing to re-develop properties on Smith Island in Everett, Washington (Figure 1 – Vicinity Map) owned by SIT LLC partners (Cedar Grove Composting, Inc., Miles Sand and Gravel [dba Concrete NorWest] and Sumner Capital LLC) which will be leased back to SIT for this Project.. The Project consists of the construction of two connecting rail lines of approximately 400 feet each to reach the nearby mainline of BNSF (north of Delta Jct.), along with the construction of approximately 8,400 feet of loop track (two full loops) and ancillary storage tracks and loading areas, office and maintenance building, a paved equipment storage area, stormwater collection and treatment facilities, construction of an undercrossing of the BNSF mainline to provide grade separated access for the Terminal and other properties on Smith Island, a new access road outside of the track to access Cedar Grove Composting and its Public Access trail, relocated utility poles, wetland mitigation including some reconfiguration and minor changes to the trail to accommodate bridging for dike breaches and tidal connection, buffer enhancement and a kayak launch adjacent to the re-located public access parking. To construct the Project, approximately 685,000 cubic yards of fill material will be placed throughout the site. The purpose of this fill is to elevate the existing grade to match the elevation of the BNSF main line and to meet flood protection requirements of the site.

In April of 2010, the U.S. Army Corps of Engineers (USACE) issued a letter of Jurisdictional Determination (JD) verifying the wetland delineation on the property (Appendix A). The JD concurs with studies identifying 13.8 of regulated wetlands and 1.1 of regulated ditches (Figure 2) on the property. Of these 14.9 acres of on-site wetlands, the proposed fill for the SIT will permanently impact 13.7 acres of regulated wetlands and 1.1 acres of regulated ditches (Figure 3). Of these 14.8 acres of permanently impacted wetlands, 1 acre is being converted from palustrine to tidal wetlands as part of the mitigation plan.

The current proposed mitigation plan (Figure 4) includes the creation of 1.4 acres of on-site, in-kind palustrine wetlands and the conversion and/or creation of 15.5 acres of on-site, out-of-kind intertidal salt marsh habitat, for a total of 16.9 acres of compensatory wetland mitigation. This mitigation plan draws on guidance for compensatory mitigation as outlined in the 2006 Washington State Department of Ecology (Ecology), USACE and US Environmental Protection Agency (EPA) joint report titled *Wetland Mitigation in Washington State*.

49 U.S.C. §§ 10501 (b) and 10901 grants exclusive jurisdiction to the construction of this type of facility to the Surface Transportation Board (which is a cooperating agency with the USACE) and Ecology for environmental review and generally pre-empts most state and local permit requirements. The Terminal development will comply with the substantive elements of the Everett Shoreline Master Plan and Regulations.

The project area is highlighted in the City of Everett's Shoreline Master Program (SMP) and the Salmon Overlay to the Snohomish Estuary Wetland Integration Plan (SEWIP) as an area of high potential for tidal mitigation. This mitigation plan was developed to address the limiting factors identified in the SEWIP and the Salmon Overlay and satisfies the requirements specified in those guidance documents. By focusing on the SMP and the SEWIP/Salmon Overlay guidance related to

mitigation in general and tidal restoration in particular, this mitigation plan provides an opportunity to re-establish critical habitat for endangered salmonid species in the Snohomish River estuary.

The habitat mitigation elements presented in this plan are consistent with the City of Everett's SEWIP and the Snohomish River Basin Salmon Conservation Plan (SCP) (Snohomish Basin Salmon Recovery Forum, 2005). In particular, the project would satisfy the following goals listed in the SCP:

- **Reconnect off-channel habitats** – Restore tidal marsh, reconnect large blind tidal channels and distributary sloughs isolated behind dikes, and improve connectivity among sloughs and marsh habitats.
- **Restore shoreline conditions** – Set back dikes from the channel edge, reduce shoreline armoring, and restore channel edge marshes.
- **Enhance instream structures** – Increase large woody debris and improve edge habitat conditions in marshes and along the edges of mainstem and distributary slough channels.

2.0 PREVIOUS STUDIES

On behalf of Cedar Grove Composting, GeoEngineers, Inc. (GeoEngineers) submitted multiple documents in support of earlier development proposals. Those relevant documents include but are not limited to:

- Revised Critical Areas Delineation and Mitigation Plan, dated April 20, 2011;
- Ordinary High Water Mark Determination Memorandum, dated September 1, 2011;
- Addendum to the Revised Wetland Mitigation Plan, Dated June 4, 2010;
- Wetland Delineation Addendum, dated April 16, 2010;
- Revised Mitigation Plan, Dated March 13, 2008;
- Revised Wetland and Ordinary High Water Delineation, dated March 11, 2008; and
- Biological Evaluation, dated June 27, 2008.

This Conceptual Mitigation Plan and accompanying Biological Evaluation (GeoEngineers 2014) supersede previous mitigation planning and biological evaluation documents.

3.0 SITE LOCATION AND EXISTING CONDITIONS

The Smith Island Terminal property is located on the north end of Smith Island in Everett, Washington within Section 5, Township 29N, and Range 5E (Figure 1). The 66.85-acre Project site is located within five tax parcels located on Smith Island at the mouth of the Snohomish River. The site is located within the jurisdiction of the City of Everett and zoned for industrial use. The undeveloped portions of the site are generally level and dominated by herbaceous vegetation. Cedar Grove owns and occupies the parcels to the west of the proposed SIT for the processing of organic wastes and debris. Some of the mitigation proposed for this Project will be located on Cedar Grove owned parcels that are not part of the SIT. The east-west

oriented Cedar Grove access road (36th Place NE) bisects the proposed development site. The BNSF mainline and right-of-way is located immediately east of the site. An existing Concrete Nor'West concrete batch plant is located in the southeast portion of the SIT site. An existing large-scale commercial topsoil production facility (owned by Pacific Topsoil) is located to the south of the site.

The lower Snohomish River estuary is tidally influenced and experiences mixed semi-diurnal fluctuations of river stage averaging 7.5 feet, with large tidal exchanges frequently exceeding 12 feet (USACE, online tidal datums). Tidal range along Steamboat and Union Sloughs are based on tidal datums established for Everett. The NOAA station ID for Everett is 9447659, located at Latitude 47 58.8'N, Longitude 112 13.4'W. Station tidal elevation data, presented in tidal datum and land datum NAVD 88 is presented in Table 1.

TABLE 1. TIDAL ELEVATION DATA FOR NOAA EVERETT STATION 9447659 (EPOCH 1983-2001)

Datum Plane	MLLW	NAVD 88
Highest Estimated Tide	12.96	11.19
Mean Higher High Water	10.83	9.06
Mean High Water	9.95	8.18
Mean Low Water	2.54	0.77
Mean Lower Low Water	-0.26	-2.03

Reference:
http://tidesandcurrents.noaa.gov/datums.html?id=9447729

The confluence of Union Slough and Steamboat Slough is located immediately north of the site. A dike that defines the northern boundary of the site protects Smith Island from flooding and tidal inundation. The dike was constructed circa 1870 (Wolken, 2003). Since dike construction, the site has been used primarily for logging related industry, agriculture, and most recently for composting and concrete production.

3.1. Site Drainage

Eleven micro-drainages are present at and adjacent to the project site. Nine agricultural ditches are located within the site boundaries. The northern portion of the site has a series of agricultural drainage ditches designed to convey water to a primary, longitudinal drainage ditch, identified as D2 on Figure 4. The drainage ditch system conveys water to Union Slough via a 36-inch culvert with a functional tide gate located at the northeast corner of the site. A freshwater blind slough defines the southern boundary of the site. The slough flows to Steamboat Slough through a tide gate, preventing access for marine species. The two tide gates at the site are designed to prevent the upstream flow of tidal waters into Smith Island and allow for surface water to drain during tidal elevations below the invert elevation of the tide gate.

The ditches and sloughs at the site were classified using the Washington State Department of Natural Resources (DNR) Interim Water Typing System (Washington Administrative Code [WAC] 222-16-031). The following table lists the drainages, DNR classification types, size and required City of Everett buffer widths.

TABLE 2. SITE DRAINAGE CLASSIFICATIONS

Drainage	Stream Classification Type (WAC 222-16-030)	Size (acres)	Required Buffer Width
Ditch 1	Ns	0.39	75 feet
Ditch 2	Ns	0.17	75 feet
Ditch 3	Ns	0.29	75 feet
Ditch 4	Ns	0.21	75 feet
Ditch 5	Ns	0.01	75 feet
Ditch 6	Ns	0.01	75 feet
Ditch 7	Ns	0.01	75 feet
Ditch 8[1]	Ns	0.01	75 feet
Ditch 9	Ns	0.01	75 feet
Ditch 10	Ns	0.01	75 feet
Slough 1	F	--	150 feet
Union Slough	S (Aquatic Conservancy Area)	--	200 feet
	Total Ditch Area:	**1.1 ac.**	

Detailed technical information for the onsite drainages is contained in the Revised Wetland and Ordinary High Water Delineation Report (GeoEngineers, 2008).

3.2. Wetlands

Eleven wetlands were delineated on the site (GeoEngineers 2007 and 2008) and confirmed by the USACE in a JD concurrence letter and follow up email in April 2010 (Appendix A). The wetlands on site were historically utilized for agricultural production and were harvested as recently as the fall of 2005. Wetland habitat consists of a diverse assortment of native and non-native emergent vegetation dominated by herbaceous species including vast areas of reed canary grass (*Phalaris arundinacea*), thistle (*Cirsium* spp), bentgrass (*Agrostis* spp) and creeping buttercup (*Ranunculus repens*). Wetter depressions support pockets of mannagrass and rush species (*Glyceria* and *Juncus* spp). As a result of the historical disturbance at the site, tree cover is sparse. Individual tree species include red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera*) and larger pacific crabapple (*malus fusca*). The shrub species include Himalayan blackberry (*Rubus armeniacus*) and some willow (*Salix* spp).

The onsite wetlands function primarily as habitat for passerine bird species. We have observed great blue herons (*Ardea herodias*) foraging within the wetlands at the site. Because of their closed depressional configurations and lack of surface water connections to the other waterbodies, the wetlands do not provide fish habitat. In general, the wetlands do not receive stormwater runoff because of the presence of onsite ditches and do not perform substantial water quality or flood attenuation functions.

Detailed technical information for the wetlands is contained in the Revised Wetland and Ordinary High Water Delineation (GeoEngineers, 2008). Table 3 below contains the wetland classifications, sizes and required buffer widths.

TABLE 3. WETLAND SIZES, CLASSIFICATIONS, AND RECOMMENDED BUFFER WIDTHS

Wetland	Cowardin Classification	Size (Acres)	Ecology Rating	Jurisdictional Category and Required Buffer Width (EMC 33D.090A(36))
NE1	Palustrine, emergent, semipermanently flooded	2.0	Cat. III	Cat. 2 – 100 feet
NW1	Palustrine, emergent, seasonally flooded	3.6	Cat. III	Cat. 2 – 100 feet
NW2	Palustrine, emergent, seasonally flooded	3.10	Cat. III	Cat. 2 – 100 feet
NW3	Palustrine, emergent, seasonally flooded	0.08	Cat. III	Cat. 2 – 100 feet
SW1	Palustrine, emergent, semi-permanently flooded	3.99	Cat. III	Cat. 2 – 100 feet
SW2	Palustrine, emergent, seasonally flooded	0.03	Cat. IV	Cat. 2 – 100 feet
SW3	Palustrine, emergent, seasonally flooded	0.22	Cat. IV	Cat. 2 – 100 feet
SW4	Palustrine, emergent, seasonally flooded	0.15	Cat. IV	Cat. 2 – 100 feet
SW5	Palustrine, emergent, seasonally flooded	0.04	Cat. IV	Cat. 2 – 100 feet
SE1	Palustrine, emergent, seasonally flooded	0.23	Cat. IV	Cat. 2 – 100 feet
SE2	Palustrine, emergent, seasonally flooded	0.35	Cat. IV	Cat. 2 – 100 feet
	Total Wetland Area:	**13.8 ac.**		

3.3. Buffers

The City of Everett designated wetland buffers on Smith Island are 50 feet for Category III wetlands and 25 feet for Category IV wetlands. Due to the homogeneous conditions of the Smith Island site, wetland buffers are structurally and functionally similar to the wetland areas, with similar degraded habitat. Due to the high level of disturbance within the buffers and surrounding areas from ongoing farming practices and other land use, these wetland buffers provide very low levels of function in terms of supporting the water quality, hydrologic and habitat functions provided by the wetlands.

The wetland and buffer habitats at the site are isolated because of the surrounding development and large areas of open water, which excludes most wildlife species except for birds. The paved access road through the center of the site represents a high degree of disturbance near the subject

wetlands. This road experiences a low level of traffic but severs continuity of wetland habitats on either side of the road. There is no aquatic habitat continuity to the north because the dike separates the site from the open water tidal habitat of Steamboat Slough. The BNSF railroad disrupts habitat continuity to the east. To the west, Cedar Grove Compost operates a facility with expansive impervious surface.

4.0 PROJECT DESCRIPTION

The Project consists of the construction of two connecting rail lines of approximately 400 feet each to reach the nearby mainline of BNSF (north of Delta Jct.), along with the construction of approximately 8,400 feet of loop track (two full loops) and ancillary storage tracks and loading areas, office and maintenance building, a paved equipment storage area, stormwater collection and treatment facilities, construction of an undercrossing of the BNSF mainline to provide grade separated access for the Terminal and other properties on Smith Island, a new access road outside of the track to access Cedar Grove Composting and its Public Access trail, and relocated utility poles.

The purpose of the Smith Island Rail Terminal project is to (i) meet the business needs of Cedar Grove (a partner in SIT) and the Formark Log Yard (Miller Shingle) for outgoing and incoming freight rail service and (ii) to meet the business needs of other third parties for incoming and outgoing freight rail service and (iii) provide a grade separated access to properties located west of the BNSF mainline on Smith Island. For SIT partner Cedar Grove, the implementation of connecting line-haul rail service would allow it to create transportation cost savings and to ship finished compost to more distant markets where product demand is strong, but where that demand rarely can be met by Cedar Grove because trucking is not economically feasible. This could include, for example, shipping bulk compost shipments in gondola cars to wineries in eastern Washington for agricultural use, or to mines in Montana for mine reclamation purposes. Additionally, bagged compost could be shipped in box cars to California or elsewhere to meet more distant consumer and commercial business demands (e.g., for landscaping). The line could also be used for incoming return shipments of commodities by rail originating from points where Cedar Grove compost is delivered (e.g., hay from eastern Washington to be re-loaded into export containers via the Port of Everett or the Port of Seattle). For SIT neighbor Formark/Miller Shingle the yard would provide a means to import logs from locations such as Montana at an economically practical rate for processing and export to Pacific Rim markets and other uses.

The Smith Island Rail Terminal line will also be available for third party use to meet the incoming and outgoing rail service demands of local and regional businesses and shippers including the Port of Everett, with SIT holding itself out as a common carrier to serve shippers who may wish to transport freight over its lines. The Washington State Rail Plan found that private investment in improvements to the rail infrastructure is a critical need that will benefit the economy and improve the environment by reducing reliance on trucking (which has greater air emissions than rail). BNSF has indicated there is a demand for rail trans-loading services in this area that can be addressed through this Terminal.

To expedite permitting of the Terminal, SIT proposes to complete the tidal and palustrine mitigation concurrent and partially in advance of the project. Cedar Grove has already completed the creation

of 1.4 acres of freshwater palustrine wetlands. Cedar Grove created these wetlands in the upland area immediately north of their existing composting facility in 2006. This completed wetland mitigation is identified as Mitigation Area 1 in Figure 4. Mitigation Area 1 is contiguous with 0.8 acres of palustrine wetlands that Cedar Grove also created to compensate for wetland impacts associated with the construction of their existing facility, referred to as the After-the-Fact (ATF) mitigation area. The ATF mitigation is not included in the SIT proposal or the compensatory mitigation plan for the proposed SIT. Mitigation Areas 2, 3, and 4 will commence construction in advance of the SIT, although the timing of tidal conversions will be reliant on work windows and may follow other on-site work.

In accordance with the National Pollution Discharge Elimination System (NPDES) Construction Stormwater Permit that we anticipate will be issued for the project, Cedar Grove will install a temporary construction stormwater management system. SIT will develop a Stormwater Pollution Prevention Plan (SWPPP) that details how they will manage stormwater at the site during construction of the SIT and prevent water quality issues.

SIT will begin installing fill material to pre-load the footprint of the new setback protective dike adjacent to Mitigation Area 4, per the project engineer's specifications. SIT will likely begin excavation of Mitigation area 2 and use that material for the protective dike. SIT will complete site grading within Mitigation Areas 2, 3 and 4 to achieve design elevations. Once the mitigation area grading and the new protective dike are complete, SIT will remove the existing protective dike in multiple locations to achieve tidal circulation.

Pre-loading of the site will occur concurrently with the new dike construction. Clean fill, consisting of dirt and rock, will be brought to the site by truck. Fill will be placed on the footprint for the terminal at an elevation recommended to promote settlement. Once desired settlement has been achieved, excess material will be removed and placed in other fill areas of the site for the future phases. The grade separated access will be constructed in two phases. BNSF will design and install a bridge on a portion of the mainline allowing SIT to construct a partial tunnel undercrossing to connect with the relocated access road and connect with another future access to the south to serve the properties on southwest Smith Island. Once the ground has been prepared for the Terminal the track bed will be laid. SIT will install the necessary utilities to the site including the permanent stormwater system during the final stages of site grading. Once the desired elevations of the site are achieved, loading and storage areas will be paved as needed.

5.0 WETLAND AND DITCH IMPACTS

The SIT development will impact 14.8 of the 14.9 acres of jurisdictional wetlands on the property. The project will result in the permanent loss of 12.7 acres of degraded palustrine wetlands and 1.1 acres of regulated ditches, and the conversion of 1 acre of palustrine wetlands to tidal wetlands. Cumulatively, the SIT will result in 14.8 acres of permanent impacts to these regulated areas.

The impacted wetlands are depressional wetlands with no surface water connection to the Snohomish River. The source of hydrology for the subject wetlands is the accumulation of seasonal precipitation and interface with shallow groundwater that responds to precipitation

events. A long-term groundwater study was conducted to confirm the correlation between shallow groundwater, rainfall, and tides throughout the site; results are provided in the Wetlands Delineation Report (GeoEngineers 2008). The contributing basin for the wetlands is isolated to the area west of the BNSF railway and confined by the dike that surrounds the western area of Smith Island.

Due to the close proximity of each wetland unit, their homogeneous vegetation structure and hydrologic regime, the wetlands are functionally similar. Wetland water quantity functions are moderate primarily due to the dense vegetation structure and potential to impound hydrologic input. However, the small size of the wetlands and contributing basin do not provide the opportunity for significant hydrologic function and/or water quality improvement. Habitat functions are low because of the lack of vegetation diversity and a history of human disturbance within and surrounding the wetland areas. It is unlikely that the wetlands provide substantial breeding habitat for amphibian species, such as salamanders, due to the total absence of necessary forested upland rearing habitat near the site and the brackish nature of the site due to infrequent inundation by tidal water. The on-site wetlands provide no potential habitat for fish and minimal habitat for birds other than passerine species.

The agricultural drainage ditches on the site will also be filled or modified as part of the SIT development which accounts for 1.1 acres of permanent impact to these regulated features.

6.0 MITIGATION PLAN

To offset the loss of 13.7 acres of low quality, invasive species infested palustrine emergent wetlands and 1.1 acres of drainage ditches, SIT is proposing compensatory mitigation to re-establish inter-tidal salt marsh habitat and create palustrine wetland conditions on 16.9 acres of the site. SIT is proposing mitigation using creation and conversion ratios that are consistent with the joint agency publication entitled *Wetland Mitigation in Washington State (*Ecology, 2006). The proposed mitigation ratios exceed the City of Everett requirements as outlined in the SEWIP (City of Everett, 1997) and the Salmon Overlay (City of Everett, 2001).

The City of Everett SMP requires identification of wetland functions utilizing the SEWIP (City of Everett, 1997) and Salmon Overlay. These documents contain several variations of a functional assessment methodology known as Indicator Value Assessment (IVA). The intent of the IVA methodology is to assign a value to the functions of wetlands and buffers to be lost as a result of development and to compare that values with a value of anticipated functions of the mitigation site. Because the mitigation plan is to replace palustrine wetlands with estuarine wetlands, the two sets of IVA values cannot be directly compared. Therefore, rather than rely on the IVA method, this mitigation plan focuses on the policies in the Salmon Overlay that, based on the known limiting functions at the Cedar Grove site, relate the loss of palustrine wetlands to the gain of tidal wetlands.

The SEWIP (City of Everett et al. 1997) identifies important functions for the wetlands within the Snohomish River Estuary. These functions include water quality, primary productivity, fish habitat, bird habitat, aesthetics, recreation, access to water and several other functions. The Salmon Overlay (City of Everett, 2001) identifies this area of Smith Island as water quality limited.

Specifically, the existing palustrine wetlands at the site are actively managed as agricultural lands which are frequently hayed and tilled. These activities result in the disturbance of surface soils and emergent ground cover, thus reducing the water quality function of these wetland features.

A primary goal of both the SEWIP and the Salmon Overlay is to protect and restore tidal estuarine habitat for salmonids and other fish and wildlife species. Because of the historical diking activity, the SIT site currently provides no tidal habitat inside the dikes. However, the SEWIP considers portions of this site to have considerable potential for reestablishing such habitat. Figure 5.2A of the SEWIP (City of Everett et al. 1997) identifies the proposed Mitigation Area 4 site as a "High Tidal Vegetated Marsh Objective." The mitigation proposed in this plan will achieve that objective by creating 6.8 acres of tidal marsh habitat at Mitigation Area 4 that will be accessible to fish species including anadromous salmonids.

Recreational opportunities are also limited in this area. The SEWIP identifies the installation of a raised walkway and canoe/kayak launch site with parking as two recreational goals for Ecological Management Unit (EMU) 3, which encompasses Smith Island (City of Everett et al. 1997 – Figure 2.2 and Appendix M). The proposed development and mitigation plan will increase low impact recreational use opportunities in this portion of the estuary by creating a canoe/kayak launch with a parking area. SIT will install these features in a location that will complement the existing walkway along the dike that is currently publically accessible for low impact recreation.

The existing functions of the depressional freshwater emergent wetlands at the site are highly limited, especially the water quality functions which are identified as the limiting functions for this portion of the estuary. The proposed mitigation project will restore 15.5 acres of historical estuarine habitat through creation of inter-tidal salt marsh habitat that is accessible to salmonids. The project is expected to have a long-term positive impact on water quality by removing the freshwater emergent wetlands managed for agriculture and restoring and replacing these wetlands with tidal wetland habitats that will not be disturbed by agricultural or industrial activities. The most significant benefits of the project will be the restoration of tidal habitat, which has been heavily modified in the lower Snohomish River since settlement and led to listing of endangered salmon populations. Other functions that are expected to increase as a result of this mitigation project include recreational opportunities as well as bird and other wildlife habitats.

6.1. Impact Avoidance and Minimization Sequencing

The SIT project was developed to avoid, reduce, and minimize impacts associated wherever feasible; however, impact to wetlands and ditches are unavoidable due to the project requirements, site constraints and mandatory design criteria for railroads. Throughout the continuing design and permitting process, SIT will continue to practice impact avoidance and minimization to the extent practical as described below. The proposed project follows guidelines for mitigation sequencing (avoidance, minimization and compensation) outlined in joint guidance prepared by Ecology, USACE and EPA (Ecology et. al., 2006). These criteria are sequentially applied to a proposed project to guide its design with the goal of minimizing impacts on wetland critical areas. This section addresses avoidance and specific measures to minimize potential impacts that may occur within wetlands or wetland buffers as a result of the proposed project.

6.1.1. Avoidance

The proposed rail project at the Smith Island site will result in the loss of most of the on-site wetlands, and there are no other locations or methods that would allow for the project to proceed without the wetland fill. The Alternatives Analysis describes in full detail the specific project requirements and avoidance measures evaluated during project planning (Wolken, 2014).

6.1.2. Minimization

The 2006 joint mitigation guidance states that if avoidance of wetland impacts cannot be achieved, then wetland impact minimization should be considered (Ecology et al. 2006a). Due to the extent of the planned fill activities required to achieve the necessary acreage for redevelopment, impacts to the wetland feature cannot be minimized through redesigning the project. As presented in SIT's Section 404 (b)(1) Alternatives Analysis submitted concurrently to the Corps, there are no other sites (upland or otherwise) that would allow SIT to achieve the project objectives without filling the Smith Island wetlands.

6.1.2.1. CONSTRUCTION WATER QUALITY IMPACTS

SIT will develop a SWPPP that identifies Best Management Practices (BMPs) that will be implemented during construction to minimize impacts to the adjacent water bodies. BMPs may include, but will not be limited to, the following:

- SIT will implement the approved SWPPP and they revaluate and revise the SWPPP as needed or as necessary to adjust for dynamic or unanticipated site conditions.
- Construction engineers, supervisors and field personnel will attend project environmental training prior to starting work. The training will include review of project environmental concerns, regulatory compliance, and spill prevention, response and cleanup.
- Heavy equipment will be inspected and replaced if necessary before equipment is used.
- Equipment will be washed and inspected before it is brought on-site.
- Disturbance will be limited to the smallest area practical for each specific task of the project and element under construction and will stay within the limits of clearing identified on-site plans and demarcated in the field with temporary exclusion fencing.
- Equipment refueling areas will be identified and established within the construction areas. These locations will be equipped with spill prevention and control devices.
- Adequate materials and procedures will be on-site to respond to unanticipated weather conditions or accidental releases of materials (sediment, concrete or fuel).
- Construction will be phased to reduce the time that soil is exposed to the extent possible.
- Accepted and approved erosion protection measures, primarily composted mulch, will be used to prevent soil loss.
- Soil stockpiles will be stabilized and protected with sediment retention BMPs when necessary.
- Disturbed areas will be stabilized and protected with sediment retention BMPs when necessary.

6.2. Goals and Objectives

This mitigation plan was developed to balance the need for watershed-scale estuarine restoration and future economic development within the Urban Growth Area of the City of Everett. The most significant benefit of the proposed mitigation will be to restore some of the historic ecological processes within the Snohomish River estuary since construction of the Smith Island dike. SIT's plans for creation of three intertidal salt marsh communities via dike breaching, excavation, and installation of a self-regulating tide gate is intended to restore an essential ecosystem habitat component for the rearing and refuge of salmonid species. Creation of freshwater palustrine wetlands adjacent to the created intertidal salt marsh is intended to bolster ecological functions and provide high quality habitats for resident and migratory animal species that utilize the Snohomish River estuary.

The salmonid habitat restoration emphasizes the conversion of existing degraded upland and palustrine wetland habitats to higher quality estuarine conditions closer to the historic function of this area. The overall functional benefit of these salt marsh and freshwater wetlands will far outweigh those functions provided by the existing, degraded palustrine wetlands.

Implementation of this mitigation plan will expand and enhance several high-quality habitat features including:

- High Structural diversity and interspersion of emergent, shrub and forested canopy layers for wildlife (e.g., amphibians, birds and mammals).
- Saltmarsh tidal channels with native vegetative cover that provide Essential Fish Habitat (EFH).
- Adequate buffers to protect water quality, slow floodwaters, and provide key components of habitat for aquatic and terrestrial species.
- Diversity and abundance of native plants and animals.
- Multiple hydroperiods including tidal, saturated, temporary and seasonal inundation and intermittent open water.

In summary, the goals of the mitigation plan are as follows:

- Reestablish high quality saltmarsh habitat specifically targeted for salmonids species.
- Improve hydrologic and water quality functions of the site.
- Improve overall wetland functions of existing wetlands.
- Restore tidal influence to portions of the site that were salt marsh habitat in the past, prior to conversion of the land for agricultural use.
- Provide public access to the mitigation site and improve recreational opportunities associated with the Snohomish River Estuary.

6.3. Site Selection Rational

Given the site's proximity to the tidally influenced waters of Union Slough, it is ideal for restoring estuarine wetland conditions to mitigate for permanent project impacts. This approach represents an out-of-kind mitigation strategy that provides far greater environmental benefit to the

Snohomish River estuary than more common in-kind mitigation. The degraded palustrine wetlands at the site currently provide a low level of water quality, hydrologic and habitat functions while significant amounts of high quality intertidal estuarine habitat have been lost to human development within the Snohomish River estuary over the past century. This mitigation approach seeks to restore the historic wetland and habitat conditions once found at the site.

Regulatory agencies consider this out-of-kind mitigation an appropriate compensatory strategy when impacts are isolated to low-quality, ubiquitous habitat. According to Ecology (2006):

> *Out-of-kind mitigation may also be acceptable if the functions or habitats lost are relatively abundant in the area and the compensation project will provide functions and habitats that are limited in the watershed. For instance, while estuarine wetlands provide critical habitat areas for fish and wildlife, much of the original estuarine wetlands in Washington have been lost. As a result, estuarine habitat and shoreline functions are very limited in some river basins, particularly in the Puget Sound area. Because restoration of these habitats is a priority to the agencies, it may be determined that the loss of reed canary grass pastureland in the lower watershed can be adequately offset through the removal of dikes to restore tidal flows and restore estuarine habitat.*

Specific characteristics and components of the mitigation site that provide a rationale for mitigation site selection are outlined below:

- Mitigation at this site is consistent with the restoration and enhancement goals outlined in the SEWIP completed by the City of Everett and other agencies in 1997 (City of Everett et al. 1997) Specifically, the SEWIP has a primary goal of restoring previously diked wetlands to tidal influence.
- Mitigation objectives are consistent with the overall management goals of the SEWIP Salmon Overlay such as achieving a net gain in salmonid habitat area and restoring tidal circulation and habitat structure by breaching dikes.
- The type and location of the mitigation site provides sustainable ecological benefits that are important to the functioning of the watershed.
- Mitigation at this site has a high likelihood for success due to consistent diurnal tidal hydrology and existing vegetative seed source.
- Restoration (return of an ecosystem to a close approximation of its previously existing condition) is generally the agencies' first choice for compensatory wetland mitigation because it is more feasible and sustainable and has a greater likelihood for success.

6.4. Wetland Mitigation Areas

Figure 4 provides the overall plan for the proposed mitigation, and Appendix B provides conceptual designs. The saltmarsh restoration will provide a direct habitat link to the main channels of the Snohomish River estuary and the marine environments of Puget Sound. Given the position of this proposed intertidal restoration cell within the estuary, it represents one of the last osmoregulatory refugia opportunities for out-migrating salmon prior to entering the open water marine environments of Puget Sound and the first vegetated terrestrial community for in-migrating salmonids. Fish presence monitoring by the Tulalip tribe (Nelson, date) documents high usage of

these areas by rearing salmonids; however, very little high quality estuarine habitat remains. Creation of the three proposed inter-tidal mitigation areas will provide significant rearing habitat in a key position within the Snohomish River estuary.

In an effort to achieve project goals, Cedar Grove is committed to establish mitigation in the following area, as presented on Figure 4 and Appendix B:

- Mitigation Area 1: Create 1.4 acres of freshwater wetland habitat immediately north of the Cedar Grove composting facility to compensate for the loss of palustrine wetland functions, area and values within the Cedar Grove property. This mitigation area was installed in 2006 and has since matured into a complex palustrine wetland habitat.
- Mitigation Area 2: Install a self-regulating tide gate between Mitigation Area 3 and the blind slough along the southern border of the property to restore 7.8 acres of blind slough to tidal influence.
- Mitigation Area 3: Excavate disturbed upland areas dominated by invasive plant species to create an additional 0.9 acres of intertidal salt marsh habitat within Mitigation Area 3.
- Mitigation Area 4: Remove approximately 500 feet of dike along the northern edge of Mitigation Area 4 to restore mixed semi-diurnal tidal cycling to 6.8 acres of the site Mitigation Area 1.

6.4.1. Mitigation Area 1

Mitigation Area 1 is located between the existing Cedar Grove facility and Union Slough. Cedar Grove created this freshwater wetland in 2004 in advance of a previous development proposal, which was never implemented. The project was implemented to demonstrate the restoration potential of the site and show Cedar Grove's commitment to success of the mitigation plan. The site has undergone annual monitoring and maintenance since construction. Cedar Grove excavated upland areas to create approximately 2.2 acres of freshwater wetlands. Cedar Grove designated 0.8 acres of these created wetlands to compensate for wetland impacts associated with the construction of their existing facility, leaving 1.4 acres remaining for mitigation of the current proposal.

Mitigation Area 1 is subject to multiple hydroperiods including temporarily and seasonally inundated with several permanently inundated areas. Cedar Grove created upland hummocks with the excavated material to provide greater diversity of habitat types within Mitigation Area 1. The higher level of habitat interspersion has increased the habitat functional value of Mitigation Area 1 relative to the wetlands impacted on site. Cedar Grove installed numerous habitat structures in Mitigation Area 1 such as snags, debris piles and large downed logs. The public walkway north of Mitigation Area 1 is frequently used by the public. Since 2006, various wildlife including coyote, deer, rabbits, muskrats, mice, bald eagles, red tailed hawks, ospreys, great blue heron, snakes, frogs, passerine birds and waterfowl have been observed in this area.

Cedar Grove initially planted Mitigation Area 1 in Winter 2004 and Spring-Summer 2005 with approximately 4,500 native plants including willow stakes collected from on-site. Cedar Grove installed supplemental plantings within Mitigation Area 1 in 2007. Additional work was done in Fall 2012 to remove excess invasives, augment soils with compost and install supplemental

plantings. Since construction of Mitigation Area 1, Cedar Grove has installed the following species at the site:

TABLE 4. SPECIES INSTALLED IN MITIGATION AREA 1

Sitka spruce (*Picea sitchensis*)	Maritime rush (*Scirpus maritimus*)
Pacific crabapple (*Malus fusca*)	Seashore saltgrass (*Distichlis spicata*)
Shore pine (*Pinus contorta*)	Meadow barley (*Hordeum brachyanterum*)
Oregon ash (*Fraxinus latifolia*)	Pacific Silverweed (*Potentilla pacifica*)
Red alder (*Alnus rubra)*	Slough sedge (*Carex obnupta*)
Bigleaf maple (Acer macrophyllum)	Hardstem bulrush (*Scirpus acutus*)
Douglas fir (*Pseudotsuga menziesii*)	Spreading rush (*Juncus supiniformis*)
Black cottonwood (*Populus trichocarpa*)	Yellow monkey flower (*Mimulus guttatus*)
Dogwood (*Cornus nuttallii*)	Nodding beggarstick (*Bidens cernua*)
Oceanspray (*Holodiscus discolor*)	Bigleaf sedge (*Carex amplifolia*)
Red Elderberry (*Sambucus racemosa*)	Bebb's sedge (*Carex bebbii*)
Thimbleberry (*Rubus parviflorus*)	Bristly sedge (*Carex comosa*)
Salmonberry (*Rubus spectabilis*)	Cusick's sedge (*Carex cusickii*)
Oregon grape (*Mahonia aquifolium*)	Sawbeak sedge (*Carex stipata*)
Willow (*Salix*)	Tufted hairgrass (*Deschampeda caespotiosa*)
Water plantain (*Alsma plantago aquatica*)	Bolander's rush (*Juncus bolanderi*)
Smallfruit bulrush (*Scirpus microcarpus*)	Daggerleaf rush (*Juncus ensifolius*)
Baltic rush (*Juncus balticus*)	Softstem bulrush (*Scirpus lacustris*)
Threesquare bulrush (*Scirpus americanus*)	Evergreen huckleberry (*Vaccinium ovatum*)
Indian plum (*Oemleria cerasiformis*)	Douglas aster (*Aster subspicatus*)
Rose baldhip (*Rosa gymnocarpa*)	Rose nootka (*Rosa nutkana*)
Rose pea fruit (*Rosa pisocarpa*)	Serviceberry (*Amelanchier alnifolia*)
Ninebark (*Physocarpus capitatus*)	Snow berry (*Symphoricarpos*)
Spirea (*Spiraea douglasii*)	Twinberry (*Lonicera involucrate*)
Sword fern (*Polystichum munitum*)	Western red cedar (*Thuja plicata*)
Western hemlock (*Tsuga heterophylla*)	Common spikerush (*Eleocharis palustris*)
Mannagrass (*Glyceria occidentalis*)	Softstem bulrush (*Schoenoplectus tabernaemontani*)
Common rush (*Juncus effusus*)	Broadleaf arrowhead (*Sagittaria latifolia*)

6.4.2. Mitigation Area 2

The slough along the southern border of the property will be opened up to tidal influence by installing a self-regulating two-way tide gate, which will allow tidal inflow up to a specified elevation. The elevation will be determined by selecting the highest allowable elevation that will not impact

the property to the south of the slough. The adjoining landowner is not participating in this project so the tide gate will be set at a point to ensure that the property is not impacted by flood waters from tidal re-introduction. For the purpose of developing this conceptual plan, we anticipate that tidal flow within Mitigation Area 2 will be limited to the areas below Elevation 6 feet Mean Lower Low Water (MLLW).

Prior to the introduction of tidal flux to Mitigation Area 2, Cedar Grove will regrade and enhance the geometry of the slough to optimize habitat for salmonids. This regrading will include broad benches where we expect saltmarsh vegetation to flourish and provide key habitat for rearing juvenile salmonids.

In addition to restoring tidal influence to the slough, areas north of and adjacent to the southern slough will be converted from uplands to tidally influenced salt marsh areas by excavating down to elevations that will support saltmarsh vegetation. Freshwater emergent and palustrine wetlands will be constructed adjacent to the tidal slough to create a mosaic of inter-connected fresh water and tidal habitats. Soil removal will occur to an elevation sufficient to interface with groundwater and provide periodic overbank flooding. Surface topography will be created to establish areas of variable hydroperiods. Closed surface depressions will be excavated to create permanently inundated open water habitat component. Sinuous flood channels will be excavated to encourage unidirectional flow through the wetland during precipitation events. Installed plants will include native emergent, shrub and tree species indicative of depressional and riparian wetlands. Habitat structures such as snags, rootwads, debris piles and downed large woody debris will be placed in various locations in and around the created wetland.

6.4.3. Mitigation Area 3

Immediately north of the mouth of Slough 1 (Mitigation Area 2), SIT will remove a portion of the existing dike along Union Slough and the area landward of the existing dikes tidal channels will be excavated to create mudflat and saltmarsh habitats. A new dike will be constructed around the perimeter of Mitigation Area 3 to prevent salt water from entering the Cedar Grove composting facility and the remainder of Smith Island. Site elevations will be referenced to the existing salt marsh immediately to the north of Mitigation Area 3. A self-regulating two-way tide gate will be installed through the new dike to hydrologically connect Mitigation Area 2 with Mitigation Area 3, thus reintroducing tidal influence to the slough. The existing utility access road will be realigned to the top of the proposed dike to allow maintenance of the onsite power lines. The reintroduction of saltwater to and excavation of tidal channels within Mitigation Area 3 is expected to restore 0.9 acres of highly valuable intertidal salt marsh habitat. We expect that saltmarsh will passively establish in the mitigation area and supplemental plantings will be installed in year 2 post construction.

6.4.4. Mitigation Area 4

The 6.8 acre Mitigation Area 4 will be regraded to elevations to reestablish saltmarsh vegetation. Portions of the existing dike will be removed to allow tidal inflow to the mitigation area. A new dike will be constructed around the perimeter of the intertidal cell to restrict tidal influence from the remainder of Smith Island. The maximum practical volume of dike material will be removed to allow brackish tidal ebb and flow into the proposed intertidal saltmarsh restoration area. 1.0 acres of degraded palustrine wetlands will be converted to intertidal salt marsh. Prior to dike removal

channels will be cut to ensure distribution of water within the area. We expect saltmarsh vegetation to passively establish within the Mitigation Area 4 following dike removal. SIT will encourage public access to the site by developing a public canoe/kayak launch at the west end of Mitigation Area 4. The current walking pathway along the existing dike will be re-routed to align with the perimeter of the proposed mitigation area and to add selected access to the newly created estuary that will allow kayak launching and close-up viewing. Two pedestrian bridges will be installed as part of this work. This element of the mitigation is mandatory to meet City of Everett Shoreline development conditions.

6.5. Mitigation Ratio Calculations

The Smith Island Rail project will result in the permanent fill of 13.8 acres of palustrine wetlands and the conversion of 1.0 acres of palustrine wetlands for tidal restoration. The required mitigation areas to offset these impacts depend on the type of mitigation being offered. SIT is proposing 1.4 acres of palustrine creation (Area 1) and 15.5 acres of tidal restoration (Areas 2, 3 and 4) to offset the wetland impacts. As presented below, the proposed 16.9 acres of total mitigation exceeds the requirements by more than 2 acres. The logic and calculations used to derive the mitigation ratios for each of these elements are presented below. This step-wise process and methodology was confirmed by Stephen Stanley, Ecology wetland specialist who has been a leader in the development of the SEWIP and Salmon Overlay.

6.5.1. Conversion of Palustrine Wetlands to Salt Marsh Habitat

SIT will convert approximately 1.0 acres (Figure 4) of low quality palustrine wetlands to tidal saltmarsh within Mitigation Area 4. As incentive for developers to undertake tidal restoration as compensatory mitigation, the SMP provides amended ratios based on scores from the SEWIP freshwater model. According to Figure 4.2 of the Salmon Overlay, all of the wetlands in Mitigation Area 4 fall within the second quartile (fair quality) for water quality. When applicants elect to convert these palustrine wetlands to tidal wetlands for compensatory mitigation, the SMP requires 0.3 acres of mitigation for each acre of second quartile wetland loss (see Salmon Overlay, page 109). As presented in Table 5-1 below, applying this 0.3:1 ratio results in 0.3 acres of tidal habitat restoration required to account for the loss of the 1.0 acres of converted wetlands.

TABLE 5-1. MITIGATION FOR CONVERSION OF PALUSTRINE WETLANDS TO SALT MARSH HABITAT

Wetland Impact Area	Mitigation Type	Recommended Mitigation Ratio	Required Mitigation Area
1.0 acres	Tidal conversion	0.3:1	0.3 acres

6.5.2. Palustrine Creation to Compensate for Palustrine Loss

As discussed in Section 5.3.1, SIT will apply 1.4 acres of advance in-kind mitigation within Mitigation Area 1 to compensate for the permanent loss of palustrine wetlands. By applying the mitigation ratio of 1.25:1 recommended by the SMP, the advance in-kind mitigation at the site compensates for the loss of 1.1 acres of wetlands at the site, as shown in Table 5-2 below.

TABLE 5-2. IN-KIND MITIGATION TO COMPENSATE FOR THE LOSS OF PALUSTRINE HABITAT

Wetland Impact Area	Mitigation Type	Recommended Mitigation Ratio	Required Mitigation Area
1.1 acres	Palustrine creation	1.25:1	1.4 acres

6.5.3. Restoration of Salt Marsh Habitat to Compensate for Palustrine Wetland Loss

When there is an opportunity to provide out-of-kind mitigation that provides far greater environmental benefit by reestablishing a portion of lost estuary, Ecology et al. (2006) recommends a 1:1 replacement ratio provided that the local jurisdiction deems this type of restoration a local priority. The Everett SMP has assigned top priority to compensatory mitigation through tidal restoration. As described on page 100 of the Salmon Overlay, the SMP establishes a 1:1 out-of-kind replacement ratio when applicants propose tidal habitat restoration to compensate for development impacts to palustrine wetlands (City of Everett and Pentec Environmental, 2001).

TABLE 5-3. TIDAL RESTORATION TO COMPENSATE FOR THE LOSS OF PALUSTRINE HABITAT

Wetland Impact Area	Mitigation Type	Recommended Mitigation Ratio	Required Mitigation Area
12.7 acres	Tidal restoration	1:1	12.7 acres

6.5.4. Total Compensatory Requirements

The SIT project will result in the permanent fill of 13.8 acres of palustrine wetlands and the conversion of 1.0 acres of palustrine wetlands to tidal habitat. The total compensatory mitigation area required by the SMP is presented in the following table:

TABLE 5-4. SUMMARY OF WETLAND IMPACTS, MITIGATION TYPE, AND MITIGATION AREAS

Wetland Impact Area	Mitigation Type	Recommended Mitigation Ratio	Required Mitigation Area
1.0 acres	Tidal Conversion	0.3:1[a]	0.3 acres
1.1 acres	Palustrine Creation	1.25:1[b]	1.4 acres
12.7 acres	Tidal Restoration	1:1[c]	12.7 acres
14.8 acres			**14.4 acres**

Notes:

References in Everett Municipal Code Title 19, Shoreline Master Plan:

[a] Chapter 33D.090.35.a(15)(C)

[b] Chapter 33D.090.35.b(3a)

[c] Chapter 33D.090.35.a(4)(B)

As presented in the table above, the compensatory requirement of the SMP is actually less than the impacted jurisdictional area. However, as described on page 98 of the Salmon Overlay, the SMP specifies that the total compensation for impacted wetlands at a site must maintain a minimum overall ratio of 1:1 to ensure no net loss of wetland area (City of Everett and Pentec Environmental, 2001). SIT is proposing 16.9 acres of mitigation to compensate for the permanent impacts to 14.8 acres of wetlands and ditches. SIT's proposed mitigation area exceeds the regulatory mitigation requirement and results in an actual mitigation ratio of 1.14:1.

6.6. Grading Plans

As the development design progresses, project engineers will develop grading plans for each mitigation area based on tide data and elevations of adjacent salt marsh habitat known to support salt marsh vegetation. Areas within the tidal cells will be cut or filled in an attempt to maximize tidal flushing and salt marsh vegetation establishment. Tidal channels will be excavated within the tidal cells to promote fish usage and positive drainage through the site during ebb tide. Once desired elevations are achieved within the tidal mitigation cells, the proposed dikes will be constructed around the perimeters of the restored tidal cells to prevent incoming tides from inundating Smith Island.

Within Mitigation Area 3, once engineered hydrologic controls are installed (e.g., dikes built along the north and east sides of the tidal cell and a regulated tide gate installed between Mitigation Area 3 and 2) the existing levee will be breached to re-introduce tidal cycling to Mitigation Areas 3.

For Mitigation Area 2, the property south of the blind slough is at an elevation equivalent to adjacent salt marsh areas in Union Slough and thus Mitigation Area 2 will need to be designed to be inundated with tidal waters at or near the elevation of the adjacent property. This design constraint will result in a need for dikes to be constructed along the southern banks of the blind slough to prevent tidal waters from flooding the adjacent property. Multiple tide gates (some regulated and some one-way) will be installed within Mitigation Area 2 as design of tidal cells and tidal channels progresses. Once all dikes and tide gates are installed the regulated tide gate connecting Mitigation Areas 2 and 3 will be activated to re-introduce tidal cycling to Mitigation Areas 2 and 3.

6.7. Water Regime

The hydrologic regime of the tidal mitigation areas will be based upon the mixed semi-diurnal tidal cycling of the tides. The frequency and level of inundation within Mitigation Areas 3 and 4 will be regulated by the elevation of the dike removal areas, while the level of inundation within Mitigation Areas 2 will be regulated by the controlled elevation of the regulated tide gate. Varying elevations will be established within the created tidal cells to promote a diversity of salt marsh communities including mud flats and tidal channels.

6.8. Soils

Creation and restoration of mitigation areas will not require the importing of fill material. Generally, because site elevations will need to be lowered to create salt marsh and Palustrine wetland habitats, excavation will be required to achieve mitigation goals and excavated material will remain on site, stockpiled in upland areas, and be available for reuse. This overburden will be used to create surface topography within the buffers of the newly created/restored wetland areas.

Disturbed areas slated for upland and freshwater wetland re-vegetation will be top-dressed with a layer of Cedar Grove Compost. This layer of compost will be used for erosion control, plant growth stimulation and weed suppression.

6.9. Planting/Landscape Plans

Due to the mixed semi-diurnal tidal cycling, frequent natural disturbances in these types of intertidal estuarine systems, logistical difficulties associated with timing re-vegetation efforts with low tide events and non-dormant seasons, and the strict salinity and elevation tolerances of salt marsh vegetation, re-vegetation of the tidal cell areas through installation of nursery plant stock is not recommended. A more cost effective approach with a greater likelihood of successful is proposed which will utilize native salt marsh plant seed mixes and natural tidal distribution of seeds as the primary restoration vector to re-vegetate Mitigation Areas 2, 3 and 4. In addition to application of the native salt march plant seed mixes, tidal fluctuations carry with them the seeds of salt marsh vegetation that will be deposited within the created salt marsh areas. These applied and naturally recruited seeds will germinate to establish salt marsh vegetation communities on the newly exposed substrates.

In the spray zone above the Ordinary High Water Mark (OHWM), shrub and herb plants species such as oceanspray, serviceberry , snowberry , and douglas aster will be installed as nursery stock or as plant materials salvaged locally. Other species that have shown success in Mitigation Area 1 and will be planted in the salt tolerant zones above OHWM include rose species, twinberry, and scouler willow. See the table below for the full list of species to be planted in the restored salt marsh zones.

Table 6 lists examples of typical salt-tolerant vegetation species commonly found in the Snohomish River Estuary, some of which should be specified in planting plan designs as containerized material and seed mixes. Goose exclosures will be erected as necessary should they pose a problem once planting occurs.

TABLE 6. SNOHOMISH RIVER ESTUARY SALT MARSH AND MARINE RIPARIAN VEGETATION

Common Name	Scientific Name
Salt Tolerant (above the OHWM)	
Oceanspray	*Holodiscus discolor*
Serviceberry	*Amelanchier alnifolia*
Snowberry	*Symphoricarpos spp.*
Douglas aster	*Aster subspicatus*
Twinberry	*Lonicera Involucrate*
Rose baldhip	*Rosa Gymnocarpa*
Rose nootka	*Rosa Nutkana*
Rose pea fruit	*Rosa Pisocarpa*
Scouler Willow	*Salix scouleriana*
Upper Marsh	
Silver burweed	*Ambrosia chamissonis*
Puget Sound Gumweed	*Grindelia integrifolia*
Silverweed	*Potentilla anserina*
Middle and Lower Marsh	
Lyngby's sedge	*Carex lyngbyei*
Tufted hairgrass	*Deschampsia cespitosa*
Pickleweed	*Salicornia virginica*

Common Name	Scientific Name
Hard stem bulrush	*Scirpus acutus*
Maritime bulrush	*Scirpus maritimus*
Toad rush	*Juncus bufonius*
Salt rush	*Juncus lesuerii*

7.0 POST CONSTRUCTION MAINTENANCE, MONITORING AND CONTINGENCY

7.1. Mitigation Areas Maintenance

SIT proposes to perform site maintenance for the duration of the monitoring period required by the project permits. We anticipate that this will be a period of no less than 5 years following the completed construction and revegetation of the mitigation areas. Maintenance during the first 2 years will include periodic watering (irrigation) of the restored upland areas and control of undesirable species throughout the mitigation sites. SIT will focus their maintenance efforts during the subsequent years on undesirable species management. However, due to the daily inundation and specific growth regime in the restored tidal areas, maintenance may not be feasible or required. The vegetation community that we expect to colonize and establish within the tidal areas will primarily consist of native estuarine species. Should monitoring identify problematic invasive species, a strategy will need to be developed that can be performed during tidal cycles and that acknowledges the sensitive nature of the salt marsh vegetative and aquatic communities.

Irrigation of the buffers and wetland creation/restoration areas that do not experience prolonged periods of saturation or mixed semi-diurnal tidal inundation may be required for the first 2 years after installation of native plants. A temporary irrigation system may be utilized or a regular watering schedule established if onsite water is not available. Watering during the plant establishment period is crucial for plant survival. During the dry months, usually June through September, it may be necessary to add up to 3 gallons of water per plant per week. Extremely warm weeks may necessitate watering on a more frequent basis. An irregular watering interval will encourage the development of deep root systems, which in time will reduce the need for any future watering.

Undesirable species will be managed by periodic removal of these species from the mitigation areas. Species to be removed will primarily include exotic invasive upland/freshwater wetland species such as: reed canary grass, Himalayan blackberry, evergreen blackberry, Canada thistle, loosestrife, nightshade, morning glory, and Scot's broom. Only desirable (native) volunteer species in addition to those planned for the area will be encouraged to grow. Wetland buffer slopes will be reseeded with grasses if deemed necessary due to disturbance, erosion or sedimentation. Cedar Grove will perform other maintenance responsibilities such as trash removal and vandalism repair on an as-needed basis.

7.2. Monitoring Plan

Monitoring will occur for a minimum of 5 years. A qualified biologist will perform a post-construction monitoring site visit to document site conditions following completion of grading and plant installation activities. The biologist will document as-built conditions in the mitigation

areas and the extent that construction plans were followed to establish baseline data for the 5-year monitoring period.

The Biologist will establish representative monitoring stations during the post-construction monitoring event. The size, type, number and configuration of the representative monitoring stations will be determined in the field by the monitoring biologist.

7.2.1. Data Collection

The monitoring biologist will collect data regarding revegetation success and areal cover within the representative monitoring stations. Specifically, the monitoring biologist will collect and record the following information:

- **Photographs.** The monitoring biologist will establish a photo point at a vantage point that will illustrate site progression through the duration of the monitoring period.
- **Plant Cover.** Within each monitoring station, percent cover of each species, including both desirable and invasive, will be estimated or calculated by an accepted method to be determined by the monitoring biologist. The method for determining areal cover will be repeated during each subsequent monitoring event.
- **Wildlife.** Recordings of wildlife observations will be made as general notes by the monitoring biologist during monitoring events. Performance standards have not been established for wildlife.
- **Maintenance Recommendations.** The need for undesirable species control, trash removal, watering or vegetation trimming will be noted and included in the monitoring report.

At a minimum, the monitoring reports will include the following information:

- Responsible parties (designer, construction contractors, planting contractor, qualified wetland scientist);
- Construction timeline (including completion date);
- Plant species, areal cover and condition at established monitoring stations;
- Observations or indications of hydrology; and
- Presence of undesirable species and recommendations for management of these species.

Monitoring will occur twice a year, in the spring and late summer at approximately 6-month intervals. The primary focus of the spring monitoring event will be to identify undesirable plant establishment at the beginning of the growing season. The late summer monitoring event will document vegetation establishment, areal cover and survival. A field report will be prepared after the spring monitoring event to document the presence of undesirable species, provide management recommendations and report maintenance needs. An annual monitoring report will be prepared subsequent to each late summer monitoring event and SIT will submit the report to the appropriate agencies. Following year 5 monitoring, SIT will notify City of Everett Environmental Review staff, Ecology and the USACE Project Manager to schedule a visit to the mitigation site for concurrence on the success of the mitigation area.

7.2.2. Performance Standards

Performance standards provide benchmarks against which the success of the mitigation plan may be evaluated. Performance standards will be evaluated during each monitoring event through the collection of quantitative data as described below. Failure to meet the performance standards will trigger immediate corrective action. Table 7 below presents percent cover performance standards for freshwater palustrine wetland, marine riparian, and salt marsh habitats.

TABLE 7 PERFORMANCE STANDARDS FOR PERCENT COVER WITHIN MITIGATION AREAS

Monitoring Year	Performance Standards (percent cover)			
	Freshwater Palustrine Wetlands		Transitional Zone	Salt Marsh
	Trees and Shrubs	Emergent Plants	Shrubs and Herbs	Emergent Plants (seeded)
1	15	20	15	5
2	25	40	25	10
3	30	50	30	25
5	35	80	35	50

Other performance standards shall include:

- Undesirable species shall be controlled such that they are not competing with desirable plants and they shall be represented by less than 15 percent cover in the created/restored wetland areas during the year 5 fall monitoring event as determined by observations made within the monitoring stations.

7.3. Contingency Plan

If the project fails to meet the standards discussed above, implementation of a contingency plan will be necessary. The proposed mitigation plan can fail if certain unfavorable factors occur. Human activity, fire, erosion, settling and disease may have a negative effect on newly planted vegetation. Plants obtained for this project may be diseased or become diseased over time and result in poor survival. Monitoring reports should include observations regarding these and other possible problems that may be occurring over the monitoring period.

If unacceptable levels of mortality of plantings occurs that jeopardize compliance with performance standards, the problem areas will be replanted, preferably in the dormant season and provided with better monitoring and maintenance to promote greater establishment of desirable species. If, in the judgment of the monitoring biologist, alternative plant species are needed to improve survival, the selection of alternative species will be made.

The photographic record and monitoring data shall determine the need for contingency plan activation. The monitoring period may be extended if survival has not stabilized by the end of monitoring year 3. The applicant is responsible for all costs associated with replanting and plant maintenance.

8.0 SUMMARY AND CONCLUSIONS

To offset the total loss of 14.8 acres of palustrine emergent wetlands and jurisdictional ditches at the SIT site, compensatory mitigation is proposed to reestablish 15.4 acres of saltmarsh habitat (Mitigation Areas 2, 3 and 4) and 1.4 acres of palustrine wetlands (Mitigation Area 1), resulting in a total of 16.9 acres of compensatory mitigation as outlined in the following table.

TABLE 8. SMITH ISLAND TERMINAL MITIGATION SUMMARY

Mitigation Area	Acres	Mitigation Type
Mitigation Area 1	1.4	Palustrine creation
Mitigation Area 2	7.8	Saltmarsh restoration
Mitigation Area 3	0.9	Saltmarsh restoration
Mitigation Area 4	6.8	Saltmarsh restoration
Total	**16.9**	

Notes:

SEWIP Definitions (City of Everett et al 1997):

Creation –Bringing into being a new ecosystem that did not exist on the site

Restoration - Return of an ecosystem to a close approximation of its previously existing condition (City of Everett et al 1997)

Conversion - Transformation of an ecosystem into a different ecosystem type or land use. Causes complete loss of the original ecosystem functions.

Comparing the total mitigation (16.01 acres) to the total loss of wetlands and ditches (14.94 acres) results in an overall mitigation ratio for the entire site of 1.15:1. Therefore, the mitigation plan proposed by SIT provides significant ecological benefit to the Snohomish River estuary, exceeds the relevant regulatory requirements and ensures no net loss of wetland area.

9.0 REFERENCES

City of Everett, Environmental Protection Agency, Puget Sound Water Quality Authority and Washington State Department of Ecology, "Snohomish Estuary Wetland Integration Plan, City of Everett Department of Planning and Community Development," Everett, Washington, 1997.

City of Everett and Pentec Environmental, "Salmon Overlay to the Snohomish Estuary Wetland Integration Plan, City of Everett Department of Planning and Community Development," Everett, Washington, 2001.

GeoEngineers, Inc., "Biological Evaluation, Smith Island Terminal Site, Everett, Washington, prepared for Cedar Grove Composting," 2014.

GeoEngineers, Inc., "Concrete Nor'west Wetland Delineation - Smith Island Site, Everett, Washington, prepared for Cedar Grove Composting," July 7, 2005.

GeoEngineers, Inc., "Revised Wetland and Ordinary High Water Delineation, Smith Island Site, Everett, Washington, prepared for Cedar Grove Composting," March 17, 2008.

Nelson, Kurt. Personal Communication, August 2008.

Stanley, Stephen, Personal communication with the Washington State Department of Ecology, February 28, 2008.

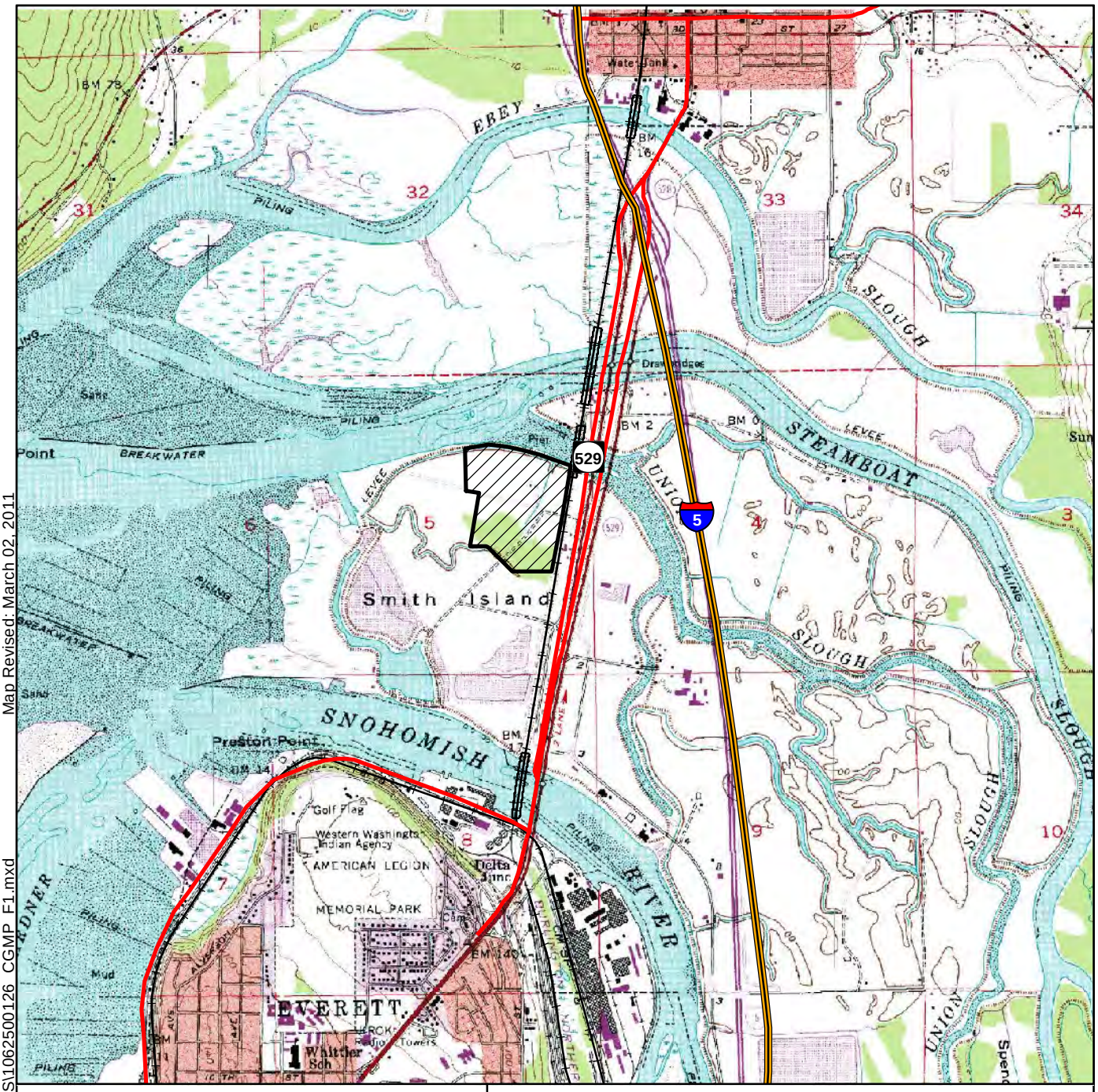
Washington Department of Ecology, U.S. Army Corps of Engineers Seattle District, and U.S. Environmental Protection Agency Region 10 (Ecology/USACE/EPA) 2006a, "Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance (Version 1). Washington State Department of Ecology Publication #06-06-011a," Olympia, Washington, 2006.

Washington Department of Ecology, U.S. Army Corps of Engineers Seattle District, and U.S. Environmental Protection Agency Region 10 (Ecology/USACE/EPA) 2006b, "Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1). Washington State Department of Ecology Publication #06-06-011b," Olympia, Washington, 2006.

Wolken, Mark. Personal Communication, January 2014.

FIGURES

GeoEngineers



Explanation

- Study Area
- Interstates
- State Routes
- Rail Line

N
W E
S

2,000 0 2,000
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005
Topo map base from USGS.
Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

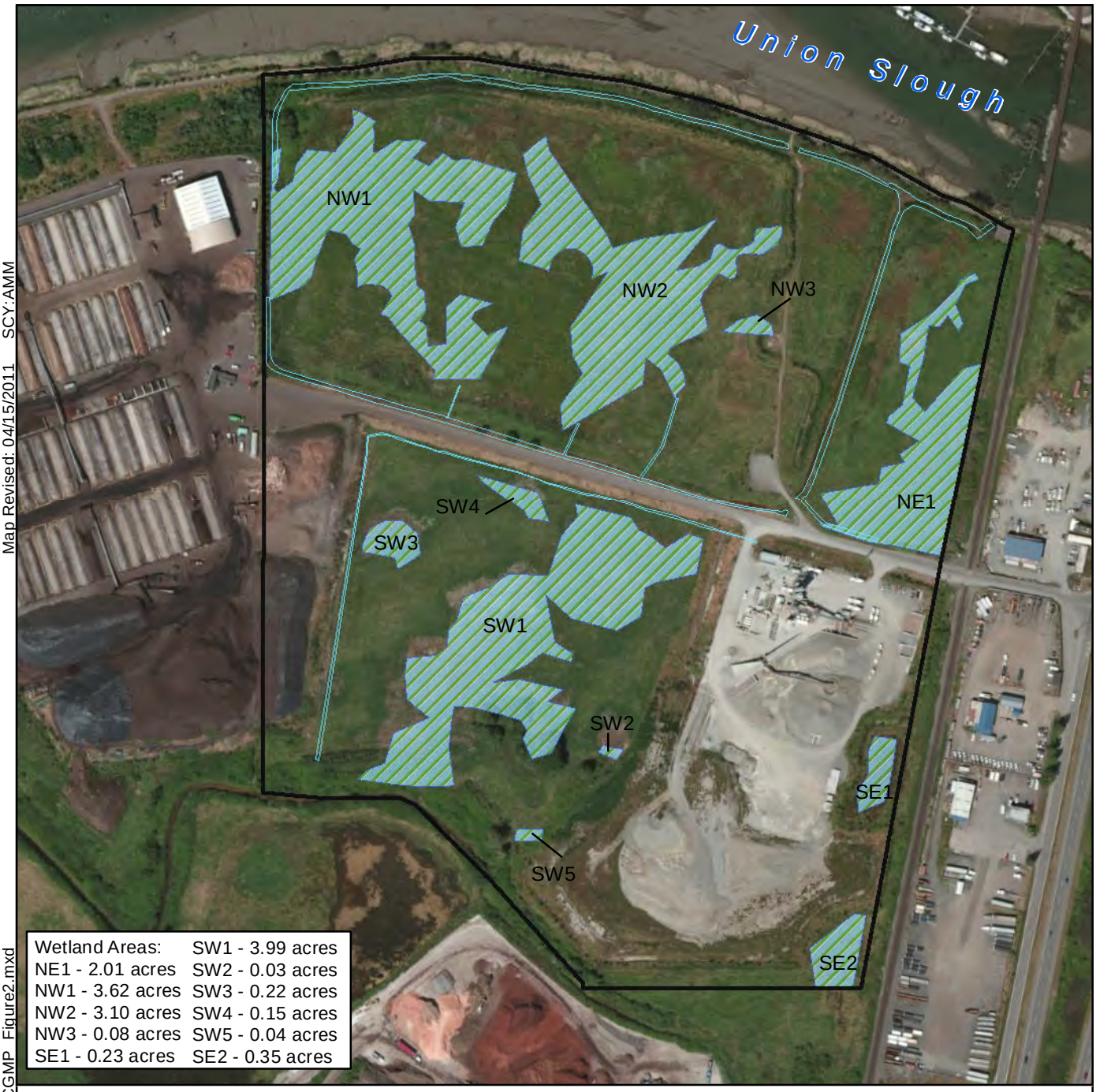
Vicinity Map

Smith Island Terminal
Everett, Washington

GeoEngineers

Figure 1

Office: SEAT Path:W:\Seattle\Projects\10\10625001\GIS\1062500126 CGMP F1.mxd Map Revised: March 02, 2011



Legend

- Project Area
- Ditches = 1.12 acres
- Wetland Areas* = 13.82 acres

*All Category II per Everett Municipal Code Title 19, Chapter 33D.0901(36)

N
W E
S

350 0 350
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983, Washinghton North (feet)
North arrow oriented to grid north

Smith Island Terminal
Wetland Exhibit

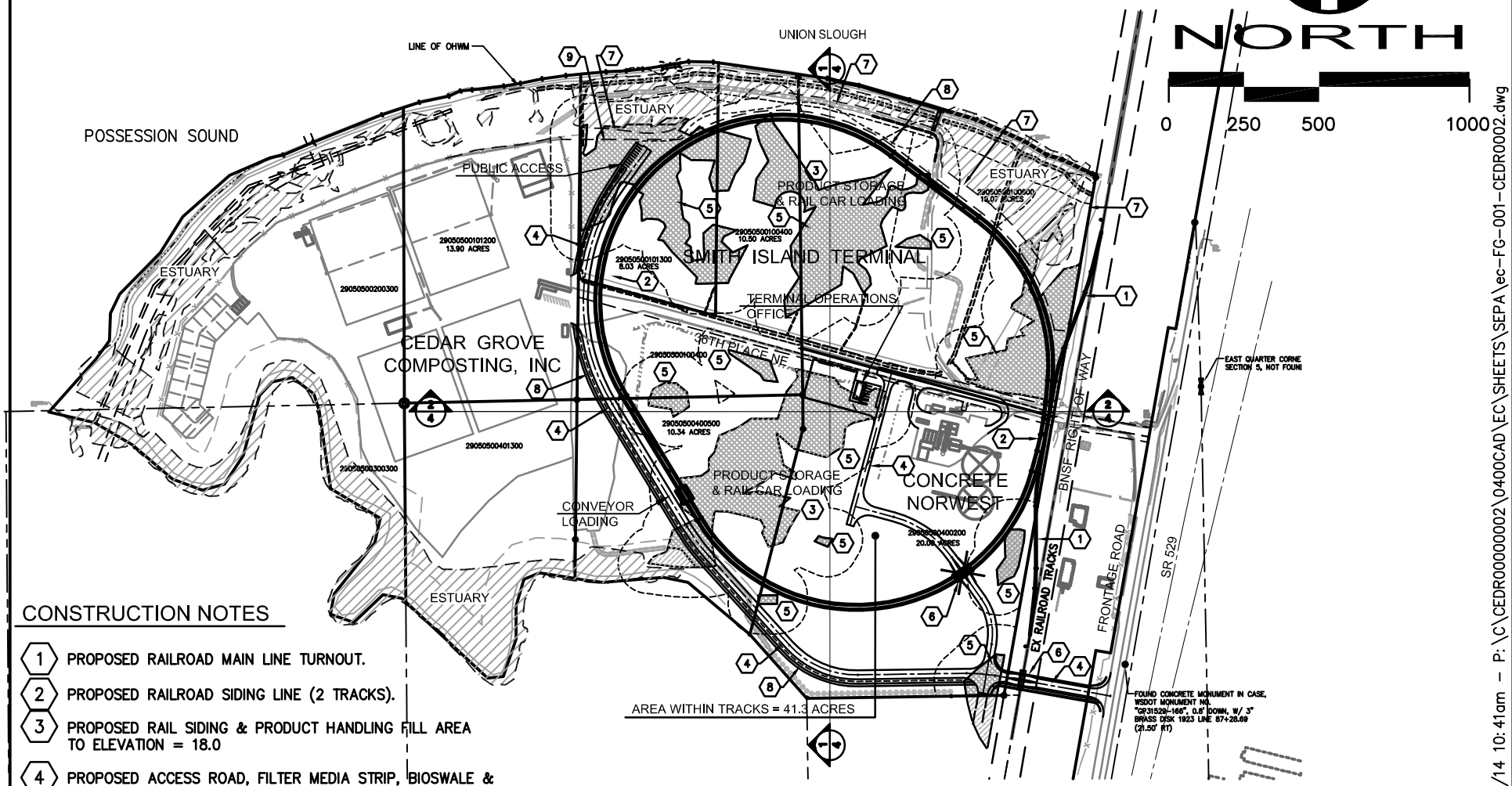
Smith Island Terminal
Everett, Washington

GEOENGINEERS

Figure 2

Office: SEA Path: P:\10\10625001\GIS\1062500126_CGMP_Figure2.mxd Map Revised: 04/15/2011 SCY:AMM

SMITH ISLAND TERMINAL SHORELINE - CLEAN WATER ACT § 404(B)(1)
EVERETT, WASHINGTON
SITE PLAN



CONSTRUCTION NOTES

1. PROPOSED RAILROAD MAIN LINE TURNOUT.
2. PROPOSED RAILROAD SIDING LINE (2 TRACKS).
3. PROPOSED RAIL SIDING & PRODUCT HANDLING FILL AREA TO ELEVATION = 18.0
4. PROPOSED ACCESS ROAD, FILTER MEDIA STRIP, BIOSWALE & PEDESTRIAN WALKWAY
5. FILL ALL OR PORTIONS OF EXISTING WETLANDS AND DITCHES.
6. PROPOSED ACCESS ROAD UNDERPASS
7. BUFFER AREA TO BE SEEDED WITH GRASS.
8. INSTALL FILTER MEDIA STRIPS ALONG ROADWAY AND TRACKS TO MAINTAIN WATER QUALITY.
9. PROPOSED PARKING – FILL TO ELEVATION 15.0

LEGEND

- EXISTING WETLANDS
- WETLAND TO BE FILLED
- EXISTING DRAINAGE DITCH
- WETLAND MITIGATION

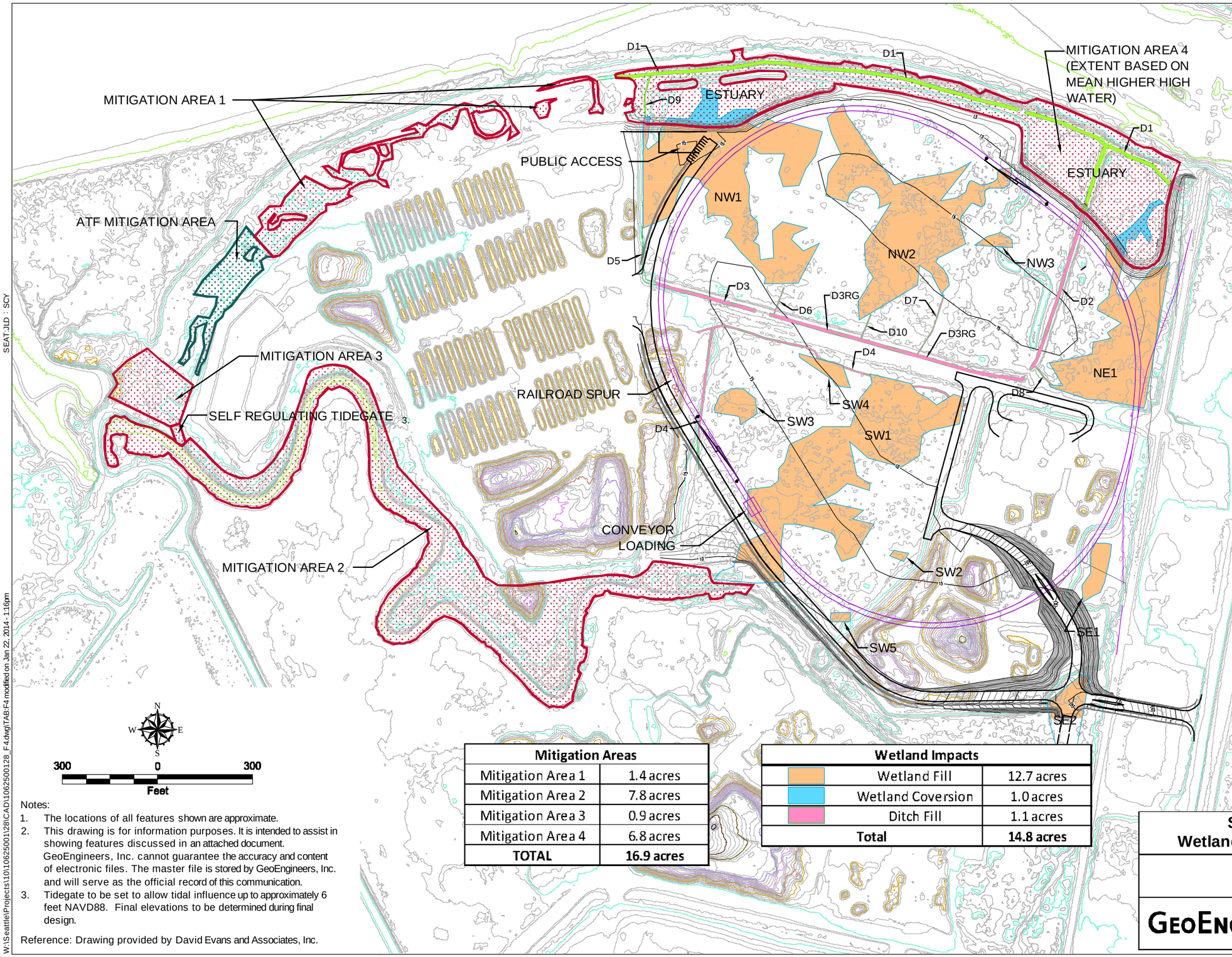
EARTHWORK:
APPROXIMATELY 677,919 CY OF FILL IS REQUIRED TO FILL ~ 67.9 ACRES

VERTICAL DATUM: NAVD '88
MHHW EL. = 9.06'

Figure 3

REFERENCE:	NWS-2007-1715
APPLICANT NAME:	SMITH ISLAND TERMINAL, LCC
PROPOSED PROJECT:	SMITH ISLAND TERMINAL
LOCATION:	EVERETT, WASHINGTON
SHEET 2 OF 4	DATE: JANUARY 29, 2014

kwmc 01/29/14 10:41am – P:\C\CEDR00000002\0400CAD\EC\SHEETS\SEPA\ec-FG-001-CEDR0002.dwg



Legend

- Existing wetlands
- Permanent impacted (wetlands)
- Wetland conversion
- Permanent impacted (ditch)
- Existing drainage ditch
- Mitigation area
- ATF mitigation area
- Proposed contour (5ft-interval)
- Proposed contour (1ft-interval)
- LiDAR contour (2ft-interval)
- LiDAR contour (0 feet)
- LiDAR contour (10 feet)
- LiDAR contour (20 feet)
- LiDAR contour (30 feet)
- LiDAR contour (40 feet)
- LiDAR contour (50 feet)
- LiDAR contour (60 feet)
- LiDAR contour (70 feet)
- LiDAR contour (80 feet)

Mitigation Areas	
Mitigation Area 1	1.4 acres
Mitigation Area 2	7.8 acres
Mitigation Area 3	0.9 acres
Mitigation Area 4	6.8 acres
TOTAL	**16.9 acres**

Wetland Impacts	
Wetland Fill	12.7 acres
Wetland Coversion	1.0 acres
Ditch Fill	1.1 acres
Total	**14.8 acres**

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Tidegate to be set to allow tidal influence up to approximately 6 feet NAVD88. Final elevations to be determined during final design.

Reference: Drawing provided by David Evans and Associates, Inc.

Smith Island Terminal
Wetlands Mitigation Area Footprint

Smith Island Terminal
Everett, Washington

GEOENGINEERS

Figure 4

W:\Seattle\Projects\10\10625001\28\CAD\10625001 28_F4.dwg\TAB:F4 modified on Jan 22, 2014 - 1:16pm
SEAT:JLD : SCY

APPENDICES

GeoEngineers

APPENDIX A
Jurisdictional Determination Concurrence Letter

From:	Bennett, Matthew J NWS
To:	Jon Ambrose
Cc:	Anderson, Paul (ECY NWRO SEA)
Subject:	NWS 2007-1715 RE: Revised Cedar Grove Wetland Impact Area Figure for Final Jurisdictional Determination
Date:	Thursday, April 22, 2010 10:34:07 AM
Attachments:	SKMBT_C45010042210270.pdf

Jon,
This message provides an addendum to the previous JD letter provided to Cedar Grove from Jonathan Smith dated October 15, 2008. Jonathan's letter requested a re-delineation of the area around Well 5. The attached Figure 2, dated 4/20/10 accurately identifies the Waters of the United States on the subject property. We accept the conclusions and boundary depiction provided in your April 16, 2010 addendum to address this area.

Per our discussion, Figure 2 identifies the jurisdictional waters on this site. When we are evaluating area of potential impacts, the Corps would likely extend impact areas to abutting wetlands that would functionally be eliminated as a result of this proposal (SE2 for example).

Please consider this message a formal addendum to the above referenced October 15, 2008 letter for your records. If you have any questions, or need additional information, please contact me. Please note, I have also cc'd Paul Anderson at Department of Ecology. Thank you.
/mb

Matthew J. Bennett, Senior Scientist
U.S. Army Corps of Engineers
Regulatory Branch - Seattle District
4735 East Marginal Way South
Seattle, Washington 98134-2385

Phone: 206.764.3428
Fax: 206.764.6602

-----Original Message-----
From: Jon Ambrose [mailto:jambrose@geoengineers.com]
Sent: Wednesday, April 21, 2010 4:49 PM
To: Bennett, Matthew J NWS
Cc: Wayne S. Wright; Mark Wolken; Thomas A. Bannister; Steve Jones; John Brigham
Subject: Revised Cedar Grove Wetland Impact Area Figure for Final Jurisdictional Determination

Good afternoon, Matt.

As you requested, we have included the ditches in the final wetlands figure. In addition, we removed those portions of wetlands NE1 and SE2 that will not be impacted by the project due to their location beyond the project boundary. Please let me know if you require any additional information.

Thank you,

Jon Ambrose

Jonathan M. Ambrose
Hydrology and River Science I GeoEngineers
t: 206.239.3239
f: 206.728.2732
c: 206.799.3687
e: jambrose@geoengineers.com <mailto:jambrose@geoengineers.com>

600 Stewart Street, Suite 1700
Seattle, Washington 98101
www.geoengineers.com <http://www.geoengineers.com/>

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Confidentiality: This message is confidential and intended solely for use of the individual or entity to whom it is addressed. If you are not the person for whom this message is intended, please delete it and notify me immediately, and please do not copy or send this message to anyone else.

Legend

Project Area

Ditches = 1.12 acres

Wetland Areas* = 13.80 acres

Total Proposed Wetland Impact Area = 14.92 acres

4/21/10

N W E S

350 0 350 Feet

*Area calculations only include on-site wetlands + ditches

*All Category IV per Everett Municipal Code Title 19, Chapter 33D.8901(36)

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005.
Snohomish County parcels, 2009.
Projection: NAD 1983, Washington North (feet)
North arrow oriented to grid north

Revised Cedar Grove
JD Response Wetland Exhibit

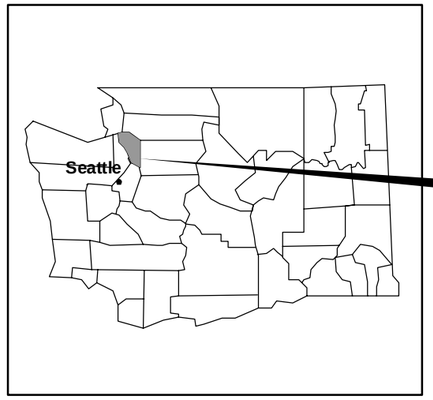
Smith Island
Everett, Washington

GEOENGINEERS

Figure 2

Office: SEA Path: P:\10\10625001\GIS\10625001 21 RCG Figure2.mxd Map Revised: April 21, 2010 KKS

APPENDIX B
Conceptual Mitigation Plans



WASHINGTON

OVERALL PROJECT SITE

EXPANSION AREA

SMITH ISLAND TERMINAL MITIGATION PLAN EVERETT, WASHINGTON

PRELIMINARY - NOT FOR CONSTRUCTION

SHEET INDEX

B–1	COVER SHEET
B–2	MITIGATION SITE PLAN
B–3	MITIGATION AREA 1 SITE PLAN AND TYPICAL CROSS SECTION
B–4	MITIGATION AREA 2 SITE PLAN AND TYPICAL CROSS SECTION
B–5	MITIGATION AREA 3 SITE PLAN AND TYPICAL CROSS SECTION
B–6	MITIGATION AREA 4 SITE PLAN AND TYPICAL CROSS SECTION
B–7	MITIGATION AREA 2 SELF REGULATING TIDE GATE DETAILS

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Images provided by ESRI Mapping Services.

Cover Sheet

Smith Island Terminal
Everett, Washington

GEOENGINEERS

Figure B-1

W:\Seattle\Projects\10\10625001\28\CAD\Mit plan lastest_JMA edits.dwg\TAB:F1 modified on Jan 22, 2014 - 12:40pm
WJS : JMA

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Tidegate to be set to allow tidal influence up to approximately 6 feet NAVD88. Final elevations to be determined during final design.

Reference: Images provided by ESRI Mapping Services.

N W E S

250 0 250
Feet

Mitigation Site Plan

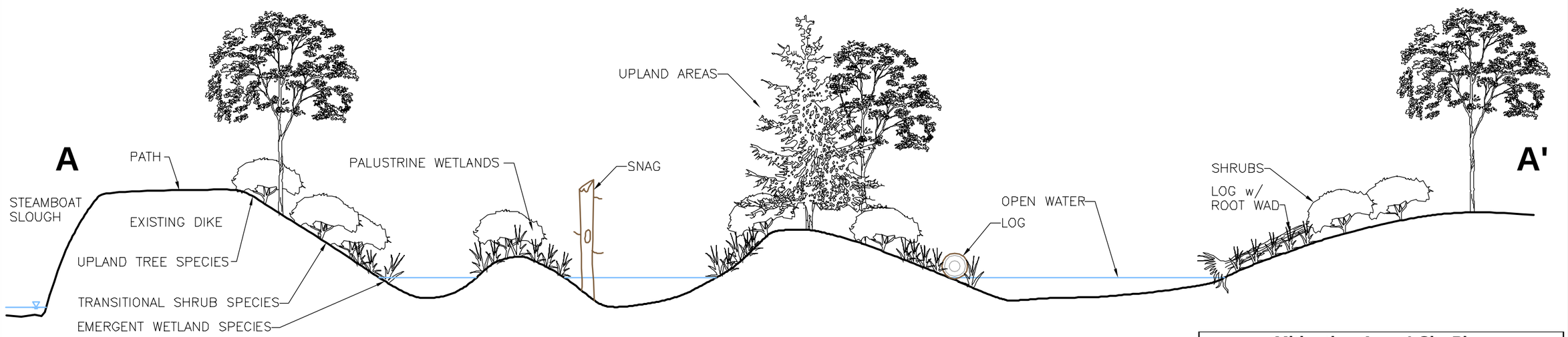
Smith Island Terminal
Everett, Washington

GEOENGINEERS

Figure B-2

WJS : JMA

W:\Seattle\Projects\10\10625001\28\CAD\Mit plan lastest_JMA edits.dwg\TAB:F2 modified on Jan 22, 2014 - 12:41pm



TYPICAL CROSS SECTION

NOT TO SCALE

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Images provided by ESRI Mapping Services.

Mitigation Area 1 Site Plan and Typical Cross Section

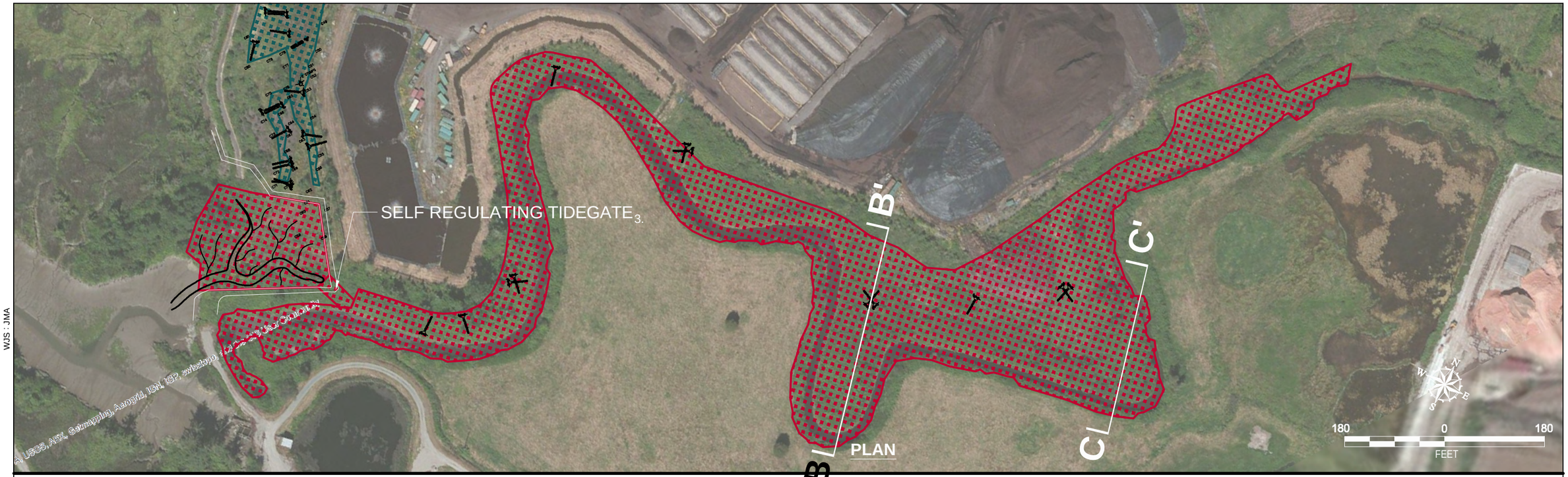
Smith Island Terminal
Everett, Washington

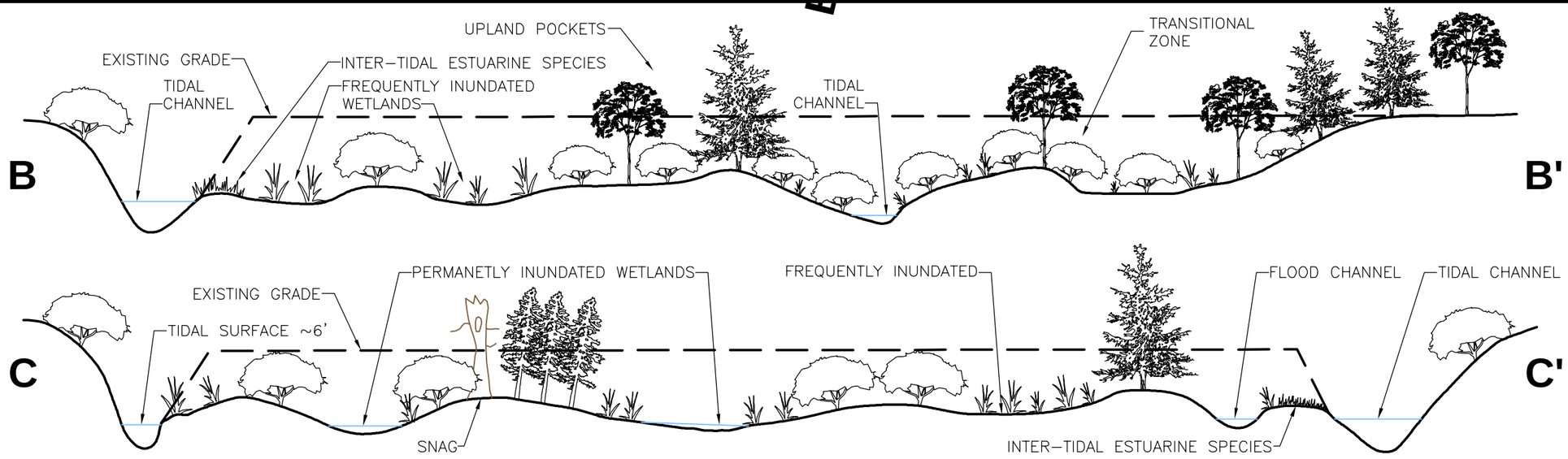
GEOENGINEERS

Figure B-3

W:\Seattle\Projects\10\10625001\28\CAD\Mit plan lastest_JMA edts.dwg\TAB:F3 modified on Jan 22, 2014 - 12:42pm

WJS : JMA





TYPICAL CROSS SECTION

NOT TO SCALE

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Tidegate to be set to allow tidal influence up to approximately 6 feet NAVD88. Final elevations to be determined during final design.

Reference: Images provided by ESRI Mapping Services.

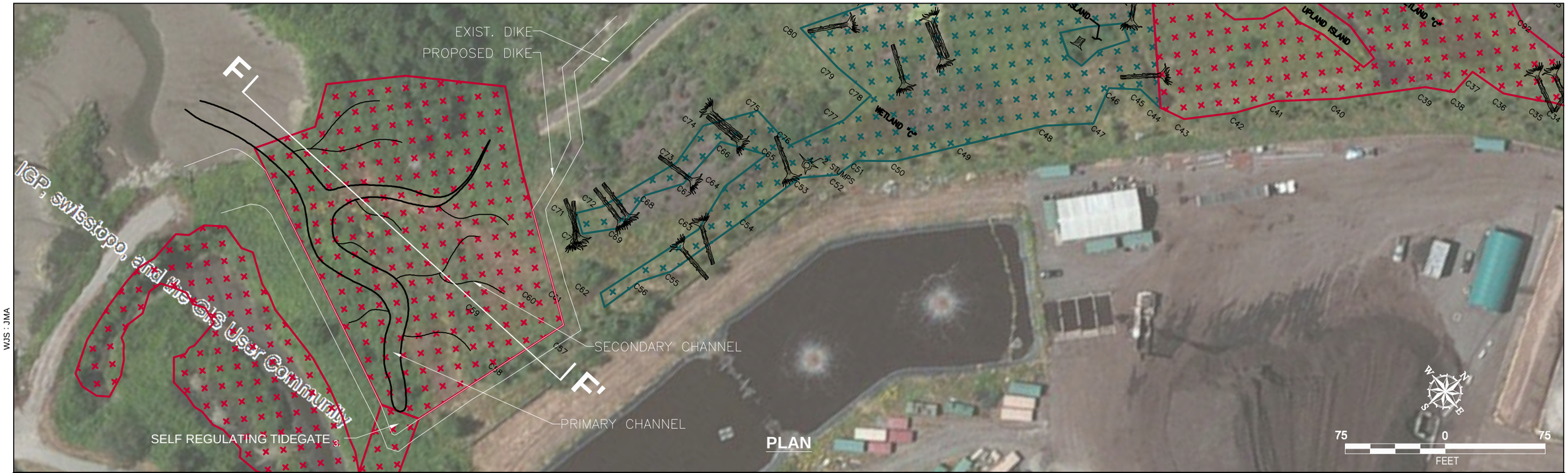
Mitigation Area 2 Site Plan and Typical Cross Sections

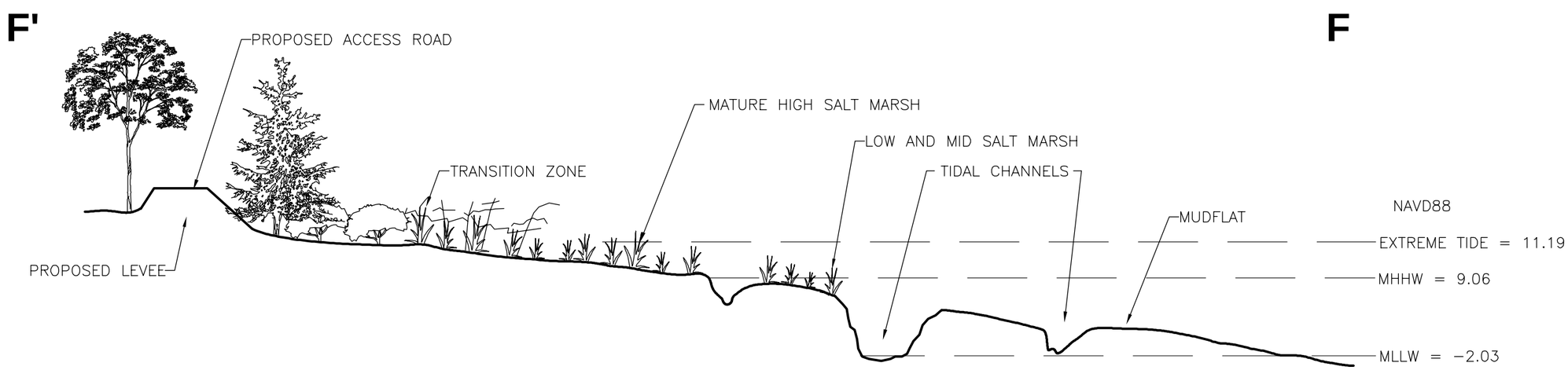
Smith Island Terminal
Everett, Washington

GEOENGINEERS

Figure B-4

W:\Seattle\Projects\10\10625001\28\CAD\Mit plan lastest_JMA edits.dwg\TAB:F4 modified on Jan 22, 2014 - 12:45pm
WJS : JMA





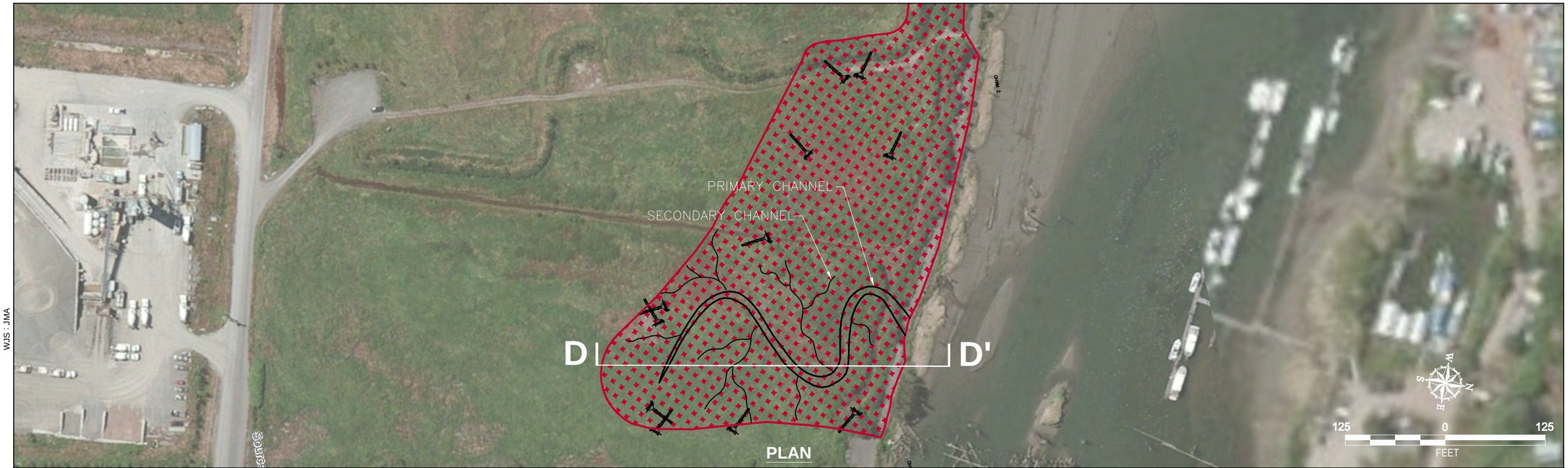
TYPICAL CROSS SECTION
NOT TO SCALE

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Tidegate to be set to allow tidal influence up to approximately 6 feet NAVD88. Final elevations to be determined during final design.

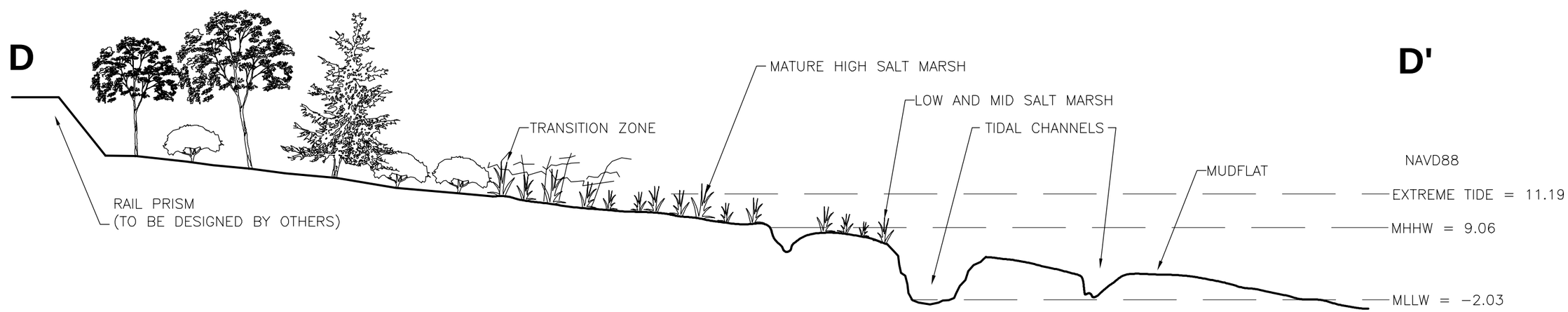
Reference: Images provided by ESRI Mapping Services.

Mitigation Area 3 Site Plan and Typical Cross Section	
Smith Island Terminal Everett, Washington	
GeoEngineers	Figure B-5

W:\Seattle\Projects\10\10625001\28\CAD\Mit plan lastest_JMA edits.dwg\TAB:F5 modified on Jan 22, 2014 - 12:50pm
WJS : JMA



PLAN



TYPICAL CROSS SECTION

NOT TO SCALE

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Images provided by ESRI Mapping Services.

Mitigation Area 4 Site Plan and Typical Cross Section

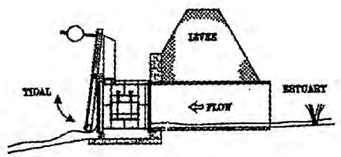
Smith Island Rail Terminal
Everett, Washington

GEOENGINEERS

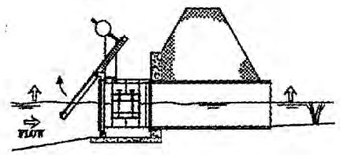
Figure B-6

W:\Seattle\Projects\10\10625001\28\CAD\Mit plan lastest_JMA edits.dwg\TAB:F6 modified on Jan 22, 2014 - 1:13pm
WJS : JMA

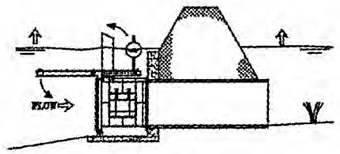
SRT In Normal Tide Sequence



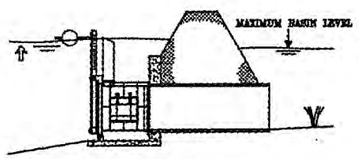
1. SRT ACTING AS NORMAL FLAP GATE ALLOWING ESTUARY DRAINAGE



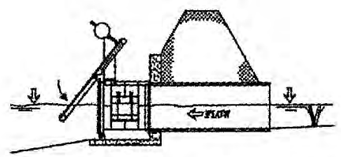
2. RISING TIDE FLOATS GATE UP ALLOWING INCOMING TIDE TO FLOOD ESTUARY BASIN



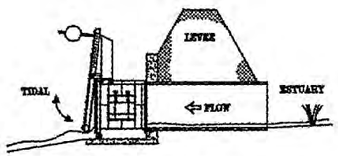
3. TIDE BEGINS TO CLOSE GATE LIMITING ESTUARY FLOOD LEVEL



4. NORMAL HIGH TIDE GATE FULLY CLOSED

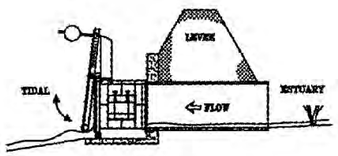


5. COVER FLOATING ON FALLING TIDE LOWERS ESTUARY FLOOD LEVEL

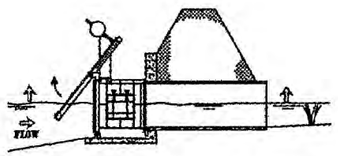


6. GATE ACTING AS NORMAL FLAP ESTUARY DRAINAGE RESUMES

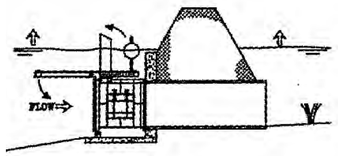
SRT In Storm Sequence



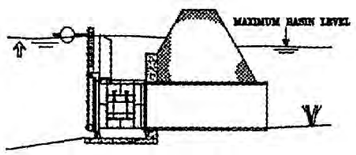
1. SRT ACTING AS NORMAL FLAP GATE ALLOWING ESTUARY DRAINAGE



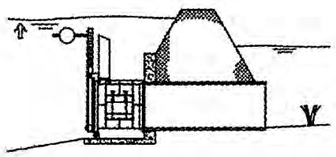
2. RISING TIDE FLOATS GATE UP ALLOWING INCOMING TIDE TO FLOOD ESTUARY BASIN



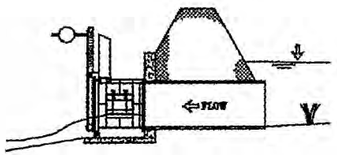
3. TIDE BEGINS TO CLOSE GATE LIMITING ESTUARY FLOOD LEVEL



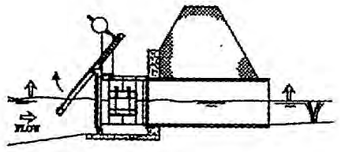
4. NORMAL HIGH TIDE GATE FULLY CLOSED



5. WHEN TIDE EXCEEDS NORMAL HIGH TIDE LEVEL, GATE LOCKS IN CLOSED POSITION TO PREVENT GATE ACTION DUE TO SURGES



6. RECEDING TIDE – SIDE FLAPS OPEN TO ALLOW DRAINAGE OF ESTUARY – MAIN GATE COVER RESTRICTED TO PARTIALLY OPEN UNTIL NEXT TIDE



7. NEXT INCOMING TIDE – GATE UNLOCKS & RESUMES NORMAL TIDE SEQUENCE

TIDE GATE DETAILS

NOT TO SCALE

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Images provided by ESRI Mapping Services.

Mitigation Area 2 Self Regulating Tide Gate Details	
Smith Island Terminal Everett, Washington	
GEOENGINEERS	Figure B-7

W:\Seattle\Projects\1010625001\28\CAD\Mit plan lastest_JMA edits.dwg\TAB:F7 modified on Jan 22, 2014 - 1:06pm
WJS : JMA