CRITICAL AREAS STUDY AND RESTORATION PLAN

Geotechnical Investigation Access Clearing

Pacific International Terminals, Inc., Property

Prepared for:

Pacific International Terminals, Inc.
1131 SW Klickitat Way
Seattle, Washington 98134

Prepared by:

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REVISION 3

June 15, 2012

Project No. 0-915-15338 C

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CONTACT INFORMATION AND RESPONSIBLE PARTIES

Following are the name and addresses of the responsible parties and contact persons for the proposed.

Owner of site, contact for contract purposes, and party responsible for long-term maintenance and monitoring:

Pacific International Terminals, Inc.
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1.0 INTRODUCTION

This Critical Areas Assessment Report and Restoration Plan is being submitted to support permit applications to the US Army Corps of Engineers (USACE), the Washington Department of Ecology (Ecology), and Whatcom County for after-the-fact permitting to authorize existing and proposed impacts to regulated areas associated with geotechnical investigations on site. Pacific International Terminals, Inc. (Pacific International Terminals), received a Notice of Violation (NOV) - Reissue (ENF2011-00047), dated August 17, 2011, from Whatcom County Planning and Development Services (PDS) for unauthorized activities at the Pacific International Terminals, Inc. property; specifically, violation of Section 20.80.734 (4) of the Whatcom County Code (WCC) regarding site clearing. Pacific International Terminals received a second NOV (ENF2011-00047), dated August 3, 2011, from Whatcom County PDS for violation of the Critical Areas Ordinance; specifically, Section 16.16.225 of the WCC. Corrective actions required per the August 17, 2011, NOV include soil erosion and sediment control measures and the completion and submission of a land disturbance application and a State Environmental Policy Act (SEPA) environmental checklist to Whatcom County PDS. Cleared areas were hydroseeded and other erosion control structures were installed in early September, 2011. Whatcom County issued an after the fact Land Disturbance Permit to Pacific International Terminals, Inc. on October 12, 2011, which covered both the land clearing and critical areas issues raised in the earlier NOV.

Pacific International Terminals, Inc. received notices during the same time from both USACE and Ecology regarding the need for permits to cover actions related to clearing in wetlands. Corrective actions include the completion and submission of a land disturbance application, a JARPA, and a critical areas report and restoration plan for temporary impacts to wetlands and wetland buffers.

The Critical Areas Report section of this report has been completed in accordance with Section 16.16.255 (Critical Areas Assessment Reports) of the WCC. The Restoration Plan section of this report includes the contents required in the NOV (restoration activities, performance standards, monitoring, and maintenance requirements), and has been completed based on the requirements for mitigation projects as listed in Section 16.16.260 and 16.16.690 of the WCC, and also meets the requirements for mitigation as provided by Ecology (Ecology, et. al 2006). The Restoration Plan has been developed to also meet the permit conditions for a Nationwide Permit #33 from the USACE, which requires that the impacted wetland areas be restored to pre-existing conditions.

2.0 PROJECT DESCRIPTION

The geotechnical investigation entails advancing approximately 50 boreholes and approximately 20 cone penetration tests (CPT) to evaluate subsurface soil and groundwater conditions. The investigation will provide information regarding subsurface conditions that will be critical for design of

future development on the property. Geotechnical boreholes are generally about 8 inches in diameter and extend to depths of 80 to 130 feet. The CPTs push a 1.4-inch-diameter rod into the ground to depths up to about 100 feet. Two shallow test pit excavations to depths of about 15 feet will be used to confirm near-surface soil profiles. The locations of the explorations are shown in Figure 1 (Geotechnical Investigation Site Access As-Built Plan).

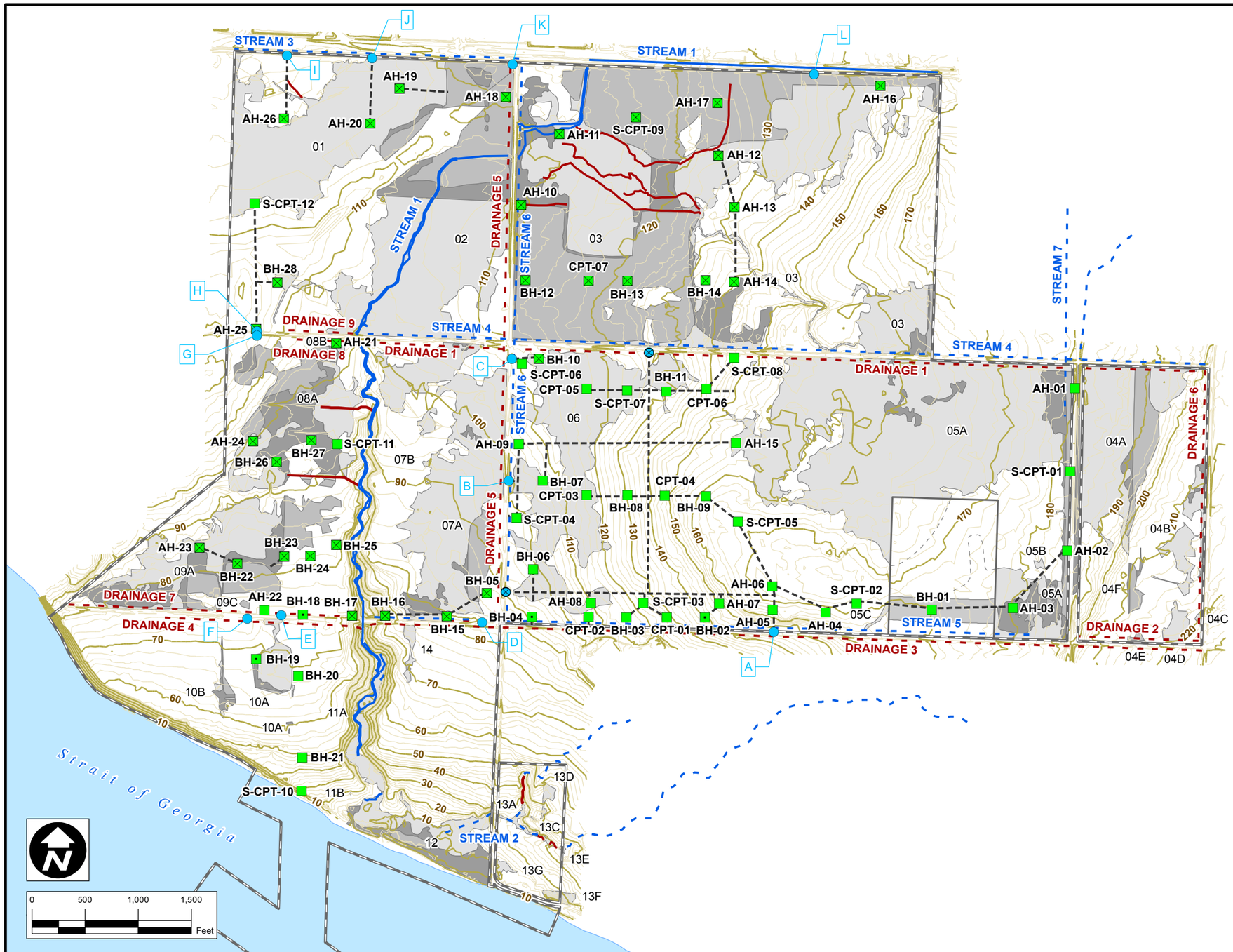
The boreholes and CPT explorations are advanced with track-mounted equipment, which is approximately 8 feet wide by 25 feet long. To allow equipment to access test locations in forested and shrub vegetated areas, access paths approximately 17 feet wide are required to accommodate the equipment and provide safe working clearance.

To prepare access paths in forest and shrub areas, a tracked excavator was used to knock over trees and to pick up smaller vegetation and push it to the perimeter of the access path. These access paths are temporary and no improvements were made to create roadways. Following initiation of clearing, data collection was begun and boreholes and CPT work initiated. Field work was halted on July 22, 2011. At that time, access to all borehole locations was completed, while approximately half of the boreholes established.

2.1 Work Plan Development and Implementation

To avoid wetlands, streams and buffers and minimize clearing disturbance, access routes were drawn onto base maps and evaluated. It is not practicable to locate the proposed geotechnical boreholes with complete avoidance of wetlands because much of the proposed terminal development area is wetland and geotechnical data is needed for subsurface conditions in those locations. However, to the extent feasible, proposed geotechnical boreholes were located outside of wetland and heavily vegetated areas in order to avoid direct vegetation impacts. When a boring hole was located within a wetland, existing roads and pastures and hayfields were used as access routes to the extent possible to minimize vegetation disturbance throughout the property. Only when no other alternative could be identified were access routes placed through forested or shrub vegetated wetland areas.

Clearing for access paths to the geotechnical boring locations was initiated on July 5, 2011, and was completed on July 22, 2011. In total, approximately 23,132 lineal feet of access paths were cleared in both uplands and in wetland forest and shrub areas. The average width of clearing was determined to be 17 feet and the total area cleared was approximately 9.1 acres. Of this total cleared area, approximately 2.8 acres of vegetation and soil in forested and shrub wetlands and approximately 0.96 acres of wetland buffers were disturbed. At this time, no additional access paths are anticipated to be necessary to complete the geotechnical investigation.



LEGEND

- BOREHOLE COMPLETED (37)
- BOREHOLE NOT COMPLETED (32)
- BOREHOLE IN PROGRESS (4)
- VEHICLE ACCESS POINT
- NO VEHICLE ACCESS
- AS-BUILT BOREHOLE ACCESS*
- APPROXIMATE DRAINAGE
- SURVEYED DRAINAGE
- APPROXIMATE STREAM COURSE
- SURVEYED STREAM COURSE
- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- APPROXIMATE WETLAND BOUNDARY
- FRESHWATER EMERGENT WETLAND (PEM)
- FRESHWATER FORESTED WETLAND (PFO)
- FRESHWATER SHRUB WETLAND (PSS)
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

*THIS LINE DEPICTS LOCATIONS WHERE TREES AND SHRUBS WERE REMOVED TO ALLOW ACCESS FOR GEOTECHNICAL INVESTIGATION. NO ACCESS ROUTE IS SHOWN WHERE ACCESS WAS ACROSS OPEN FIELDS.

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Bothell, WA 98011

amec

DWN BY:	SD
CHK'D BY:	KD
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	1 inch = 1,000 feet

PROJECT: GATEWAY PACIFIC TERMINAL GEOTECHNICAL INVESTIGATION

TITLE: 2011 GEOTECHNICAL INVESTIGATION SITE ACCESS AS-BUILT PLAN AND WETLAND IMPACT AREAS

DATE:	AUGUST 2011
PROJECT NO.:	091515338C-07-03
REV. NO.:	3
FIGURE NO.:	FIGURE 1

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-07-03 - Geotechnical Investigation\Critical_Areas_Report\Figure 2 - 2011 Geotechnical Investigation Site Access As-Built Plan.mxd

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3.0 DESCRIPTION OF THE PROJECT SITE

The site is located 18 miles northwest of Bellingham and 10 miles west of Ferndale (Figure 2). The property is approximately 1,200 acres in size and covers portions of Sections 17, 18, and 19 of Township 39 North, Range 1 East, all in unincorporated Whatcom County. The property is accessible from I-5 via Highway 548 (Grandview Road) west, and left on Kickerville Road.

Roughly rectangular in shape, the property is bounded by roads and industrial operations to the north, east, and south, and by the Strait of Georgia to the southwest:

- BP's Cherry Point refinery property is adjacent to the north and west;
- 70 acres owned by BP lie to the northwest;
- Kickerville Road, populated by private residences, lies to the east;
- Pastures owned by others lie to the south;
- DNR lands lie to the northeast; and
- The Strait of Georgia lies to the south and southwest.

Cherry Point, a small promontory of land south of Point Whitehorn, forms the southwest corner of the property. Gulf Road (formerly Powder Plant Road) and the BNSF Railway's Custer Spur runs north-south in the eastern portion of the property, and Lonseth Road bisects the property east-west. A BPA transmission-line corridor runs north-south through the eastern portion.

The current land use proposal is for upland geotechnical investigations, and does not include geotechnical investigation of the Strait of Georgia, or the freshwater or marine shoreline. Therefore, this document does not evaluate other Critical Areas, such as those Fish and Wildlife Habitat Conservation Areas (FWHCAs) associated with the shoreline, and is focused on the portion of the site above ordinary high water. Furthermore, throughout this document, any reference to the property excludes the marine shoreline portions of the property.

3.1 STUDY AREA

This study describes the critical areas located with the Pacific International Terminals, Inc. property with emphasis on those relevant to the geotechnical investigation and associated clearing. The current proposal is for an upland geotechnical investigation that does not include investigations in the marine area. The restoration plan described here focuses on the cleared forested within the Pacific International Terminals, Inc. property and especially in wetlands and wetland buffers, which were cleared to perform the geotechnical investigation.

3.2 HISTORICAL LAND USE

Archaeological studies indicate that portions of the study area have been used by a group of Salish Indians, known by the post-reservation name of Lummi, for at least 3,000 years. The Salish Indians at Cherry Point were noted for reef-netting and other fishing practices. According to homestead records, the earliest account of Euroamerican occupation of Cherry Point was documented in the 1870s. Between 1902 and 1934, European settlers used a portion of the study area as a camp for fishermen tending off-shore fish traps (Markham 1993). One site with potential archaeological significance is within property.

Beginning in the late 1800s, the site was logged and homesteaded for farming by European settlers. Several abandoned orchards remain. Farming included crops such as rye, potatoes, hay, dairy and chicken farms, and scattered woodlots for firewood and logging. Farming activities continued through the mid-1940s, when large portions of land were acquired for industrial use. Based on historical aerial photographs, the present distribution of vegetation on the property, with open fields and wooded areas, appears to have been stable for at least the last 50 years.

3.3 CURRENT LAND USE

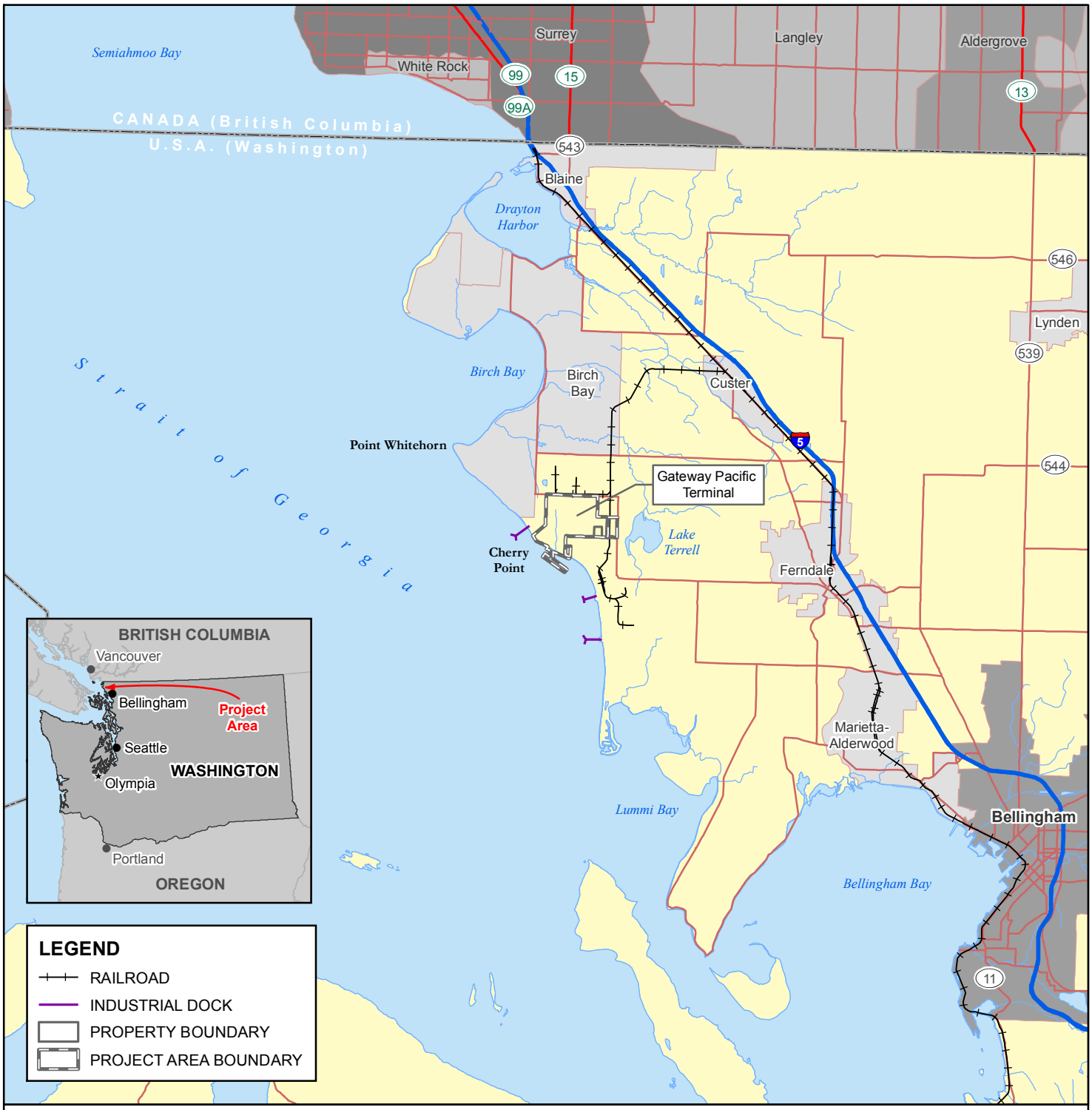
Recent land use of the property has included pasture, hay farming, and firewood production. In general, the plant communities present include a mix of young red alder forests, pastures, hayfields, and abandoned fields. The pastures and hayfields still in use are occasionally tilled and reseeded.

4.0 CRITICAL AREAS STUDY

Critical Areas regulated under WCC 16.16 include

- Geologically hazardous areas,
- Frequently flooded areas,
- Critical aquifer recharge areas (CARAs),
- Wetlands, and
- Fish and Wildlife Habitat Conservation Areas (FWHCAs).

As indicated in the introduction to this document, Whatcom County has requested a Critical Areas Study and a Restoration Plan for temporary impacts to wetlands and wetland buffers. This Critical Areas Study describes Critical Areas identified within the property, as identified through a review of published information, and field investigations.



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amec

Pacific International Terminals

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: GATEWAY PACIFIC TERMINAL GEOTECHNICAL INVESTIGATION	DWN BY: SD	DATUM: NAD83	DATE: AUGUST 2011
TITLE: VICINITY MAP	CHK'D BY: CS	REV. NO.: 1	PROJECT NO.: 091515338C-07-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=3 miles	FIGURE No.: FIGURE 2

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-07-03 - Geotechnical Investigation\Critical_Areas_Report\Figure 1 - Vicinity Map.mxd

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4.1 APPROACH

Available site information was reviewed to identify any documented wetlands, streams, or other site characteristics (e.g., vegetation patterns, topography, soils, or water courses) that would indicate the presence of wetlands, as well as the presence of geologically hazardous areas, CARAs, and FWHCAs.

Based on Whatcom County Critical Areas Maps, there are no frequently flooded areas identified by Whatcom County on the property.

The Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) database (WDFW 2009) was searched for the documented occurrence of sensitive wildlife and/or habitats in the vicinity of the project footprint. The following section summarizes the available information. Figure 3 shows the Critical Areas on a map of the property.

4.1.1 Geologically Hazardous Areas

Based on preliminary site review and information published in the Whatcom County Critical Areas Maps (Whatcom County 2006), the property contains one small portion of land considered a *Marine Landslide Hazard Area with Modified Shoreline Stability* just north and west of Henry Road (Figure 3 – Critical Areas and Buffers). No geotechnical drilling was conducted, nor is any geotechnical drilling planned in this area. Geologically hazardous areas are not discussed further in this report.

4.1.2 Critical Aquifer Recharge Areas

A Critical Aquifer Recharge Area (CARA) is defined by the Washington Administrative Code (WAC) Chapter 365-190 as follows:

> "Areas with a critical recharging effect on aquifers used for potable water are areas where an aquifer that is a source of drinking water is vulnerable to contamination that would affect the potability of the water."

According to Whatcom County critical areas maps (Whatcom County 2006) and position in the watershed, no CARAs appear to be present on the property. Surficial aquifers are located along the shoreline of the property and north of Henry Road (Figure 3).

4.1.3 Wetlands

Comprehensive site investigations were used to identify and delineate the wetlands throughout the property from 2006 to 2011, with most of the work completed between 2006 and 2008. Potential wetland areas were evaluated in the field using the methods outlined in the US Army Corps of

Engineers *Wetland Delineation Manual* (Environmental Laboratory 1987) and the Washington State *Wetlands Identification and Delineation Manual* (Ecology 1997).

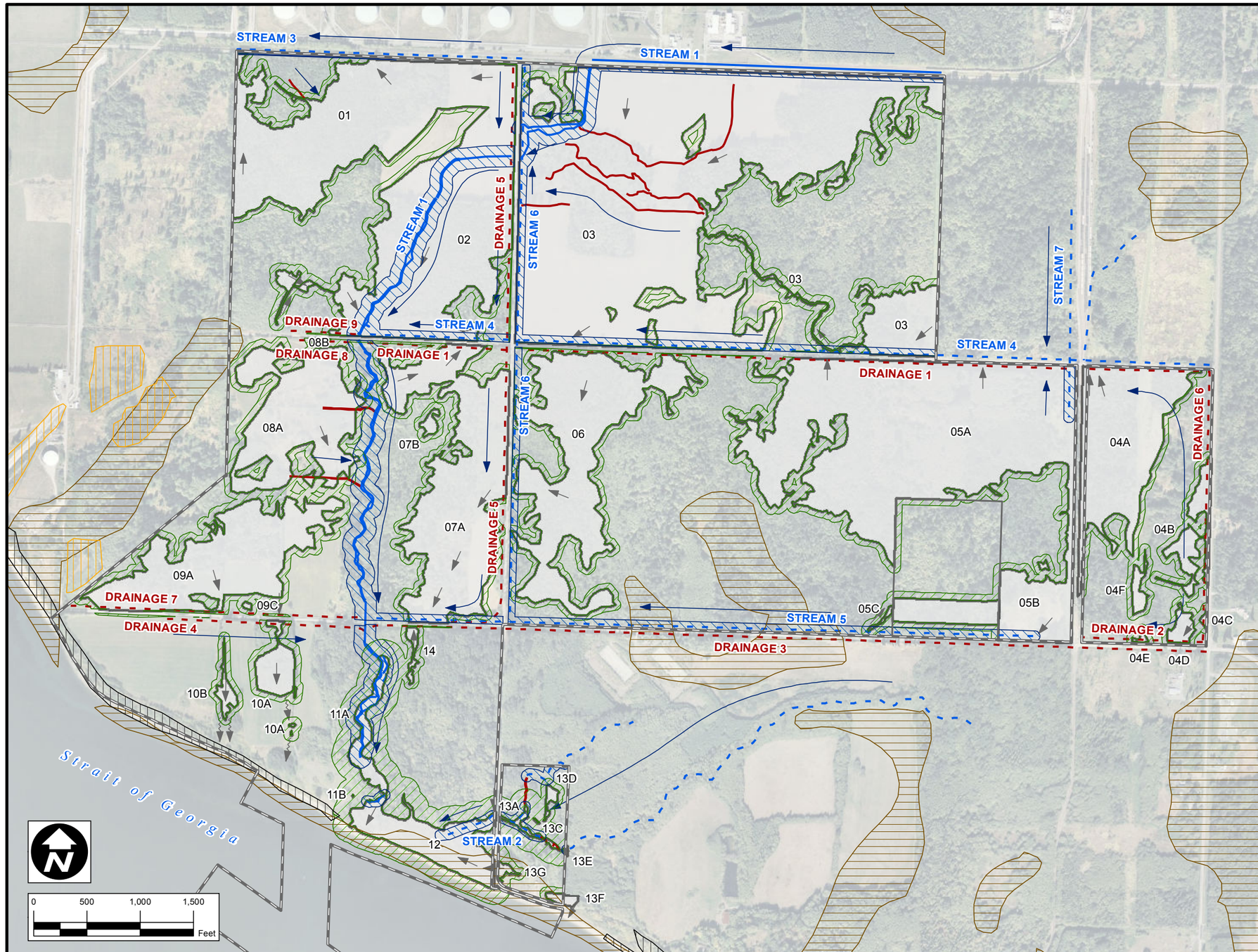
According to these manuals, hydrophytic (wetland) vegetation, hydric (wetland) soils, and wetland hydrology must be present for a significant duration during the growing season for an area to be considered a wetland. Data used to evaluate these parameters were collected from plots representative of typical conditions in each wetland. Additional data collected in areas adjacent to wetlands documented upland conditions.

Wetlands were rated using the *Washington State Wetlands Rating System for Western Washington* (Hruby 2004, revised), which evaluates wetlands based on rarity, sensitivity, and wetland function. Wetlands were categorized as Category I, II, III, or IV, based on the results of the evaluation. Wetlands were rated to develop and apply standards for protecting and managing wetlands, and for establishing wetland buffers.

A more detailed description of the wetland delineation approach is provide in the *Wetland Determination and Delineation Report* (AMEC 2008), and is available upon request.

4.1.4 Wetland Buffers

Whatcom County Code Section 16.16.630(D) designates wetland buffers from the edges of all wetlands to protect the integrity, functions, and values of the wetland. Per the WCC, wetland buffers are to be measured perpendicular to the wetland edge on all sides as marked in the field. The standard wetland buffer is determined based on the intensity of the proposed land use and the functions and values provided by the wetland (wetland rating), particularly with respect to wildlife function. The results of the wetland investigation and wetland maps were used to determine the width and to map the extent of the required wetland buffer.



LEGEND

- APPROXIMATE DRAINAGE
- SURVEYED DRAINAGE
- APPROXIMATE STREAM COURSE
- SURVEYED STREAM COURSE
- STREAM BUFFER
- STREAM AND DRAINAGE FLOW DIRECTION
- 05A WETLAND FLOW DIRECTION
- EXISTING WETLAND AREA
- WETLAND BUFFER *
- SURFICIAL AQUIFER (Mainland Only)

SHORELINE STABILITY:

- MODIFIED
- UNSTABLE SLOPE
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

*THE STANDARD WETLAND BUFFERS SHOWN ARE BASED ON WETLAND FUNCTIONS AND VALUES AND LOW-INTENSITY LAND USE ASSOCIATED WITH GEOTECHNICAL ACTIVITIES (per WCC 16.16.630).

Source:
Surficial Aquifer and Shoreline Stability data obtained from Whatcom County Planning & Development Services.

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amec

DWN BY:	SD
CHK'D BY:	MG
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	1 inch = 1,000 feet

PROJECT: GATEWAY PACIFIC TERMINAL GEOTECHNICAL INVESTIGATION

TITLE: CRITICAL AREAS AND BUFFERS

DATE:	AUGUST 2011
PROJECT NO.:	091515338C-07-03
REV. NO.:	1
FIGURE NO.:	FIGURE 3

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-07-03 - Geotechnical Investigation\Critical_Areas_Report\Figure 3 - Critical Areas and Buffers.mxd

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4.1.5 Fish and Wildlife Habitat Conservation Areas

Whatcom County Code Section 16.16.710 defines FWHCAs as, “those areas identified as being of critical importance to the maintenance of certain fish, wildlife, and/or plant species,” and includes:

- Streams,
- Areas that support federally and/or state-listed species,
- State priority habitats and areas with state priority species,
- Commercial and recreational fishing areas,
- Kelp and eelgrass beds,
- Forage fish spawning areas,
- Naturally occurring ponds under 20 acres,
- Naturally occurring lakes and other waters of the state,
- Natural area preserves, and
- Locally important species and habitats with recreational, cultural, and/or economic value.

Based on general site characteristics and position of the property in the watershed, FWHCAs in the project area include:

- streams,
- areas that support state-listed species, and
- state priority habitats and areas with priority species.

Whereas other FWHCAs (commercial and recreational fishing areas, kelp and eelgrass beds, forage fish spawning areas) may occur adjacent to the site, they are beyond the limits of this current Critical Areas Study, because they are not affected by the subject geotechnical investigation and vegetation clearing.

An investigation of streams and waterways was conducted in conjunction with the wetland determination and delineation described previously, and subsequent habitat studies and fish presence surveys have been conducted. Preliminary information on streams and state listed habitats and spaces was provided in the *Gateway Pacific Terminal Project Information Document* (AMEC 2011) and is on file with Whatcom County and the USACE.

The *Gateway Pacific Terminal Project Information Document* (AMEC 2011) also provides an analysis of baseline characteristics relative to areas that support state-listed species and state priority habitats and areas with priority species and we refer the reader to that document.

4.1.6 Stream Buffers

Stream buffers are established in WCC Section 16.16.740 to protection the integrity, functions, and values of the resource. The WCC states that buffers do not include areas that are disconnected from the habitat area by a road or other developed surface. The WCC provides guidelines for establishing stream buffers based on position in the watershed and whether the stream supports fish. Stream buffers occur throughout the property.

4.2 DESCRIPTION OF CRITICAL AREAS

Based on the review of available site characteristics and field investigations, as well as communication with a Whatcom County Technical Administrator, the description of Critical Areas provided herein is focused on wetlands and their associated buffers. This was determined because while streams, drainages, and other FWHCAs are present onsite, they were not impacted by the subject geotechnical investigation and vegetation clearing. As mentioned previously, more information about streams, drainages, and wildlife is provided in the *Gateway Pacific Terminal Project Information Document* (AMEC 2011).

4.2.1 Wetlands

Wetlands comprise approximately 530.6 acres of the property. Wetlands were classified as riverine, slope, and depressional hydrogeomorphic (HGM) classes. Palustrine forested (PFO) wetlands were most common, followed by wet pastures and hayfields (PEM), and a small amount of scrub-shrub wetlands (PSS). One wetland was identified as an estuarine emergent system (Wetland 12).

Table 1 provides the typical plant community compositions for forested wetlands, shrub wetlands, and wet pastures.

Table 1 Typical Plant Communities in Forested, Shrub and Wet Pasture Wetlands.

Red Alder Wetland Forest Community		
Common Name	***Scientific Name***	**Wetland Indicator Status**
Red alder	*Alnus rubra*	FAC
Black cottonwood	*Populus trichocarpa*	FAC
Western red cedar	*Thuja plicata*	FAC
Twinberry	*Lonicera involucrata*	FAC
Salmonberry	*Rubus spectabilis*	FAC
Red-osier dogwood	*Cornus stolonifera*	FACW
Pacific willow	*Salix lucida*	FACW+
Sitka willow	*Salix sitchensis*	FACW
Wetland Shrub Community		
Common Name	***Scientific Name***	**Wetland Indicator Status**
Nootka rose	*Rosa nutkana*	FAC
Douglas spirea	*Spiraea douglasii*	FACW
Himalayan blackberry	*Rubus armeniacus*	FACU-
Salmonberry	*Rubus spectabilis*	FAC
Lady fern	*Athyrium filix-femina*	FACW
Slough sedge	*Carex obnupta*	OBL
Pacific silverweed	*Potentilla pacifica*	OBL
Stinging nettle	*Urtica dioica*	FAC+
Wet Pasture Community		
Common Name	***Scientific Name***	**Wetland Indicator Status**
Bentgrass	*Agrostis* sp.	FACW-FACU
Meadow foxtail	*Alopecurus pratensis*	FACW
Sweet vernal grass	*Anthoxanthum odoratum*	FACU
Tall buttercup	*Ranunculus acris*	FACW-

Note: OBL = obligate; FACW = facultative wetland; FAC = facultative wetland/upland; FACU = facultative upland

Table 2 provides a summary of wetland ratings for each of the delineated wetlands.

Table 2 Characteristics and Ratings of Wetlands on the Pacific International Terminals, Inc., Property as Confirmed by the USACE (USACE 2009)

		Area by Cowardin[1] Classification				
Wetland Name	**Hydrogeomorphic Class**	**Palustrine Scrub-Shrub (acres)**	**Palustrine Emergent (acres)**	**Palustrine Forested (acres)**	**Rating[2]**	**Total Area (acres)**
1	Flats/Depressional	1.3	5.1	37.8	III	44.2
2	Slope	5.0	11.3	37.0	III	53.2
3	Slope	15.1	72.3	63.2	III	150.7
4A	Slope	2.2	5.0	19.5	III	26.6
4B	Depressional	0.7	0	3.7	III	4.4
4C	Depressional	0.1	0	0.1	III	0.2
4D	Slope	0	0	1.3	III	1.3
4E	Slope	0	0.2	0	III	0.2
4F	Slope	0.3	0.8	0	IV	1.1
5A	Slope	8.6	3.2	83.4	III	95.2
5B	Depressional	0	0	0.1	III	0.1
5C	Slope	0	0	0.2	III	0.2
6	Slope	0	0	36.9	III	36.9
7A	Slope	2.1	3.5	34.5	III	40.1
7B	Depressional	0	0	0.6	III	0.6
8A	Slope	9.8	5.9	9.1	III	24.8
8B	Depressional	0.1	0	0	III	0.1
9A	Slope	6.9	8.6	12.7	III	28.2
10A	Slope	0.5	0.2	3.1	III	3.7
10B	Depressional	0.6	0.3	0.3	III	1.1
11A	Riverine	0	0	3.5	I	3.5
11B	Depressional	<0.1	0	0	III	<0.1
12	Depressional[3]	4.7	0.7	5.8	I	11.2
13A	Riverine	0	0	0.6	I	0.6
13C	Depressional	0	0	<0.1	III	<0.1
13D	Slope	0	0	0.4	III	0.4
13E	Riverine	0	0	0.1	II	0.1
13F	Depressional	0	0	0.6	III	0.6
13G	Depressional	0	0	0.4	III	0.4
14	Depressional	0	0	0.7	III	0.7
Total Wetland		**57.9**	**117.1**	**355.6**		**530.6**

A description of the characteristics and values of each of the delineated wetlands is provided in the *Wetland Determination and Delineation Report* (AMEC 2008), which is available upon request.

Additional wetland boundaries were delineated in August 2011 on Parcel 14, an area excluded from the original wetland delineation due to property access limitations. Parcel 14 is located on the eastern side of the area abutting the north side of Henry Road.

Wetland boundaries of Wetland Units 5A, 5B, and 5C extended onto Parcel 14 as shown on Figure 3. The additional wetland delineations resulted in the connection of Wetland 5A to Wetland 5C, and are thus named as one wetland (5A). Whereas these additional wetland boundaries have not yet been confirmed by the USACE, preliminary area calculations for Wetlands Units 5A/5C and 5B are as given in Table 3.

Table 3 Revised, preliminary characteristics and ratings of wetlands 5A, 5B, and 5C, including previously excluded area on Parcel 14 on the Pacific International Terminals property, subject to confirmation by the USACE

		Area by Cowardin[1] Classification				
Wetland Name	**Hydrogeomorphic Class**	**Palustrine Scrub-Shrub (acres)**	**Palustrine Emergent (acres)**	**Palustrine Forested (acres)**	**Rating[2]**	**Total Area (acres)**
5A/5C	Slope	8.7	3.2	97.0	III	108.9
5B	Depressional	-	-	0.1	III	0.1

The following section provides a description of the wetlands impacted by the subject geotechnical investigation and vegetation clearing. Wetlands locations are shown on Figures 1 and 3.

4.2.1.1 Wetland 1

PFO and PEM
Category III
Abuts Stream 3
Continues off-site and appears to infiltrate to groundwater north of Lonseth Road.

Wetland 1 is a 44.27-acre shallow-depressional area that abuts Stream 3 in the northwestern most portion of the study area (Figure 3). The red alder community typical of the area is present across most of the wetland. Heavily grazed wet meadows in the northeastern extent are vegetated with the study area's typical pasture mixture, as described in AMEC 2008.

The wetland is flat, with a topographic gradient of less than 1 percent over most of the study area. While this area could be classified as a slope, the hydrodynamics are more similar to the conditions found in a depressional system. During high flows, a 6-inch culvert beneath Aldergrove Road conveys surface flow from the ditch on the north side of the road into the wetland. However, this inflow does not generate well-defined drainage channels. It appears that wetland hydrologic conditions exist primarily due to a seasonally high ground water table and local precipitation.

This wetland is hydrologically separated from the rest of the study area by a watershed boundary that occurs along a northeast-southwest trending ridgeline that lies southeast of the wetland. This is the only wetland within the study area that does not drain southward via a stream located within the study area. The wetland continues southwest onto the adjacent property, where it appears to infiltrate to groundwater north of Lonseth Road.

Wetland 1 occupies a large portion of its drainage basin, and may potentially function to improve water quality by processing nutrients. Wetland 1 could also provide wildlife habitat due to the presence of multiple Cowardin classes, hydroperiods, and relatively high habitat interspersion.

4.2.1.2 Wetland 2

PFO and PEM
Category III
Abuts Streams 1 and 4
Drains to Streams 1 and 4, then to the Strait of Georgia.

Wetland 2 is a large (49.0-acre), mostly-forested slope wetland located north of Lonseth Road, south of Aldergrove and west of Gulf Road (Figure 3). Within Wetland 2, Stream 1 is characterized as a very low gradient, slow flowing stream with a poorly defined channel for most of the area. Water collects in Wetland 2 as a result of a seasonally high groundwater table, precipitation, and some contribution of overbank flooding. The area was saturated during the first field effort in June 2006, and almost completely inundated in winter 2007, with depths of 2 to 8 inches in most portions.

The forested portion is vegetated by the young alder forest community typical of the forested wetlands in the study area (AMEC 2008). The northern-most extent is heavily grazed wet pasture. Small thickets of rose, snowberry, and Himalayan Blackberry are common along the transition from forest to pasture and along the roadway. Reed canarygrass dominates the area surrounding Stream 1 in the pasture.

Soils are mapped as Whitehorn silt loam. Soils are black (10 YR 2/1) loam and silt loam in the top approximate 6 inches. The surface of soil near Stream 1 is high in organic content. The upper part of the subsoil varies by location and is loam or clay loam with redox features present, generally starting at approximately 6 inches.

Wetland 2 has a relatively shallow slope, dense, woody vegetation, and very few surface depressions. Functions provided by Wetland 2 may include the attenuation of overland flow velocity, thereby decreasing erosion and sediment deposition in areas downslope. Multiple Cowardin classes, hydroperiods, habitat features, and interspersion contribute to the habitat value of Wetland 2.

4.2.1.3 Wetland 3

PFO, PSS, and PEM.
Category III
Abuts Streams 1, 3, 4, and 6
Drains to Streams 1, 3, 4, and 6, then to the Strait of Georgia.

Wetland 3 is a large (143.44 acres) wetland located north of Lonseth Road, south of Aldergrove Road, and east of Gulf Road (Figure 3). Stream 1 originates in Wetland 3 through the confluence of many small, undefined drainages into one constructed, well-defined stream just prior to flowing out of the wetland on the east side of Gulf Road.

Wetland 3 is actively-grazed pasture in the western half and forested wetland in the eastern half. The pasture vegetation is the typical mixed grass community found in the study area (AMEC 2008). The forested wetland has the red alder community typical of the study area (AMEC 2008). The slightly wetter conditions in the vicinity of the outlet at Gulf Road support a willow shrub community interspersed with small, open water areas with cattail, rushes, and sedges.

Soils are mapped as Whitehorn silt loam for most of the area in the western and central portions. Soils on the eastern most extent are mapped as Birchbay Silt loams on 0 to 3 percent slopes. Soils are a compact, very dark brown (10 YR 2/2) clay loam in the top approximate 6 inches. Below 6 inches, soils are a dark brown silt loam with redoximorphic features indicating saturated conditions.

Wetland 3 has a relatively shallow gradient, very little dense or rigid vegetation, and surface depressions are present throughout. Wetland 3 provides some attenuation of overland flow due to its ability to retain a limited amount of water. Multiple Cowardin classes and hydroperiods, plant diversity and habitat interspersion contribute to the habitat value of Wetland 3.

4.2.1.4 Wetland 5A/5C

PFO and PEM
Category III
Wetland 5A abuts RPW tributary on the south side of Lonseth Road
Water in the northern portion of the wetland drains north to the roadside ditch on the south side of Lonseth Road, then to Stream 6 and ultimately to the Strait of Georgia. Water in the southern portion of the wetland appears to infiltrate to groundwater, then flow south to Stream 5, then to Stream 1 and ultimately to the Strait of Georgia.

Wetland 5A/5C is a large (108.9-acre), primarily forested slope wetland that abuts the roadside ditch on the south side of Lonseth Road to the north, and lies adjacent to Stream 5 to the south (Figure 3). Old logging roads and skid trails are common throughout this wetland, and result in linear areas of ponding throughout the area. Wetland 5A/5C receives some water from the roadside ditch on the north side of Henry, which empties into the wetland via a culvert under the railroad tracks.

Wetland 5A/5C includes forested, scrub shrub, and emergent habitat types. Forest vegetation is the typical community for almost all of the area (AMEC 2008) as forested wetlands cover 97.0 of the 108.9-acre wetland complex. The southeast corner of this wetland unit contains a wet pasture dominated by reed canarygrass (*Phalaris arundinacea*), meadow foxtail (*Alopecurus pratensis),* and bentgrass species (*Agrostis spp.).* A 100-foot-wide easement adjacent to the rail embankment, vegetated mainly with reed canarygrass, is mowed annually.

Soils are mapped as Whitehorn silt loam. Soils were very dark brown (10 Y/R 2/2) or black (10 YR 2/1) in the upper 5 to 6 inches. In some areas, depth below 6 inches had a depleted matrix (10 YR 4/1) with distinct redox features. Most areas had redox features within 6 inches of the surface, and some small depressional features showed increased organic matter at the surface.

Wetland 5A/5C, located on a shallow slope, has dense, rigid vegetation throughout most of its area, and many small surface depressions that can trap water. Wetland 5A/5C may function to improve downstream water quality by trapping nutrients and sediments, and to decrease downstream erosion by attenuating overland flow velocity. Multiple Cowardin classes and hydroperiods, plant diversity, and habitat interspersion and features contribute to the habitat value of Wetland 5A/5C.

4.2.1.5 Wetland 5B

PFO and PSS
Category III
Isolated
No apparent outlet – infiltrates to groundwater that likely drains to the RPW on the south side of Lonseth Road, and ultimately to the Strait of Georgia.

Wetland 5B is a small, isolated wetland (0.13 acres) with vegetation typical of forested wetlands in the study area with hydrophytic emergent species. The soils are mapped as Whitehorn silt loam, and field observations are generally consistent with the mapped description. It is likely that Wetland 5B is connected to Wetland 5A/5C by shallow interflow, groundwater, or surface runoff during large storm events. Drainage patterns were assumed based on topographic gradients and field observations.

Wetland 5B has a relatively constricted outlet, and consists of dense, persistent vegetation, multiple Cowardin classes and hydroperiods, and includes areas of occasional ponding greater than 0.5 feet. Functions provided by Wetland 5B include slight flood attenuation, erosion control, some nutrient and sediment removal, and organic matter and terrestrial invertebrates production.

4.2.1.6 Wetland 6

PFO
Category III
Abuts Stream 6 and the RPW tributary on the south side of Lonseth Road
Drains to Stream 6, then Stream 5 and ultimately the Strait of Georgia.

Wetland 6 is a large (36.93-acre), forested, slope wetland that abuts Stream 6 and the roadside ditch on the south side of Lonseth Road (Figure 3). Gulf Road borders the area on the west and Lonseth Road on the north. Upland forests border the south and eastern portions. Old logging roads and skid trails are common and result in linear areas of ponding throughout the area. Forest vegetation is the area's typical plant community. The overstory consists of red alder and black cottonwood, with a shrub community that includes salmonberry, Douglas spirea, and twinberry. The herbaceous layer includes slough sedge and Hood's sedge.

Wetland 6, located on a shallow slope, has dense, rigid vegetation throughout most of its area, and many small surface depressions that can trap water. Wetland 6 functions to improve downstream water quality by trapping nutrients and sediments, and to decrease downstream erosion by attenuating overland flow velocity. Multiple Cowardin classes and hydroperiods, plant diversity and habitat features contribute to the habitat value of Wetland 6.

4.2.1.7 Wetland 7A

PFO, PSS, and PEM.
Category III
Abuts Stream 5 and other RPW tributaries on Gulf and Lonseth roads
Drains to Stream 5, then to Stream 1, and to the Strait of Georgia. Water may also infiltrate and drain towards the Stream 1 ravine, ultimately to be expressed as base flow for Stream 1.

Wetland 7A, a 40.06-acre slope wetland, abuts Stream 5, the roadside ditch on the east side of Gulf Road, and the roadside ditch on the south side of Lonseth Road (Figure 3).

Vegetation in the wetland consists of the area's typical forest and shrub communities. The overstory includes a canopy of red alder, with an understory shrub community of Douglas spirea, and twinberry and slough sedge. Indicators of wetland hydrology include water-stained leaves observed during the June survey and observations of inundation in January 2007. The soils are mapped as Whitehorn silt loam. Field observations indicate that the soils have higher clay content and the matrix is darker than the mapped type. Redoximorphic features were observed below 8 inches.

Wetland 7A, located on a shallow slope, has dense, woody vegetation throughout most of its area, and many small surface depressions that trap water. Wetland 7A may function to improve downstream water quality by trapping nutrients and sediments, decreasing downstream erosion by

attenuating overland flow velocity. Multiple hydroperiods, plant diversity, and habitat interspersion contribute to the habitat value of Wetland 7A.

4.2.1.8 Wetland 8A

PFO, PSS, and PEM
Category III
Abuts Stream 1
Drains southeast to Stream 1 via constructed drainages, then to the Strait of Georgia.

Wetland 8A is a 24.69-acre forest, shrub, and emergent complex slope wetland abutting Stream 1 (Figure 3). Vegetation for most of the area is succeeding from old field to forest and shrub communities. Some parts in the northern extent were hayed and one area was scraped in the summer of 2006.

Vegetation in the forested portions is typical of the study area. Emergent portions have a mixed grass community with some of the lower portions and ditches supporting thick stands of sedge, reed, and rushes. Some small portions support pure stands of reed canarygrass. Indicators of wetland hydrology include water within 2.5 inches of the surface and saturated soil throughout the soil profile. Soils in the wetland are mapped as a Whitehorn silt loam. Field observations indicate that the soil profile was homogenous throughout a 16-inch sample hole, with no redoximorphic features. The texture of the soil is a silt loam or loam.

Wetland 8A is located on a shallow slope with patchy vegetation and many surface depressions that can retain water. Wetland 8A may function to improve the water quality in Stream 1 by removing some nutrients and sediments. The wetland may also attenuate downstream flooding, scouring, and erosion by retaining a small amount of water. Multiple Cowardin classes and hydroperiods, high levels of plant diversity and habitat interspersion, habitat features, and relatively undisturbed buffers contribute to the habitat value of Wetland 8A.

4.2.1.9 Wetland 9A

PFO, PSS, and PEM.
Category III
Abuts Stream 5
Drains south to Stream 5, then to Stream 1 via and ultimately to the Strait of Georgia.

Wetland 9A (25.69 acres) is a forest, shrub, and pasture area that abuts Stream 5 in the western portion of the study area (Figure 3).

During the 2006 investigation, a portion the southern extent had recently been plowed while the adjacent field was likely turned and reseeded the previous year. The area was seeded in spring 2006. Vegetation in the plowed area was sparse and young during our 2007 field investigation, and

consisted of weedy annuals, reed canarygrass, and Himalayan blackberry. The remaining portions of the wetland are forested with the typical red alder forest community (AMEC 2008).

Soil in the vicinity is mapped as Whitehorn silt loam. During the field investigation, soils were hard and compacted. The plowed area was inundated with up to 10 inches of water during the 2007 field investigation. Most of the wetland was inundated with up to 6 inches of water during the 2007 investigation.

Wetland 9A has a shallow slope, patches of dense, woody vegetation, and surface depressions throughout that trap water. Wetland 9A may function to improve water quality downstream by removing nutrients and sediments, and by attenuating overland flow velocity. Wetland 9A also provides organic matter and terrestrial invertebrates to downstream communities. Multiple Cowardin classes and hydroperiods, high levels of plant diversity and habitat interspersion, special habitat features, and relatively undisturbed buffers contribute to the habitat value of Wetland 9A.

4.2.1.10 Wetland 10A

PFO, PSS, and PEM.
Category III
Abuts RPW tributary on the south side of Henry Road
No apparent outlet; likely drains to Strait of Georgia downslope via groundwater.

Wetland 10A is a 3.73 acre forested wetland that abuts the roadside ditch on the south side of Henry Road (Figure 3). The wetland may receive water from the ditch during high flows. The wetland appears to be the site of a former homestead or residence. A small fruit orchard and concrete foundation are situated in the southern portion of the wetland.

The dominant vegetation in Wetland 10A consists of wetland species including slough sedge and common rush, as well as facultative species typical of forested communities in the study area. Indicators of wetland hydrology include saturated soil in the upper 12 inches, and free water in the sampling pit. The soil is mapped as Whitehorn silt loam, and field observations generally confirm the mapped soil type.

Wetland 10A has a shallow slope, dense, woody vegetation, and surface depressions throughout can trap water. Wetland 10A functions to improve water quality downstream by removing nutrients and sediments, and attenuating overland flow velocity. Wetland 10A also provides organic matter and terrestrial invertebrates to downstream communities. Multiple hydroperiods, a high degree of habitat interspersion, special habitat features, and relatively undisturbed buffers contribute to the habitat value of Wetland 10A.

4.2.2 Wetland Buffers

As described previously, the WCC Section 16.16.630(D) designates buffers from the edges of all wetlands to protect the integrity, functions, and values of the wetland. The results of the wetland investigation (AMEC 2008), wetland functions and values (overall wetland classification and habitat score), and wetland maps were used to determine the width, and to map the extent of the required wetland buffer. The presumed widths of wetland buffers based on functions and values provided in Table 4, below, assume a low-intensity land use as is characteristic of the subject project description (geotechnical investigations).

Wetland buffer areas are consistent with other upland areas of the site. Similar to wetlands, the upland plant communities in the study area are a result of historical land use, soil characteristics, and geomorphic and hydrologic conditions. Vegetation of buffer areas within pastures that are occasionally seeded and hayed annually consists of grasses including red fescue, bentgrass, sweet vernalgrass, velvetgrass, and plantain. In less extensively managed pastures, dominant grass species include red fescue, foxtail, reed canarygrass, Canadian thistle, bentgrass, quackgrass, and orchardgrass.

Vegetated buffers provide protection to wetland functions by providing an area to attenuate the effects of disturbance from human activities and development. Buffers adjacent to the forested wetlands are contiguous with the wetlands and upland forest for most of the area. Vegetation in forested buffer areas is predominantly red alder along with black cottonwood (deciduous forest) and with relatively rare occurrences of western red cedar and Douglas fir trees. Understory species include vine maple, common snowberry, salmonberry, English holly, clustered rose, bracken fern, and red elderberry. Appendix B of the *Wetland Determination and Delineation Report* (AMEC 2008) provides a summary of all plant species (common and scientific names) identified in the study area.

The following Restoration Plan includes the restoration of wetlands and wetland buffers impacted by vegetation clearing associated with the geotechnical investigation. The following plan includes an assessment of impacts and a restoration strategy for Critical Areas (wetlands and buffers), as well as an implementation plan, goals, objectives, performance standards, a monitoring and maintenance plan, and a contingency plan.

Table 4 Wetland Unit Numbers, Ratings, Habitat Scores, and Buffer Widths

Wetland Name	Wetland Rating	Habitat Score	Applied Buffer Width
1	III	19	50
2	III	23	60
3	III	21	60
4A	III	18	50
4B	III	14	50
4C	III	14	50
4D	III	14	50
4E	III	10	50
4F	IV	7	50
5A	III	21	60
5B	III	17	50
5C	III	21	50
6	III	19	50
7A	III	21	50
7B	III	18	50
8A	III	23	60
8B	III	11	50
9A	III	24	60
9B	III	18	50
10A	III	18	60
10B	IV	16	50
11A	I	32	150
11B	III	10	50
12	I	*	150
13A	I	27	150
13C	III	16	50
13D	III	18	50
13E	III	26	60
13F	III	15	50
13G	III	18	50
14	IV	14	50

* Category 1 wetland rating due to special characteristics. An automatic 150-foot buffer is applied.

4.2.3 Streams and Stream Buffers

The purpose of this section is to provide information for establishment of stream buffers only. Per WCC Section 16.16.740(B), stream buffers were measured landward horizontally on both sides of the streams from the ordinary high water mark.

The WCC provides the following guidelines for establishing stream buffers:

- Shoreline Streams: 150-feet
- Fish-bearing streams: 100-feet
- Non-fish bearing streams: 50-feet

Based on these guidelines, the buffer for Stream 1 is established at 100-feet because it is a non-shoreline of the State, fish-bearing stream. All other streams on site are non fish-bearing streams, and have a buffer of 50-feet (Figure 3). Where buffers are interrupted by roads, such as the case with Streams 1, 3, 4, 5, and 6, the buffer does not extend beyond the road.

4.3 IMPACT ASSESSMENT

4.3.1 Approach

An impact assessment was performed to evaluate effects to wetlands and buffers that resulted from the temporary access roads. Pre-disturbance conditions were assessed by examining previous wetland delineation reports and inspecting on-site and adjacent off-site undisturbed areas.

AMEC staff conducted field investigations on August 2, 3, and 9, 2011, to directly measure the impacts to forest wetlands and their buffers on the property. The general conditions of all cleared paths were visually assessed, and wetland boundaries determined by the location of wetland flagging from the 2008 wetland delineation, and wetlands delineated in the previous exclusion area on July 27, 28, and 29, 2011. Wetland impact measurements included the width of the access path impacted by heavy equipment as indicated by the tracking footprint, and the rootwads and soil mounds that parallel the paths.

Twenty-four separate wetland impact areas were established due to differences in tree age stand, soil conditions, proximity to other areas of wetland impacts, and vegetation density across the property. These physical variations resulted in differences in soil displacement and rootwad size along the access paths. The 24 assessment areas have been lumped together by Wetland Unit in order to describe impacts to Wetland Units as described in previous reports submitted to Whatcom County PDS. Multiple widths were measured in the field with a tape measure in each wetland impact area to determine the average width of impacts for each wetland/buffer impact area.

To calculate the area of wetland impact, the linear feet of access paths through forested and shrub wetlands was determined through surveyed borehole locations and surveyed access routes. Wetland boundaries from the 2009 Jurisdictional Determination (Appendix B) and approximate, unsurveyed boundaries from the 2011 delineation of the previous exclusion area (Parcel 14) were then juxtaposed

with the surveyed borehole locations and related access routes to determine linear feet of impacts to wetlands. In three instances, impact areas were rectangular polygons that minimally affected wetland areas, and were thus measured directly in the field (Impact Areas 8, 10, and 12). In three other instances, divots and uprooted trees were not continuous, and thus each feature was measured (Impact Areas 11, 17, and 18). Locations of impacts to Critical Areas are shown in Figure 4.

4.3.2 Wetlands

The average width of the access paths that resulted from tracking heavy equipment through forested wetland areas was 17 feet. This number was consistent across all wetland impact areas because the same piece of equipment was used to clear the access paths in each of the wetland impact areas. The clearing associated with access paths and boring holes resulted in a total of 7,097 linear feet and 120,649 square feet of wetland impacts.

Each wetland impact area had variable widths outside of the access paths. This variability resulted from the various sizes of displaced soil mounds and rootwads along each access path. Table 1 shows the average width of the access path plus rootwads and soils mounds for each impact area. This table also shows the linear feet of each impact area, and the total square feet of impacts. As such, the total impact to forest and shrub wetlands is 170,756 square feet.

The total temporary discharge (soil mounds and rootwads) to wetlands as a result of these activities was determined by subtracting the impacts solely from tracking (120,649 square feet) from the total impacts (170,756 square feet), which is calculated to be 50,107 square feet.

Table 5 below shows the total amount of impacts to forest and shrub wetlands by Wetland Impact Area as a result of geotechnical investigations.

Table 5 Details of Forested Wetland and Shrub Clearing and Debris Piles

Wetland Impact Area	Wetland Unit	Length (LF)	Acres	Average Width	Area (SF)	Acres
Wetland Impact Area 1	5B/5C	1,488	0.3	25	37,200	0.9
Wetland Impact Area 2	6	251	0.0	24	6,024	0.1
Wetland Impact Area 3	6	809	0.2	25	20,225	0.5
Wetland Impact Area 4	6	82	0.0	25	2,050	0.0
Wetland Impact Area 5	6	339	0.1	23	7,797	0.2
Wetland Impact Area 6	6	367	0.1	18	6,606	0.2
Wetland Impact Area 7	6	812	0.2	22	17,864	0.4
Wetland Impact Area 8	6	48	0.0	42	2,016	0.0
Wetland Impact Area 9	1	33	0.0	35	1,155	0.0
Wetland Impact Area 10	8A	45	0.0	30	1,350	0.0
Wetland Impact Area 11	8A	*	*	*	150	0.0
Wetland Impact Area 12	8A	51	0.0	27	1,377	0.0
Wetland Impact Area 13	7A	659	0.1	19	12,521	0.3
Wetland Impact Area 14	9A	409	0.1	24	9,816	0.2
Wetland Impact Area 15	9A	161	0.0	21	3,381	0.1
Wetland Impact Area 16	1	12	0.0	23	276	0.0
Wetland Impact Area 17	10A	*	*	*	270	0.0
Wetland Impact Area 18	3	*	*	*	110	0.0
Wetland Impact Area 19	1	605	0.1	29	17,545	0.4
Wetland Impact Area 20	1	459	0.1	23	10,557	0.2
Wetland Impact Area 21	6	78	0.0	28	2,184	0.1
Wetland Impact Area 22	3	32	0.0	29	928	0.0
Wetland Impact Area 23	3	333	0.1	26	8,658	0.2
Wetland Impact Area 24	2	24	0.0	29	696	0.0
Total Wetland Impact Area		**7,097**	**1.3**		**170,756**	**3.9**

* Divots and uprooted trees were not contiguous impacts, and thus each feature was measured independently

LEGEND

- BOREHOLE COMPLETED (37)
- BOREHOLE NOT COMPLETED (32)
- BOREHOLE IN PROGRESS (4)
- VEHICLE ACCESS POINT
- NO VEHICLE ACCESS
- AS-BUILT BOREHOLE ACCESS*
- APPROXIMATE DRAINAGE
- SURVEYED DRAINAGE
- APPROXIMATE STREAM COURSE
- SURVEYED STREAM COURSE
- STREAM BUFFER
- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- APPROXIMATE WETLAND BOUNDARY
- FRESHWATER EMERGENT WETLAND (PEM)
- FRESHWATER FORESTED WETLAND (PFO)
- FRESHWATER SHRUB WETLAND (PSS)
- WETLAND IMPACT AREA (see text)
- WETLAND BUFFER **
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

*THIS LINE DEPICTS LOCATIONS WHERE TREES AND SHRUBS WERE REMOVED TO ALLOW ACCESS FOR GEOTECHNICAL INVESTIGATION. NO ACCESS ROUTE IS SHOWN WHERE ACCESS WAS ACROSS OPEN FIELDS.

**THE STANDARD WETLAND BUFFERS SHOWN ARE BASED ON WETLAND FUNCTIONS AND VALUES AND LOW-INTENSITY LAND USE ASSOCIATED WITH GEOTECHNICAL ACTIVITIES (per WCC 16.16.630).

Pacific International Terminals
A Carrix Enterprise

CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC Earth & Environmental
11810 North Creek Parkway N
Bothell, WA 98011

amec

DWN BY:	SD
CHK'D BY:	KD
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	1 inch = 1,000 feet

PROJECT: GATEWAY PACIFIC TERMINAL GEOTECHNICAL INVESTIGATION

TITLE: CRITICAL AREAS IMPACT ASSESSMENT

DATE:	AUGUST 2011
PROJECT NO.:	091515338C-07-03
REV. NO.:	4
FIGURE NO.:	FIGURE 4

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-07-03 - Geotechnical Investigation\Critical_Areas_Report\Figure 4 - Critical Areas Impact Assessment.mxd

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Table 6 below shows the consolidated area of impacts to forested and shrub wetlands by Wetland Unit as a result of geotechnical investigations.

Table 6 Details of Wetland Impacts by Wetland Unit

Wetland Unit Number	Area (SF)	Acres
1	29,533	0.7
2	696	0.1
3	9,696	0.2
5B/5C	37,200	0.8
6	64,766	1.5
7A	12,521	0.3
8A	2,877	0.1
9A	13,197	0.3
10A	270	<0.1
Total Wetland Impact Area	**170,756**	**3.9**

The impacts from the clearing activities resulted in temporary loss of wetland functions due to compacted soil, fallen vegetation, and discarded soil and rootwads in areas adjacent to the access paths. Loss of wetland functions include reduced wildlife habitat from the fallen vegetation, reduced groundwater infiltration and biochemical processing from compacted soils, loss of flood storage due to compacted soils, and reduced water quality functioning as a result of reduced infiltration from compacted soils. The reduction in function was to a small proportion of the total wetland area and the majority of wetland areas were undisturbed. Vegetation is expected to fully reoccupy the cleared areas as a result of hydroseeding, planting and natural regrowth from roots and shoots and reseeding. Once revegetated the wetland functions are anticipated to be fully restored to pre-disturbance levels.

4.3.3 Wetland Buffers

Table 7 shows the total amount of impacts to wetland buffers by Wetland Impact Assessment Unit as a result of geotechnical investigations. Approximately 2,474 linear feet of forested upland buffer were cleared of vegetation for the use of temporary access paths. The total impact to forested wetland buffers as a result of clearing activities was 42,029 square feet, or 0.96 acres. The clearing activities compacted the soil and side-casted fallen vegetation and soil along the temporary access paths.

The impacts to values and functions provided by forested wetland buffers include the temporary loss of wildlife habitat and water quality function. Wetland buffer slows the run-off of stormwater from uplands into wetlands, and filters sediments and contaminants. Impacts to wetland buffers that did not contain forested or shrub habitat are not included in the restoration plan because impacts to these grass-dominated habitats were minimal.

Table 7 below shows the total amount of impacts to wetland buffers by Wetland Unit as a result of geotechnical investigations.

Table 7 Details of Impacts to Wetland Buffers by Wetland Unit

Wetland Unit Number	Length (LF)	Miles	Average Width	Area (SF)	Acres
1	218	0.04	17	3706	0.09
2	71	0.01	17	1207	0.03
3	284	0.05	17	4828	0.11
5A/5B/5C	429	0.09	17	8398	0.19
6	1208	0.23	17	20536	0.47
7A	194	0.04	17	3298	0.08
8A	44	<0.01	17	748	0.02
9A	26	<0.01	17	442	0.01
Total Wetland Buffer Impact	**2,474**		**17**	**42,029**	**0.96**

4.3.4 Stream Buffers

Impacts to stream buffers occurred as a result of the clearing associated with the geotechnical investigation (Figure 4). Approximately 924 linear feet of impacts occurred to stream buffers only, whereas 201 linear feet of impacts occurred to combined stream buffer and wetland buffer areas. Because the cleared access paths averaged 17 feet wide, the estimated impact solely to stream buffers was 15,708 square feet.

5.0 RESTORATION STRATEGY

Compensation for unauthorized impacts to wetlands and wetland/stream buffers will be provided onsite. Opportunities for restoration were determined through on-site investigation and the limit of disturbance to regulated Critical Areas. Reforestation to upland areas that are not wetland or stream buffer will be addressed in a separate plan to be submitted to DNR. The Restoration Plan has been prepared to meet the requirements of local (Whatcom County), state (Ecology), and federal (USACE) wetland regulatory agencies.

The following section describes the goals, objectives, and design of the restoration activities. Restoration design plans are included in Appendix A.

5.1 RESTORATION DESIGN

The general approach for the restoration design is to remove soil mounds and side-casted rootwads from existing wetland and wetland/stream buffers, and to restore the wetlands and wetland/stream

buffers to their pre-existing conditions. Restoring hydrological connections within wetland units will help facilitate recovery. The soil mounds will be dispersed within the access paths to restore pre-existing grades, and the rootwads will be placed in divots that were created when the rootwads were removed. Vegetation debris piles will be removed, chipped, or dispersed so as to allow those areas to restore naturally. Additional restoration activities include remediating compacted soils, stabilizing soils to reduce erosion, replanting temporarily impacted areas to restore wildlife and water quality functions, and managing invasive plant species. Restoring pre-existing hydrologic and drainage patterns in the wetlands will be closely monitored during restoration activities.

An abundant native seed stock is available from the existing seed bank in the soil, and from the existing forest stands that abut the impact areas. The existing native seed stock is expected to succeed rapidly along with the tree and shrub plantings. Even though they are currently rare on site, conifers are proposed in the wetland and wetland/stream buffer areas to mimic the historical plant community. Impacted areas outside of the 17-foot wide cleared access path will be allowed to restore naturally following the removal of soil mounds and side-casted rootwads. Any disturbed soils in these areas will be hand-seeded as necessary for soil erosion control.

Replanting the impacted wetland and wetland buffer areas will facilitate the restoration of a multi-strata plant community of emergent, shrub, and tree species. The goal of the planting plan is to restore the plant communities in affected wetlands and wetland buffers using adjacent undisturbed areas as a reference.

5.1.1 Wetlands

Temporarily impacted wetland areas will be restored to pre-existing conditions. Soil mounds and stockpiles will be moved back to within the access paths to restore pre-existing wetland elevations. After separating the tree rootwads from the tree trunks with a chainsaw, the rootwads will be returned to divots that formed when they were removed and side-casted along the temporary access paths.

The compacted soil portion of the temporary access paths in all wetlands will be de-compacted by scarifying the soil surface with manual raking where needed. The temporary access paths will then be replanted with a variety of native tree and shrub species. See Appendix A for cross sections and proposed conditions following restoration activities.

Planting Scheme

To restore wetlands to their pre-disturbance condition, the proposed restoration includes planting locally dominant plant species with the goal of restoring multi-strata plant communities in affected wetlands.

Trees are proposed to be planted from 1 and 2-gallon containers, and will include the following species: red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera*), Sitka spruce (*Picea sitchensis*), Western red cedar (*Thuja plicata*), and Western hemlock (*Tsuga heterophylla*). A total of 1,194 trees are proposed to be planted across 2.8 acres for approximately 426 stems per acre.

The seed mix will contain a mix of native emergent species suitable for wetland conditions, including: sterile wheatgrass (*Poa spp.),* meadow foxtail (*Alopecurus pratensis*), alsike clover (*Trifolium hybridum),* and creeping bentgrass (*Agrostis stolonifera*).

Shrubs are included in the proposed planting scheme to re-establish pre-existing conditions in wetland areas. Shrubs will be planted from 1-gallon containers, including: twinberry (*Lonicera involucrata*), salmonberry (*Rubus spectabilis*), red-osier dogwood (*Cornus sericea*), Sitka willow (*Salix sitchensis*), and Nootka rose (*Rosa nutkana*).

The site will be closely monitored after planting, and if competing shrubs are threatening the success of the planted conifer tree species, methods will be employed as described in monitoring and maintenance sections of this document. A total of 3,607 shrubs are proposed to be planted across 2.8 acres, or 1,288 stems per acre.

Sheet 2 in Appendix A provides the planting plan for proposed on-site restoration in wetland areas.

5.1.2 Wetland and Stream Buffers

Temporarily impacted wetland and stream buffers will be restored to pre-existing conditions. Impacts to wetland and stream buffers include the access paths that crossed wetland buffers to access wetland areas. Buffer areas cleared of vegetation will be revegetated with new trees and shrubs after pre-existing grades are restored to promote the restoration of a multi-strata plant community. To restore pre-existing grades, soil mounds or other areas of displaced soil will be returned to the cleared access path to replace any divots caused by tree removal. Any remaining side-casted soil will be dispersed in the immediate vicinity. Discarded vegetation in the wetland and stream buffers on the sides of the access paths is anticipated to remain in place. Compacted soil in the access paths within the buffers will be decompacted by scarifying the soil surface with manual raking, a backhoe, or other piece of agricultural equipment, but only as needed.

Planting Scheme

To restore wetland and stream buffers to their pre-disturbance condition, the proposed restoration includes planting locally dominant tree and shrub species with the goal of restoration to forested conditions with a shrub understory. This approach will facilitate the rapid development of pre-disturbance plant communities that would take years to develop on their own. Trees will be planted

from 1- and 2-gallon containers, species include: big-leaf maple (*Acer macrophyllum),* black cottonwood (*Populus balsamifera*), Douglas fir (*Pseudotsuga menziesii),* Western red cedar (*Thuja plicata*), and Western hemlock (*Tsuga heterophylla*). A total of 580 trees are proposed to be planted 10 feet-on-center across 1.38 acres, or 420 stems per acre, in the stream and wetland buffer areas.

In addition, native shrubs will be planted in wetland and stream buffers to restore these areas to pre-existing conditions. Shrubs will be planted from 1-gallon containers, including: Indian plum (*Oemleria cerasiformis*), Nootka rose, and salmonberry (*Rubus spectabilis*). A total of approximately 1,701 shrubs are proposed to be planted 5 feet-on-center across 1.38 acres, for a density of 1,233 stems per acre.

Sheet 3 in Appendix A provides the planting plan for proposed on-site restoration in wetland and stream buffer areas.

6.0 IMPLEMENTATION

6.1 CONSTRUCTION OBSERVATION

A qualified biologist, usually a restoration specialist, should be present during various stages in the implementation of the restoration plan. The onsite biologist will help in the field to identify wetland boundaries, compacted soil areas, rootwads to be replaced, soil mounds to be removed, and debris piles to be dispersed. The onsite biologist will also be present during planting to ensure that trees and shrubs receive the required protection from animal browse, and specific plant species are located in the appropriate habitats. Existing drainage patterns in wetlands will be maintained and restored where necessary.

Trees and shrubs will be kept cool and moist during transport and storage prior to planting. During transport, storage, and planting, all trees and shrubs will be protected with a moist material around the roots consisting of wet burlap, peat moss, a planting bag, or similar material. Trees and shrubs will be removed from their containers, and transported by hand to the restoration areas.

The phases appropriate for field visits are: (1) soil mound re-grading, debris pile dispersal, and rootwad replacement; (2) approval of all plants and of their locations by the onsite biologist before planting; (3) installation of trees and shrubs, protection, seeding by hand, if needed; and (4) final inspection, including observations of active recruitment of pioneer species, soil stabilization, and wetland hydrology.

6.2 RESTORATION SEQUENCE

Restoration activities will commence immediately following agency approval of the restoration plan. Wetlands and wetland buffer areas will be accessed from upland locations so as to limit any further disturbance to wetlands or buffers. Restoration activities will start at the furthest locations from access points from county roads.

Sequencing will be as follows:

- Removal of rootwads and soil mounds from wetland areas to cleared access paths;
- Re-grading using rakes or suitable machinery to restore pre-existing grades, as needed;
- Restoration of compacted soils using rakes or a backhoe, as needed;
- Soil stabilization with upland and wetland seed mixes as appropriate; and,
- Planting of trees and shrubs according to plan details.

6.3 PROPOSED TIME SCHEDULE AND EXPECTED COMPLETION DATES

Restoration activities will commence following receipt of authorizations from the USACE, Ecology, and Whatcom County PDS. Tree and shrub planting will occur in the next suitable planting window to ensure success of the restoration plantings, most likely in Fall 2012.

7.0 GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

7.1 RESTORATION GOALS

The overall goal of the restoration plan is to restore the functions of on-site wetlands and wetland buffers to their pre-disturbance condition. Wetlands will be restored by revegetating 2.8 acres of cleared wetlands and removing rootwads and soil mounds from 1.1 acres of wetlands that received side-cast vegetation and soil during the clearing for geotechnical investigation activities. An additional 1.38 acres of wetland and stream buffers will also be planted.

The specific goals of the proposed restoration are to:

- Restore pre-disturbance wetland hydrologic conditions to all wetland areas by removing fill where needed;
- Re-establish forested wetland vegetation communities within forested wetlands; and
- Re-establish wetland and stream buffer vegetation communities in disturbed areas.

7.2 RESTORATION OBJECTIVES

Restoration goals would be attained through achieving the following objectives:

1. Remove rootwads and soil mounds from 1.1 acres of wetlands;
2. Hand replace soil materials and root mats where fallen vegetation contributed to fill along the access roads; and
3. Restore approximately 2.8 acres of cleared wetlands and 1.38 acres of cleared wetland and stream buffer by scarifying compacted soil where needed and planting native tree and shrub vegetation.

7.3 PERFORMANCE STANDARDS

Performance standards are established to help ensure that restoration areas are trending toward success. The following performance standards for each monitoring year are proposed.

7.3.1 Native Tree Vegetation

The wetland and wetland and stream buffer areas will be planted and maintained to help ensure 100 percent survivorship of planted trees by the Year 1 monitoring. Any dead planted trees will be replaced by replanting at the end of Year 1 following planting.

Wetland plant community development will be evaluated by measuring absolute aerial coverage in monitoring Years 2, 3, 4, and 5. The performance standard for the plant community will be at least 15 percent absolute aerial coverage at Year 2, at least 20 percent at Year 3, and at least 40 percent at Year 4. The standard for Year 5 will be at least 50 percent absolute aerial coverage by native trees, including both volunteer and planted trees.

7.3.2 Native Shrub Vegetation

The wetland and wetland and stream buffer areas will be planted and maintained to ensure 100 percent survivorship of planted shrubs by the Year 1 monitoring. As stated earlier, trees and shrubs will be interplanted with the goal to reestablish a forested wetland area (PFO) with shrubs in the understory. To achieve a forested overstory, the trees must grow overtopping the shrubs. As a result of overtopping, shading of the shrub community occurs, and the shrub canopy is usually not as dense overall once the tree layer has matured to a closed canopy. The following standards for shrub vegetation reflect this expectation of wetland plant community development.

Similar to tree species, shrub community development will be measured by absolute aerial coverage in Years 2 through 5. The standard will be at least 10 percent absolute aerial coverage will by Year 2, at least 20 percent at Year 3, at least 25 percent at Year 4, and at least 30 percent by Year 5.

Native Emergent Vegetation

No herbaceous plantings are proposed in wetland and wetland and stream buffer areas. However, emergent vegetation will naturally reestablish from the existing seed bank in the soil because the soil has not been deeply disturbed and because there are no areas greater than 10 feet from an existing plant community. In addition, all areas cleared in July 2011 were hydroseeded with a wetland seed mix in September 2011. At the time of this writing, most areas already have a dense seedling crop comprised of a variety of plants. Mannagrass (*Glyceria spp.)* is currently common.

The restoration area will be planted with trees and shrubs, and remaining light gaps maybe filled by other emergent plant species that already exist on site. No performance standard is proposed for this plant stratum. Emergent vegetation is expected to become established from the existing seed bank in the soil and root stocks where plant competition allows.

7.3.3 Summary of Performance Standards

Table 8 Summary of Restoration Performance Standards

Stratum	Year 1	Year 2	Year 3	Year 4	Year 5
Tree (7.3.1)	100% survival	10% absolute aerial cover	20% absolute aerial cover	40% absolute aerial cover	50% absolute aerial cover
Shrub (7.3.2)	100% survival	10% absolute aerial cover	20% absolute aerial cover	25% absolute aerial cover	30% absolute aerial cover
Invasive Species* (7.3.4)	<15% absolute aerial cover	<15% absolute aerial cover	<15% absolute aerial cover	<15% absolute aerial cover	<15% absolute aerial cover

*Performance standards for invasive species includes zero percent cover by Japanese knotweed in any given monitoring year.

7.3.4 Control of Non-native Species

Cover by invasive species is expected to be maintained below a threshold throughout the five-year monitoring period. Invasive species likely to be present on the restoration site include, but are not limited to, reed canarygrass, Himalayan blackberry, and Japanese knotweed. Reed canarygrass and Himalayan blackberry shall not cover more than 15 percent of restoration area in any given monitoring year and exceeding this 15 percent cover would result in maintenance activities of the restoration areas.

Invasive species aggressively grow in disturbed areas and would inhibit the effective regeneration of a preferred multi-strata forested vegetation community. Japanese knotweed shall not be present in any given monitoring year, and will be removed if identified within any of the restoration areas. Currently none is known to occur on site.

7.4 MONITORING PLAN

A monitoring program will be implemented to assess the performance of restoration following construction. Monitoring results will be compared to the performance standards to judge the success of the restoration effort. An annual report describing the level of success submitted to Whatcom County PDS and the USACE for review and approval by the end of each monitoring year (December 31). Photo documentation will accompany the monitoring reports.

Monitoring would begin by providing as-built plans immediately following completion of the installation and completing an initial baseline compliance report following installation. Subsequent monitoring would occur at 6, 12, and 24 months following installation, and annually thereafter. Parties responsible for monitoring and report submittal would be Pacific International Terminals and the consultant of their choice. Monitoring would reported by a qualified wetland biologist.

7.4.1 As-built Plans

As-built plans will be made following construction that detail any changes made to the planting plan or other alterations made to the restoration plan during installation. These as-built plans will be included in the report for each year of monitoring and will be submitted to Whatcom County PDS and the USACE for review.

7.5 VEGETATION MONITORING PROCEDURE

Standardized procedures will be used to measure the survival and growth of plant material and the success of the mitigation plantings. The vegetation monitoring strategy will consider survivorship.

The location of sampling plots will be established by the monitoring biologist during the first monitoring period (6 months after installation). The center of the plot will be marked with rebar and a tall polyvinyl chloride (PVC) pipe. This will identify the location of sample plots during subsequent monitoring periods. Photopoints would be established in conjunction with the sample plots and will be used to obtain representative photographs of the project at each monitoring event. Sampling plots will be 30 linear feet of restored cleared access path with the rebar and PVC pipe established in the middle of each plot. Approximately 12 sampling plots will be established across the wetland and wetland buffer restoration areas or approximately 4 per acre.

Vegetation data for seedling survivorship will be collected from each plot. Native tree species within each plot will be listed and counted. Non-native species will be listed and absolute coverage by these species estimated for each plot.

7.5.1 Monitoring Schedule

A proposed monitoring schedule is presented in Table 8.

Table 9 Proposed Monitoring Schedule for the First 5 Years Following Installation

Year	Anticipated Date	Action
Installation	Fall 2012	Prepare site and install
Year 1	March 2013	Monitor plant growth
	August 15, 2013	Monitor plant growth
	December 15, 2013	Year 1 report
Year 2	August 15, 2014	Monitor plant growth
	December 15, 2014	Year 2 report
Year 3	August 15, 2015	Monitor plant growth
	December 15, 2015	Year 3 report
Year 4	August 15, 2016	Monitor plant growth
	December 15, 2016	Year 4 report
Year 5	August 15, 2017	Monitor plant growth
	December 15, 2017	Year 5 report

8.0 SITE PROTECTION

To protect the site throughout the restoration process, all temporary access paths will be closed to public access. During restoration construction, the access paths will be barricaded with a locked chain extending between two concrete jersey barriers.

8.1 MAINTENANCE PLAN

For any restoration site to succeed, control of invasive species year round is recommended until the desired vegetation on the site is completely established. Establishment is usually indicated by documented plant survival from one year to the next over the monitoring period and a low prevalence of invasive species.

8.2 SCHEDULE FOR MAINTENANCE

Site maintenance will be conducted monthly between March 15 and October 15 during the growing season during the first 2 years following installation. Site maintenance will be conducted semi-annually for years 3 through 5 pending plant survivorship and on the ground conditions. Maintenance activities will include the identification and removal of non-native species, and other tasks as needed.

8.3 MAINTENANCE ACTIVITIES - NON-NATIVE PLANT CONTROL

One common reason why restoration installations fail is they become overrun by invasive non-native plants during the early years. Aggressively growing plants shade and out-compete the planted natives. To help facilitate the success of the restoration project, maintenance is anticipated to include removing invasive species to decrease competition with native species. Removal of unwanted non-native plant species will initially be completed by hand. If specific areas become overrun by non-native species, the use of an herbicide by a qualified applicator will be necessary to ensure the success of the restored vegetation community.

8.4 SHRUB CONTROL

Because of the nature of the site and to encourage survival and growth of trees, it may be necessary to implement shrub control measures. It is anticipated that additional native shrubs may emerge aggressively from existing roots and seed bank, and potentially shade and out-compete the planted trees. If native shrubs appear to be out competing planted trees, shrubs would be either pruned or relocated and transplanted within the restoration area to decrease competition with planted trees.

9.0 CONTINGENCY PLAN

Depending on monitoring results, it may be necessary to implement contingency measures to ensure that the original goals of the restoration project are met. Several factors, both artificial and natural, could have detrimental effects on the success of the restoration plantings.

Table 9 lists the components of the restoration plan, related factors that may have an adverse effect on the restoration areas, and contingencies for success of the project. No contingency plan can foresee all problems or their solutions. If a more effective remedy is identified, it would be considered. The USACE and Whatcom County will be consulted before any proposed contingency measures are implemented.

Table 10 Contingency Plan

Mitigation Component	Potential Factors	Contingency
Hydrologic Conditions	Insufficient	Drought, lack of runoff from adjacent uplands and wetlands, and incorrect soil elevations could result in insufficient hydrologic support. Contingency measures could include excavations to a deeper level, if necessary, or surface and subsurface runoff could be redirected to the area.
Hydrologic Conditions	Excessive	After identification of the cause, soil elevations could be modified or excess water could be directed away from the area.
Hydrologic Conditions	Pollution	The type and source of the pollutants would be determined and proper corrective measures established. These measures would include cleanup, biofiltration, or placement of erosion-control measures.
Soils	Erosion	Causes of erosion would be identified, and remedies could include use of erosion-control fabric and seeding of plant species with dense, strong root systems conducive to erosion control. Other appropriate BMPs would be considered.
Vegetation	Competition from Shrubs	Shrub species are anticipated to compete with the planted tree seedlings. Shrubs would be identified and removed from restoration areas to ensure the success of the planted tree seedlings.
Vegetation	Competition from Invasive Species	Invasive species would be identified and eradicated or controlled during the monitoring period. If herbicides were determined to be necessary, a detailed application plan would be developed in coordination with Whatcom County, Ecology, and other resource agencies.
Disturbances	Wildlife	Excessive herbivory or grazing could have an adverse effect on the success of plant species. Depending on the disturbance, fencing could be installed or wire mesh cylinders could be placed around individual plants.
Disturbances	Human	Human intrusion could be controlled by fencing and or signage.

10.0 REFERENCES

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APPENDIX A

Restoration Plan

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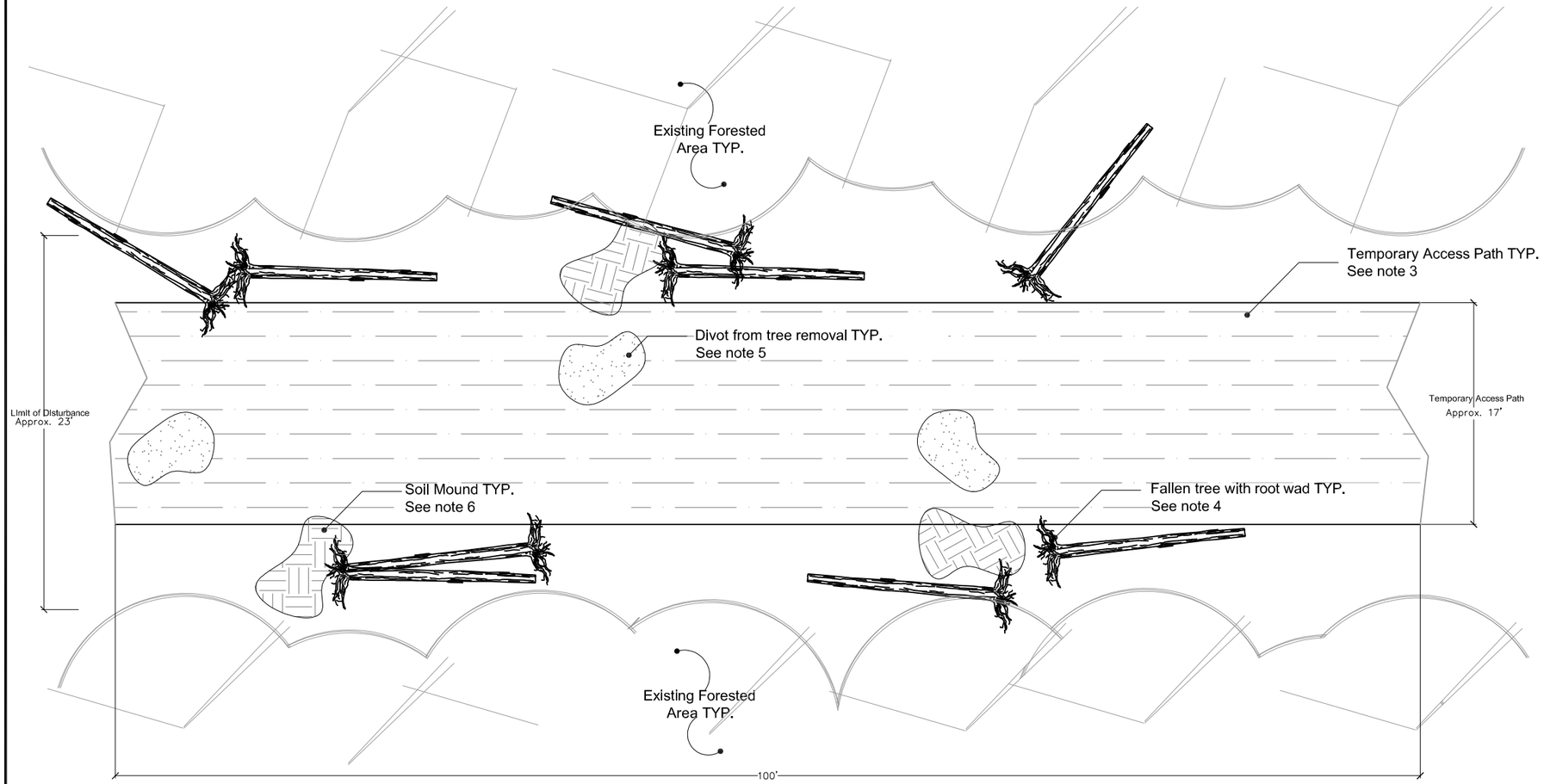

Legend

- Temporary Access Path TYP.
- Divot TYP.
- Soil Mound TYP.

NOTES:

1. TYP. = Typical
2. Approx. = Approximate
3. Temporary Access Path to be planted. Meet and match pre-disturbance grades where root wad divots are backfilled.
4. Fallen tree root wads to be installed in temporary access path.
5. Divots to be backfilled with soil and root wads.
6. Soil mounds to be dispersed.
7. Drawing shows typical/representative area of wetland and wetland buffer impacts.

CLIENT LOGO Pacific International Terminals A Carrix Enterprise	CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.	DWN BY: DP CHK'D BY: KD	PROJECT GATEWAY PACIFIC TERMINAL GEOTECHNICAL INVESTIGATION	DATE: OCTOBER 2011 PROJECT NO: 0-915-15338-C
	AMEC Earth & Environmental 11810 North Creek Parkway North Bothell, WA, U.S.A. 98011-8201	DATUM: NONE PROJECTION: NONE SCALE: AS SHOWN	TITLE EXISTING CONDITIONS TYPICAL STRETCH OF TEMPORARY ACCESS PATH	REV. NO.: 2 FIGURE No. 1

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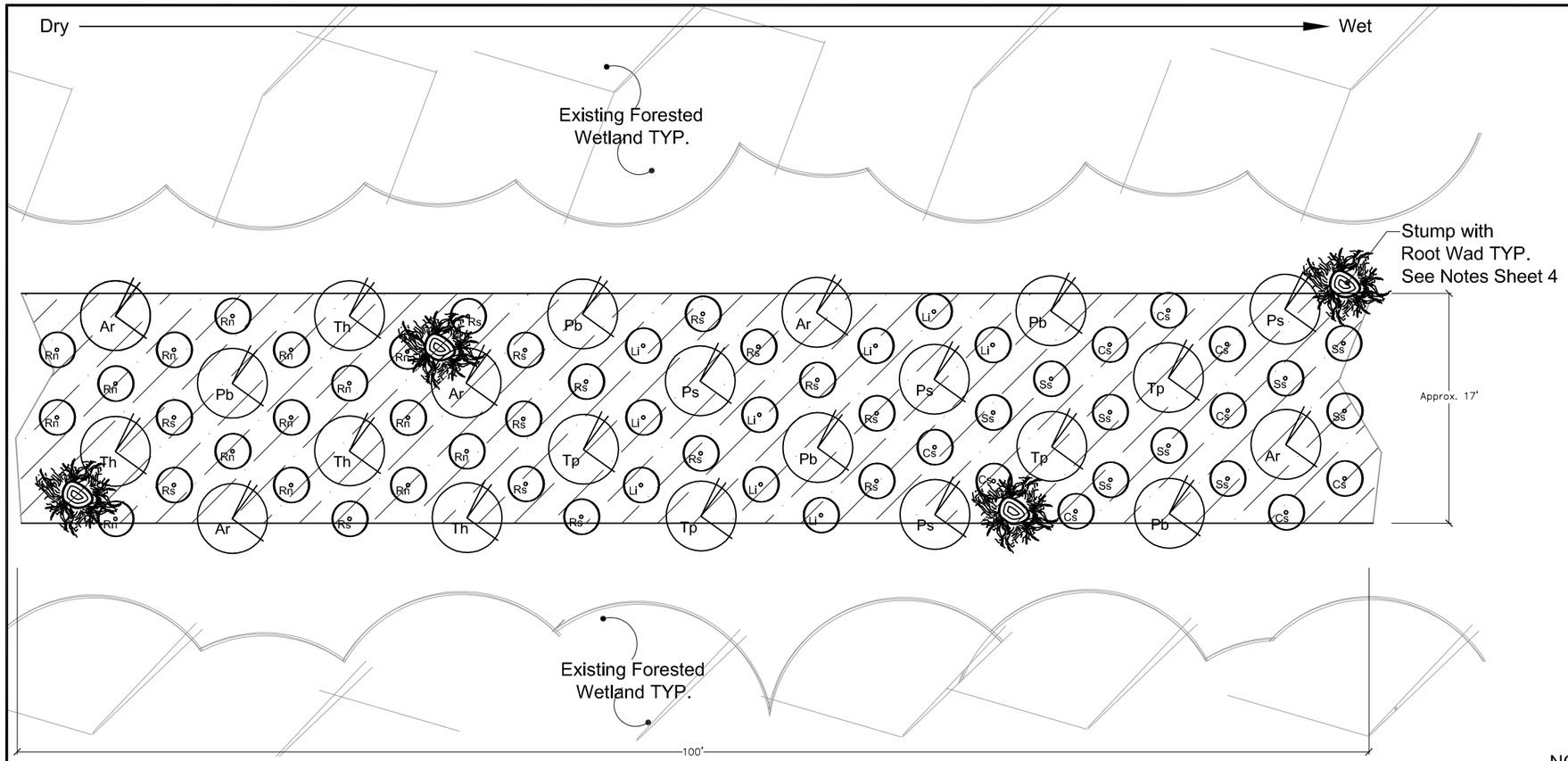
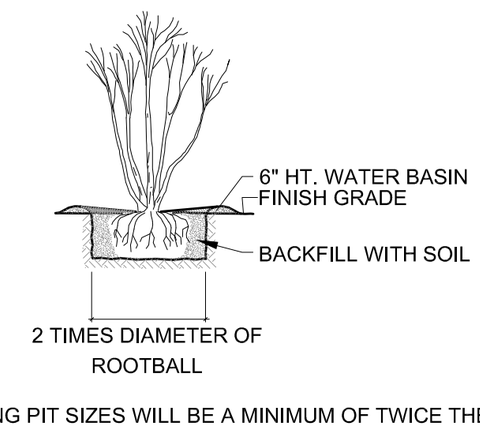


Qty. per 1,700 square feet

5	Ar - Alnus rubra	Red Alder
4	Ps - Picea sitchensis	Sitka Spruce
5	Pb - Populus balsamifera	Black Cottonwood
4	Tp - Thuja plicata	Western Red Cedar
4	Th - Tsuga heterophylla	Western Hemlock
9	Cs - Cornus stolonifera	Red-osier Dogwood
9	Li - Lonicera involucrata	Twinberry
15	Rn - Rosa nutkana	Nootka Rose
15	Rs - Rubus spectabilis	Salmonberry
9	Ss - Salix sitchensis	Sitka Willow

NOTES:

1. TYP. = Typical
2. Approx. = Approximate
3. Drawing shows typical/representative area of wetland to be planted.



NOTES:

1. PLANTING PIT SIZES WILL BE A MINIMUM OF TWICE THE ROOT BALL WIDTH AND HAVE THEIR TOP TRUE ROOT NO MORE THAN 1 INCH ABOVE THE SOIL SURFACE.
2. PRIOR TO PLANTING, CONTAINERS SHALL BE COMPLETELY REMOVED AND THE ROOTS LOOSENED BY APPROPRIATE PRUNING.
3. PLANTING PITS WILL BE BACKFILLED WITH EXISTING SOILS THAT ARE FREE OF ROCKS OVER 2 INCHES, LUMPS, AND OTHER FOREIGN MATERIALS. BACKFILLING AROUND TRUNKS OR STEMS IS NOT PERMITTED.
4. THE BACKFILL MATERIAL AND ROOTBALL SHALL BE THOROUGHLY WATERED ON THE SAME DAY THAT PLANTING OCCURS REGARDLESS OF SEASON.

TREE AND SHRUB PLANTING DETAIL
NTS

PLANT LIST FOR WETLAND IMPACT AREAS: 2.8 acres

Type	Scientific Name	Common Name	Size	Spacing	* W1 18,853 sf	W2 408 sf	W3 6,205 sf	5A/ 5B/5C 25,296 sf	W6 47,362 sf	W7A 11,203 sf	W8A 1,632 sf	W9A 9,690 sf	Total:
Tree	Alnus rubra	Red Alder	2 gal.	10' o.c.	38	1	12	50	95	20	3	20	**239**
Tree	Picea sitchensis	Sitka Spruce	2 gal.	10' o.c.	38		12	50	95	20	3	20	**238**
Tree	Populus balsamifera	Black Cottonwood	2 gal.	10' o.c.	38	2	12	50	95	20	3	20	**240**
Tree	Thuja plicata	Western Red Cedar	2 gal.	10' o.c.	38	1	12	50	95	20	3	20	**239**
Tree	Tsuga heterophylla	Western Hemlock	2 gal.	10' o.c.	38		12	50	95	20	3	20	**238**
Shrub	Cornus stolonifera	Red-osier Dogwood	1 gal.	5' o.c.	100		30	120	240	50	5	50	**595**
Shrub	Lonicera involucrata	Twinberry	1 gal.	5' o.c.	112		44	150	280	90	10	70	**756**
Shrub	Rosa nutkana	Nootka Rose	1 gal.	5' o.c.	124	6	37	180	340	70	15	70	**842**
Shrub	Rubus spectabilis	Salmonberry	1 gal.	5' o.c.	124	6	44	180	340	80	15	80	**869**
Shrub	Salix sitchensis	Sitka Willow	1 gal.	5' o.c.	100		30	120	200	60	5	30	**545**
				Total:	**750**	**16**	**245**	**1,000**	**1,875**	**450**	**65**	**400**	**4,801**

*See Figure 1 of Critical Areas Study & Restoration Plan for wetland locations.

WETLAND SEED MIX: 2.8 acres

67%	Sterile Wheatgrass	
17%	Agrostis stolonifera	Creeping Bentgrass
10%	Alopecurus pratensis	Meadow Foxtail
6%	Trifolium hybridum	Alsike Clover

CLIENT LOGO: Pacific International Terminals, A Carrix Enterprise

CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC Earth & Environmental
11810 North Creek Parkway North
Bothell, WA, U.S.A. 98011-8201

DWN BY: DP
CHK'D BY: KD
DATUM: NONE
PROJECTION: NONE
SCALE: AS SHOWN

PROJECT: GATEWAY PACIFIC TERMINAL
GEOTECHNICAL INVESTIGATION

TITLE: PROPOSED PLANTING PLAN
WETLAND AREA TYP.

DATE: OCTOBER 2011
PROJECT NO: 0-915-15338-C
REV. NO.: 2
FIGURE No. 2

U:\15338-C GPT3\07-Permitting-Geotech\Task 03- Geotech Clearing\Mitigation Plan\Old\Mitigation Plan Set 8-16.dwg - Wetland Planting (2) - Oct. 11, 2011 9:20am - danah.palik

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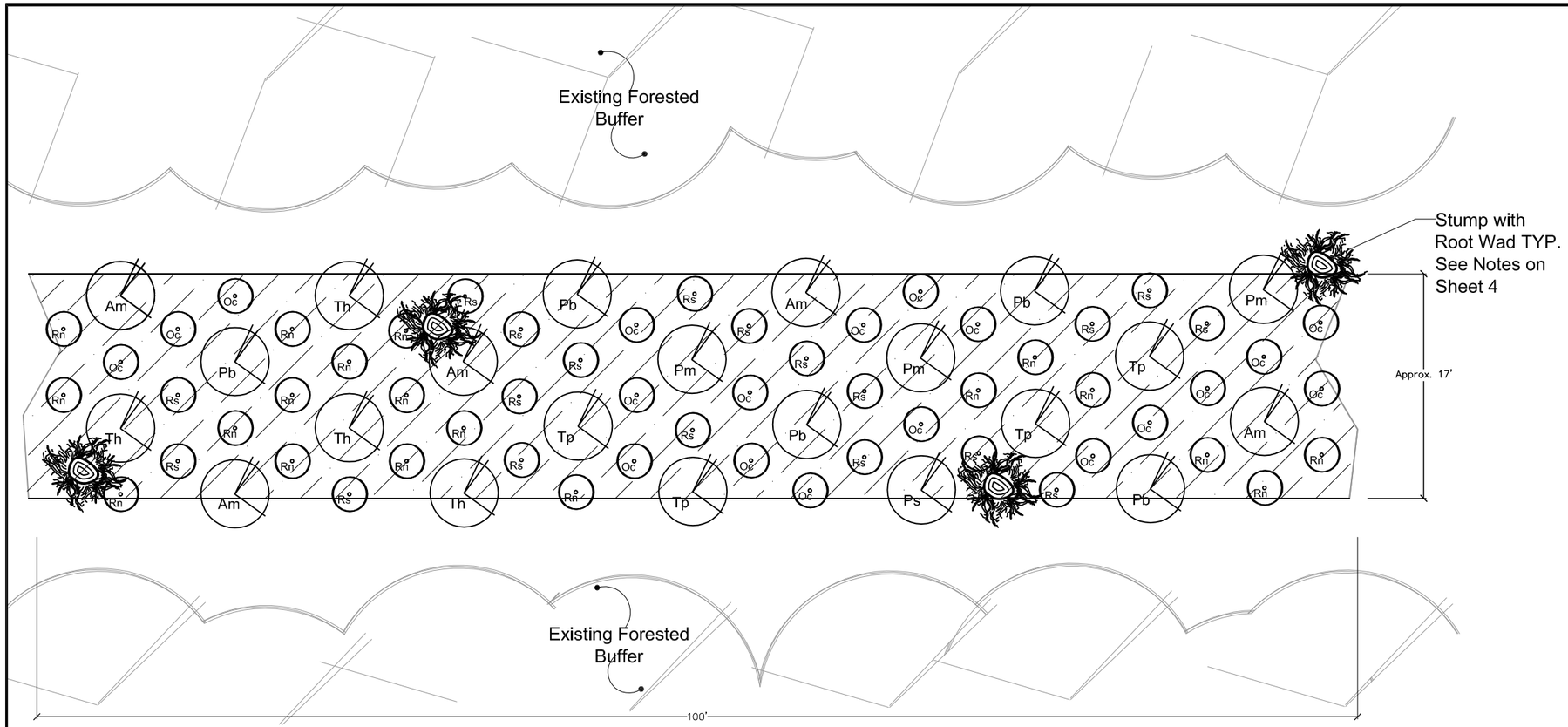

Qty. per 1,700 square feet

5	Am - Acer macrophyllum	Big Leaf Maple
5	Pb - Populus balsamifera	Black Cottonwood
4	Pm - Psuedotsuga menziesii	Douglas Fir
4	Tp - Thuja plicata	Western Red Cedar
4	Th - Thuja heterophylla	Western Hemlock
19	Oc - Oemleria cerasiformis	Indian Plum
19	Rn - Rosa nutkana	Nootka Rose
19	Rs - Rubus spectabilis	Salmonberry

NOTES:

1. TYP. = Typical
2. Approx. = Approximate
3. Drawing shows typical/representative area of wetland buffer to be planted.

PLANT LIST FOR WETLAND AND STREAM BUFFER IMPACT AREAS: 1.32 acres

Type	Scientific Name	Common Name	Size	Spacing	* W1 3,698 sf	W2 1,205 sf	W3 4,828 sf	5A/ 5B/5C 7,293 sf	W6 20,529 sf	W7A 3,295 sf	W8A 724 sf	W9A 434 sf	Stream Buffer 15,708 sf	Total:
Tree	Acer macrophyllum	Big Leaf Maple	2 gal.	10' o.c.	8	3	10	15	40	7	2	1	30	**116**
Tree	Populus balsamifera	Black Cottonwood	2 gal.	10' o.c.	8	3	10	15	40	7	2	1	30	**116**
Tree	Psuedotsuga menziesii	Douglas Fir	2 gal.	10' o.c.	8	3	10	15	40	7	2	1	30	**116**
Tree	Thuja plicata	Western Red Cedar	2 gal.	10' o.c.	8	3	10	15	40	7	2	1	30	**116**
Tree	Tsuga heterophylla	Western Hemlock	2 gal.	10' o.c.	8	3	10	15	40	7	2	1	30	**116**
Shrub	Oemleria cerasiformis	Indian Plum	1 gal.	5' o.c.	35	10	48	72	200	32	6	4	160	**567**
Shrub	Rosa nutkana	Nootka Rose	1 gal.	5' o.c.	35	10	48	72	200	32	6	4	160	**567**
Shrub	Rubus spectabilis	Salmonberry	1 gal.	5' o.c.	35	10	48	72	200	32	6	4	160	**567**
				Total:	**145**	**45**	**194**	**291**	**800**	**131**	**28**	**17**	**630**	**2,281**

*See Figure 1 of Critical Areas Study & Restoration Plan for wetland buffer locations.

WETLAND AND STREAM BUFFER SEED MIX: 1.32 acres

60%	Elymus glaucus	Blue Wildrye
10%	Festuca occidentalis	Western Fescue
30%	Festuca rubra	Native Red Fescue

CLIENT LOGO: Pacific International Terminals, A Carrix Enterprise

CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC Earth & Environmental
11810 North Creek Parkway North
Bothell, WA, U.S.A. 98011-8201

DWN BY: DP
CHK'D BY: KD
DATUM: NONE
PROJECTION: NONE
SCALE: AS SHOWN

PROJECT: GATEWAY PACIFIC TERMINAL
GEOTECHNICAL INVESTIGATION

TITLE: PROPOSED PLANTING PLAN
WETLAND AND STREAM BUFFER TYP.

DATE: OCTOBER 2011
PROJECT NO: 0-915-15338-C
REV. NO.: 2
FIGURE No. 3

U:\15338-C GPT3\07-Permitting-Geotech\Task 03- Geotech Clearing\Mitigation Plan\Old\Mitigation Plan Set 8-16.dwg - Buffer Planting (2) - Oct. 11, 2011 9:21am - danah.palik

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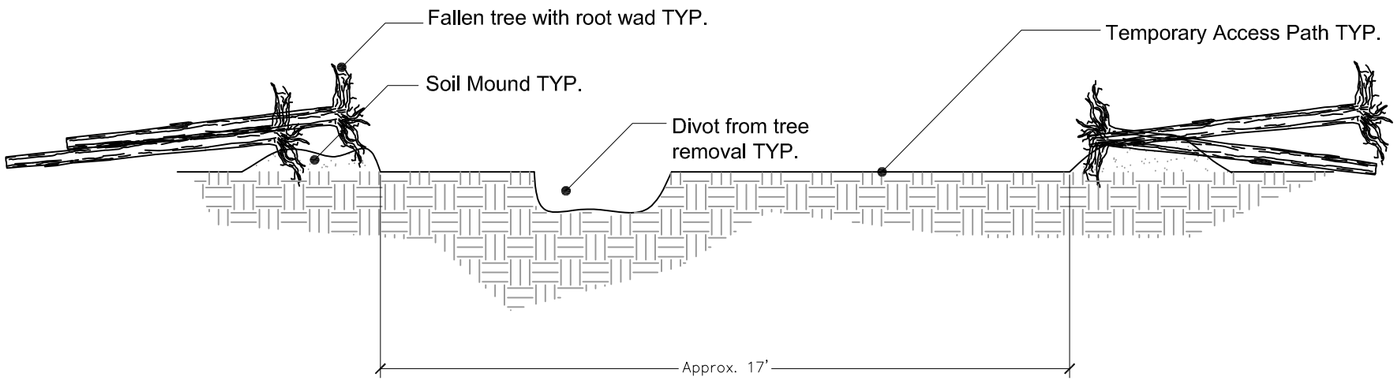
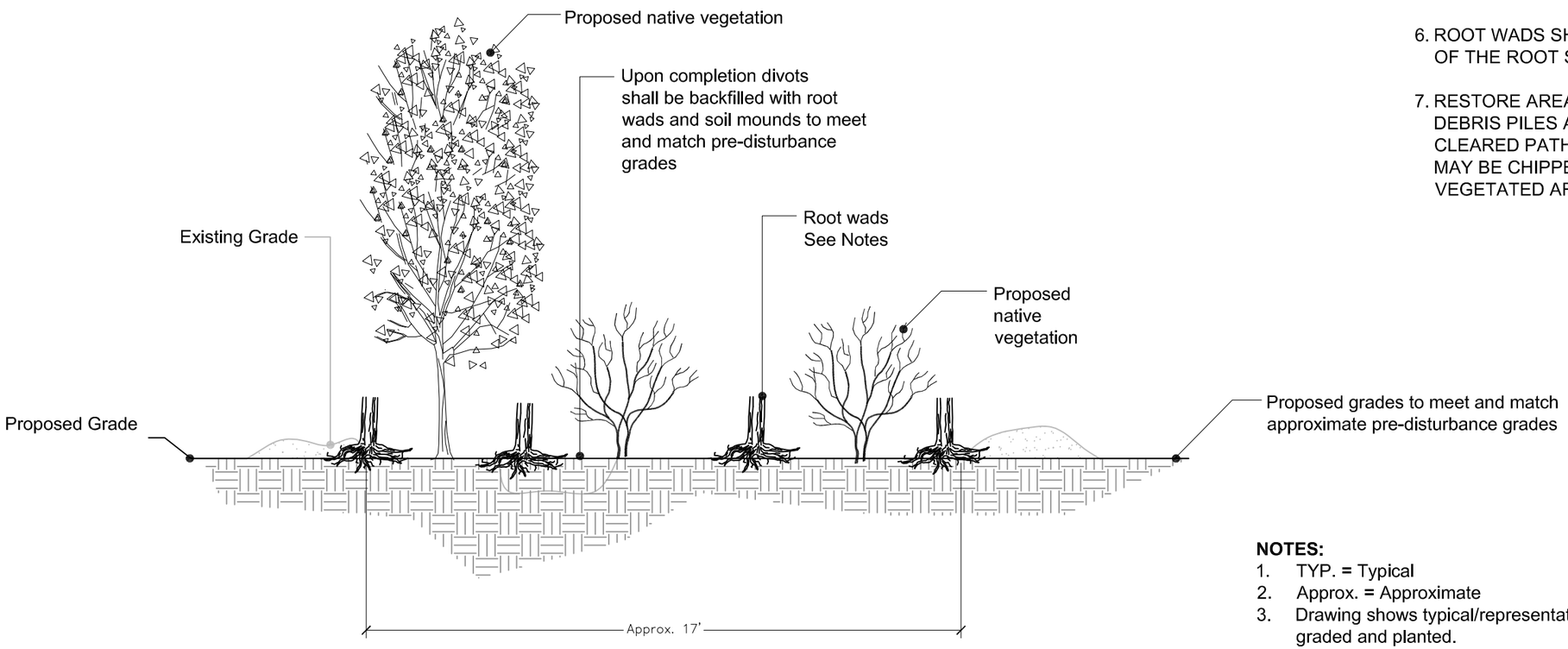


EXISTING CROSS SECTION



PROPOSED CROSS SECTION

GENERAL NOTES:

1. MANUALLY BACKFILL AROUND REPLACED ROOT WADS WHEN NECESSARY.
2. PLACE VEGETATED SOIL MATS AND ROOT WADS IN CLEARED PATHS.
3. SCARIFY COMPACTED SOILS, WHICH DO NOT EXHIBIT NATIVE PLANT RE-GROWTH.
4. FOR EXISTING DOWNED TREES, ROOT WADS SHALL BE CUT 2 FEET ABOVE TRUNK FLARE. REMAINING TREE TRUNKS SHALL BE LEFT IN PLACE. IF TRUNKS ARE CLUMPED TOGETHER THEY SHALL BE EVENLY DISPERSED WITHIN EXISTING VEGETATED AREAS.
5. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT ADDITIONAL DAMAGE TO EXISTING VEGETATION.
6. ROOT WADS SHALL BE PLACED UPRIGHT. AT MINIMUM ONE HALF OF THE ROOT STRUCTURE SHALL BE BURIED.
7. RESTORE AREAS ADJACENT TO CLEARED PATHS BY REMOVING DEBRIS PILES AND DISTRIBUTING MATERIAL WITHIN THE CLEARED PATHS. TREE LIMBS OR OTHER WOODY MATERIALS MAY BE CHIPPED OR MANUALLY DISPERSED WITHIN EXISTING VEGETATED AREAS.

NOTES:

1. TYP. = Typical
2. Approx. = Approximate
3. Drawing shows typical/representative area to be graded and planted.

CLIENT LOGO: Pacific International Terminals, A Carrix Enterprise	CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.	DWN BY: DP	PROJECT: GATEWAY PACIFIC TERMINAL GEOTECHNICAL INVESTIGATION	DATE: OCTOBER 2011
		CHK'D BY: KD		PROJECT NO: 0-915-15338-C
	AMEC Earth & Environmental, 11810 North Creek Parkway North, Bothell, WA, U.S.A. 98011-8201	DATUM: NONE	TITLE: CROSS SECTIONS TYP.	REV. NO.: 2
		PROJECTION: NONE		FIGURE No. 4
		SCALE: AS SHOWN		

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APPENDIX B

2009 Jurisdictional Determination from the USACE

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DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

Regulatory Branch

MAR 5 2009

Pacific International Terminals
Mr. Skip Sahlin
1131 Southwest Klickitat Way
Seattle, Washington 98134

Reference: NWS-2008-260-NO
Pacific International
Terminals

Dear Mr. Sahlin:

On March 23 and 24, 2008 and November 6, 2008, Mr. Randel Perry and I conducted a site visit in response to your request for a jurisdictional determination for wetlands and streams on property located near Ferndale, Whatcom County, Washington. The information provided by your agent, AMEC Earth and Environmental, Inc., indicated that some of the wetlands may be "isolated" and outside the U.S. Army Corps of Engineers (Corps) jurisdiction.

We have confirmed that wetlands and jurisdictional streams exist on your property. After reviewing the submitted information and our office resources and after visiting the site, we have determined the all delineated on-site wetlands shown on the enclosed drawing dated April 2008 abut or are adjacent to unnamed tributaries of the Strait of Georgia, a navigable waterway used for interstate and foreign commerce. These wetlands have a significant nexus to down stream traditional navigable waters (the Strait of Georgia) and, as such, are regulated by the Corps under Section 404 of the Clean Water Act.

We have also confirmed that all waterbodies identified as "Streams" and "Drainages" on the enclosed drawing dated April 2008 are tributaries to down stream navigable waters (the Strait of Georgia) and/or have a significant nexus to down stream traditional navigable waters. These tributaries are jurisdictional waters of the U. S. and are regulated by the Corps under Section 404 of the Clean Water Act.

This approved jurisdictional determination is valid for a period of 5 years from the date of this letter unless new information warrants revisions of the determination. A copy of this jurisdictional determination can be found on our website at http://www.nws.usace.army.mil/ click on Regulatory, Regulatory/Permits, Recent Jurisdictional Determinations. If you object to this determination, you may request an administrative appeal under our regulations 33 CFR 331

as described in the enclosed *Appeal Process Fact Sheet* and the *Notification of Administrative Appeal Options and Process and Request for Appeal* form.

A copy of this correspondence with enclosure will be furnished to Ms. Kristie Dunkin of AMEC Earth and Environmental, Inc. at 11810 North Creek Parkway North, Bothell, Washington 98011. Because Department of the Army authorization may be necessary for work in jurisdictional wetlands and drainages, do not commence construction before written authorization is received.

If you have any questions, please contact Mr. Randel Perry at (206) 764-6985 or by email at randel.j.perry@usace.army.mil.

Sincerely,

Matthew Bennett
Senior Scientist
Regulatory Branch

Enclosures