PRELIMINARY CONCEPTUAL COMPENSATORY MITIGATION PLAN – REVISION 1

Gateway Pacific Terminal

Whatcom County, Washington

Prepared for:

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March 2012

Project No. 0-915-15338-C.01.03

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PREFACE

Pacific International Terminals, Inc., a subsidiary of SSA Marine, proposes to develop the Gateway Pacific Terminal (the "Terminal"), a multimodal terminal for transfer of dry bulk commodities, at Cherry Point in Whatcom County, Washington. Construction and operation of the Terminal and associated facilities require the approval of local, state, and federal agencies. Agency decision makers are to be informed of the potential environmental impacts of the proposed project by preparation of an Environmental Impact Statement (EIS). The EIS will be prepared under guidelines of the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) by a lead federal agency and lead state agency or agencies working in cooperation.

This report is one of several technical reports prepared on behalf of Pacific International Terminals, Inc. that provides scientific technical information about the existing conditions of the proposed project site, and in some cases, the projected effects of project operations. It is provided to the lead federal and state agencies for their use in preparation of a Draft EIS. Several of the technical reports have also been prepared to support specific project permit applications submitted to local, state, and federal agencies or as part of the consultation process with resource agencies and affected Indian nations.

A more detailed description of the proposed Terminal, including a complete list of proposed commodities and the phasing plan, is provided in the *Revised Project Information Document* (Pacific International Terminals, Inc., 2012).

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EXECUTIVE SUMMARY

This Preliminary Conceptual Compensatory Mitigation Plan, Revision 1 is presented in conjunction with the proposed construction of the Gateway Pacific Terminal by Pacific International Terminals, Inc. It is the intent of Pacific International Terminals, Inc. to provide full compensation for lost aquatic resources and functions that may result from project construction and operation in accordance with the federal, state and county no net-loss wetland policies.

Mitigation for losses of aquatic resources follows a three-step procedure, including avoidance, minimization, and compensation. The proposed project avoids and minimizes impacts to wetlands, streams, and ditches to the extent possible, rectifies temporary impacts wherever possible, and provides compensation for minimized, unavoidable negative effects, all consistent with federal, state and county regulatory requirements and guidance.

Impact assessment has determined that approximately 147.5 acres of wetlands, 48.6 acres of wetland buffers, and 14,932 linear feet of roadside streams and ditches will be directly affected as a result of the Terminal project. Approximately 11.3 acres of wetlands and 3,399 linear feet of roadside streams and ditches will be temporarily disturbed during construction. Compensation for these unavoidable impacts will be provided through a combination of compensatory mitigation methods, including on and off-site wetland creation and enhancement.

Proposed on-site wetland compensation includes creating 85.5 acres and enhancing 118.1 acres of wetlands. In addition, off-site wetland compensation includes creating 68.7 acres and enhancing 27.6 acres of wetland. Total proposed on-site and off-site wetland compensation includes creating 154.2 acres of wetland, and enhancing 145.7 acres of existing wetland. The proposed mitigation provides a net increase of 6.7 acres of wetland area in the watersheds where the impacts are proposed. Wetland buffers will be provided in association with the wetland creation and enhancement areas.

Per Whatcom County code requirements for mitigation, the proposed mitigating actions would generate approximately 117.4 mitigation credits towards the necessary 147.5 mitigation credits. The remaining 30.1 mitigation credits required for the project are proposed to be satisfied through out-of-kind resource trade-offs, including: restoring or relocating 15,305 linear feet of freshwater ditches or streams into natural channels to increase fish habitat, removing fish passage barriers to increase fish access to these improved habitats, and providing 13.7 acres of riparian enhancements to improve ecological functioning at a watershed scale. Additional mitigation actions may also include the purchase of wetland mitigation bank credits and/or in lieu fees, if necessary.

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CWA	Clean Water Act
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
HGM	Hydrogeomorphic
MHHW	Mean higher high water
MLLW	Mean lower low water
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
PEM	Palustrine emergent
PFO	Palustrine forested
PHS	Priority Habitats and Species
PSS	Palustrine scrub-shrub
RCW	Revised Code of Washington
RPW	Relatively permanent water
SEPA	State Environmental Policy Act
SSDP	Shoreline Substantial Development Permit
Terminal	Gateway Pacific Terminal
TNW	Traditional navigable waterway
USACE	U.S. Army Corps of Engineers
USC	United State Code
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WCC	Whatcom County Code
WRIA	Water Resources Inventory Area

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Responsible Parties and Contact Information
Pacific International Terminals is the project proponent and the permit applicant for the actions described in this document.

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Owner of mitigation sites and party responsible for long-term maintenance and monitoring of mitigation site:
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1.0 INTRODUCTION

Pacific International Terminals, Inc., a subsidiary of SSA Marine, is proposing to develop the Gateway Pacific Terminal (the "Terminal") at Cherry Point in Whatcom County, Washington (Figure 1). Designed for import and export of dry bulk commodities, the proposed Terminal would include a deep-water wharf with access trestle, dry bulk materials handling and storage facilities, and rail transportation access. Construction of the Terminal would result in permanent and temporary loss of existing wetlands, streams, and ditches and their functions. Indirect effects to wetlands, streams, and ditches may also occur during construction or during operation.

This report provides:

- A descriptive analysis of potential direct and indirect effects,
- Steps taken during both project design and project construction to avoid or minimize negative effects, and
- A plan for mitigation of minimized unavoidable effects.

It is the intent of Pacific International Terminals to provide full compensation for lost aquatic resources and functions that may result from project construction and operation.

On March 5, 2009, the U.S. Army Corps of Engineers (USACE) confirmed all wetlands (approximately 530 acres), streams, and ditches on Pacific International Terminals' property, to be jurisdictional because they either abut or are adjacent to unnamed tributaries of the Strait of Georgia, a traditional navigable water (TNW) used for interstate and foreign commerce. The USACE also confirmed the extent and location of delineated wetlands on Pacific International Terminals' property at that time. Details and a functional assessment of existing wetland conditions can be found in the *Wetland Determination and Delineation Report* (AMEC 2008) for the Pacific International Terminals property.

The wetland boundaries on an additional 29.7-acre, privately-held parcel within the project area were reviewed in the field by USACE, Whatcom County, and Washington State Department of Ecology (Ecology) staff on February 6, 2012. Pacific International Terminals has executed an option to purchase this parcel, identified as Parcel 14 in this report. A confirmation of wetland boundary locations for this area has not been received from the agencies at the time of this writing; however, it is believed that wetlands on Parcel 14 are jurisdictional because these wetland areas are extensions of wetlands already determined to be jurisdictional.

A total of 544.4 acres of wetlands are located in the project area.

The wetland impact assessment has determined that approximately 147.5 acres of wetlands and 14,932 linear feet of roadside streams and ditches will be directly impacted by the project. Approximately 11.3 acres of wetlands and 3,399 linear feet of roadside streams and ditches will be temporarily impacted during construction of the project. Indirect impacts to wetlands and streams may also occur as a result of project construction and operation.

These impacts would be compensated by a combination of:

- On-site creation and enhancement of wetlands;
- Off-site creation, restoration, and enhancement of wetlands;
- Out-of-kind resource trade-offs in on- and off-site mitigation areas, including: stream relocations and creation of natural water courses, increasing fish habitat and access, and providing other riparian enhancements to improve ecological functioning at a watershed scale;
- Mitigation banking credit; and
- In-lieu fees to a designated agency or third party to support other off-site restoration activities.

Federal and state agencies encourage ecosystem-based strategies that consider a project's watershed and its overall functions during the mitigation and restoration processes. These strategies are derived from the 2008 Mitigation Rules (*Compensatory Mitigation for Losses of Aquatic Resources; Final Rule* [Department of Defense and the Environmental Protection Agency (EPA) 2008, 33 CFR 332]) and recent documents from Ecology (2008).

The preliminary conceptual-level plan presented here for providing on-site compensation for minimized, unavoidable impacts to wetlands indicates that approximately 85.5 acres of wetlands can be created, 118.1 acres of wetlands can be enhanced, and 391 acres of wetlands can be preserved within the current Terminal project area. Additional compensatory mitigation required to offset the 147.5 acres is proposed to satisfy Whatcom County's guidelines for wetland mitigation, including:

- Off-site mitigation: Pacific International Terminals has identified additional property within the same watershed as the proposed Terminal for wetlands mitigation activities. This property is identified as Mitigation Area I in this report. Approximately 68.7 acres of wetlands can be created at this off-site location, and an additional 27.6 acres are planned for enhancement.
- Out-of-kind resource trade-offs: Additional environmental restoration activities on- and off-site designed to increase overall ecological functioning in the project area, such as riparian buffer enhancement, stream restoration, and culvert replacements.

AMEC
11810 North Creek Parkway N
Bothell, WA 98011

CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: MARCH 2012
TITLE: VICINITY MAP	CHK'D BY: JG	REV. NO.: -	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=3 miles	FIGURE No.: FIGURE 1

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure 1 - Vicinity Map.mxd

- Obtain wetlands banking credits (if necessary): The Lummi Nation Wetland and Habitat Mitigation Bank has been proposed with a service area that includes the Terminal project area. The bank has not been commissioned; however, Pacific International Terminals would work in collaboration with the bank sponsors towards a mutually beneficial arrangement and credit purchase.
- Establish in-lieu fee program with a public agency or third party (if necessary): Recent guidance by the USACE, EPA, and Ecology indicates a strong preference for in-lieu fee programs and mitigation banking approaches over permittee-responsible on- or off-site approaches. Based on research data (Natural Research Council 2001), in-lieu fee programs provide greater benefit and less risk of mitigation failure. Pacific International Terminals proposes to assist a public agency or third party who would establish an in-lieu fee program. This revised conceptual compensatory wetlands mitigation plan provides conceptual-level design information and incorporates comments received during agency review of the 2011 plan.

This report focuses on impacts and mitigation for freshwater wetlands, streams, and ditches and their associated buffers within the Gateway Pacific Terminal project area and watershed. The existing conditions and potential effects of construction and operation of the proposed deep-water wharf and trestle located in the shoreline and marine environment are discussed in the *Preliminary Draft Biological Evaluation* (AMEC 2012) prepared for the project.

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2.0 PROJECT DESCRIPTION

Pacific International Terminals proposes to construct and operate a deep-water, multimodal terminal, known as the Gateway Pacific Terminal, for the export and import of dry bulk commodities. The Terminal will have a three-berth, deep-water wharf and storage and transfer areas. The storage and transfer area will be serviced by two rail loops and support facilities. The wharf will accommodate the largest of oceangoing vessels, including Capesize and Panamax. The Terminal will handle a variety of dry bulk commodities throughout its lifetime.

Dry bulk commodities would be transferred to and from the Terminal by rail. Rail access would be provided by the BNSF Railway main line via new connections from the Terminal to the existing Custer Spur track. Modern commodities-handling equipment would be installed and appropriate management practices enforced to protect the safety of employees and the environment during Terminal operations.

Complete development of the Terminal would result in the following facilities and infrastructure:

- Two independently operational, industrial service rail loops (the “East Loop” and “West Loop”) with sufficient rail tracks to handle projected bulk volumes by rail; both loops would be connected to BNSF Railway’s Custer Rail Spur, and each loop would house associated commodity storage capacity, material handling equipment, and other required bulk handling infrastructure;
- A Shared Services Area providing access from the East and West Loops to the access trestle and wharf;
- A three-berth, deep-draft wharf with ship loading and unloading equipment and an access trestle extending from the shoreline to the wharf;
- A stormwater management system and other utilities; and
- Specific design features to mitigate and reduce potential impacts of the Terminal.

The project site layout of these general functional areas is shown in Figure 2.

2.1 PROJECT LOCATION

The Gateway Pacific Terminal would be located at Cherry Point on the Strait of Georgia. Cherry Point is a small promontory of land on the south side of Point Whitehorn and south of Birch Bay. The project area is approximately 5 miles west of the City of Ferndale, approximately 18 miles northwest of the City of Bellingham, and approximately 17 miles south of the Canadian border (see Figure 1).

The project area covers portions of Sections 17, 18, and 19 of Township 39 North, Range 1 East, all in unincorporated Whatcom County.

The project area, which is zoned for heavy-impact Industrial use, is located within unincorporated Whatcom County and is in Whatcom County's designated Cherry Point Industrial Urban Growth Area 9 (Whatcom County 2006). The wharf would be located in the Strait of Georgia between the BP Cherry Point Refinery pier and the ALCOA Intalco Works pier.

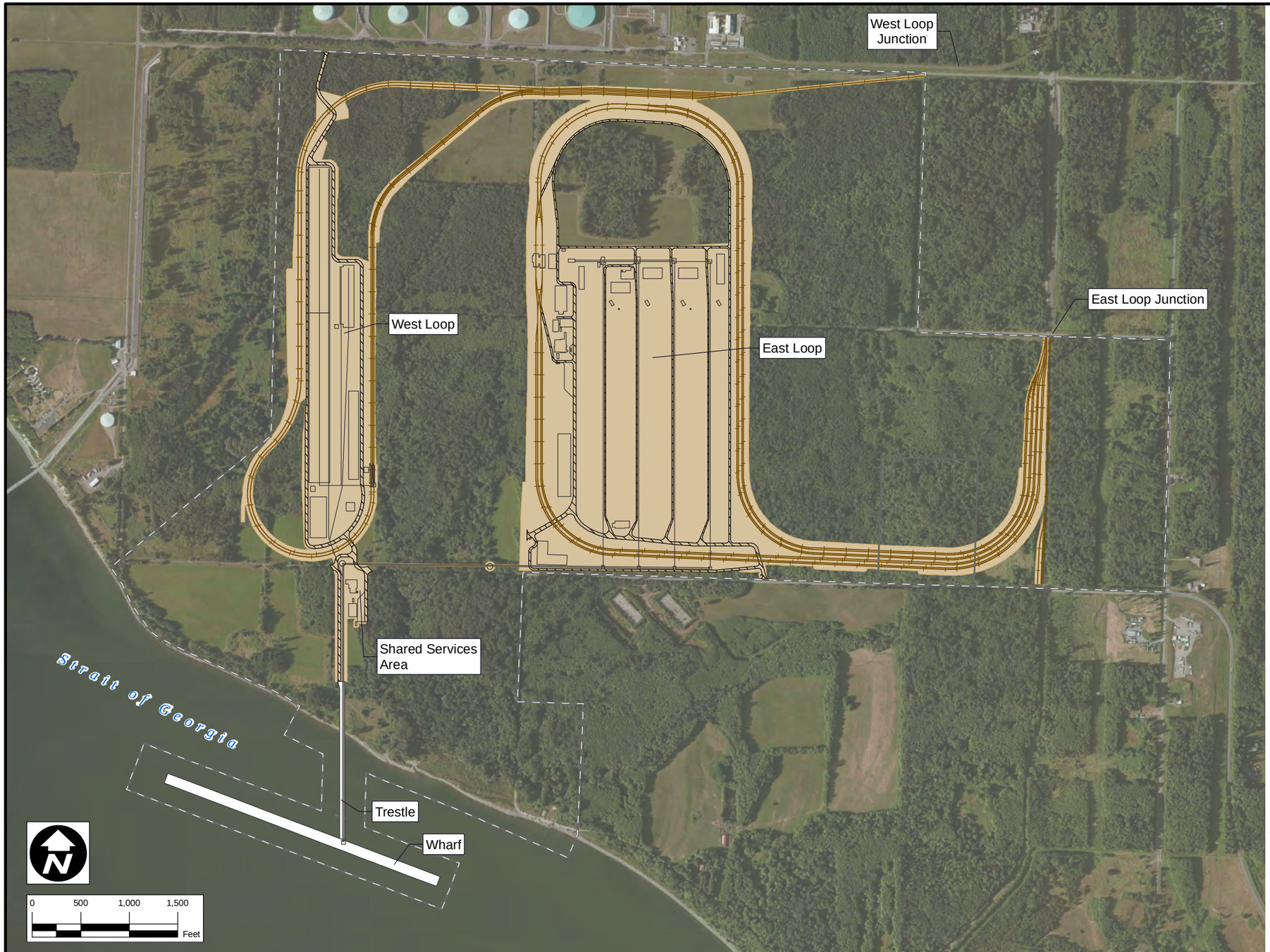
The BP Cherry Point Refinery borders the project site to the north and west. The ALCOA Intalco Works (aluminum plant) is located approximately 1 mile to the southeast. The Strait of Georgia lies to the southwest. The nearest residential areas are located on Kickerville Road, adjacent to the eastern edge of the project site. The Lake Terrell Wildlife Refuge, owned by the Washington Department of Natural Resources (WDNR), is located east of the site (approximately 0.25 mile) beyond Kickerville Road. Active pastures occur on lands to the southeast.

Roads, pipelines, power-line corridors, railroads, and other heavy industrial utilities further define the project area. The BNSF Railway's Custer Spur and a Bonneville Power Authority transmission line run north-south in the eastern portion. A gas line doglegs through the area from the BP Cherry Point Refinery on the north toward the southeast, and other pipelines run parallel to the western boundary of the project area.

2.2 PROJECT AREA

The terrain is characterized by generally flat to gently rolling slopes. Elevations range from sea level to 210 feet above mean sea level. The highest elevation occurs nearest the eastern project site boundary, with site elevation gradually decreasing to the west and to the south. Moderate slopes and steep bluffs border the westernmost and easternmost stretches of shoreline within the project area. A ravine containing Stream 1 lies in the south-central portion of the project area, and a second ravine with Stream 2 runs along the southeastern portion. Unstable slopes are not present on the site other than in the vicinity of the shoreline bluffs.

Wetlands, streams, and ditches occur throughout the project area. Field investigations from 2006 through 2011 resulted in delineation of 530.6 acres of wetlands on the property owned by Pacific International Terminals (Figure 3), and an additional 13.8 acres on privately-owned land. A total of 544.4 acres of wetlands are located in the project area.



LEGEND

- RAILROAD
- ROAD
- DEVELOPMENT FOOTPRINT
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

Source:
Ausenco Sandwell, 143166-A100-WC001-1.dwg (Rev. P1), 12/22/2011.

Pacific International Terminals
A Cemix Enterprise

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amec

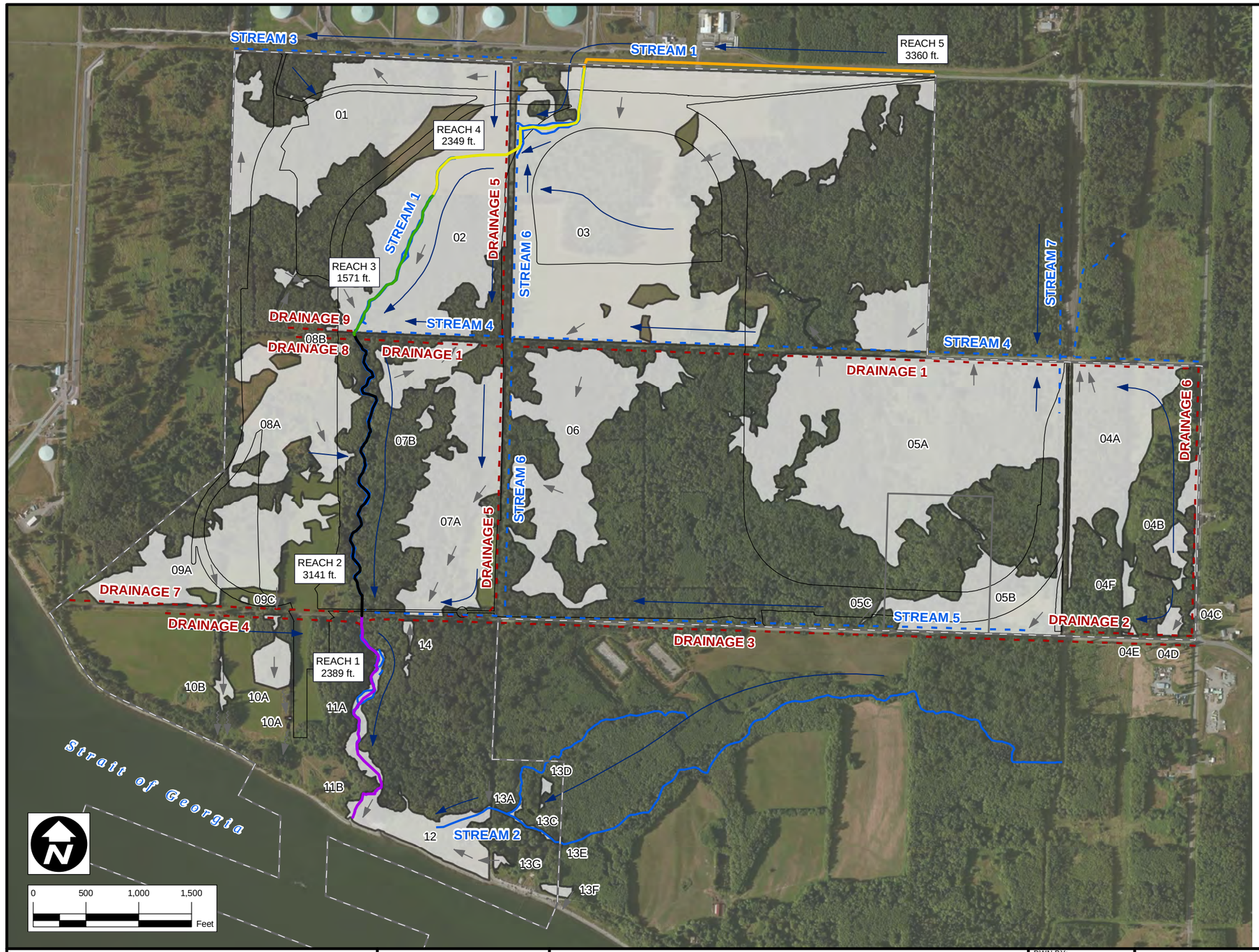
DWN BY:	SD
CHK'D BY:	JG
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	1 inch = 1,100 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
GATEWAY PACIFIC TERMINAL
DEVELOPMENT FOOTPRINT

DATE:	MARCH 2012
PROJECT NO.:	091515338C-01-03
REV. NO.:	-
FIGURE NO.:	FIGURE 2

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure 2 - Development Footprint.mxd



LEGEND

- APPROXIMATE DRAINAGE
- APPROXIMATE STREAM
- SURVEYED STREAM
- STREAM AND DRAINAGE FLOW DIRECTION
- WETLAND FLOW DIRECTION

STREAM 1:

- REACH 1
- REACH 2
- REACH 3
- REACH 4
- REACH 5
- EXISTING WETLAND AREA
- DEVELOPMENT FOOTPRINT
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

NOTE: Streams regulated by WDFW under the Hydraulic Code (RCW 77.55 and WAC 220-110): Stream 1 (Reaches 1, 2, and 3), 2, 4, 6 & 7.

Streams regulated by Whatcom County per Critical Areas Ordinance Maps: Streams 1, 2, 3, 4, 5, 6, and 7 .

Source:
Ausenco Sandwell, 143166-A100-WC001-1.dwg (Rev. P1), 12/22/2011.

Pacific International Terminals
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CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

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

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL

TITLE: WETLANDS AND DRAINAGES WITHIN THE GATEWAY PACIFIC TERMINAL PROJECT SITE

DATE:	MARCH 2012
PROJECT NO.:	091515338C-01-03
REV. NO.:	-
FIGURE NO.:	FIGURE 3

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure 3 - Wetlands and Drainages.mxd

Delineated wetlands within the project area were classified as riverine, slope, and depressional according to the hydrogeomorphic (HGM) approach. Palustrine forested (PFO) wetlands are most common, followed by palustrine emergent wetlands (PEM) used as pastures, hayfields, and mowed utility easements. Palustrine scrub-shrub (PSS) vegetated wetlands occur in areas of abandoned pastures and in linear strips at the boundaries between forest and emergent wetland areas or forest and roadways. Seasonally-saturated PEM wetlands are dominated by nonnative herbaceous plant species. Seasonally-saturated PFO and PSS wetlands are dominated by native plant species. One wetland is a categorized as a coastal lagoon system.

Seven streams were identified within the project area per the Whatcom County Critical Areas Ordinance (Stream 1 through 7). Two of these seven streams (Streams 1 and 2) are also regulated by the Washington Department of Fish and Wildlife (WDFW) under the state Hydraulic Code. Streams 1 (Reaches 1, 2, and 3) and 2 occur in natural stream channels, whereas Streams 3 through 7 occur as roadside ditches. Both Streams 1 and 2 are located within Water Resource Inventory Area 1 (WRIA 1). Stream 1 drains the north, central, and western project area, while Stream 2 drains the southeastern portion.

2.3 PROPERTY OWNERSHIP

The proposed Terminal would be developed on approximately 334 acres of the project area, which includes approximately 1,108.7 acres of heavy-impact industrial zoned land owned by Pacific International Terminals. In addition to the Pacific International Terminals-owned land, the project area includes Whatcom County road right-of-way, state-owned tideland, and one area of privately owned land (Table 1). There are also a number of utility easements on the property. A major portion of the trestle and wharf would be located within state lands leased from WDNR.

Table 1 Summary of Land Ownership and Acreage in the Project Area

Land Owner	Upland (acres)	Marine (acres)	Total (acres)
Pacific International Terminals, Inc.	1,090.5	18.2	1,108.7
Whatcom County right-of-way	19.9	0.0	19.9
Parcel 14	29.7	0.0	29.7
State lands leased from WDNR	0.0	43.3	43.3
Total	**1,140.0**	**61.5**	**1,201.5**

2.3.1 Pacific International Terminals, Inc. Property

Pacific International Terminals owns 1,108.7 acres of the project area. The property was developed early in the last century as single-family farms. The property has been logged repeatedly, the last time as recently as 1999. Agriculture in the form of hayfields and pasture are the only current active land

uses. Approximately 18.2 acres of the property are located below the mean higher high tide line of the Strait of Georgia.

2.3.2 Parcel 14

Parcel 14 is a 29.7-acre parcel adjacent to Henry Road owned by others. Pacific International Terminals has executed an option to purchase this parcel. The area is currently forested and has been logged in the past. It is not known to have been previously developed.

2.3.3 County Rights-of-Way

Approximately 19.9 acres of Whatcom County road rights-of-way currently bisecting the Pacific International Terminals property would be petitioned by Pacific International Terminals for vacating (Table 2). Portions of these rights-of-way to be vacated have been closed to vehicular traffic for a number of years.

Approximately 15 acres of existing impervious surfaces on vacated county roadways would be removed creating the opportunity for removing culverts, rerouting flows from roadside streams and ditches to restored wetlands and streams, and reconnecting formerly-bisected wetland systems.

Table 2 Summary of Whatcom County Rights-of-Way to be Vacated

County Road	Portion of Existing Road to Be Vacated	Rights-of-Way to Be Vacated (acres)	Existing Impervious Roadbed to Be Removed (acres)
Aldergrove Road[1]	Property line to property line	3.0	0.0
Lonseth Road	Property line to property line	7.0	7.0
Henry Road	Powder Plant Road west to western property line	3.9	2.0
Powder Plant Road	Henry Road to Aldergrove Road	6.0	6.0
Total		**19.9**	**15.0**

1 The total area of Aldergrove Road right-of-way to be vacated is approximately 9.2 acres. It is assumed that the northern two-thirds of the width of the Aldergrove right-of-way would be purchased by BP and are therefore not expected to be part of the Gateway Pacific Terminal project site.

2.3.4 State Lands Managed by the Department of Natural Resources

The wharf and almost all the trestle would be located on state-owned tidelands managed by the WDNR. The existing near-shore and marine shoreline conditions, potential effects, and compensation are discussed further in the *Preliminary Draft Biological Evaluation* (AMEC 2012).

2.4 GATEWAY PACIFIC TERMINAL DEVELOPMENT

Terminal development, including roadways, rail loops, and other infrastructure would affect approximately 334 acres of the project area, including uplands, wetlands, streams, and ditches. Of the 334 acres, approximately 147.5 acres qualify as jurisdictional wetland (Table 3).

Wetlands would be directly impacted by grading to develop the Terminal including filling to raise some areas and grading and fill for rail embankments. Table 3 provides a summary of impacts by location and type.

Table 3 Summary of Direct Permanent and Temporary Wetland Impacts

Project Area	Permanent Wetland Impacts (acres)	Temporary[4] Wetland Disturbance (acres)
East Loop[1]	101.1	5.2
West Loop[2]	46.3	6.0
Shared Services Area[3]	<0.1	<0.1
Total	**147.5**	**11.3**

1 This area includes the East Loop from the junction at Custer Spur, all infrastructures within the loop, and the load-out conveyor servicing the shared services area (Figure 2).

2 This area includes the West Loop from the junction at the Custer Spur and all infrastructure within the loop.

3 The shared services area begins at the surge bins where conveyors from the East and West Loop meet, and extends to the trestle abutment. It includes infrastructure such as buildings, parking areas, and roadways.

4 Temporary construction impact areas were estimated as the area 15 feet beyond the proposed cut and fill line on rail embankments and any other proposed infrastructure footprint.

Terminal development would also permanently affect a total of approximately 14,932 linear feet of streams and ditches. Table 4 provides a summary of permanent and temporary impacts to streams and ditches.

Table 4 Summary of Direct Permanent and Temporary Stream and Ditch Impacts

	Permanent Stream and Ditch Impacts		Temporary Stream and Ditch Disturbance	
Project Area	**Linear feet**	**Area (sq. ft.)[1]**	**Linear feet**	**Area (sq. ft.)[1]**
East Loop	12,958	51,832	3,204	12,816
West Loop	1,340	5,360	150	600
Shared Services Area	634	2,536	83	332
Total	14,932	59,728	3,437	13,748

1 Roadside streams and drainages estimated to be a standard 4 feet wide.

Construction of infrastructure needed for the Terminal would occur over 4 years (Stages 1 and 2), with the Terminal opening when the East Loop, shared services area, wharf, and trestle would be complete (Stage 1). Stage 2 construction would develop the West Loop. Construction staging, stockpiling, and materials lay-down would occur within the rail loops in locations that would ultimately function as part of the commodity-handling infrastructure, and no additional areas are expected to be needed on other portions of the project area for construction staging or lay-down.

Within the construction footprint, vegetation would be cleared, topsoil excavated, and the soil surface graded, compacted, and filled. The Terminal includes construction of rail embankments, commodity

stockpile areas (patio) and storage structures, administrative and other service building and parking areas, and stormwater facilities and utility development. More complete details of the project and construction staging are available in the *Revised Project Information Document* (AMEC 2012).

Erosion and sediment control methods, including on-site stormwater treatment ponds, will be used to protect water quality during construction. After completion of construction, construction stormwater treatment ponds will be redeveloped to become part of the permanent stormwater treatment facility.

Stormwater treatment is currently planned for the project. Runoff from any area that potentially would come into contact with a commodity, along with runoff from other areas, such as parking areas, would be directed to the stormwater treatment systems.

3.0 ECOLOGICAL ASSESSMENT OF THE PROJECT AREA

Information about watershed processes is key to planning protection, restoration, and sustainability of aquatic systems on the landscape (Stanley, et al. 2005). A summary of watershed processes and existing conditions in the project area is provided to support the discussion on impacts and functional assessments.

The project area lies within two watersheds. Approximately 1,133.5 acres of the project area lies within an unnamed small coastal watershed and drains to Stream 1 or Stream 2 (Figure 4), identified as the Gateway Pacific Terminal watershed in this document. Approximately 68 acres of the project area drains to the Birch Bay Watershed. The following sections provide descriptions of the characteristics, functions, and processes of these two coastal watersheds. Wetlands, streams and ditches are discussed within their respective watershed location.

The project area is included in the WRIA 1 watershed management area. Washington State, for planning purposes, grouped several small coastal watersheds, including the two coastal watersheds in the project area, in with the major Nooksack River drainage into the WRIA 1 watershed management area (Ecology 2010). The project area drains directly to coastal waters and has no hydrologic connection to interior mountain drainages or to the Nooksack River watershed.

3.1 BIRCH BAY WATERSHED CHARACTERISTICS

The northwest corner of the project area (68 acres) lies within the 31-square-mile Birch Bay Watershed. Stream 3 is located on BP property north of the northern perimeter of the project area, and flows west in a deep ditch adjacent to the north side of Aldergrove Road. This stream appears to connect downstream with the “Industrial Tributary to Terrell Creek” that drains the western and northwestern portions of BP’s property. Access to private property has not been available to verify this connection, but since no alternative is apparent, the assumption that this connection occurs has been made.

In the project vicinity, the Birch Bay coastal watershed lies to the north and east and supports a variety of land uses, including heavy industry, residential, open space, and farming. The watershed includes the BP Cherry Point Refinery and associated industries lying immediately north, and Lake Terrell and its natural area lying due east of the project area. Both the BP Refinery and Lake Terrell are notable features in the project vicinity.

Wetlands are widespread and extensive in the Birch Bay Watershed, covering approximately 25 percent of the entire basin. Much of these wetland environments are associated with Terrell Creek and Lake Terrell. The westernmost extent of Lake Terrell lies a little under a mile east of the

Terminal's eastern boundary. Lake Terrell State Wildlife Refuge is a 1,500-acre wildlife area managed by the Washington Department of Fish and Wildlife (WDFW) as part of the Whatcom Wildlife Area for wintering waterfowl. It includes Lake Terrell (500 acres) and approximately 50 acres farmed for winter waterfowl forage (WDFW 2006). Canada geese, a variety of duck, trumpeter and tundra swans, and pen-raised pheasants (released for hunting) occur in the refuge. Shallow Lake Terrell has extensive marshes on the south and southwest sides and is a popular area for fishing. Lake Terrell discharges into Terrell Creek and Terrell Creek flows to Birch Bay.

Planning efforts led by Whatcom County and Ecology identified goals to meet natural resource objectives for maintaining the health of Birch Bay (ESA Adolfson 2007).

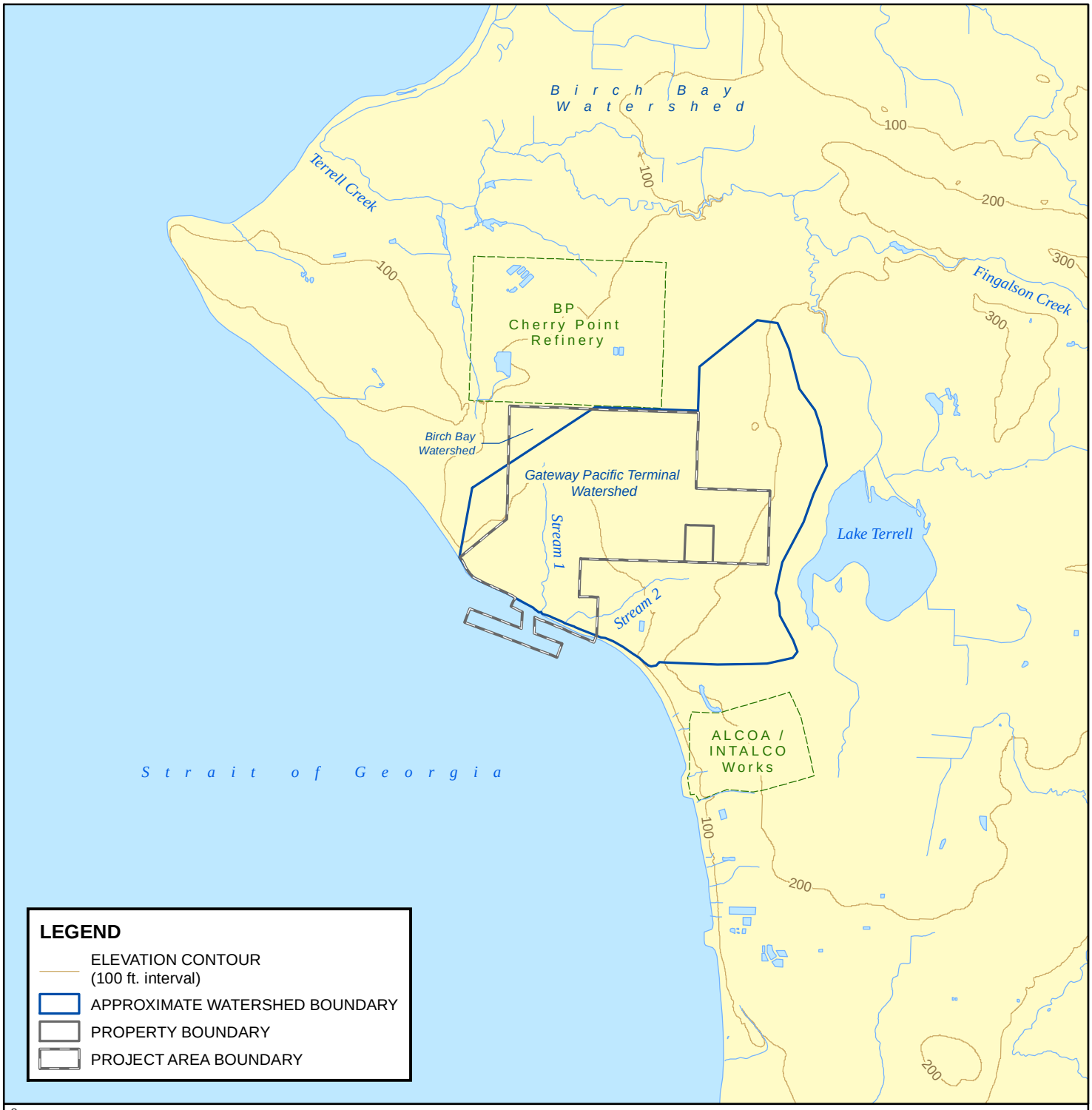
The portion of the Birch Bay Watershed within the project area includes Wetland 1 (44 acres), which drains to Stream 3 (Table 5). A single 6-inch culvert beneath Aldergrove Road was identified as providing surface water connection to the stream only during high flow periods (AMEC 2008). However, based on topographic gradients, Wetland 1 likely has subsurface hydrologic connectivity through the Aldergrove roadbed. Portions of Wetland 1 would be affected by Gateway Pacific Terminal development; no direct effects are anticipated for Stream 3.

Table 5 Summary of Streams and Wetlands in the Project Vicinity that Drain in the Birch Bay Watershed

Stream or Wetland ID	State of Washington Stream Type/ Wetland Rating[1]	Whatcom County Stream Type[2]	Water Flow Characteristic/ Classification	Location
Stream 3 (the "Industrial Tributary to Terrell Creek")	Ns	HCA 1c	2,000 linear feet are adjacent to property. Relatively permanent water. Drains to Terrell Creek.	Drainage ditch on BP property adjacent to north side of Aldergrove Road.
Wetland 1	III	N/A	44.21-acre deciduous forested slope wetland.	Northwest corner of the project area. Drains toward Stream 3.

1 Hruby (2004) and WAC 222-16-030

2 Whatcom County Code – HCA, Habitat Conservation Areas. HCA 1c – Non-fish bearing streams are those streams that have no known or potential use by anadromous or resident fish



Source:
Elevation Contours from Whatcom County:
http://www.co.whatcom.wa.us/pds/planning/gis/gisdata.jsp

0 0.5 1 2 Miles

N

AMEC 11810 North Creek Parkway N Bothell, WA 98011	amec	Pacific International Terminals	CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.
PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL		DWN BY: SD	DATUM: NAD83	DATE: MARCH 2012
TITLE: WATERSHEDS WITHIN THE GATEWAY PACIFIC TERMINAL PROJECT SITE		CHK'D BY: JG	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
		PROJECTION: WA SP North, Ft.	SCALE: 1 inch=1 mile	FIGURE No.: FIGURE 4

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure 4 - Watersheds.mxd

3.2 GATEWAY PACIFIC TERMINAL WATERSHED CHARACTERISTICS

The Gateway Pacific Terminal watershed is a small, approximately 2,000-acre coastal watershed that lies completely within the Puget Sound lowlands and drains via two streams to the Strait of Georgia. A coastal lagoon lies at the mouth of the streams at the Strait.

The following subsections provide details on the watershed process including wetlands, streams, ditches and their connectivity and wildlife habitats and characteristics. This information is provided to help the reader understand the potential watershed process changes that could result from Terminal development.

3.2.1 Land Uses

Existing land use of the watershed includes pastures, hay farming, and recreation. In general, the project area is a mix of forest, pastures, hayfields, abandoned fields, and areas of previous development. Logging of forested areas for pulpwood and firewood last occurred in 1999. Pastures and hayfields in use are occasionally tilled and reseeded.

Public access to the shoreline and beach area is via Gulf Road. Casual recreational uses along the shoreline include fishing, picnicking, and other passive activities.

The watershed has experienced disturbance from road building, rail development, gas-line, and power-line installation, homesteading, forest harvesting, and other development. Together these land uses resulted in wetland filling and ditching, rerouting of streams, clearcut logging and removal of other vegetation, and in some locations, continuous grazing and hay production. However, land use has been less intense in the last 20 years than historically because homesteads are no longer present.

3.2.2 Habitats

A short description of vegetation in the Gateway Pacific Terminal watershed is provided here. More detail for each wetland is provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

3.2.2.1 Forest Vegetation

Forested wetland and forested upland in the project area are quite similar in vegetation community composition. Vegetation in both wetland and upland forested areas consists primarily of deciduous forest—red alder (*Alnus rubra*) and black cottonwood (*Populus balsamifera*)—and infrequent single trees of western red cedar (*Thuja plicata*) or Douglas fir (*Pseudotsuga menziesii*). There are stands representing several different forest management events. Generally, the oldest and largest trees are

found near riparian corridors. Some small areas have tree species that were probably planted when the area had homes and yards.

Most of the forested areas have a dense understory of shrubs including vine maple (*Acer circinatum*), common snowberry (*Symphoricarpos alba*), salmonberry (*Rubus spectabilis*), Indian plum (*Oemleria cerasiformis*), clustered rose (*Rosa pisocarpa*), and red elderberry (*Sambucus racemosa*). Forested wetlands have similar red alder canopy with twinberry (*Lonicera involucrata*), salmonberry (*Rubus spectabilis*), red osier dogwood (*Cornus sericea*), and willows (*Salix* spp.) in the understory. Where present, the herbaceous layer contains sword fern (*Polystichum munitum*), Pacific blackberry (*Rubus ursinus*), and piggyback plant (*Tolmiea menziesii*), with the addition of soft rush and slough sedge in some forested wetland areas.

3.2.2.2 Shrub Vegetation

Dense thickets of Nootka rose (*Rosa nutkana*) and Himalayan blackberry (*Rubus armeniacus*) are common along the forest/pasture boundaries and adjacent to roadsides in both wetlands and uplands. Patches of shrub wetlands are present throughout the project area and are commonly dominated by Nootka rose, Douglas spirea (*Spiraea douglasii*), and Himalayan blackberry.

3.2.2.3 Herbaceous Vegetation

Vegetation in hayfields that are occasionally seeded and hayed annually consists of grasses and forbs, including bentgrass (*Agrostis* spp), sweet vernalgrass (*Anthoxanthum odoratum*), common velvetgrass (*Holcus lanatus*), and English plantain (*Plantago lanceolata*). In less frequently managed pastures areas, dominant grass species include red fescue, meadow foxtail (*Alopecurus pratensis*), Canadian thistle (*Cirsium arvense*), bentgrass, quackgrass (*Agropyron repens*), and orchard grass (*Dactylis glomerata*). Mowing occurs annually along power-line and pipeline easements and promotes thick stands of reed canarygrass (*Phalaris arundinacea*).

3.2.2.4 Marine Nearshore Conditions

Because nearshore conditions influence the functioning of the coastal lagoon (Wetland 12) and the functions of Stream 1 and Stream 2 and their associated wetlands, a summary of the marine nearshore conditions is provided. Potential effects and compensation due to the proposed trestle and wharf portions of the development are discussed in the *Preliminary Draft Biological Evaluation* (AMEC 2012).

The shoreline in the vicinity of the proposed project footprint is characterized by mostly flat to gently sloping terrain on the uplands, with steep bluffs bordering the easternmost portion of beach and the westernmost 2,500 feet of beach. A coastal lagoon, Wetland 12, abuts one section of the beach.

Wetland 12 is dependent on the characteristics of the Strait of Georgia, including abundant glacial sediment transport, limited sea level rise, a moderate tidal range, and wave exposure (Shipman 2008). Hydrologic conditions in Wetland 12 can be dynamic, with inflow/outflow rates, water depth, and salinity dependent on both groundwater discharge rates and flows from Stream 1, as well as influenced by marine tidal and current dynamics. Strong storms can lead to overwash of the barrier beach and relocation of the stream outlet. The area was likely formed by interacting effects of Stream 1 and ocean currents on sedimentation and barrier accretion and erosion, thus vegetation and large woody debris stabilization of the barrier is an important characteristic.

The lagoon area behind the barrier does not drain at low tide, probably because the pool of water lies lower than the current outlet elevation. The lagoon water elevation also does not appear to have daily tidal fluctuation. As a result, Wetland 12 lacks some features common in other tidal influenced local coastal lagoons. Features such as areas dominated by salt marsh vegetation, areas of seagrasses, or unvegetated intertidal flats are not present.

3.2.2.5 Priority Habitats

Wetlands and streams are priority habitats and are present within the project area. According to the WDFW Priority Habitats and Species (PHS) database, 25 priority species and several types of waterfowl—all of which are bird and/or marine species—are listed as having the potential to be present on or in the vicinity of the Gateway Pacific Terminal project area (WDFW 2010). The riparian areas of Streams 1 and 2 were mapped as priority habitat by WDFW (2010) and Whatcom County (2005b).

Seven bird species on the PHS database were detected during field surveys from 2008 to 2009: common loon, western grebe, harlequin duck, bald eagle, merlin, great blue heron, and pileated woodpecker. Priority areas exist for five of the seven species: eagle, harlequin duck, western grebe, common loon, and pileated woodpecker. The project area does not contain breeding habitat for merlin due to a lack of coniferous forest, and no heron rookeries were observed; therefore, priority areas for these species are not considered present. Non-migratory birds were generally present in all habitats in the project area, with a few exceptions. Northern harrier were found only in riparian areas; golden crowned kinglets, hairy woodpecker, Hutton's vireo, pileated woodpecker, and red-winged blackbird were identified in the forests; merlins were only found in shrub communities; Cooper's hawk and red-tailed hawk were observed in the pasture and hayfields; and pelagic cormorants were found in the nearshore.

Bald eagles were observed roosting in trees along the shoreline bluff in the southwestern portion of the site, which would be considered a priority area. A bald eagle nest is located at the lowest reach of Stream 1 near the stream's mouth. Other priority areas include nearshore habitat, which provides

habitat for common loons, western grebes, and harlequin ducks, and a migratory stopover area for loons and grebes. Suitable breeding habitat exists within the site for pileated woodpeckers, which depend on large trees for cavity nesting.

Fifteen species of migratory birds were detected during avian surveys in 2009. Of those, seven species are assumed to be using the site for breeding and would be protected by the Migratory Bird Act. No wildlife species listed under the Endangered Species Act (ESA) were detected within the upland and wetland portions of the project area. The *Draft Preliminary Biological Evaluation* (AMEC 2012) written for the project addresses ESA-listed marine species in the Strait of Georgia that could potentially utilize the nearshore environment.

Up to 10 amphibian species could occur in the project area; however, most of these species are not likely to be common to the area. None of the species identified are listed as sensitive, threatened, or endangered by WDFW or the U.S. Fish and Wildlife Service. Two species of frogs, red-legged frog (*Rana aurora*) and Pacific treefrog (*Pseudacris regilla*), and two species of salamander, northwestern salamander (*Ambystoma gracile*) and long-toed salamander (*Ambystoma macrodactylum*), were observed during amphibian surveys in 1994 (Shapiro and Associates 1994).

3.3 STREAMS AND DITCHES

Streams 1 and 2 have been assigned a number under the WRIA stream naming convention (01.0100 and 01.0101 respectively); all other streams and ditches are technically unnamed and unnumbered, but have been given numerical assignments to facilitate discussion.

Streams and drainages identified within the project site drain to the Strait of Georgia. Streams 4, 5, 6, and 7 flow in roadside ditches. Reach 5 of Stream 1 flows in a roadside ditch. In addition, nine other drainages occur as roadside ditches. The streams have continuous flow for at least three months of the year, and are therefore considered to be relatively permanent water (RPWs) (see Figure 3 for locations). Other relatively permanent tributaries include Ditches 1, 3, 4, 7, 8, and 9. Ditches 2, 5, and 6 are non-RPWs because they flow for less than 3 months a year. Table 6 provides the water flow category and Whatcom County's and the State of Washington's categories for streams in the Gateway Pacific Terminal Watershed. More information regarding freshwater streams, fish presence, and stream functioning is provided in the *Freshwater Streams Baseline Inventory Report* (AMEC 2012).

3.3.1 Stream 1

The greater part of the site is contained within the Gateway Pacific Terminal Watershed, which drains to a single stream (Stream 1). Detailed information on Stream 1's existing conditions is provided here to help the reader understand the function of the watershed's main tributary, including its current

functional characteristic in locations where impacts would occur, in areas that are preserved, and in locations where enhancements could be made to improve functions.

Stream 1 is approximately 2.4 miles long and drains a total of approximately 800 acres. Stream 1 originates north of Aldergrove Road, flows as a roadside ditch on the north side of Aldergrove Road,

Table 6 Stream Characteristics in the Gateway Pacific Terminal Watershed

Stream ID	WDFW Jurisdiction?	State of Washington Stream Type[1]	Whatcom County Stream Type[2]	Water Flow Characteristic[3]	Location
Stream 1	Yes	F – Reach 1 Ns – Reaches 2-5	HCA 1b	Relatively Permanent Water	First-order stream. Flows mainly south through the project area.
Stream 2	Yes	Ns	HCA 1b	Relatively Permanent Water	First-order stream. Flows southwest in the southernmost portion of the project area. Most of stream on adjacent property. Has several small tributaries (not mapped).
Stream 4	Yes	Ns	HCA 1c	Relatively Permanent Water	Drainage ditch on the north side of Lonseth Road
Stream 5	No	Ns	HCA 1c	Relatively Permanent Water	Drainage ditch on the north side of Henry Road
Stream 6	Yes	Ns	HCA 1c	Relatively Permanent Water	Drainage ditch on the east side of Gulf Road
Stream 7	Yes	Ns	HCA 1c	Relatively Permanent Water	Drainage ditch located between Henry Road and Lonseth Road along the west side of the Custer Spur rail embankment in the Elliot Yard

1 WAC 222-16-030

2 Habitat Conservation Area (HCA). HCA 1b - Other fish bearing streams that do not meet the definition of shorelines of the state but have known or potential use by anadromous or resident fish species. HCA 1c - Non-fish bearing streams are those streams that have no known or potential use by anadromous or resident fish.

3 All Streams drain to the Strait of Georgia, a Traditional Navigable Water.

and then turns south entering the project area near the intersection of Gulf Road and Aldergrove Roads. The stream flows into Wetland 3, a large pasture in the northern portion of the project area. The stream flows southwest through the pasture as a ditch and through forested wetlands (Wetland 2) until it reaches its ravine approximately 2,000 feet downstream from where it entered the property. It is fed by surface flow through excavated roadside ditches and isolated channels within wetlands, and in some places, by surface sheet flow. Groundwater seeps appear to be important for base flow support in the lower reaches (Figure 3).

Relative to the National Marine Fisheries Service (NMFS) definition of properly functioning condition, Stream 1's lowest reach has indicators of properly functioning conditions with regard to width-to-depth ratio and large woody debris (LDW); however, other characteristics are lacking. Tables 7 and 8 provide an evaluation of Stream 1 by reaches. There is limited fish habitat in Stream 1 because of intermittent flow, few high-quality pools, lack of LDW and spawning gravels, poor water quality attributed to sediment load, and garbage in the stream. Fish species identified within the stream channel during the May 2011 survey included three-spine stickleback (*Gasterosteus aculeatus*), juvenile chum salmon (*Oncorhynchus keta*), and juvenile coho salmon (*O. kisutch*). Nearly all fish species were located at the mouth of Stream 1.

Restoration opportunities identified along Stream 1 include replacing culverts to permit fish passage further upstream, rerouting flows from roadside tributary ditches to wetlands, restoring adjacent wetlands and riparian areas, and possibly installing LDW and habitat gravels where needed.

Table 7 Summary of Conditions in Stream 1 by Reaches

Reach Number	Length (linear ft)	Description	Characteristics	Stream Function: High, Medium, Low (Based on Field Observations)
1[1]	2,161	Stream mouth to Henry Road	Flows through a ravine, defined by steep slopes on both stream banks with a red alder canopy and a willow and twinberry shrub understory. Riverine wetlands are characteristic along the stream.	High
2[1]	2,742	Henry Road to Lonseth Road	Narrow streambed with less emergent or aquatic vegetation than Reach 1, without riverine wetlands. The riparian community is characterized by a red alder canopy with shrubs, including salmonberry (*Rubus spectabilis)* and snowberry (*Symphoricarpos albus*), in the understory.	High
3[1]	1,571	Upstream of Lonseth Road to the pasture South of Aldergrove Road	Shallow streambed, in places poorly defined bed, not in a ravine. Travels through Wetland 2 (PFO). No fish habitat, but provides water quality function.	Medium
4	2,349	From the pasture to Aldergrove Road	Ditch in active pasture (Wetlands 1 and 3). Not protected from grazing. In culvert under Powder Plant Road.	Low
5	3,360	From culvert at Aldergrove Road to property boundary	Roadside ditch on north side of Aldergrove Road. Receives runoff from refinery and roadway.	Low

1 WDFW jurisdiction only applies to Reaches 1, 2, and 3 of Stream 1.

Table 8 Pathways and Indicators Relative to Properly Functioning Conditions in Stream 1, Reaches 1 through 5

Pathway	Indicator	Level of Function[1]
Reach 1		
Habitat Access	Physical Barriers	Not Properly Functioning
Habitat Elements	Substrate	Not Properly Functioning
Habitat Elements	Large Woody Debris	Properly Functioning
Channel Condition and Dynamics	Width/Depth Ratio	Properly Functioning
Watershed Conditions	Riparian Reserves	Not Properly Functioning
Reach 2		
Habitat Access	Physical Barriers	Not Properly Functioning
Habitat Elements	Substrate	Not Properly Functioning
Habitat Elements	Large Woody Debris	Properly Functioning
Channel Condition and Dynamics	Width/Depth Ratio	Properly Functioning
Watershed Conditions	Riparian Reserves	Not Properly Functioning
Reach 3		
Habitat Access	Physical Barriers	Not Properly Functioning
Habitat Elements	Substrate	Not Properly Functioning
Habitat Elements	Large Woody Debris	Properly Functioning
Channel Condition and Dynamics	Width/Depth Ratio	Properly Functioning
Watershed Conditions	Riparian Reserves	Not Properly Functioning
Reach 4		
Habitat Access	Physical Barriers	Not Properly Functioning
Habitat Elements	Substrate	Not Properly Functioning
Habitat Elements	Large Woody Debris	Not Properly Functioning
Channel Condition and Dynamics	Width/Depth Ratio	Not Properly Functioning
Watershed Conditions	Riparian Reserves	Not Properly Functioning
Reach 5		
Habitat Access	Physical Barriers	Not Properly Functioning
Habitat Elements	Substrate	Not Properly Functioning
Habitat Elements	Large Woody Debris	Not Properly Functioning
Channel Condition and Dynamics	Width/Depth Ratio	Not Properly Functioning
Watershed Conditions	Riparian Reserves	Not Properly Functioning

1 According to the National Marine Fisheries Service definitions, after USDI-BLM (1993): Level of functioning is either Properly Functioning, At Risk, or Not Properly Functioning.

3.3.2 Stream 2

Stream 2 is approximately one mile long, approximately 1,160 linear feet of which are located on Pacific International Terminals' property, with the remaining area on adjacent parcels. While only a short reach of this stream is located within the project area boundary, information is provided to support the discussion presented later on how this stream and its associated wetlands might be enhanced.

Stream 2 drains from the eastern portion of the watershed and generally flows southwest. At a location approximately 400 feet east of Gulf Road, a short tributary flowing from the northeast (Stream 2A) joins the primary channel of Stream 2. The stream then flows southwest through a culvert under Gulf Road to Wetland 12, a coastal lagoon. Stream 2 and its tributaries have continuous flow for at least three months out of the year, and are therefore considered RPWs. According to Whatcom County, this stream is categorized as HCA-1b (Whatcom County 2005). The riparian areas of Stream 2 are identified as priority habitat by WDFW and Whatcom County and the stream itself is identified as having potential/historical fish distribution (Whatcom County 2005; WDFW 2010).

Although the area has been mapped as a priority area due to its location, the habitat value of Stream 2 and its tributary is relatively low because it has been disturbed by development over many years, including industrial, agricultural, and residential.

There are at least three areas of abandoned foundations and piles of debris within the riparian area of the lower reach. As a result of previous development in this area much of the vegetation has been disturbed and includes a large component of Himalayan blackberry. An old stock pond with an earthen dam across the main channel eliminated continuous flow in the stream corridor. Upstream of the stock pond, the stream lies in a steep-sided ditch, and riparian area is narrow but forested. The stream drains approximately 80 acres of active pasture area; however, cattle are fenced from the stream and its ravine.

3.3.3 Roadside Streams and Drainages

Roadside ditches within the project area were constructed to convey runoff, keep the road subbase dry, and provide a transition from the public road to private property. The roadside ditches classified as streams were constructed to hold water displaced through the installation of roadways through wet areas. While all of the roadside conveyances produce a defined channel or bed, none of them (neither streams nor ditches) occur in locations where natural streams existed before human alteration. According to correspondence with Whatcom County, the roadside ditches are mowed annually and excavated approximately once every 5 years.

The flow in the ditches mostly enters over land or via over-the-shoulder sheet flow; only a few locations occur with small, single-point confluences. The geometry of nearly all of the ditches is trapezoidal, with relatively sharp corners subject to erosion. The dimensions of the ditches are variable, with depths ranging from 0.8 to 3.9 feet. The average depth of roadside ditches is 2.4 feet, while streams are 2.2 feet. The generalized geometric and hydraulic characteristics of the roadside streams and ditches are shown in Table 9 to provide the reader with information in these characteristics.

Table 9 Geometric and Hydraulic Characteristics of Roadside Streams and Ditches

	Roadside Streams	Roadside Ditches	Total or Average
Number of transects measured	34	31	65
Average water depth (inches)	2.6	3.9	3.1
Average ditch depth (feet)	2.2	2.4	2.3
Average top width (feet)	9.2	10.3	9.6
Avg. bottom width (feet)	2.6	2.9	2.8
Ratio Bankfull Width to Bankfull Depth	1:2	1:4	1:2

During a field evaluation in April 2010, standing water was observed in 93 percent of roadside ditch transects and 84 percent of the roadside stream transects. The average depth of water in ditches was 3.9 inches, and the average depth in streams was 2.6 inches. Standing water was more common in ditches categorized as streams than as ditches. Relative to channel morphology, width-to-depth ratios were low, as these ditches were constructed to convey water with the least resistance and ensure good drainage.

Vegetated roadside ditches have the potential to provide water quality benefits, but they may also transport sediments and pollutants. Therefore, roadside ditches may provide both positive and negative effects on downstream water quality. In the project area, roadside ditches and streams in roadside ditches have the potential to improve water quality by reducing pollutants in stormwater. General characteristics of roadside ditches that function to improve water quality include the following (Colwell et al. 2000):

- Cross section shape that spreads flow and reduces velocity, helping to limit erosion.
- Gradual sloping along the direction of flow, functioning to moderate velocity and avoid standing water.
- Minimal erosion.
- Minimal shading to limit vegetation growth.
- Vegetation types beneficial to pollutant removal.

Dense herbaceous vegetation present in the majority of the ditches has the potential to reduce the contaminant load of roadside runoff. Direct disturbance to roadside ditches that may impair their water quality performance is not widespread, as ditch maintenance occurs only approximately every 5 years. Approximately 50 percent of the ditch segments exhibited trash, all classified as minor. Siltation was evident in 83 percent of ditches evaluated and in all of the roadside streams.

When compared to the three condition levels of the NMFS matrix, most of the environmental parameters of the roadside ditches and streams are “not properly functioning” (Table 10). Stream morphology is the only habitat function that is properly functioning for all streams and ditches. The other parameters, including physical barriers, abundant large woody debris, and substrate are not properly functioning. Table 9 reflects an analysis of the conditions of the overall stream when compared with reference data. The roadside ditches and streams are not functioning properly to provide fish habitat, according to the NMFS Matrix of Pathways and Indicators. Based on habitat conditions, none of the roadside streams or ditches would be expected to be used by anadromous or resident salmonids or other fish populations. Field investigations indicated that fish do not use the roadside streams and ditches. Stream and ditch fauna identified were frogs and tadpoles. The roadside streams and ditches are currently providing minimal habitat value.

Table 10 NMFS Matrix of Pathways and Indicators Evaluated for Streams in Roadside Ditches and Other Major Roadside Ditches

Pathway	Indicator	Stream 5, north side Henry Road	Drainage 3 south side Henry Road	Stream 4 north side Lonseth Road	Drainage 1 south side Lonseth Road	Kickerville Road (North)	Kickerville Road (South)	Drainage 5 east side of Gulf Road	Stream 6 west side of Gulf Road
Habitat Access	Physical Barriers	Not[1]	Not	Not	Not	Not	Not	Not	Not
Habitat Elements	Substrate	Not	Not	Not	Not	Not	Not	Not	Not
	Large woody debris	Not	Not	Not	Not	Not	Not	Not	Not
Channel Condition and Dynamics	Width/Depth Ratio	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Watershed Conditions	Riparian Reserves	Not	Not	Not	Not	Not	Not	Not	Not

1 Not = Not Properly Functioning; Yes = Properly Functioning

3.3.4 Other Ditches

Other small, unnamed ditches occur in the project area, mainly in hayfields and pasture area wetlands. These constructed ditches appear to have been primarily for improving drainage for agricultural purposes. All of these small ditches are considered jurisdictional by the USACE. They are generally less than 3 feet deep and 4 feet wide, are often discontinuous, and are not regularly maintained. In the vicinity of hayfields, these ditches have narrow riparian areas with blackberry, rose, and young alder vegetation. In the pasture areas, the ditches are not protected from cattle, and thus the ditches and riparian areas have grazed herbaceous vegetation.

3.4 WETLANDS

Over the last 20 years, efforts to evaluate wetlands on the Pacific International Terminals property have consistently demonstrated that approximately half of the property meets the definition of wetland (Aqua-Terr Systems, Inc. 1995; Parametrix 1991; Shapiro and Associates 1992).

As mentioned in the introduction, the USACE determined that all aquatic features including wetlands, streams, and ditches on the Pacific International Terminals property are jurisdictional because they either abut or are adjacent to unnamed tributaries of the Strait of Georgia, a traditional navigable water (TNW) used for interstate and foreign commerce (EPA and USACE 2007). Details on existing wetland conditions and functions as well as wetland ratings sheets can be found in the report *Wetland Determination and Delineation* (AMEC 2008). Wetland characteristics on Parcel 14 are documented in the report *Wetland Identification and Delineation* (AMEC 2011).

A total of 544.4 acres of wetlands are located in the project area. Wetlands comprise approximately 530.6 acres, or approximately 49 percent of the Pacific International Terminals property (Table 11). An additional 13.8 acres are located on Parcel 14. Wetlands on Parcel 14 were determined to be continuous with previously delineated Wetland 5A and 5C. Wetlands 5A and 5C are now incorporated into a single wetland, identified as Wetland 5A. Hydrogeomorphic wetland classes present include depressional, slope, and riverine. Red alder forested wetlands (PFO) are most common, followed by wet pastures and hayfields (PEM), with a smaller amount of dense rose/blackberry/snowberry shrub wetlands (PSS; see Table 11). Approximately 527.8 acres are rated as Category III, and 0.1 acres are rated as Category IV (Wetland 4F). Category I and II Wetlands total about 15 acres.

A barrier dune separates Wetland 12 from the beach and shore. The area was classified as an estuarine emergent wetland that grades in the landward direction to a forested palustrine wetland system. Wetland characteristics and ratings are summarized in Table 11.

Table 11 Characteristics and Ratings of Wetlands on the Pacific International Terminals, Inc., Property and Parcel 14

		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	97.4	III	109.2
5B	Depressional	0	0	0.1	III	0.1
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**	**369.4**		**544.4**

1 Cowardin et al. (1979)

2 Hruby (2004)

3 Estuarine, not palustrine wetland

3.4.1 Water Quality Functions

Wetlands in the project area have low to moderate potential to provide water quality functions. A majority of the forested wetlands lack defined outlets, which helps to slow and detain water and allow sediments and pollutants to settle out and become assimilated into the soil column. The presence of large wetland pastures that are grazed or mowed and the lack of clay or organic soils reduce the overall ability of on-site wetlands to perform water quality functions.

Due to the presence of paved roads and grazed pastures, many wetlands received higher ratings based on the opportunity to perform water quality functions. However, the deep roadside streams and drainages collect a majority of the surface water runoff from the adjacent wetlands. While Wetlands 2 and 3 have the opportunity to perform water quality functions, their low vegetation biomass reduces their actual water quality functional rating to low.

3.4.2 Hydrologic Functions

Table 12 describes the connectivity of streams and wetlands, as well as flow pathways in the project area. These connections are key to understanding interdependent hydrologic process in the watershed.

Wetlands 5B, 11A, 13A, and 13E had the highest hydrologic function scores (18 or greater) while most wetlands scored much lower. Although the wetlands are common on the landscape and many contain depressions to detain water, a majority of the wetlands are not effectively connected to natural drainage courses such as Stream 1 and taken at the watershed level, the hydrologic process is impaired. They do not receive stormwater or floodwater inputs. Therefore, their ability to perform hydrologic functions and protect downstream resources from flooding or erosion is low.

Under existing conditions, untreated stormwater flows from adjacent developed and agricultural areas to Stream 1 and Stream 2, and ultimately the Strait of Georgia. Sediment, potentially excess nutrients and pathogens could reach downstream waters. Wetland characteristics allow for moderate potential to filter stormwater, but as previously discussed, most of the on-site wetlands provide low water quality functions because of deep roadside streams and drainages that collect stormwater and do not overflow to adjacent wetlands, which reduces their opportunity to receive stormwater inputs. However, the few wetlands that receive stormwater do likely increase the relative quality of water that drains through them to the Strait of Georgia. These mildly protective water quality functions would be impaired due to loss of wetlands as a result of Terminal development if insufficient consideration was given to appropriate stormwater management.

Table 12 Drainage Relationships of Wetlands and Streams

Wetland Name	Location	Size (acres)	Drainage association/ classification	Hydrogeomorphic Class	Distance from RPW	Distance from TNW	Wetland Drains to:
1	Northwest corner	44.21	Abuts Stream 3	Depressional	0	0.9 mi.1	Infiltrates to groundwater south of Aldergrove Rd.
2	Northwest corner	48.94	Abuts Streams 1 and 4, Drainage 9 and 5	Slope	0	0.9 mi.	Drainage 5, Drainage 9, Stream 1 and Stream 4 to Stream 1 to Strait of Georgia
3	Northern portion	144.37	Abuts Streams 1, 3, 4, and 6	Slope	0	1.2 mi.	Streams 4 and 6 to Stream 6 to Stream 5 to Stream 1 to Strait of Georgia; Stream 3 and Stream 1 to Strait of Georgia
4A	Eastern portion	26.62	Abuts Drainage 6	Slope	0	2.3 mi.	Drainage 6 to Drainage 1 to Stream 6 to Stream 5 to Stream 1 to Strait of Georgia
4B	Eastern portion	4.36	Abuts Drainage 6	Depressional	800.	2.5 mi.	Drainage 6 to Drainage 1 to Stream 6 to Stream 5 to Stream 1 to Strait of Georgia
4C	Eastern portion	0.15	Abuts Drainage 6	Depressional	0.4 mi.	2.7 mi.	Drainage 6 to Drainage 1 to Stream 6 to Stream 5 to Stream 1 to Strait of Georgia
4D	Eastern portion	1.31	Adjacent to but not abutting Drainage 2	Slope	0.7 mi.	2.7 mi.	Infiltrates to groundwater
4E	Eastern portion	0.17	Adjacent to but not abutting Drainage 2	Depressional	0.6 mi.	2.6 mi.	Infiltrates to groundwater.
4F	Eastern portion	1.07	Isolated	Slope	0.3 mi.	2.6 mi.	Infiltrates to groundwater.
5A	Eastern portion	109.2	Abuts Drainage 1 and Stream 5 and 7	Slope	0	1.7 mi.	Stream 7 and Drainage 1 to Stream 6 to Stream 5 to Stream 1 to Strait of Georgia; Stream 5 to Stream 1 to Strait of Georgia
5B	Eastern portion	0.13	Isolated	Depressional	0.3 ft	2.0 mi.	Infiltrates to groundwater
6	Central portion	36.93	Abuts Stream 6 and Drainage 1	Slope	0	0.9 mi.	Drainage 1 and Stream 6 to Stream 5 to Stream 1 to Strait of Georgia
7A	Western portion	40.06	Abuts Stream 5, Drainage 1, and Drainage 5	Slope	0	0.5 mi.	Drainage 5 and Stream 5 to Stream 1 to Strait of Georgia
7B	Western portion	0.59	Isolated	Depressional	500 ft.	0.8 mi.	Infiltrates to groundwater
8A	Western	24.69	Abuts Stream 1	Slope	0	0.6 mi.	Stream 1 to Strait of Georgia

Table 12 Drainage Relationships of Wetlands and Streams

Wetland Name	Location	Size (acres)	Drainage association/ classification	Hydrogeomorphic Class	Distance from RPW	Distance from TNW	Wetland Drains to:
	portion						
8B	Western portion	0.15	Abuts Drainage 8	Depressional	0	1.0 mi.	Drainage 8 to Stream 1 to Strait of Georgia
9A	Western portion	24.81	Abuts Drainage 7	Slope	0	0.7 mi.	Drainage 7 to Stream 1 to Strait of Georgia
10A	Southwest corner	3.73	Abuts Drainage 4	Slope	0	0.6 mi.	Infiltrates to groundwater
10B	Southwest corner	0.04	Isolated	Depressional	N.A.	450 ft.	Infiltrates to groundwater
11A	Southern portion	3.54	Abuts Stream 1	Riverine	0	450 ft.	Stream 1, to Strait of Georgia
11B	Southern portion	.003	Isolated	Depressional	250 ft.	550 ft.	Infiltrates to groundwater
12	Southern portion	11.17	Abuts Stream 2 and Strait of Georgia	Depressional	N.A.	0	Stream 2 to Strait of Georgia and directly to Strait of Georgia
13A	Southern portion	5.50	Abuts Stream 2	Riverine	0	0.4	Stream 2 to Strait of Georgia
13C	Southern portion	0.02	Isolated	Depressional	125 ft.	0.4 mi.	Infiltrates to groundwater
13D	Southern portion	0.37	Isolated	Slope	200 ft.	0.4 mi.	Infiltrates to groundwater
13E	Southern portion	0.06	Abuts Stream 2	Riverine	0	0.4 mi.	Stream 2 to Strait of Georgia
13F	Southern portion	0.62	Abuts Strait of Georgia	Depressional	N.A.	0	Strait of Georgia
13G	Southern portion	0.37	Abuts Strait of Georgia	Depressional	N.A.	140 ft.	Strait of Georgia
14	Southwest portion	0.67	Abuts Drainage 3	Depressional	15 ft.	0.5 mi.	Drainage 3 to Stream 1 to Strait of Georgia

3.4.3 Stream and Ditch Water Quality

Surface water quality within the project area is affected by sheet-flow runoff from roads to adjacent open ditches. The extent of both roadway area and traffic volume is relatively low in this area. Water quality is degraded during periodic roadside ditch maintenance. Vegetation mowing in and adjacent to the ditches occurs on a 1- to 2-year cycle, and ditch cleaning on about a 5-year cycle (currently). Trash is almost always observed in ditches. Water quality is also affected by grazing in the active pasture areas.

3.4.4 Habitat Functions

According to the *Washington State Wetlands Rating System for Western Washington* (Hruby 2004), wetlands at the Terminal project site provide moderate to high habitat functions. With the exception of Wetland 4F, all wetlands on site scored 10 or higher for habitat functions, and 10 wetlands scored 20 or higher (Wetlands 2, 3, 5A, 7A, 8A, 9A, 11A, 13A, and 13E). Wetland 11A provides the highest habitat functions and coincides with WDFW and Whatcom County priority riparian habitats along Stream 1. Large forested wetlands with multiple vegetation layers provide numerous habitat niches for a variety of species.

However, adjacent roads and land uses inhibit undisturbed corridors and connections to other habitats and reduce the ability of wetland buffers to provide habitat functions. Forest habitat is generally homogenous across the site as the forests are dominated by similarly aged stands of secondary-growth red alder, with low plant diversity and few conifers.

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4.0 POTENTIAL IMPACTS AND FUNCTIONAL ASSESSMENT

Consistent with the federal Compensatory Mitigation Rule mitigation sequence, impacts to wetlands, streams, and ditches have been avoided and minimized to the extent practicable, while maintaining the ability and area to develop and operate a Terminal. Development of the Terminal would result in direct permanent impacts to 147.5 acres of wetlands (Figure 5) and 14,932 linear feet of streams and ditches (Figure 6). Temporary impacts are estimated to include 11.2 acres of wetlands and 3,399 linear feet of streams and ditches. Indirect impacts to wetland and streams are also

4.1 HOW IMPACT ASSESSMENT WAS PERFORMED

Impacts to aquatic systems need to be evaluated within a landscape context and that context is most appropriately defined as the watershed. Evaluation of the area of potential effects on aquatic features in the project area was performed using GIS analysis.

Considerations for analysis were as follows:

- Unavoidable direct areal effects were defined as those areas to be graded or permanently disturbed.
- Potential temporary effects were defined as areas disturbed by project construction that could be restored in the same growing season, including a 15-foot setback from proposed site features and rail embankments.
- Potential indirect effects from construction and operation of the Terminal were evaluated to be those effects that result in adverse conditions on aquatic resources lower in the watershed.

Base maps showing the locations of existing aquatic features were overlain with detailed drawings of the proposed development. Cut/fill lines for the rail embankments were used as the effects area limit, as well as the grading limits for proposed structures and facilities.

To evaluate temporary direct effects, a 15-foot offset beyond all direct effect limits was assumed. Temporary impacts were defined as those areas that are expected to incur disturbance, usually vegetation removal, followed by active restoration. The evaluation of indirect effects includes consideration of actions or activities that—while they do not directly alter the aquatic feature —may still result in negative changes to aquatic functions. Examples of indirect effects include changes in the quality of wildlife habitat from construction and operation noise, light, and human presence; changes in water quality, hydroperiods, or hydraulic functioning; alterations in habitat quality through changes in plant diversity or structure; and facilitation of invasive species establishment. These indirect effects are connected to five watershed processes that play key roles:

- Water
- Sediment
- Phosphorus and toxins
- Pathogens
- LWD (Stanley et al. 2005)

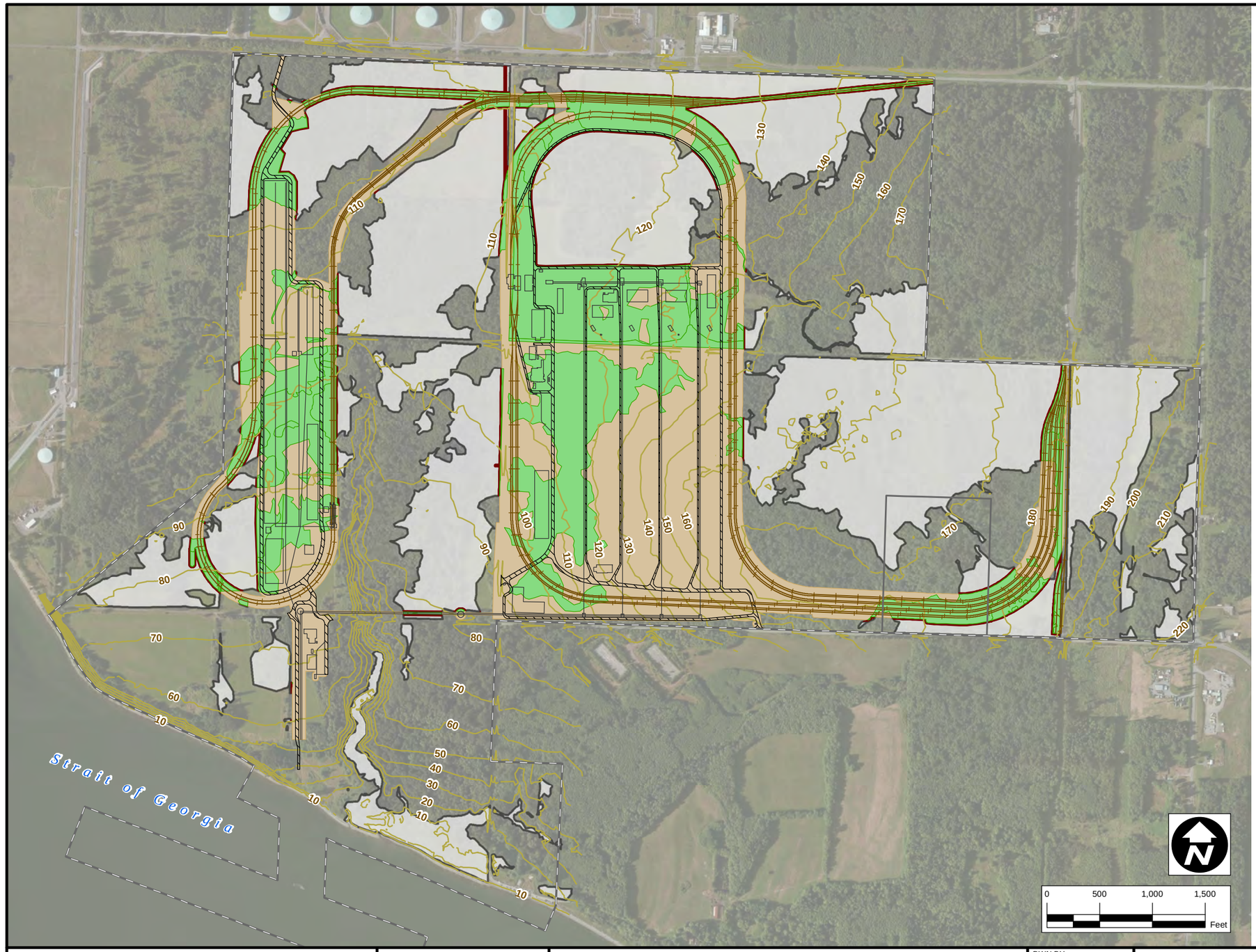
Wetland and stream areal impacts result in changes to functions. Wetland functions have been evaluated and reported (AMEC 2008), and stream functions are reported for the first time here.

Functional Assessment Units in the project area were determined previously (AMEC 2008) using the methodology first outlined by Ecology in 1999 (Hruby, Granger, et al. 1999) and refined over the years to become the preferred method for assessing wetland function and rating (Hruby 2004). Watershed level assessment of hydraulic relationships between groundwater and surface water and flow volumes from existing assessment units is currently reported in the *Hydrologic and Hydrogeologic Investigation Report* (AMEC In Preparation). Surface connectivity for the entire drainage has been outlined (AMEC 2008) and presented here where needed for clarity.

Because of the difficulty and cost of measuring wetland functions in absolute terms, models of wetland function are routinely accepted as surrogates to measurements. The *Washington Wetland Rating System* provides a set of scores for describing water quality, hydrologic and habitat functions as one index for estimating the level of function (Hruby 2004). Because no other system provides as much ease of use or uniform understanding, these scores appear to work as a tool to provide information on impact to functions.

A focus sheet published in March 2008 (Shorelands and Environmental Assistance 2008) provided information on why the *Washington Wetland Rating System* was inadequate due to some major constraints for this use when used alone. Ecology has proposed a method for calculating credit and debits (Hruby 2010) that uses the Washington Wetland Rating System and extends it to provide the missing information. This methodology is currently in development.

Smith, et al. (1995) defined sustainable wetlands and landscapes as occurring when “structural components and physical, chemical, and biological processes in the wetland and surrounding landscape reach the dynamic equilibrium necessary to achieve the highest sustainable functional capacity.”



LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- RAILROAD

WETLAND IMPACT AREA (158.72 acres):

- PERMANENT (147.47 acres)
- TEMPORARY (11.25 acres)
- PROPOSED ROADWAY
- DEVELOPMENT FOOTPRINT
- EXISTING WETLAND AREA
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

Source:
Ausenco Sandwell, 143166-A100-WC001-1.dwg (Rev. P1), 12/22/2011.
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

Pacific International Terminals
A Cermix Enterprise

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway N
Bothell, WA 98011

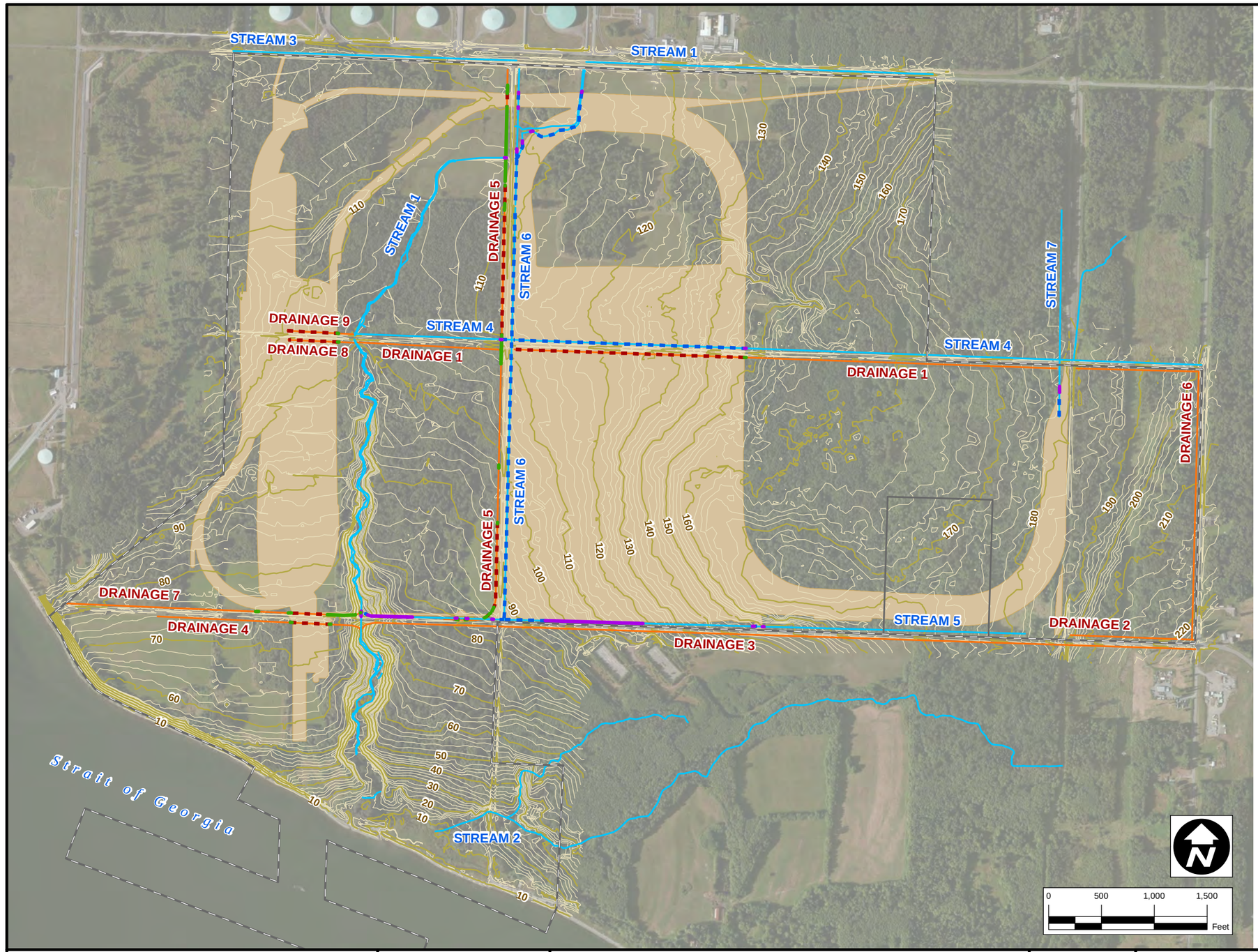
DWN BY: SD
CHK'D BY: JG
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: 1 inch = 1,000 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
SUMMARY OF DIRECT FILL IMPACTS
TO WETLANDS WITHIN THE
GATEWAY PACIFIC TERMINAL PROJECT SITE

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE 5

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure 5 - Summary of Direct Fill Impacts to Wetlands.mxd



LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- DRAINAGE
- STREAM

STREAMS AND DRAINAGES IMPACT (18,331 linear feet)

PERMANENT IMPACT (14,932 linear feet):

- DRAINAGE (6,221 linear feet)
- STREAM (8,711 linear feet)

TEMPORARY IMPACT (3,399 linear feet):

- DRAINAGE (1,712 linear feet)
- STREAM (1,687 linear feet)
- DEVELOPMENT FOOTPRINT
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

NOTE: Streams regulated by WDFW under the Hydraulic Code (RCW 77.55 and WAC 220-110): Stream 1 (Reaches 1, 2, and 3), 2, 4, 6 & 7.

Streams regulated by Whatcom County per Critical Areas Ordinance Maps: Streams 1, 2, 3, 4, 5, 6, and 7 .

Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

Pacific International Terminals
A Cermix Enterprise

CLIENT:
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AMEC
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amec

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

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
DIRECT FILL IMPACTS TO STREAMS AND DRAINAGES WITHIN THE GATEWAY PACIFIC TERMINAL PROJECT SITE

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE 6

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure 6 - Direct Fill Impacts to Streams and Drainages.mxd

Some functional changes are easily indexed using the impact area weighted by an index of the function. However, the magnitude and thus the needed compensation for indirect effects are often harder to quantify. For these we qualitatively estimated the level of effect as low, moderate, or high based on the existing level of the resource, the potential effect and the ability for the effect to be mitigated.

4.2 TIMING OF IMPACTS

The proposed Terminal would be built in two stages over 4 years; thus, some impacts would occur approximately 2 years later than others. Two years of construction are assumed to be needed to develop the shared services area, the East Loop rail, and the entire infrastructure for the East Loop area (Figure 2). Stage 2 is scheduled to begin once Stage 1 construction is complete, and would develop the West loop rail and the infrastructure to service this area.

4.3 DIRECT WETLAND IMPACTS

4.3.1 Permanent

Direct permanent wetland impacts are expected to total approximately 147.5 acres (Table 13). See Figure 5 for locations of these impacts. Impacts would be the result of earth moving to establish grades suitable for development, and would include both filling and grading or cutting.

4.3.2 Temporary Impacts

Temporary impacts are those transient effects that are expected to be restored within the same growing season as the impacts would occur. Impacts that were anticipated to occur for longer durations were not considered as temporary, and included under permanent effects. Temporary direct effects to wetlands and streams would occur during construction and would result from removal of wetland and/or riparian vegetation and soil disturbance. Temporary impacts were defined to occur in a zone that extends 15 feet in width beyond the outer edge of the permanent infrastructure. Temporary vegetation removal would be needed to place construction and silt fencing that defines the limits of construction, and to provide an area of maneuver for earth moving and other machinery. Temporary disturbance would also result in areas where trenching would be required through wetland areas for the installation of water and electrical utilities.

Invasive plant species are dominant in some locations within the project area. Extensive Himalayan blackberry hedges occur in abandoned hayfields and along roadsides and reed canarygrass occupies areas along utility corridors, roadsides, and some areas of abandoned pastures and hayfields. Vegetation disturbance during construction can result in recolonization or expansion of unwanted plant species such as reed canarygrass or Himalayan blackberry. Appropriate site preparation followed by planting and good maintenance will be needed to reduce this risk from these species.

Table 13 Direct Permanent Wetland Impacts

Wetland ID	Category[2]	Wetland Vegetation Community[1] (acre)			Total (acre)
		PEM	PFO	PSS	
1	III	0.5	7.2	0	7.7
2	III	1.0	1.8	0.2	3.0
3	III	38.6	9.4	7.0	55.0
5A	III	2.4	8.7	2.9	14.1
5B	III	0	0.1	0	0.1
6	III	0	36.9	0	36.9
7A	III	0	0.4	<0.1	0.4
8A	III	5.7	5.5	9.5	20.7
8B	III	<0.1	0	0.1	0.2
9A	III	5.1	1.9	2.2	9.2
9C	IV	0.1	0	0	0.1
10A	III	0	<0.1	0	<0.1
Total		**53.5**	**72.0**	**22.0**	**147.5[3]**

1 Cowardin, et al. (1979). PEM = Palustrine Emergent, PSS = Palustrine scrub-shrub; PFO= Palustrine Forested

2 Hruby (2004)

3 Total impacts calculated by rounding the GIS-produced final/total number to the tenths.

Following construction, soil in these areas would be re-graded to the natural topography and the areas would be replanted with appropriate native forest and shrub wetland vegetation. Temporal losses would be accounted for with permanent impacts compensation. Areas that are now hayfields or pastures would be restored to forested vegetation following temporary impacts.

A summary of the temporary direct impacts to wetland by vegetation type is provided in Table 14.

Table 14 Direct Temporary Wetland Impacts

Wetland ID	Wetland Vegetation Community[1] (acre)			
	PEM	PFO	PSS	Total
1	0.4	1.6	0	2.0
2	0.7	0.3	0.1	1.2
3	2.6	1.3	0.3	4.2
5A	0.2	1.0	0.4	1.6
7A	0	0.6	0.1	0.7
8A	0.1	0.5	0.1	0.7
9A	0.3	0.4	0.2	0.9
9C	<0.1	0	0	<0.1
10A	<0.1	<0.1	<0.1	<0.1
Total	**4.2**	**5.5**	**1.2**	**11.3[2]**

1 Cowardin, et al. (1979). PEM = Palustrine Emergent, PSS = Palustrine scrub-shrub; PFO= Palustrine Forested

2 Total impacts calculated by rounding the GIS-produced final number to the tenths

4.4 DIRECT STREAMS AND DITCH IMPACTS

4.4.1 Permanent

Gateway Pacific Terminal development would permanently affect 14,932 linear feet of streams and drainages at the project area. Impacts would primarily be to roadside streams and roadside ditches. Table 15 describes the location of impacts by stream or reach as well as the mitigation strategy for each. See Figure 6 for locations of these impacts.

4.4.2 Temporary Stream and Ditch Impacts

Temporary impacts to streams and ditches would occur as a result of construction of the Gateway Pacific Terminal. We estimated these effects would occur in a zone 15 feet in width beyond the outer edge of the permanent infrastructure. Temporary impacts would be restored within the same growing season they occurred. Temporary impacts anticipated to have longer durations were included under permanent impacts. Removal of riparian vegetation (where present), soil disturbance, and temporary water diversion would be the source of the impacts. Vegetation removal would be needed to place construction and silt fencing that defines the limits of construction and to provide an area of maneuver for earth moving and other machinery, and to provide access for rerouting of stream flows where necessary.

Temporary impacts to streams would be for maneuvering and water management during construction. Where necessary, water in streams and ditches would be temporarily piped in-place during construction, or temporarily rerouted or bypassed to natural channels or wetlands. Temporary disturbance would also result in areas where trenching would be required under streams and drainages for the installation of water and electrical utilities. Temporary erosion and sediment control measures would be implemented to maintain water quality during temporary impacts to streams and drainages during and after construction.

Table 15 Impacts to Gateway Pacific Terminal Streams and Drainages

Stream/Drainage – Impact Location	Development Stage/Location	Impact Description/Flow Routing	Impact (linear feet)	Estimated Area of Fill (sq. ft.)[1]
Stream 1 – Reach 4 in active pasture (Wetland 3)	Stage 1/ East Loop and portion of West Loop	Stream would be piped under West Loop rail embankment and relocated in a natural stream channel.	970	3,880
Stream 4 – West-flowing roadside ditch on north side of Lonseth Road	Stage 1/East Loop	Rail embankment and interior of East Loop; flows rerouted starting from upstream location into historic channel. Stream to be routed under rail embankment.	2,297	9,188
Drainage 1 – West-flowing ditch on south side of Lonseth Road.	Stage 1/East Loop	Rail embankment and interior of East Loop; flows rerouted starting from upstream location into historic channel (same as Stream 4).	2,179	8,716
Stream 5 – West-flowing roadside ditch on north side of Henry Road	Stage 1/East Loop	Western portion piped in same location. Eastern portion flows relocated to accommodate infrastructure.	693	2,772
Stream 6 – South-flowing roadside ditch on east side of Powder Plant Road	Stage 1/East Loop	Fill for rail embankment. Flow routed into wetlands, relocated Stream 1, or existing Stream 5.	4,520	18,080
Stream 7 – North flowing railroad ditch on west side of BNSF rail	Stage 1/East Loop	Fill for rail embankment; flow routed in Stream 4	230	920
Drainage 5 – South-flowing roadside ditch on west side of Powder Plant Road	Stage 1/East Loop	Fill for rail embankment. Flows rerouted to adjacent wetland.	2,364	9,456
Drainage 7 – East-flowing roadside ditch on north side of Henry Road, West of Stream 1	Stage 2/West Loop	Culvert under rail embankment; western portion restored to wetland when roadbed removed.	391	1,564
Drainage 4 – East-flowing roadside ditch on south side of Henry Road, west of Stream 1	Stage 2/West Loop	Culvert under rail embankment (same as Drainage 7); western portion restored to wetland when roadbed removed.	349	1,396
Drainage 8 – East-flowing roadside ditch on south side of Lonseth Road	Stage 2/West Loop	Filled for rail bed, eastern portion restored to wetland when roadbed removed.	467	1,868
Drainage 9 – East-flowing roadside ditch on north side of Lonseth Road	Stage 2/West Loop	Filled for rail bed(same as Drainage 8), eastern portion restored to wetland when roadbed removed.	472	1,888
Total			**14,932**	**59,728**

1 Roadside streams and drainages estimated to be a standard 4 feet wide.

Table 16 describes the locations and area for direct temporary impacts for streams and drainages.

Table 16 Temporary Impacts to Gateway Pacific Terminal Streams and Drainages

Stream/Drainage – Impact Location	Development Stage/Location	Impact (linear feet)	Estimated Area of Fill (sq. ft.)[1]
Stream 1 – Reach 3 in Wetland 3	Stage 1/ West Loop	109	436
Stream 4 – West-flowing roadside ditch on north side of Lonseth Road	Stage 1/ East Loop	30	120
Stream 5 – West-flowing roadside ditch on north side of Henry Road	Stage 1/ East Loop and West Loop	1,430	5,720
Stream 6 – South-flowing roadside ditch on east side of Powder Plant Road	Stage 1/ East Loop	60	240
Stream 7 – North-flowing rail side ditch on west side of BNSF railroad	Stage 1/East Loop	57	228
Drainage 1 – West-flowing ditch on south side of Lonseth Road	Stage 1/ East Loop	19	76
Drainage 4 – East-flowing roadside ditch on south side of Henry Road, West of Stream 1	Stage 1/ West Loop	34	136
Drainage 5 – South-flowing roadside ditch on west side of Powder Plant Road	Stage 1/East Loop	1,300	5,200
Drainage 7 – East-flowing roadside ditch on north side of Henry Road, West of Stream 1	Stage 1/West Loop	329	1,316
Drainage 8 – East-flowing roadside ditch on south side of Lonseth Road	Stage 2/West Loop	15	60
Drainage 9 – East-flowing roadside ditch on north side of Lonseth Road	Stage 2/West Loop	15	60
Total		**3,399**	**13,596**

1 Roadside streams and drainages estimated to be a standard 4 feet wide.

4.5 DIRECT WETLAND BUFFER IMPACTS

Direct permanent and temporary impacts to wetland buffers are expected as a result of the proposed Terminal project. Direct permanent impacts to 48.6 acres of wetland buffers are anticipated, and 3.5 acres of wetland buffers will be temporarily impacted. See Figure 7 for locations of these impacts.

Permanent impacts would be the result of earth moving to establish grades suitable for development, and would include both filling and grading or cutting. Temporary impacts would be the result of construction staging and maneuvering to build the proposed infrastructure. Temporary impacts would be restored within the same growing season in which the impacts occurred.

4.6 CHANGES TO FUNCTIONS

As stated earlier, wetlands were mapped into Assessment Units (AUs) prior to assessing the existing level of functions, so the wetland number indicates the assessment unit in which the wetland resides. For many AUs there is only one large wetland; where there is more than one, wetland names included

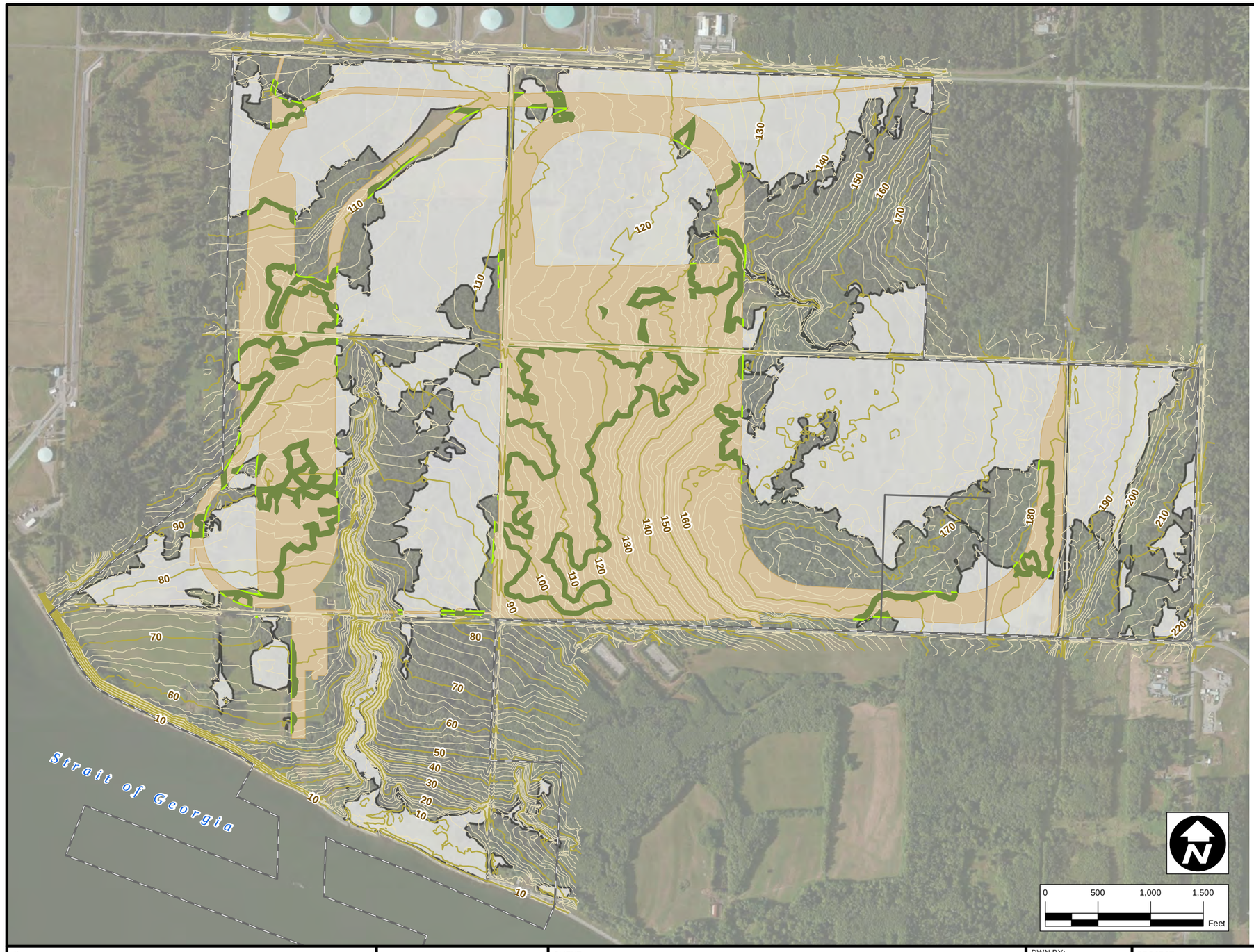
a letter. Changes to wetland functions were assessed using the *Washington State Wetlands Rating System for Western Washington* (Hruby 2004). Original wetland rating sheets can be found in the report *Wetland Determination and Delineation* (AMEC 2008).

Direct impacts would occur in 10 of the 14 assessment units in the project area. Direct effects to AUs 11, 12, 13, and 14 were completely avoided, while AUs 2, 4, and 7 had minor effects, and AUs 1, 3, 5, 8, 9 would be greatly reduced in area. Wetlands in AU 6 would be eliminated. Table 17 summarizes the functions currently provided by wetlands on the project site. These scores will assist in assessing changes to these functions to aid in the development of appropriate mitigation methods and actions to offset project effects.

Wetlands on the project site provide low to moderate water quality and hydrologic functions, and provide moderate to high habitat functions. Bird habitat would be reduced because of the loss of 72 acres of deciduous forested wetland. Large forested wetland areas with multiple vegetation layers provide numerous habitat niches for a variety of species. With the exception of Wetland 4F, all wetlands scored 10 or higher for habitat functions. The loss of wetland forest habitat would be partially offset by the enhancement of emergent wetlands in pastures or hay fields to forested wetlands 2 years in advance of some of the impacts. During the time that it takes for the establishment of these forested habitats, those species dependent on mature forest habitat could use mature forested areas on- and off-site.

The lack of open water or aquatic bed habitats, as well as the lack of conifer forest, limits the available habitat's productivity to support wildlife. Once the terminal was developed, wildlife corridors would be reduced. While roadways currently bisect the area, these are narrow compared to the adjacent open areas. The proposed rail loops would be wide, and cover two oval-shaped areas. The existing wildlife corridor along Stream 1's riparian area, from the shore to the vicinity of AU 2, would be retained. The corridor would be enhanced with additional wetland areas and removal of a road and culvert.

The following section describes additional impacts by assessment unit and grouped by construction stage, because construction is planned to occur over 4 years and impacts due to Stage 2 construction would occur starting approximately in Year 2. It is anticipated that all compensatory mitigation would be constructed within the first 2 years of development. Thus, compensatory mitigation would be provided in advance of impacts for Stage 2 construction areas.



LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- DEVELOPMENT FOOTPRINT

WETLAND BUFFERS IMPACT AREA (52.12 acres):

- PERMANENT (48.62 acres)
- TEMPORARY (3.50 acres)
- EXISTING WETLAND AREA
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

NOTE: The standard wetland buffers shown are based on Whatcom County Code 16.16.630.

Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

Pacific International Terminals
A Cermix Enterprise

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway N
Bothell, WA 98011

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

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
DIRECT FILL IMPACTS TO WHATCOM COUNTY WETLAND BUFFERS WITHIN THE GATEWAY PACIFIC TERMINAL PROJECT SITE

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE 7

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure 7 - Direct Fill Impacts to Whatcom County Streams and Wetlands Buffers.mxd

Table 17 Existing Water Quality, Hydrologic, and Habitat Functions Provided by Wetlands On-site

Ecological Function	Summary Of Impacted Wetland Functions	
	Score[1]	Characteristics
Water Quality	11	• Low to moderate functions • Majority of the wetlands are forested and have no defined outlet, enabling a moderate level of water detention • Depressional wetlands are limited by slope characteristics that lower ability to detain water; however low topographic gradient allows some water to be detained • Majority of highest scoring wetlands are some of the smallest on site, limiting their opportunity to slow and detain water • Lack of clay or organic soils • Large grazed wetland pastures with little to no ability to slow and detain water • Deep roadside streams and drainages that do not overflow to wetlands limit their opportunity to receive stormwater inputs from developed areas
Hydrologic	10	• Low to moderate functions • Wetlands are mostly flat and contain depressions to detain water • Wetlands are low in the watershed and occupy a very small portion of their contributing drainage basin • Majority of the wetlands do not receive storm or floodwater inputs • Highest-scoring wetlands are some of the smallest on site, limiting their opportunity to slow and detain water.
Habitat	18	• Moderate to high habitat functions • With the exception of Wetland 4F, all wetlands on site scored 10 or higher for habitat functions, and 10 wetlands scored 20 or higher • Adjacent roads and land uses inhibit undisturbed corridors and connections to other habitats and reduce the ability of wetland buffers to provide habitat functions • Large forested wetlands with multiple vegetation layers provide numerous habitat niches for a variety of species • Wetland 11A provides the highest habitat functions and coincides with WDFW and Whatcom County priority riparian habitats along Stream 1
Total (for ratings purposes)	39	Category III

1 Hruby (2004). Scores represent the mean of scores for all wetlands.

4.6.1 Stage 1 Construction Area

Stage 1 construction would result in impacts to approximately 101.1 acres of wetlands. Of these 101.1 acres, approximately 54.7 acres would be palustrine forested habitat, 9.7 acres would be palustrine scrub shrub habitat, and 36.7 acres would be palustrine emergent habitat. Under existing conditions, untreated stormwater flows from roadways, adjacent development, and agricultural areas to Stream 1, which ultimately drains to the Strait of Georgia. Wetland characteristics provide indicators of low to moderate hydrologic functions, mostly related to the ability to retain and infiltrate precipitation, but the

roadside ditches short-circuit much of the hydrologic interaction in this area. The few wetlands that receive stormwater runoff in addition to precipitation likely increase erosion and sediment protective functions in the landscape. These hydrologic functions would be reestablished through rerouting of flows and other landscape engineering.

Forested wetlands lack defined outlets; the vegetation and lack of outlets help to slow and retain precipitation. However, from a surface water standpoint, wetlands are poorly hydrologically connected to drainages in the landscape; therefore, their opportunity to protect downstream resources from flooding or erosion is limited to the water they receive from precipitation and retain and infiltrate.

Throughout the following discussion, refer to Figure 6 for locations of features and areas of impacts. Direct permanent impacts to wetlands are summarized in Table 18, which provides the total acreage of wetland in the assessment unit, as well as the estimated impact area.

AU 5 and 4 would be impacted by linear corridors for rail embankments. The new rail corridor would be located adjacent to an existing roadway and existing rail embankments, and portions of these areas are abandoned hayfields and mowed utility rights-of-way. There is generally less surface flow in this portion of the project area than in other portions. Most of AU 5 and AU 4 wetlands would be avoided.

Direct areal impacts at AUs 7 and 2 would be largely restricted to a linear section on the eastern margin of the area due to rail embankment, and the larger portions of the wetlands in the units would not be directly affected. AUs 7 and 2 are currently divided by a roadway that would be removed, and the hydrological connection restored between these two units. The culvert for Stream 1 would be removed along with the road prism. Other portions of these two AUs would include wetland creation and enhancement following construction.

AU 3 would be directly affected by the East Loop and infrastructure development (Table 18). The area of AU 3 located in the northern-most end of the rail loop is called the “hoop” of the East Loop (for discussion sake), and would be largely undeveloped for infrastructure. This area is approximately 50 acres, is currently pasture and contains a portion of the Stream 1 drainage in several small channels, as well as two constructed ditches. Without design consideration, development would reduce the area providing detention and potentially increase in-ditch or in-stream flows during high precipitation events. As part of mitigation, Drainage 1, Drainage 6, and Stream 4 will be re-located to a relic stream channel that will flow through this hoop area. Existing emergent wetlands to the north and south of proposed channel will be enhanced with tree species to improve habitat, water quality, and hydrologic functioning in this area.

Table 18 Stage 1 Construction Direct Permanent Wetland Impact Areas – Summarized by Vegetation Community Type

Wetland Assessment Unit[1]	Total Wetland Area in Assessment Unit (acres)	Impacts By Wetland Community Type[2]			Total Impact Area (acres)	% Wetland Loss Per Wetland Assessment Unit
		PEM[3]	PFO	PSS		
3	150.7	34.2	8.2	6.6	49.0	32.5
5	109.3	2.4	8.9	2.9	14.2	13.0
6	36.9	0.0	36.9	0.0	36.9	100.0
7	40.7	0.0	0.4	<0.1	0.4	1.0
10	4.8	0.0	<0.1	0.0	<0.1	<1.0
Total Stage 1		**36.7**	**54.7**	**9.7**	**101.1**[4]	

1 Areas of separate wetlands within an assessment unit are combined into a single total for the unit.

2 Cowardin, et al (1979) palustrine forested (PFO); palustrine emergent (PEM); palustrine scrub-shrub (PSS).

3 PEM areas are pastures.

4 Total Stage 1 impact area calculated from final GIS output for Stage 1, not the sum of individual AUs.

4.6.2 Stage 2 Construction Area

Table 19 provides a summary of Stage 2 development area impacts. As mentioned earlier, AU 1 appears to not drain to the Gateway Pacific Terminal watershed but towards Stream 3, and also does not currently have a functioning surface outlet. A combination of rail construction and mitigation would be anticipated to result in capture of surface flows from approximately half this unit (22 acres) into AU 2 at the completion of construction.

Table 19 Stage 2 Development Area Impacts and Summary of Both Construction Stages

Wetland Assessment Unit[1]	Total Wetland Area in Assessment Unit (acres)	Impacts By Wetland Community Type[2]			Total Impact Area (acres)	% Wetland Loss Per Wetland Assessment Unit
		PEM[3]	PFO	PSS		
1	44.2	0.5	7.2	0.0	7.7	17.4
2	53.2	1.0	1.8	0.2	3.0	5.6
3	150.7	4.3	1.3	0.4	6.0	4.0
8	24.9	5.7	5.5	9.6	20.8	83.5
9	28.3	5.2	1.9	2.2	9.3	41.3
Total Stage 2		**16.8**	**17.3**	**12.2**	**46.3**[4]	

1 Areas of separate wetlands within an assessment unit are combined into a single total for the unit.

2 Cowardin et al. (1979) palustrine forested (PFO); palustrine emergent (PEM); palustrine scrub-shrub (PSS).

3 PEM areas are hayfields in Stage 2 construction area.

4 Total Stage 2 impact area calculated from final GIS output for Stage 2, not the sum of individual AUs.

AUs 8 and 9 are hayfields or recently abandoned hayfields, and contain a variety of shrub and emergent habitats along with several unmaintained (unnumbered) agricultural ditches that drain to Stream 1's ravine. Following construction, hydrologic functions of areas not directly affected in these

areas is anticipated to be retained, while wildlife functions will be reduced. Agricultural ditches will be plugged and waters rerouted to the remaining wetlands. A wetland creation and enhancement area is planned for the area southwest of the West Loop, and would be designed to support hydrologic, as well as habitat functions.

4.6.3 Impacts by Watershed

Permanent direct impacts to 7.7 acres of wetlands in the Birch Bay Watershed would occur from development of the northern section of the west loop and related infrastructure. Direct impacts to 139.8 acres of wetlands in the Gateway Pacific Terminal watershed would occur from development of the east loop, remaining portion of the west loop, shared services area, and related infrastructure.

Temporary direct impacts to 2.0 acres in the Birch Bay Watershed would occur from development of the northern section of the west loop and related infrastructure. Temporary direct impacts to 9.3 acres of wetlands in the Gateway Pacific Terminal watershed would occur for the east loop, remaining portion of the west loop, shared services area, and related infrastructure. See Table 20.

Table 20 Permanent and Temporary Direct Impacts to Wetlands By Watershed

	Wetland Impacts (acres)	
Watershed	**Permanent**	**Temporary**
Birch Bay	7.7	2.0
Gateway Pacific Terminal	139.8	9.3
Total	**147.5**	**11.3**

4.7 INDIRECT EFFECTS

Indirect effects to wetlands, streams, and buffers occur when actions taken outside of the area have a downstream or other indirect negative consequence on the aquatic system. Indirect effects are sometimes transitory, such as occurring only during high flows, but can result in long-term degradation if causes are not addressed. Some indirect effects such as operation noise are difficult to completely mitigate onsite because of the nature of industrial operations. Indirect effects to wetlands, streams, drainages, and buffers have been identified in regards to hydrologic functions, habitat functions, and water quality functions. Additional indirect effects may result from inadvertent spills or fugitive dust. These potential indirect effects are qualitatively assessed in the following sections.

4.7.1 Indirect Effects to Hydrologic Functions

The risk of downstream flooding, scour, channel degradation, and loss of habitat would be mitigated through the use of appropriately-sized stormwater facilities that would replace hydrologic functions and avoid downstream effects from the alteration in upstream conditions.

One important aspect of a development's effect on downstream hydrologic systems is the amount of new impervious surface that occupies the watershed. Precipitation on impervious surfaces results in increased runoff.

Without effective controls on runoff from impervious surfaces, there could be a risk of degradation of downstream systems by increased peak runoff volumes and decreased baseflow delivered to streams. The Terminal design incorporates appropriate stormwater collection and retention/detention for all new impervious surfaces. These facilities will both treat and control the runoff.

4.7.2 Indirect Effects to Habitat Functions

Negative changes to habitat functioning is mainly the loss of connectivity to wetlands, streams, and buffers due to the construction of proposed infrastructure, railbeds, or other facilities that isolate these systems. Development of the Terminal would include consideration of habitat connectivity in order to reduce these indirect impacts to wildlife. These indirect impacts will be mitigated to the maximum extent possible onsite, and will be considered in any offsite mitigation so there is no net loss of wetland habitat functions in the local area.

4.7.3 Indirect Effects to Soil Conservation and Water Quality

Development of the Terminal would require a significant amount of excavation, filling, and grading to prepare the development footprint for construction of the Terminal facilities. Exposed soils are inherent in such a large construction project, and as such there is the potential for erosion of unstable or unprotected soils into wetlands, streams, and drainages, even with proper installation of recommended control systems.

Soil erosion into wetlands, streams, and drainages could negatively affect water quality and fish and amphibian habitat. Erosion would be controlled by carefully staging construction so that exposed areas are limited to the area of active work, and no exposed areas are left un-worked for long durations but rather are stabilized as soon as feasible. Other standard housekeeping requirements would be used as well, such as wheel washes.

4.7.4 Indirect Effects from Inadvertent Spills and Fugitive Dust

The Terminal would operate in a safe and environmentally protective manner. Design features have been incorporated into the facility to minimize risks, including production of fugitive dust, spillage, and tracking of commodities. Dust has the ability to coat vegetation, reducing efficiency of plant growth, or wash off or settle in open water areas, degrading water quality. Spillage and tracking create the risk that surfaces would become contaminated with a commodity, which would then be washed or blown into adjacent aquatic areas. Dust control and containment measures are extensive and located throughout the Terminal. They include enclosed wind screens, water or surfactant spray for open

stockpiles, negative air pressure unloading stations, enclosed storage for some commodities, covered/enclosed conveyors, and active dust control systems (sprays and fogging) on transfer points of conveyors and shiploaders, for example. Details regarding these design features are provided in the *Revised Project Information Document* (Pacific International Terminals, Inc. 2012).

Inadvertent spills of bulk commodities into wetlands, streams, and buffers are possible, and mitigation to reduce this risk has been taken. All of the Terminal's potential bulk commodities could have adverse impacts to wetlands, streams, and buffers should they inadvertently spill into these areas, specifically with respect to water quality and subsequently to habitat. The risk of spills would be mitigated through the development and active implementation of safety plans, including plans for spill control and countermeasures. Terminal employees would be trained to respond quickly and appropriately to minimize potential damage from spills.

5.0 MITIGATION SEQUENCING

Gateway Pacific Terminal's project area was first investigated in 1980s. The *Gateway Pacific Terminal Draft Environmental Impact Statement* (Whatcom County 1996) discussed two potential project layout alternatives and stated that other layouts had been considered but withdrawn due to environmental considerations.

The Terminal's currently proposed layout, with two independently functioning rail loops, would best meet the project's purpose and need, while providing a safe, efficient, and sustainable operation. The proposed project avoids and minimizes impacts to wetlands, streams, and ditches to the extent possible, rectifies temporary impacts wherever possible, and provides compensation for minimized, unavoidable negative effects to wetland streams, ditch areas, and their functions, all consistent with federal and state regulatory requirements and guidance.

Mitigation was developed following the latest guidance and information available, including the following:

- Guidelines for Developing Freshwater Mitigation Plans and Proposals (Hruby and Brower 1994)
- Restoring Wetlands in Washington: A Guidebook for Wetland Restoration, Planning, & Implementation (Stevens and Vanbianchi 1993)
- Washington State Wetland Mitigation Evaluation Study (Johnson and Mock 2000; Johnson et al. 2002)
- Selecting Mitigation Sites Using a Watershed Approach (Hruby, Harper, and Stanley 2009)
- Compensatory Mitigation for Losses of Aquatic Resources (Federal Register 2008)
- Making Mitigation Work: The Report of the Mitigation That Works Forum (Ecology 2008)
- Wetland Mitigation In Washington State – Parts 1 and 2 (Ecology 2006)

5.1 AVOIDANCE

Adverse aquatic impacts have been avoided to the extent practicable with the current project design. Impacts to the nearshore area have been avoided by placing all project infrastructure (materials handling, commodity storage and rail facilities) away from the nearshore, except for the trestle which must cross the nearshore to connect with the wharf. The project does not require marine dredging for construction, operation, or maintenance of the wharf.

Project design alternatives have included crossing the Stream 1 ravine with the rail siding, which would have likely required filling for construction of the embankment within the ravine. Operation of trains across the ravine may have resulted in other indirect impacts. The direct and indirect effects of a train crossing of the Stream 1 ravine have been avoided with the current layout.

Other designs created significantly more wetland and stream impacts, in some cases up to 180 acres of direct wetland impacts. To avoid aquatic areas, Terminal infrastructure was repositioned to be more densely developed, leaving large areas of the property undisturbed. As stated earlier, priority wildlife habitats are present in the project area and were avoided to the extent possible to protect these areas. The current design completely avoids the direct effects to the highest functioning wetland and stream systems in the project area. Approximately 391 acres of wetlands will be avoided by the revised plans for development of the Terminal.

The proposed project site layout and project facilities footprint avoids direct impacts at:

- Reaches 1, 2, 3, and 5 of Stream 1,
- All reaches of Stream 2,
- All areas of Category I Wetlands (11A, 12, 13A, and 13E), and
- Category III Wetlands 4A, 4B, 4C, 4D, 4E, 4F, 7B, 10B, 13C, 13D, 13F, 13G, and 14.

Terminal infrastructure has been located as far from these sensitive and priority habitat areas as feasibly possible and still meet the project's operational requirements and purpose and need.

5.2 MINIMIZATION

For those impacts that cannot be avoided, appropriate and practicable measures to minimize impacts to wetlands, streams, and ditches and priority habitats have been taken, including:

- Rail lines were aligned to minimize impacts to wetlands, streams, and drainages while maintaining the length and turning radius required for trains to enter and exit the site safely and efficiently.
- Storage areas were grouped inside rail loops. This has concentrated development on the site within defined areas.
- Facilities shifted away from the shoreline (compared to the 1996/1997 design) which allows for preservation and improvement of the critical areas proximate to shoreline priority habitats.
- The shared services area was relocated to the east side of the conveyor to minimize impacts to Wetland 10A.

- Grading and cut/fill limits have been minimized to the maximum extent practicable to still support the proposed infrastructure.
- Extra consideration given to preserving watershed functions, especially functions that protect downstream functions of Stream 1. Potential effects to hydrology and water quality have been minimized through the careful design of stormwater facilities that provide water quality protection and integrate hydrologic functions with the natural stream.
- Development of Terminal infrastructure in a single construction period, which avoids repeated disturbances to areas over time.
- Temporary construction impacts were minimized by locating construction lay down and staging in areas that will be ultimately be developed, using high visibility fencing to locate construction limits, and designing and enforcing an effective construction stormwater plan.
- By performing all mitigation within the first two years of construction, compensation for some impacts will be provided in advance of actual impacts. For those areas not yet impacted, this will reduce the duration of temporal loss.

The Terminal was designed to avoid and minimize impacts to wetlands and streams to the extent practicable. Development impacts to wetlands, streams, and drainages would be expected to result in water quality impacts if development was poorly controlled within the watershed. However, the degradation of water quality is not anticipated because the Terminal development would result in:

- Removing animal grazing from over 100 acres,
- Providing effective stormwater treatment systems to new development, and
- Rerouting streams and drainages to the extent possible into new or restored natural stream systems to improve water quality functioning.

No grazing would remain in the project area following construction. Some of the currently grazed acres would be permanently affected by Terminal development, but approximately 58 acres of wet pasture would be enhanced from emergent pasture to forested wetland, and a portion would be re-graded to create wetlands.

Impacts to hydrologic functions are minimized through engineering of the Terminal to integrate hydrologic and water quality systems and a mitigation design that works to maintain and improve this important function.

5.3 RECTIFICATION/RESTORATION/ENHANCEMENT

Areas temporarily affected by vegetation removal during construction will be restored. This will reestablish wetland functions and improve functions in areas currently disturbed by haying or pasturage. As just mentioned, some areas of current pasture or hayfields would be restored to have more complete functions including hydrologic, water quality and habitat functions.

Wetland enhancement of existing wetland areas will involve site preparation, vegetation plantings including shrub and forest vegetation to increase the number and interspersion of Cowardin classes, vegetation structure, and the overall number of species. Enhancement will also consist of invasive species control to ensure success and further increase the wetland habitat functions. Some minor grading is envisioned in limited enhancement areas to increase the diversity and duration of inundation.

6.0 COMPENSATION

Compensatory mitigation for unavoidable, minimized impacts to wetlands, buffers, streams, and drainages is proposed. The compensatory mitigation strategy was developed using a watershed approach, where compensation is designed within a holistic framework, and which addresses first the highest needs for the watershed when viewed as a connected, interactive aquatic ecosystem from its headwater wetlands to the Strait of Georgia. The goal of a watershed approach is to maintain and improve the quality and quantity of aquatic resources in a watershed through strategic selection of mitigation sites.

The compensatory mitigation strategy for impacts to wetlands and streams was developed using a watershed approach as prescribed in the *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule* (DOD and U.S. EPA 2008). This regulation directs the Agencies to evaluate mitigation strategies with consideration for the location of compensation sites that is driven by an assessment of watershed needs, and addresses how specific wetland restoration projects can best meet those needs. In the rule, Agencies are directed to evaluate proposed compensatory mitigation in light of watershed analysis, considering landscape position and sustainability, ability to provide a suite of functions, and ensuring that the level of analysis is commensurate with impacts. Whatcom County includes similar mitigation plan requirements at WCC 16.16.260(B) and 16.16.690(B).

Federal guidance outlines three acceptable mechanisms for providing compensatory mitigation:

- on- and off-site permittee-responsible mitigation;
- mitigation banking; and
- in-lieu fee mitigation.

The federal guidance recommends using mitigation bank credits and in-lieu fee credits in preference to permittee-responsible mitigation when such credits are available. Currently, only one potential source of mitigation bank credits services the project area. While in-lieu fee credits may be available in the future, there is no existing in-lieu fee program for the area at this time. Therefore, the following describes a permittee-responsible approach for the Gateway Pacific Terminal for on-site and off-site compensation.

The proposed permittee-responsible compensatory mitigation would consist of wetland creation and enhancement, riparian enhancement, stream relocation, fish passage improvements, forest preservation, forest enhancement, buffer creation and enhancement, and stormwater quality and quantity control. On-site and off-site compensatory mitigation sites have been selected to offset

unavoidable impacts to wetlands, streams, drainages, and buffers in both the Birch Bay and Gateway Pacific Terminal watersheds.

Whatcom County code regulates compensation ratios for impacts (Table 21).

Table 21 Area of Compensatory Mitigation Required for Category III Wetland Impacts

Mitigation Type	Compensation Area Needed for One Acre of Impact
Creation	2:1
Rehabilitation	4:1
Enhancement	8:1
Preservation (Category I and II only)	20:1

Whatcom County Code (16.16.680)

Unavoidable minimized impacts to wetlands, streams, and ditches would be compensated by:

- Creating wetland areas to provide no-net loss of wetland area in the watershed,
- Providing replacement hydrologic and water quality functions high in the watershed,
- Rehabilitating/restoring degraded wetlands wherever feasible to provide additional hydrologic, water quality and habitat functions, and
- Rerouting streams and ditches to increase riparian and in-stream functions.

6.1 COMPENSATORY MITIGATION SITE SELECTION

Site selection for compensation focused on both the Gateway Pacific Terminal and Birch Bay watersheds. Mitigation concentrated on providing areal, as well as hydrologic, water quality, and habitat functions in locations as close as possible to impacts to provide stability to watershed processes. Compensatory actions need to be located and designed in a manner that allows them to be self-sustaining in the landscape indefinitely once established.

Because Pacific International Terminals owns almost all of a single watershed, this provided a unique opportunity to take a recovering, moderately-functioning watershed area, and, while developing it in part, actively working to provide the adequate and appropriate compensation so that there is no net loss in overall watershed function as a result of development. Once the Terminal design footprint was finalized, areas within the watershed were evaluated to identify opportunities and constraints, suitability, and feasibility of mitigation opportunities.

Within the project area, areas were identified that met one or more of the following criteria:

- Areas that were not wetland but have the potential to support created wetland.
- The location for wetland creation was adjacent to—and has high potential—to complement existing wetlands.
- The location for wetland creation would, as fully as possible, re-create or even improve hydrologic functions.
- Areas of wetland where one or more wetland functions and values have been eliminated by prior human activity and could be restored to their previous type, size, and vigor.
- Areas where wetland functions and values had been severely degraded by prior human activity and could be enhanced to their previous type, size, and vigor.
- Areas where hydrologic functions and linkages between streams and wetlands could be created or enhanced.
- Areas where development, management, and maintenance could appropriately enhance one or more existing wetland function, such as wildlife cover or water quality enhancement.

The likelihood of successful compensation—including wetland and stream creation, enhancement and restoration—is high for these locations for the following reasons:

- The Property is owned by Pacific International Terminals and the project will place conservation easements or other legal protections on the areas to ensure long-term protection of the areas.
- The sites were selected using a watershed approach.
- The proposed strategy proposes to reestablish some of the ecological conditions and functions that were historically provided at or near the site.

To further analyze opportunities for compensatory mitigation at more specific locations, detailed information was gathered to identify potentially suitable areas on site. The selection criteria used to determine if a location would be suitable for compensatory mitigation included:

- Proximity to the area of proposed impacts;
- Total area available for compensatory mitigation;
- Level of current ecological function especially in regards to priority habitats;
- Suitability of topography, hydrology, and soils;

- Connectivity to other aquatic and terrestrial habitats, especially to Streams 1 and 2;
- Ability to provide protection of critical habitats or other functions; and
- Potential for future sustained success, including avoiding disturbance.

Of the areas identified, 8 areas on-site were selected for conceptual design and analyses (Compensatory Mitigation Areas A through H, locations shown in Figure 8, and described in further detail in Appendices A through H). The areas were selected because they offer the most comprehensive opportunity to provide contiguous, high-functioning wetland and stream systems. Appendices A through H provide conceptual level details for each of these areas.

In addition, one off-site mitigation area was selected for conceptual design and analysis (Mitigation Area I). This site was identified as the only off-site parcel in the Gateway Pacific Terminal Watershed suitable for wetland mitigation activities to offset project impacts. Tables 22 and 23 provide a summary of on-site and off-site compensatory mitigation by construction stage.

Table 22 Direct Permanent Wetland Impacts and Mitigation

Activity	Wetland Name	Wetland Type and Rating Category	Permanent Impact Wetland Community Type (acres)			Total Permanent Impact Area (acres)	Proposed Mitigation Type[1]	Wetland Mitigation Area (acres)[2]
			PSS	PFO	PEM			
Clearing, grading, excavation, filling for East Loop and Shared Services Area	3	III	6.6	8.2	34.2	49.0	(C),(E)	Creation: Mitigation Areas A, B, C, D, E, F, G, H, I = 154.2 acres; Enhancement: Wetlands 1, 2, 3, 7A, 7B, 10A, 10B, 13C, 13E, 13F, 13G = 145.7 acres; Total compensation area = 299.9 acres
	5A	III	2.9	8.7	2.4	14.1	(C)	
	5B	III	0.0	0.1	0.0	0.1	(C)	
	6	III	0.0	36.9	0.0	36.9	(C)	
	7A	III	<0.1	0.4	0.0	0.4	(C),(E)	
	10A	III	0.0	<0.1	0.0	<0.1	(C),(E)	
	Stage 1 Construction Total Impacts =101.1 acres							
Clearing, grading, excavation, filling for West Loop	1	III	0.0	7.2	0.5	7.7	(C),(E)	
	2	III	0.2	1.8	1.0	3.0	(C),(E)	
	3	III	0.4	1.3	4.3	6.0	(C),(E)	
	8A	III	9.5	5.5	5.7	20.7	(C)	
	8B	III	0.1	0.0	<0.1	0.2	(C)	
	9A	III	2.2	1.9	5.1	9.2	(C),(E)	
	9C	IV	0.0	0.0	0.1	0.1	(C)	
	Stage 2 Construction Total Impacts = 46.3 acres							

1 Creation (C), Enhancement (E)

2 All Mitigation Areas are anticipated to be rated as Category II wetlands within 15 years after construction.

LEGEND

- PROPOSED RIPARIAN PLANTING
- PROPOSED STREAM RESTORATION
- PROPOSED WETLAND ENHANCEMENT AREA (approx. 145.7 acres)
- PROPOSED WETLAND CREATION AREA (approx. 154.2 acres)
- EXISTING WETLAND AREA
- DEVELOPMENT FOOTPRINT
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY

Source:
Ausenco Sandwell, 143166-A100-WC001-1.dwg (Rev. P1), 12/22/2011.

Pacific International Terminals
A Cairnix Enterprise

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway N
Bothell, WA 98011

amec

DWN BY:	SD
CHK'D BY:	JG
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	1 inch = 1,125 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
PROPOSED MITIGATION AREAS

DATE:	MARCH 2012
PROJECT NO.:	091515338C-01-03
REV. NO.:	-
FIGURE NO.:	FIGURE 8

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure 8 - Proposed Mitigation Areas.mxd

Table 23 Direct Permanent Stream and Drainage Impacts and Mitigation

Activity	Stream/ Drainage Name	WDFW Jurisdiction	Total Permanent Impact Length (linear feet)	Total Permanent Impact Area (square feet) [1]	Stream/Drainage Mitigation Area (acres)
Clearing, grading, excavation, filling for East Loop and Shared Services Area	Stream 1	Yes	970	3,880	Stream Restoration/Relocation in Mitigation Areas A, F, H and I: 15,305 linear feet (6.8 acres); Riparian Enhancement in Mitigation Areas H and I: 13.7 acres;
	4	Yes	2,297	9,188	
	5	No	693	2,772	
	6	Yes	4,520	18,080	
	7	Yes	230	920	
	Drainage 1	No	2,179	8,716	
	5	No	2,364	9,456	
	8	No	467	1,868	
	9	No	472	1,888	
	Stage 1 Construction Total Impacts =14,192 LF (56,768 SF)				
Clearing, grading, excavation, filling for West Loop	Drainage 4	No	349	1,396	
	7	No	391	1,564	
	Stage 2 Construction Total Impacts = 740 LF (2,960 SF)				

1 Roadside streams and drainages estimated to be a standard 4 feet wide.

6.2 GOALS OF THE PROPOSED COMPENSATION

The main goals for compensatory mitigation for the Terminal are as follows:

1. Provide full areal compensation and functional equivalency for direct permanent impacts to wetlands, including increasing wetland cover by 6.7 acres in the project vicinity.
2. Provide approximately 2 years advance compensation for 46.3 acres of direct impacts.
3. Provide full replacement of buffer functions for direct permanent impacts to buffers.
4. Provide functional replacement for 14,932 linear feet of stream and drainage impacts.
5. Maintain the water quality functional capacity of project area relative to current conditions.
6. Increase potential fish habitat in Streams 1 and 2 by improving connectivity and fish passage, increasing riparian functions, and installing habitat features.
7. Protect and provide habitat functions for wetland-associated birds, mammals, and amphibians by developing structurally diverse native vegetation communities in created wetlands and riparian areas; by enhancing wetlands; and by providing protection to forested areas.
8. Provide flood attenuation by creating depressions within created riparian wetlands that would function to capture and retain water during periods of high flow.

9. Use native vegetation to effectively buffer the facility from adjacent habitats and to provide habitat functions.

6.3 OBJECTIVES

To accomplish the goals of the compensatory mitigation, the following objectives have been identified:

1. Remove approximately 2,800 linear feet of Lonseth Road (West Loop vicinity) and the existing culvert at Stream 1 and:
   - install fish passage–friendly log weirs, large woody debris, and habitat gravel where needed;
   - remove impervious surfaces and roadbed (approximately 3 acres this location),
   - restore riparian, wetland, and hydrologic connectivity between AUs 2 and 7.
2. Replace the Stream 1 culvert under Henry Road with a bottomless box culvert to remove the blockage to fish passage and restore riparian vegetation (approximately 4000 feet of Stream 1 would be opened to fish from downstream).
3. Create 154.8 acres of forested, shrub, and emergent wetlands.
4. Enhance 145.7 acres of existing wetlands, including the control of invasive species.
5. Create 10,305 linear feet of new watercourses to convey current roadside streams and drainages, including restoring a relic stream channel and directing flows to existing and created wetlands.
6. Remove approximately 3,500 linear feet of Lonseth Road (East Loop vicinity) and reroute roadside Stream 4, Stream 7, and roadside Drainage 1 through Wetland 3. Enhance the riparian areas with native vegetation, and the existing riparian wetlands.
7. Remove other impervious surfaces that are in various locations throughout the project area, including unused roadways and remnant concrete foundations (approximately 16 acres).
8. Preserve 441 acres of wetlands, including forested vegetation that will remain after Terminal development.

6.4 ONSITE COMPENSATORY MITIGATION

Onsite compensatory mitigation actions include wetland creation, wetland enhancement, stream relocation and restoration, riparian enhancement, and wetland preservation.

6.4.1 Proposed Wetland Creation and Enhancement

Compensation for unavoidable, minimized impacts to wetlands at the Terminal will consist of creating 85.5 acres of Category II wetlands, and enhancing 118.1 acres of existing wetlands. Wetland creation areas have been designed to improve on-site water quality and habitat functions from current conditions. Creation areas have been located as near to the area of impacts as possible to maintain and possibly improve hydrologic functions.

The proposed mitigation would:

1. Create high-quality wetlands to compensate for low-quality wetland loss;
2. Enhance existing low-quality wetlands to compensate for wetland loss;
3. Increase water quality function by installing dense persistent vegetation adjacent to the Terminal;
4. Provide a high-functioning wildlife habitat, especially for fish, birds, and amphibians;
5. Maintain hydrologic functions, especially floodwater attenuation in Stream 1; and
6. Remove remnant concrete foundations, which would make way for wetland creation.

6.4.2 Stream Relocation and Restoration

Compensation for unavoidable, minimized impacts to streams and drainages consists of the creation of 8,305 linear feet of streams and drainages, fish passage improvements along Streams 1 and 2, and fish habitat improvements in Streams 1 and 2. Stream 4 and Drainage 1 would be redirected into Wetland 3 and a newly constructed natural stream channel. The sum of stream and drainage impacts includes drainages and stream which occur on both sides of linear road corridors. When compensating for these stream and drainage impacts there appears to be a loss of linear feet of stream drainage as flows would be replaced by a single channel where currently two parallel drainages exist. For example, Stream 4 and Drainage 1 occur adjacent to Lonseth road. The road would be removed and the two flows directed to a new single channel (called Stream 4).

The proposed mitigating actions would:

1. Create streams through existing uplands, wetlands, and proposed wetland creation and enhancement areas to compensate for stream/drainage loss;
2. Increase sinuosity of Stream 1 as it flows through Wetland 2;
3. Replace the culvert containing Stream 1 under Henry Road with a bottomless box culvert opening up over 4,000 feet of Stream 1 to fish passage;

4. Remove the culvert containing Stream 1 under Lonseth Road and install fish passage-friendly log weirs to improve fish passage; and
5. Install large woody debris and fish gravels within Stream 1 and Stream 2 at strategic locations to improve fish habitat.

6.4.3 Riparian Enhancement

Riparian buffers play an important role in maintaining a stream's properly functioning condition. Riparian areas function to dissipate stream energy and improve water quality in streams by capturing and filtering pollutants and sediment in runoff from upland areas. Riparian buffers also provide wildlife habitat, and create wildlife corridors to enable organisms to move along stream systems and avoid isolated communities. Riparian area enhancement is provided in the mitigation plan to maintain and improve functional capabilities in the watershed. Riparian areas are disconnected from most streams on-site because the majority of streams were ditched along roadsides in the past. Restoring streams to natural channels with connectivity to riparian areas will improve water quality, wildlife habitat, and hydrologic conditions in order to protect resources downstream.

The proposed activities would include 3.4 acres of riparian area enhancement along the new channel of Stream 4 and Drainage 1 with native coniferous forested vegetation to increase water quality, hydrologic, and habitat functions.

6.4.4 Wetland Preservation

Category I and II wetlands would be preserved in perpetuity. The majority of forested Wetland 5 would be preserved. Other areas of wetlands not directly impacted in AUs 1, 2, 3, 4, 5, 7, 9 and 10 would be preserved. These areas would be hydrological connected by restored or enhanced watercourses. An estimated total of 391 acres of wetland would be preserved in perpetuity.

6.5 OFF-SITE COMPENSATION

In order to fully replace the values and functions lost in the Gateway Pacific Terminal watershed as a result of the proposed Terminal project, additional off-site mitigation actions are required. The 336-acre property south of Henry Road and east of Gulf Road, identified as Mitigation Area I (Appendix I), is proposed. Mitigation activities on this property include wetland creation, wetland enhancement, buffer compensation, stream restoration, riparian and buffer enhancement, and wetland and upland preservation. All on- and off-site mitigation areas are summarized in Table 24.

Table 24 Total On- and Off-Site Wetland Creation and Enhancement Areas

Mitigation Area	Hydrogeomorphic Class	Wetland Creation Area (acres)	Wetland Enhancement Area (acres)
A	Slope/Depressional	7.9	1.8
B	Slope	1.8	3.7
C	Slope	37.5	7.1
D	Depressional	6.4	0.5
E	Flats/Depressional	7.9	2.9
F	Depressional	11.3	90.6
G	Slope	11.2	9.7
H	Slope/Riverine	1.5	1.7
I (Off-site)	Slope	68.7	27.6
Total Wetland Creation and Enhancement		**154.2**	**145.7**

6.5.1 Proposed Wetland Creation and Enhancement

Off-site compensation activities include creating 68.7 acres of Category II wetlands, and enhancing 27.6 acres of existing wetlands. Wetland creation and enhancement areas have been designed to improve on-site water quality, habitat, and hydrologic functions from current conditions.

The proposed mitigation would:

1. Create high-quality wetlands to compensate for wetland loss;
2. Enhance existing low-quality wetlands in agricultural fields to compensate for wetland loss;
3. Increase water quality function by installing dense persistent vegetation and plugging agricultural ditches;
4. Provide a high-functioning wildlife habitat, especially for fish, birds, and amphibians;
5. Enhance the shorelines of existing farm ponds for wildlife;
6. Increase hydrologic functions, especially connectivity and floodwater attenuation on Stream 2; and,
7. Remove remnant structural foundations and soil mounds, which would decrease impervious surface and make way for wetland creation.

6.5.2 Stream Relocation and Restoration

Off-site mitigation activities to offset impacts to streams and ditches from the proposed Terminal project include relocating, restoring, and increasing habitat accessibility to 7,515 linear feet of Stream 2. Activities include re-connecting Stream 2 to its headwaters, reducing peak flows by plugging approximately 2,000 linear feet of agricultural ditches and increasing base flow support through

groundwater, removing a concrete weir and earthen dam, and relocating Stream 2 through a forested setting to a created coastal lagoon with connectivity to the Strait of Georgia.

Available fish habitat would increase in the Gateway Pacific Terminal watershed as a result of the proposed mitigation actions. Stream 2 would be re-routed away from the culvert under Henry Road, which currently makes this stream course inaccessible to anadromous fish. Restoring connectivity to the Strait of Georgia, installing fish gravels and large woody debris in strategic locations, and increasing stream sinuosity would altogether combine to increase the overall functioning of Stream 2 from its current low-functioning state.

The earthen dam and concrete weir are remnant features of a former homestead on Mitigation Area I, and which detain flows that would have drained to the lower reaches of Stream 2. Connectivity between the portions of Stream 2 above and below the earthen dam and concrete weir area is only present if pond water overflowed across the dam crest. A failed outlet structure at the base of the dam no longer regulates the water levels in the pond behind the dam. During rainy periods, the pond overflows and produces ephemeral surface channels that flow overland south towards the Strait of Georgia and west towards Henry Road. Removing these human-made structures will enable Stream 2 to flow again, restore the natural channel, and have a more continuous hydrologic regime.

Proposed mitigation for impacts to existing streams and drainages would include the relocation or restoration of 15,305 linear feet of streams and drainages, fish passage improvements at two locations along Stream 1 and two locations along Stream 2, and fish habitat enhancement including large woody debris and fish gravels in Streams 1 and 2.

Stream 1's Reach 1 is the only documented fish-bearing stream reach on site, and as such, increasing the fish passage potential and habitat conditions would greatly improve the fish habitat of this system. Stream 2 is documented as having potential/historical fish distribution, and increasing habitat conditions and connectivity to the Strait of Georgia would improve chances of fish once again inhabiting this stream in the future. Restoring stream functions and habitat access to 15,305 linear feet of streams more than offsets the impacts to 14,932 linear feet as a result of the proposed project.

6.5.3 Riparian and Buffer Enhancement

Improvements to riparian corridors and wetland buffers include removing invasive plant species and planting conifer species to increase plant diversity and thus wildlife habitat functioning. Activities would also include removing historic and current barbed wire fences to increase wildlife access to the riparian corridors. The buffers around the three stock ponds located in the central portion of the site would be enhanced with woody plantings to prevent sedimentation and provide perches for wildlife. Removing the agricultural fields from pasture would also improve the water quality. Riparian area

enhancement actions include 10.4 acres of riparian area enhancement along Stream 2 to improve functioning in the watershed.

6.5.4 Wetland Preservation

As a result of the off-site mitigation, approximately 50 acres of wetlands would be preserved in perpetuity. This property has been sighted for industrial development in the past, and placing these features in a conservation easement or other protective instrument would ensure their place and functioning in the watershed for years to come.

6.6 NON-PERMITTEE RESPONSIBLE MITIGATION

In addition to permittee-responsible mitigation on on-and off-site locations, wetland mitigation guidance encourages the purchase of wetland mitigation bank credits or in-lieu fee mitigation activities.

6.6.1 In Lieu Fee Mitigation

Studies of previous wetland mitigation projects in Washington and other states indicate high rates of failure. The primary reasons included inappropriate selection of mitigation sites, poor site design, inadequate construction techniques, lack of installation, and lack of monitoring and maintenance.

In-lieu fee compensation programs are professionally managed and solely focused on providing high quality environmental mitigation. In-lieu fee mitigation is intended to target ecological restoration on the highest priority sites to maximize the improvement to watershed health (Puget Sound Partnership, no date). Development of an In-lieu fee program for the Puget Sound Region has been recommended and supported by the *Mitigation that Works Forum*, a group made up of 22 members representing state and federal agencies with mitigation responsibilities, local governments, ports, business, environmental, and land use/conservation interests. The Puget Sound Action Agenda also calls for the establishment of in-lieu fee programs as one tool to improve the health of Puget Sound (Puget Sound Partnership 2008).

In 2009, the Washington State Legislature allocated funds for the development of In-lieu fee compensation programs, as well as the implementation of pilot in-lieu fee restoration sites in advance of impacts to aquatic resources. Permitting agencies with jurisdiction over impacts make decisions regarding appropriate compensatory mitigation. In-lieu fee programs maintain agencies permitting authority. All agencies with permitting authority would have to agree in-lieu fee would be appropriate compensatory mitigation (Puget Sound Partnership, no date).

As an example, since 2005, King County operated its Mitigation Reserves Program as a pilot program. In its pilot phase, the program accepted more than $1 million in mitigation fees and has used

those fees to implement both large and small mitigation projects in King County. The program is now being revised and moving out of the pilot phase, with anticipated certification in the first quarter of 2012 (King County, 2012). Puget Sound Partnership has implemented in-lieu fee programs at two pilot sites, the Deschutes River Wetland Restoration in Thurston County, and the Larchmont Wetland Reserve in Pierce County (Puget Sound Partnership, no date).

Local municipalities have also explored the feasibility of implementing in-lieu fee programs. The City of Mount Vernon has successfully designed and implemented an in-lieu fee program for impacts to critical area buffers within its jurisdiction, where developers are able to “buy down” the required buffers on critical areas to fund City-managed wetland, stream, and buffer restoration projects (City of Mount Vernon, 2008). The City of Tacoma is also currently exploring the feasibility of implementing an in-lieu fee program for shoreline impacts within its jurisdiction (ESA Adolfson 2010).

At the County level, Whatcom County is nearing implementation of the Birch Bay Habitat Mitigation Fund as an in-lieu fee program to mitigate for impacts to stream and wetland buffers in the Birch Bay Watershed. A prerequisite for a viable program is an understanding of restoration and conservation needs in an area. In 2007, Whatcom County, in collaboration with a group of interested agencies and other stakeholders, investigated the Birch Bay Watershed to characterize the area and its watershed processes in just such a manner. The highest priority identified was to focus terrestrial and aquatic habitat rehabilitation efforts in the Terrell Creek stream corridor and areas within and adjacent to Lake Terrell, because together they have the highest potential with areas of intact habitat and watershed processes and the full range of connecting habitat, from the lake to the shore (ESA Adolfson 2007).

As of January 31, 2012, the Whatcom County Planning Commission voted in favor of the Birch Bay Habitat Mitigation Fund, and a vote by the Whatcom County Council is pending. However, Whatcom County does not have a federally-approved in-lieu fee program for direct wetland impacts at this time. Whatcom County has shown interest in developing such program (L. Driscoll, personal communication, 2011), but Whatcom County Code does not specifically allow in-lieu fee as mitigation for impacts to critical areas currently. Nevertheless the Whatcom County Code does allow for off-site mitigation, if through a watershed or landscape-based analysis, it is determined that mitigation within an alternative sub-basin of the same basin would have the greatest ecological benefit and the greatest likelihood of success, provided that limiting functions shall not be removed from sensitive watersheds identified in WCC Title 20, and the mitigation occurs in Water Resources Inventory Area (WRIA) 1 or 3 (WCC 16.16.680.F).

Whatcom County Code also allows for alternative mitigation approaches per WCC 16.16.260.E that would satisfy the required mitigation while deviating from the specific standards outlined in the code,

provided that the standards at WCC 16.16.260.E.1 are met (Whatcom County 2010). As such, In-lieu fee is a potentially feasible future option.

6.6.2 Mitigation Bank Credit Purchase

Wetland mitigation banks are supported by federal agencies as the preferred method of wetlands mitigation because of the ecological benefits they provide relative to permittee-responsible mitigation. Wetland mitigation banks typically encompass a large area, have to meet specific performance standards before credits are released to limit the temporal loss of wetland functions, and include a variety of restored ecosystems within a single project. Mitigation banks are granted mitigation credits by reviewing agencies, which can then be sold to project proponents who have unavoidable wetland impacts within the same pre-determined service area as the bank.

Currently, the only proposed wetlands mitigation bank that services the proposed Terminal site is the Lummi Nation Wetland and Habitat Mitigation Bank. However, this bank has not received full approval from regulatory agencies.

Any mitigation activities supplemental to the proposed permittee-responsible mitigation activities would most likely include the purchase of wetlands mitigation bank credits.

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7.0 ADEQUACY OF THE PROPOSED COMPENSATORY MITIGATION

The adequacy of proposed mitigation for wetlands and stream impacts is typically evaluated in two ways, or a combination thereof. The two common approaches include meeting the minimum standards for area replacement, and evaluations of replacement of wetland and stream functions.

Ecology has proposed a "credit" and "debit" method that relies on methods for assessing functional capabilities to evaluate if proposed compensation fully replaces lost functions. This method was first announced in October 2010, and on February 11, 2011, a year-long trial was implemented (Ecology Operational Draft 2011). In this method a proposed compensatory project is considered adequate when the credit score is greater than the debit score for all wetland functions. The final version of this methodology has not been released at this time by Ecology staff, and the credit/debit method has not been adopted by Whatcom County. Consideration will be given to this method of evaluating the adequacy of mitigation projects in the future should Whatcom County require its use following its approval and adoption into County code.

7.1 REPLACEMENT STANDARDS

The Gateway Pacific Terminal watershed would lose 139.8 acres of wetland, while 143.5 acres would be created, meaning that greater than 1:1 replacement area is proposed. The Birch Bay watershed would lose 7.7 acres of wetland, while 10.7 acres would be created (Table 25). The Terminal project and mitigation plan would result in a net increase of 6.7 acres of wetlands between the Gateway Pacific Terminal and Birch Bay watersheds, including increased ecological functions and values provided by the additional wetland acreage. Based on the designs presented here, approximately 117.4 in-kind acre-credits would be provided.

Table 25 Permanent Direct Impacts to Wetlands and Mitigation (Creation) By Watershed

	Wetland Impacts (acres)	Proposed Mitigation Wetland Creation (acres)		Net Difference in Wetland Areal Cover After Project Construction and Mitigation (acres)
Watershed	**Permanent Direct**	**On-Site**	**Off-Site**	
Birch Bay	7.7	10.7	-	+3.0
Gateway Pacific	139.8	74.8	68.7	+3.7
Sub Total		85.5	68.7	
Total	147.5	154.2		+6.7

Direct compensation of impacts to wetlands may occur by creating new wetlands or enhancing or preserving existing wetlands. Each of these strategies, however, does not yield the same degree of benefit towards achieving full mitigation of impacts. While acreage would be enhanced (145.7 acres), this area alone would not suffice to provide wetland acreage, nor fully provide the additional buffer

required to cover the risk of compensation failure and temporal loss of wetland function that would occur. Wetland preservation is highly merited, but does not in itself provide for lost area or functions of these systems, and is in itself discounted heavily by Whatcom County.

An acre of mitigation is factored by a specific ratio to determine how much mitigation credit is awarded towards the goal of complete replacement of impacted area. Based on the mitigation defined in this plan—154.2 acres of created wetland, 145.7 acres of wetland enhancement, and 441 acres of preserved wetland—the equivalent of 117.4 acres of mitigation credit is created by mitigation towards the total 147.5 acres required (Table 26). This is commensurate with county, state and federal policy for no-net-loss of wetland acreage and function as the project will result in a net increase of 6.7 acres on-site (see Table 25).

Table 26 Approximate In-kind Credits Available from On- and Off-Site Wetland Mitigation

Mitigation Type	Estimated Area Available (acres)	Ratio[3]	Potentially Available Credits (in "equivalent" acres)
Creation	154.2	2:1	77.1
Enhancement[1]	145.7	8:1	18.2
Preservation[2]	441	20:1	22.1
Total Estimated Available Credits			**117.4**

1 Enhancement includes areas enhanced to forested wetland and other habitat improvements

2 Assumes that forested Category III wetlands would be allowed for preservation on-site; otherwise approximately 15 acres of preservation of Category 1 wetlands would be included, along with 50 acres from the off-site location.

3. Based on WCC replacement ratios for Category III wetlands (WCC 16.16.680(C))

For the remaining approximately 30.1 acre-credits, out-of-kind resource trade-offs are proposed. According to the federal *Compensatory Mitigation Rule, the Federal Guidance on the Use of Off-Site and Out-of-Kind Compensatory Mitigation under Section 404 of the Clean Water Act* (USACE, et al, 2004), and the *Washington State Wetland Mitigation Guidance* (Ecology 2006), improvements to watershed functions and natural resources other than wetlands that are connected into a system of existing natural areas and aquatic corridors can also receive mitigation credit.

This method of mitigation is referred to as out-of-kind mitigation, and encourages the implementation of mitigation activities that may provide increased environmental benefits to the watershed, when other options would not produce as great a benefit to the watershed. According to Ecology (2006), out-of-kind resource tradeoffs may be allowed when these non-wetland actions contribute to and enhance the overall functioning of the wetland and watershed system. An example of out-of-kind resource tradeoff would be providing stream and riparian rehabilitation adjacent to a riverine wetland.

In evaluating the reasonableness of resource tradeoffs for wetland compensation, consideration should be given to the degree of permanent disruptions to environmental processes (for example, the way the water moves through the landscape). Importantly, out-of-kind resource tradeoffs are suitable for this project, as compensation for wetland area impacts have been fully provided in the form of in-kind compensation located at on- and off-site locations within the watershed.

For this project, because alterations to the watercourses and natural streams have been historically redirected into roadside ditches in the watershed to expedite area drainage, restoring the natural flows of water through this landscape within restored or relocated natural channels is the type of activity suitable to receive mitigation credit to offset project impacts. Therefore, in addition to providing 154.2 acres of wetland creation and 145.7 acres of wetland enhancement, approximately 15,305 linear feet of streams will be restored or relocated, and 13.7 acres of riparian buffer will be enhanced within the on- and off-site mitigation locations described in this report.

Activities to restore streams and their functions include:

- Opening up approximately 4,000 linear feet of Stream 1 habitat to fish,
- Opening up approximately 7,515 linear feet of Stream 2 habitat to fish,
- Re-supplying Stream 2 with natural flows that are currently ditched,
- Relocating 6,140 linear feet of Stream 4 into a natural channel,
- Relocating Drainage 3 into 2,000 linear feet of a new stream channel, and
- Replacing existing culverts with fish-friendly bottomless culverts, and installing LWD and fish gravels in strategic locations to improve fish habitat.

Credit accounting for these out-of-kind resource tradeoffs is anticipated to meet or exceed the remaining 30.1 equivalent mitigation credits required to completely offset project impacts.

The project proponents will continue to look for opportunities to mitigate impacts, including avoidance and minimization, through engineering and design features.

7.2 ECOLOGICAL LIFT ANALYSIS

Federal, state, and local wetland regulations and guidelines require that compensatory wetland mitigation provide equal or greater function (i.e., lift) than that lost through project impacts. These functions are measured in terms of water quality and hydraulic and habitat functions of wetlands. Table 28 presents the evaluation of wetland functions for each functional parameter and compares the aggregate functional performance of the wetlands lost to project development against the onsite

and offsite wetlands either restored or created as proposed mitigation. In each case the functional score of the wetlands created is greater than the functional score of the wetlands lost, indicating a net gain in wetland function.

The proposed mitigation would substantially improve the habitat and hydrologic function of Streams 1 and 2, and roadside Stream 4 and Drainages 1, 2, 3, 4, 6, 7, 8, and 9. The compensatory mitigation plan provides for wetland creation and enhancement to compensate for wetland impacts from the Terminal development in the Gateway Pacific Terminal and Birch Bay watersheds. The proposed Terminal design would incorporate water quality and hydrologic functional improvements with the goal of maintaining, and where possible improving, these functions over the current conditions.

With the exception of Wetland 9C (0.1 acre) which is Category IV, wetlands to be impacted within the Terminal project site are Category III systems that provide low to moderate ecologic function. Creating higher Category II wetlands will show a significant lift when calculated over the watershed area (Table 27).

Table 27 Change in Water Quality, Hydrologic, and Habitat Functions to Be Provided by the Proposed On- and Off-Site Mitigation

Ecological Function	Impacted Wetland Functions		Compensatory Wetland Functions	
	Score[1]	Characteristics	Score[2]	Characteristics
Water Quality	11	• Low to moderate functions • Majority of the wetlands are forested and have no defined outlet, enabling a moderate level of water detention • Depressional wetlands are limited by slope characteristics that lower ability to detain water; however low topographic gradient allows some water to be detained • Majority of highest scoring wetlands are some of the smallest on site, limiting their opportunity to slow and detain water • Lack of clay or organic soils • Large grazed wetland pastures with little to no ability to slow and detain water • Deep roadside streams and drainages that do not overflow to wetlands limit their opportunity to receive stormwater inputs from developed areas	18	• Moderate to high functions at maturity • All created wetlands would be forested and have intermittently flowing outlets or no defined outlet, enabling a higher level of water detention than existing wetlands. • Majority of created wetlands would be depressional which would allow significant amounts of water to be detained compared to current conditions. • Majority of created wetlands would be located adjacent to development providing high opportunity to perform water quality functions. • Proposed wetland creation areas would score 18 or higher for water quality functions, some of which would score 20 or higher. • Relocated streams to increase connectivity to riparian wetlands to increase water quality functioning. • Created and enhanced riparian areas would detain and filter significantly more water than current conditions.

Table 27 Change in Water Quality, Hydrologic, and Habitat Functions to Be Provided by the Proposed On- and Off-Site Mitigation

Ecological Function	Impacted Wetland Functions		Compensatory Wetland Functions	
	Score[1]	Characteristics	Score[2]	Characteristics
Hydrologic	10	• Low to moderate functions • Wetlands are mostly flat and contain depressions to detain water • Wetlands are low in the watershed and occupy a very small portion of their contributing drainage basin • Majority of the wetlands do not receive storm or floodwater inputs • Highest-scoring wetlands are some of the smallest on site, limiting their opportunity to slow and detain water.	14	• Moderate functions. • Created wetlands would contain micro and macro-depressions to detain significant amounts of water during high flows compared to current conditions. • Majority of the wetlands would receive storm or floodwater inputs, increasing opportunity to perform hydrologic functions. • Mitigation Areas F and H would provide significant hydrologic functions because of their size and position along Stream 1.
Habitat	18	• Moderate to high habitat functions • With the exception of Wetland 4F, all wetlands on site scored 10 or higher for habitat functions, and 10 wetlands scored 20 or higher • Adjacent roads and land uses inhibit undisturbed corridors and connections to other habitats and reduce the ability of wetland buffers to provide habitat functions • Large forested wetlands with multiple vegetation layers provide numerous habitat niches for a variety of species • Wetland 11A provides the highest habitat functions and coincides with WDFW and Whatcom County priority riparian habitats along Stream 1	24	• High habitat functions • All created wetlands would score 20 or higher for habitat functions, with Mitigation Area A scoring 32 • Although wetland buffers would still provide little habitat functions due to the lack of undisturbed corridors and connections to other habitats, design of the mitigation areas expanded upon existing wetlands to the extent practicable to maintain the existing habitat connectivity to the extent practicable • Large forested wetlands with multiple vegetation layers would provide numerous habitat niches for a variety of species • Mitigation Area A and I would provide a high-functioning wetland habitat adjacent to Wetland 12 (a large coastal lagoon), Stream 2, and riparian areas along Stream 2, which is identified by WDFW and Whatcom County as priority riparian habitats • Created and enhanced riparian areas would provide significant habitat for birds and amphibians
Total (for ratings purposes)	39	Category III	56	Category II

1 Hruby (2004). Scores represent the mean of scores for all wetlands.

2 The score represents anticipated site conditions 15 years post-construction.

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8.0 IMPLEMENTATION SCHEDULE

All compensatory mitigation would be installed in concert with Stage 1 construction over the course of 2 years. This would result in earth moving to create new grades and restoring soils during the drier months, planting and stabilizing new channels in preparation for the winter and rerouting roadside stream and ditch flows once winter rains subside. Details of construction including staging, site planning, implementation of management practices, and detailed timings, for example, would be provided in later plans.

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9.0 POST INSTALLATION REQUIREMENTS

Following design and installation, compensatory mitigation areas require maintenance and monitoring, as well as long term protection to ensure that the areas provide the intended contribution to watershed processes and functional characteristics. A wide diversity of compensatory actions are proposed on-site, each having its own characteristic properties. In the following, we provide preliminary information on monitoring schedules, performance standards, and other post-installation actions. It is intended that each compensation area would have specific provisions, and that these would be tailored to each area in the future as the compensation plan evolves.

9.1 FINANCIAL ASSURANCES AND PERMANENT CRITICAL AREAS PROTECTION

In accordance with Whatcom County requirements for on-site permittee-led compensation the applicant, Pacific International Terminals, would post a mitigation surety in the amount of 125 percent of the estimated cost of the uncompleted actions or the estimated cost of restoring the function and values of the critical area that are at risk, whichever is greater (WCC 16.16.260).

Cost associated with construction of the Terminal and the cost of restoring the functions and values of the critical areas at risk would need to be calculated following agreement on a final mitigation plan between all interested parties. Therefore, final calculation of the required mitigation surety for the Terminal would be forthcoming following approval of the mitigation plan. As required by WCC 16.16.260D.b, the surety would be in the form of an assignment of funds or other means approved by the technical administrator.

Permanent critical areas protective measures would be implemented in accordance with WCC 16.16.265. Signage would be installed near primary access points and approximately every 200 feet along the critical area boundary to alert citizens to a potential public health or safety risk associated with a critical area, or to accomplish other objectives specifically provided for in WCC Chapter 16. Specifications on the type, content, and size of the signs would be provided by the technical administrator prior to permit approval.

Pacific International Terminals would record a notice with the County Auditor in a format approved by the technical administrator and provide a copy of the filed notice to the Planning and Development Services Department at the time the permit is issued, in accordance with WCC 16.16.265.B. The notice would state the general presence of the critical areas on the property and the fact that limitations on actions in or affecting the critical area exist. The notice would also provide that restrictions on uses within the critical area exist until such time as the technical administrator approves a change in restriction and such approval is filed.

In addition, the mitigation areas and other critical areas onsite and offsite would be protected by establishment of a protective easement, public or private land trust dedication, or preserved through an appropriate permanent protective mechanism that provides the same level of permanent protection as designation of a separate tract or tracts, as determined by the Whatcom County technical administrator or hearing examiner.

9.2 MONITORING AND REPORTING SCHEDULES

A 10-year monitoring program would be implemented to ensure that the installed areas remain stable and that planted communities develop as intended. Monitoring would occur annually, with additional site checks every few weeks in the first rainy season, followed by every 6 months for the next 2 to 3 years. Site checks would be made to observe site conditions, including stability, species survival, and human encroachment, and to gather information for near-term maintenance plans.

During monitoring site visits, data would be collected on hydrologic conditions. Native vegetation and invasive species would be measured and compared with established performance standards Monitoring results would be incorporated into one or more Monitoring Reports in Years 1, 2, 3, 5, 7, and 10 for submission to regulatory agencies.

9.3 PERFORMANCE STANDARDS

Performance standards are provided as tools to measure the compensatory mitigation site's success. The standards provided below are based on best available science. They use objective measures of performance, which are both accessible and verifiable. Performance standards for this preliminary conceptual compensatory plan are provided in brief. More detailed, quantifiable, and verifiable standards specific would be provided as this plan is further developed.

9.3.1 Hydrologic Performance

Wetland creation would be verified through the performance of wetland hydrologic conditions for the first 3 years following installation. Wetland hydrologic conditions would be monitored during the growing season using shallow groundwater wells. Wetland hydrology would be considered to be present if the area meets the technical standard for potential wetland sites (USACE 2005). Appropriate locations for determining hydrologic performance and a specific monitoring schedule would be developed.

9.3.2 Vegetation Performance

Vegetation performance standards would be set to ensure that the sites were developing as planned. An example of vegetation performance standards is provided. 100 percent survival in Year 1 will be ensured by replacing any dead plantings at the end of Year 1. Starting in Year 2, performance of

vegetation would be measured in absolute percent canopy cover (also known as leaf area). Success would be assessed by comparing field measurement to performance standards outlined in Table 28.

Table 28 Vegetation Performance Standards

Monitoring Year	Recommended Performance Standard
Year 1	100 percent survival of planted trees and shrubs. 80 percent survival of planted emergent species. Less than 20 percent cover by invasive plant species.
Year 2	At least 10 percent cover by native species. At least 15 percent cover by native emergent species. Less than 20 percent cover by invasive plant species
Year 3	At least 20 percent cover by native trees and shrubs species. At least 30 percent cover by native emergent species. Less than 20 percent cover by invasive plant species.
Year 5	At least 35 percent cover by native trees and shrubs species. At least 30 percent cover by native emergent species.
Year 7	At least 45 percent cover by native trees and shrubs species.
Year 10	At least 60 percent cover by native trees and shrubs species.

9.4 MAINTENANCE AND CONTINGENCY PLANS

Site maintenance will be conducted routinely, at least monthly between March 15 and October 15, and during alternate months outside of the growing season, during the first 3 years following installation. Maintenance activities after the first 3 years will depend on site conditions, including plant survival, species management, and encroachment. Maintenance will include nonnative plant control, trash removal, maintenance of signs and fences, and summer irrigation during the initial period of plant establishment (likely in Year 1 through Year 3). Pacific International Terminals will be responsible for the first 10 years for maintenance of the site.

Contingencies are put in place when principle plans do not work out as expected. Adaptive management would be the primary tool used to deal with unanticipated results. Adaptive management follows the following general sequence: monitor site conditions, analyze outcomes, and incorporate results into plans. Pacific International Terminals will be responsible for implementing contingencies over the first 10 years after construction has been completed.

The plan for maintenance activities will be more thoroughly developed as on- and off-site mitigation areas are designed, and the scope of work is established.

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APPENDIX A

Mitigation Area A

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1.0 INTRODUCTION

Mitigation Area A is located at the south end of the Gateway Pacific Terminal ("Terminal") site and is bounded by Gulf Road to the south and west, and by the site boundaries to the north and east. This area currently consists of predominantly upland forested areas interspersed with small pocket wetlands and narrow linear riparian wetlands along Stream 2 and 2A.

Priority habitats currently present at Mitigation Area A include riparian zones along Stream 2 and 2A and urban natural open space along the Strait of Georgia that provides habitat for bald eagles and peregrine falcons (Washington Department of Fish and Wildlife [WDFW] 2006; Whatcom County 2005b). Whatcom County maps Stream 2 as also having potential/historical distribution of fish (Whatcom County 2005a).

Mitigation Area A provides the opportunity to expand upon the existing wetlands and priority habitat associated with Stream 2 and 2A and to improve water quality, hydrologic, and habitat functions in the following ways:

1. Create approximately 6.6 acres of Category II scrub-shrub and forested wetland from existing upland areas.
2. Create approximately 1.3 acres of Category II aquatic bed and emergent wetland from existing, disturbed upland areas.
3. Redirect Stream 2 through forested wetlands towards the proposed new area of emergent wetland and aquatic bed.
4. Restore connectivity to the Strait of Georgia by providing a water supply.
5. Install fish gravels and large woody debris (LWD) in strategic locations in Stream 2.
6. Leave existing large upland coniferous trees to become standing snags, where appropriate.
7. Remove approximately 5,390 square feet (sq. ft.) of concrete foundations from the area.
8. Remove a derelict scaffold gravel loader from the nearshore.

The proposed mitigation will provide increased habitat functions for priority species and other wildlife by expanding wetland and riparian areas associated with Stream 2 and 2A. The hydrologic and habitat connectivity will be increased between Mitigation Area A and the Strait of Georgia. Newly created wetlands will increase the level of functions provided, such as maintaining water quality and providing flood attenuation, which help to protect downstream aquatic resources.

2.0 EXISTING CONDITIONS

Mitigation Area A consists predominantly of forested areas; six wetlands (Wetlands 13A, 13C, 13D, 13E, 13F, and 13G) totaling 2.12 acres; Stream 2; and an unnamed tributary to Stream 2 called Stream 2A. Gulf Road extends in a north-south orientation on the western boundary of Mitigation Area A, turns east at the southwest corner, and extends in an east-west orientation along the southern boundary. Wetland 12, an estuarine coastal lagoon, is to the west beyond Gulf Road. The Strait of Georgia is to the south beyond Gulf Road.

The Terminal project boundary defines the north and east borders of Mitigation Area A. Forested areas with mapped wetlands and streams are present beyond Mitigation Area A to the west, north, and east. Topography slopes down to the southwest, from an elevation of approximately 58 feet above mean sea level (amsl) at the northeast corner of the site, to approximately 10 feet amsl at the southwest corner of the site.

Figure A-1 shows the existing stream network, wetlands, and hydrologic flow at Mitigation Area A. Stream 2 generally flows northwest through Wetlands 13E and 13A in the center of Mitigation Area A before flowing west through a culvert under Gulf Road to Wetland 12. Stream 2A flows southwest through the northern portion of the site, and through Wetland 13A before confluencing with Stream 2 on the western portion of the site.

Wetlands 13C, 13G, and 13D seem to have no surface water connections but are likely hydrologically connected to Stream 2 via groundwater. The other wetlands at Mitigation Area A are hydrologically connected to Stream 2 or 2A by surface water. Wetland 13F, located on the southeast corner of Mitigation Area A, does not flow to Stream 2 or 2A but flows south directly to the Strait of Georgia via a culvert under Gulf Road.

A former gravel export operation and single-family residence were historically present in the mitigation area (Figure A-1). Three concrete pad foundations totaling approximately 5,390 sq. ft. remain from the residence and gravel operation, along with a scaffold gravel loader that extends from the shoreline into the waters of the Strait of Georgia. An access road extends north from Gulf Road past the west side of the house foundation into the central forested area.

The following sections briefly summarize these and other features. A full description of these features can be found in the *Wetland Determination and Delineation Report* (AMEC 2008).

2.1 WETLANDS

Currently, wetlands comprise approximately 2.12 acres at Mitigation Area A. Wetlands are classified as riverine, slope, and depressional HGM classes. Wetland characteristics are summarized in Table A-1. Detailed descriptions are provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

Table A-1 Mitigation Area A Existing Wetland Characteristics

Wetland Name	Hydro-geomorphic Class[1]	Rating[2]	Total Area (acres)	Location[3]	Hydrologic Connection
13A	Riverine	I	0.63	Abuts Stream 2 and 2A; nearly contiguous with Wetland 13E	Drains to Stream 2 and 2A and Wetland 12, then to the Strait of Georgia
13C	Depressional	III	0.02	Near Stream 2 on eastern portion	Isolated – No apparent outlet; likely drains to groundwater flowing downslope to Stream 2 and Wetland 12, then to the Strait of Georgia
13D	Slope	III	0.42	Adjacent to, but does not abut, Stream 2 on northeast portion	Isolated – No apparent outlet; likely drains to groundwater flowing downslope to Stream 2 and Wetland 12, then to the Strait of Georgia
13E	Riverine	I	0.06	Abuts Stream 2; nearly contiguous with Wetland 13A on central portion	Receives water from and drains to Stream 2 and Wetland 12A, then to the Strait of Georgia
13F	Depressional	III	0.62	Abuts the north side of Gulf Road east of former single-family residence on southeast corner	Drains directly to the Strait of Georgia via a culvert under Gulf Road
13G	Depressional	III	0.37	Base of slope on southwest corner	Isolated – No apparent outlet; likely drains to groundwater flowing downslope to Stream 2 and Wetland 12A, then to the Strait of Georgia

1 Brinson (1993)

2 Hruby (2004)

3 Refer to Figure A-1

2.1.1 Vegetation

The forested wetlands at Mitigation Area A are characterized by dense persistent vegetation and have multiple vegetation layers. Typical tree species dominate the wetlands and include red alder (*Alnus rubra*) and black cottonwood (*Populus balsamifera*). Common understory species include red osier dogwood (*Cornus sericea*), salmonberry (*Rubus spectabilis*), twinberry (*Lonicera involucrata*), and Nootka rose (*Rosa nutkana*). Emergent species present in the wetland at Stream 2 include skunk cabbage (*Lysichiton americanus*), slough sedge (*Carex obnupta*), reed canarygrass (*Phalaris arundinacea*), reed mannagrass (*Glyceria maxima*), and slender boykinia (*Boykinia elata*).

2.1.2 Hydrology

Wetland 13F has a direct connection with the Strait of Georgia via a culvert under Gulf Road while other wetlands drain via surface or groundwater flow to Stream 2, and then to Wetland 12 and the Strait of Georgia. The wetlands exhibit multiple hydroperiods.

Wetlands 13C, 13D, and 13G are considered isolated as they have no defined surface water outlet and therefore have no surface water connection to jurisdictional waters. However, water within these wetlands likely infiltrates to groundwater flowing down slope to Stream 2 or the Strait of Georgia. Surface water ponds within Wetlands 13C and 13G, but due to the relatively steep slope and lack of surface depressions to hold water, surface water does not pond within Wetland 13D.

Wetlands 13A, 13E, and 13F have surface water connections to Stream 2. Wetland 13F contains an aquatic bed that hold up to three feet of water during the winter; Wetlands 13A and 13E also contain surface depressions that trap water. Wetlands 13A and 13E are relatively contiguous with each other and receive hydrology from and drain to Stream 2. Wetland 13A has a large capacity for storage of overbank flooding given its location along Stream 2 and its tributary. Wetland 13F receives hydrology as sheetflow flowing downhill from a pond to the east.

2.1.3 Soils

Soils mapped within wetlands at Mitigation Area A include the Whitehorn silt loam 0 to 2 percent slopes; Neptune very gravelly sandy loam 0 to 3 percent slopes; and Birch Bay silt loam 3 to 8 percent slope soil units. Soils in Wetlands 13C and 13D are mapped as Whitehorn silt loam and soils in Wetlands 13F and 13G are mapped as Neptune very gravelly sandy loam. Soils in Wetlands 13A and 13E are combinations of Whitehorn silt loam and Birch Bay silt loam (Natural Resources Conservation Services [NRCS] 2007); however, soils in these wetlands were observed to be a mixture of depositional layers composed of sorted alluvium and shallow swales with muck and silts.

As evidenced by the characteristics in Table A-2, soils at Wetland Mitigation Area A have a wide range of depth to water table and ability to infiltrate and retain water. Soils at Wetland Mitigation Area A generally grade from poorly drained with a water table at the soil surface, high available water capacity, and frequent ponding (Whitehorn series) to somewhat excessively drained with a water table at about 80 inches, very low available water capacity, and no ponding (Neptune series). The Birch Bay series is between these with respect to hydrologic condition.

Table A-2 Mitigation Area A Existing Soils Characteristics

Soil Series	Drainage Class	Depth to Water Table (inches)	Frequency of Flooding	Frequency of Ponding	Available Water Capacity
Whitehorn silt loam, 0%–2% slopes	Poorly Drained	0	None	Frequent	High (about 10.5 inches)
Birch Bay silt loam, 3%–8% slopes	Moderately Well-Drained	24–48	None	None	Low (about 1.5 inches)
Neptune very gravelly sandy loam	Somewhat Excessively Drained	80	None	None	Low (about 2.3 inches)

Source: NRCS (2007)

See the *Wetland Determination and Delineation Report* (AMEC 2008) for a more details on these soil series.

2.1.4 Stream 2

Stream 2 is approximately 1.25 miles long, draining Mitigation Area I which lies to the east, and generally flowing northwest through the central portion of Mitigation Area A. Approximately 400 feet east of Gulf Road, Stream 2A flows from the northeast from Mitigation Area I and confluences with the primary channel of Stream 2.

Flow in Stream 2 continues west through a culvert under Gulf Road to Wetland 12 and ultimately to the Strait of Georgia. Stream 2 and its tributary have continuous flow for at least three months out of the year and are therefore considered to be relatively permanent tributaries.

The fish habitat values of Stream 2 and its tributary are low. Flows of Stream 2 in this lowest reach are reduced due to conditions in upstream reaches off-site, including most importantly, a farm pond berm built in the stream channel, as well as agricultural drainages (See Appendix I - Existing Conditions for Mitigation Area I). A relatively sparse forest canopy of alder grows along the main channel; however, the stream banks of Stream 2 are lined by Category I wetland areas that include

several obligate species, Himalayan blackberry and nettle dominate the understory along a good part of the riparian area.

2.1.5 Stream 2A

Stream 2A begins offsite to the north on Mitigation Area I. Portions of this tributary stream have been altered by previous development activities, including the failed industrial area and possibly the old gravel industry. Currently, the catchment area is small and flows are intermittent. Groundwater recharge is important for supplying flows in the lower reach, and wetlands surround the main channel in this area. The middle reach flows through a possibly artificially-created ravine with straight walls and a squared off headwall. A large berm of soil occurs just at the crest of the headwall area. This entire area is currently well vegetated with young red alder and understory shrubs, so previous disturbance is less easy to determine.

2.2 UPLANDS

Uplands within Mitigation Area A are predominantly forested by red alder and understory shrubs with little variation in stand age or community composition across the upland area. Abundant standing or fallen dead trees (mainly smaller-diameter red alder) and very few light gaps characterize the forest. Coniferous species are present in the previously developed portion of Mitigation Area A, but rare in other portions of the site. Upland soil types are generally the same as previously described, although the area previously developed shows some evidence of previous filling.

2.3 WILDLIFE

2.3.1 Fish

The riparian area of Stream 2 is mapped as priority habitat by WDFW (2006) and Whatcom County (2005b). Stream 2 is mapped by Whatcom County (2005b) as having potential/historical fish distribution. Thus, while Stream 2 is not a known fish-bearing stream, it has the potential to provide habitat for fish species.

2.3.2 Birds

The southern portion of Mitigation Area A is mapped by WDFW as peregrine falcon (*Falco peregrinus*) winter habitat, as the area coincides with the wintering waterfowl areas on Bellingham Bay, Lummi Bay, and the Lummi Flats (WDFW 2006). A small area at the southeast corner of Mitigation Area A in the same general location of Wetland 13F is mapped by WDFW as urban natural open space and is characterized as having steep bluffs and many large perch trees. This area is used by bald eagles (*Haliaeetus leucocephalus*) for foraging year-round and by peregrine falcons in winter (WDFW 2006).

AMEC conducted bird surveys from 2008 to 2009 in representative areas at the Terminal site to determine bird presence and use of the site (AMEC 2012). Bird Count Station 3 was located adjacent to the southwest of Mitigation Area A at the southeast edge of Wetland 12. Birds observed from this location during winter or breeding seasons include American robin (*Turdus migratorius*), Bewick's wren (*Thyrothorus ludovicianus*), red-tailed hawk (*Buteo jamaicensis*), song sparrow (*Melospiza melodia*), spotted towhee (*Pipilo maculatus*), chestnut-backed chickadee (*Poecile rufescens*), orange-crowned warbler (*Vermivora celata*), savannah sparrow (*Passerculus sandwichensis*), yellow-rumped warbler (*Dendroica coronata*), and unidentified gulls.

The presence of multiple songbirds indicates suitable songbird habitat is present in this area. No candidate, threatened, or endangered species of birds under the Endangered Species Act were observed during the bird surveys. Breeding habitat for common loons, great blue herons, and Barrow's goldeneyes is listed as priority habitat by the WDFW. Although these species were observed during surveys, the mitigation area appears to not support breeding habitat for these species.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREA A

3.1 SITE SELECTION RATIONALE

Mitigation Area A is in a prime location to locally increase water-quality, hydrologic, and habitat functions at the Terminal site. The presence of Stream 2, Stream 2A, Category I wetlands along Stream 2, other small areas of wetlands, and priority habitats (riparian areas, urban natural open space) in a previously developed area with fill, impervious surfaces, and invasive species provides the opportunity to increase fish and wildlife habitat, repair hydrologic connectivity, and improve water quality functions.

Upland areas with fill and impervious surfaces adjacent to riparian wetlands provide the opportunity to convert the disturbed areas to high functioning wetlands. Coniferous trees in the previously developed area can be retained as they provide for perching bird species such as bald eagle and peregrine falcon.

Removing the remnant structures and concrete foundations on Mitigation Area A will decrease impervious surface cover and make way for wetland creation. The range of topography, soil types, and existing hydrology at Mitigation Area A will allow for creation of aquatic bed, emergent, shrub, and forested wetlands. The new wetlands will connect existing wetlands along Stream 2 (Wetlands 13A and 13E) and the wetlands to the south (Wetlands 13F and 13G). Stream 2 will be directed through a newly-created natural channel, which will restore its likely historic connection to the Strait of Georgia.

Located west of Mitigation Area A, Wetland 12 is situated at a similar position on the landscape; using this existing wetland as a biological benchmark in designing Mitigation Area A will help ensure the site's long-term success and high-functioning capabilities.

3.2 FUNCTIONAL ASSESSMENT

The proposed actions at Mitigation Area A would create approximately 7.9 acres of Category II depressional, riverine, and slope wetlands. Table A-3 identifies the compensatory functions that the created wetland would provide 15 years post-construction, after performance standards are met, based on the *Wetland Rating System for Western Washington* (Hruby 2004).

Due to the presence of farmed fields upstream and stormwater inputs from adjacent development, Mitigation Area A will have moderate opportunity to filter out and retain sediment and pollutants, increasing water quality for downstream aquatic resources. Persistent dense riparian vegetation will slow flows from Stream 2 and 2A, allowing sediments and pollutants to settle out in depressional areas and become assimilated into the soil column. Forested riparian zones along small tributaries draining to the Strait of Georgia, such as Stream 2, are identified by WDFW as important for maintaining water quality (WDFW 2006). Persistent vegetation will also attenuate potential flooding from Stream 2, and depressional areas will be able to store floodwater; however, the overall hydrologic functions of Mitigation Area A are anticipated to be low because of the position of this area low in the watershed.

The highest increase in functions that Mitigation Area A will provide is with respect to fish and wildlife habitat. Expanded wetlands along Stream 2 will provide additional amphibian, bird, and other wildlife habitat, while improving water quality in Stream 2 for downstream aquatic species. Improving current conditions in the riparian area and bed of Stream 2 would provide much more suitable in-stream habitat for fish species should they gain access and inhabit Stream 2. High interspersion of Cowardin classes, multiple hydroperiods, and special habitat features in the created wetlands (coastal lagoon) will provide numerous niches for wildlife species, especially amphibians and birds. The presence of other wetlands and priority habitats in the vicinity increases the likelihood of species dispersion to and from Mitigation Area A. Therefore, Mitigation Area A has high potential for habitat mitigation opportunities.

Table A-3 Hydrologic, Water-Quality, and Habitat Functions to be Provided by Mitigation Area A

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
Water Quality	18	• Intermittently flowing outlet • Soil 2 inches below the surface is not clay or organic • Persistent ungrazed vegetation ≥95% of area • Area seasonally ponded is > 1/4 total area but < 1/2 total area • Untreated stormwater discharges to wetland; stream discharges into wetland that drains farmed field and roads; developed areas within 150 ft	• Filter out and retain sediment and pollutants from farmed fields upstream and stormwater from adjacent development • Increased water quality for on-site and downstream aquatic resources
Hydrologic	8	• Unit has an intermittently flowing outlet • Marks of ponding minimum 0.5 ft to maximum 2 ft from surface or bottom of outlet • Area of watershed basin is 10 to 100 times the area of the wetland unit • Opportunity to reduce flooding and erosion is low because of the low position this location has in the watershed.	• Increased riparian wetland area and storage volume will attenuate potential flooding from Stream 2 and its tributary 2A.
Habitat	31	• Cowardin classes present: aquatic bed, emergent, scrub-shrub, forested; forested class has three out of five strata • Hydroperiods: seasonally flooded, occasionally flooded, saturated only, seasonally flowing stream in or adjacent to the wetland • Plant richness: >19 species • High interspersion of Cowardin classes • LWD, standing snags, overhanging vegetation at least 3.3 ft over a stream contiguous with the unit for at least 33 ft, >1/4 acre thin-stemmed persistent vegetation in areas seasonally inundated, invasive plants cover less than 25% of wetland in each stratum • Buffers: 100 meters (330 ft) relatively undisturbed vegetated areas >25% circumference • Priority habitats within 330 ft: biodiversity areas and corridors, riparian, in stream, near shore, snags, and logs • At least three other wetlands within 1/2 mile; connections between them are relatively undisturbed	• The following will provide several niches and habitat connectivity for a variety of species: o High Cowardin interspersion between 4 classes o Multiple hydroperiods o High plant species richness o Multiple special habitat features o Multiple priority habitats within 330 ft o Other wetlands within the vicinity • Area A will expand upon existing WDFW priority habitat associated with Stream 2 riparian areas and urban natural open space
Total	57 (Cat. II)	Moderate Water Quality Functions Low Hydrologic Functions High Habitat Functions	

1 Hruby (2004)

2 The score represents anticipated site conditions 15 years post-construction.

4.0 COMPENSATORY MITIGATION GOALS AND OBJECTIVES

4.1 GOALS OF THE PROPOSED MITIGATION

The goal of the action at Mitigation Area A is to create wetlands and a new stream channel in this location just upland of the beach. The compensation area will be adjacent to but separate from Wetland 12, which lies to the west beyond Gulf Road and adjacent to the Strait of Georgia. In addition, the mitigation plan aims to expand upon the existing riparian priority habitats along Stream 2 to increase habitat and water quality functions (Figure A-2).

Mitigation Area A provides unique opportunities to expand the functions unique to wetlands that exist near the confluence of marine and freshwater systems. This location in the landscape increases local biodiversity by providing habitat niches for freshwater species in the vicinity of saltwater species. More importantly, this area will provide habitat for species that inhabit both freshwater and brackish/saltwater environments, such as certain shorebirds. In addition, wetlands and steams near saltwater are important habitats for salmonids.

The overall goals of the compensatory mitigation at Mitigation Area A are as follows:

- Increase the extent of high-functioning freshwater wetlands;
- Increase hydrologic connectivity between Stream 2, on-site wetlands, and the Strait of Georgia;
- Provide an additional stream channel with connectivity to the Strait of Georgia; and
- Increase the area and quality of functioning priority habitats at Area A.

4.2 OBJECTIVES OF THE PROPOSED MITIGATION

The specific objectives of the proposed compensation are as follows:

- Create approximately 7.9 acres of Category II wetland including, aquatic bed, emergent, shrub, and forested wetland areas.
- Create a new channel for new flows on Stream 2, while maintaining the existing connection to Wetland 12.

Mitigation objectives would be attained through the following actions:

- Excavate to create wetland hydrologic conditions in the area between Wetlands 13A and 13E and extending to Wetlands 13G and 13F.
- Plant the excavated area with native emergent, scrub-shrub, and forest wetland vegetation.

- Remove derelict structures and impervious surfaces.
- Reduce the presence of invasive species, especially Himalayan blackberry.
- Restore Stream 2's connection with the Strait of Georgia by redirecting it towards the wetland creation areas, thereby increasing accessible fish habitat.
- Install habitat features in Stream 2, including fish gravels and LWD.

4.3 HYDROLOGIC REGIME

Wetland hydrology will be established in the wetland creation areas by grading and redirecting Stream 2. Newly created braided channels will disperse Stream 2 during periods of high flows into adjacent wetlands. The area will be graded so that surface flows would drain to the Strait of Georgia through the existing culvert under Gulf Road.

4.4 PLANTING PALETTE AND COMMUNITY COMPOSITION

The proposed mitigation includes planting a variety of plant species with the goal of establishing a diverse community and accelerating shrub and forest succession. Plant communities will include aquatic bed, emergent, and shrub areas in the central portion, and forested to the north. This vegetation gradient will provide diverse habitat niches for wildlife and will expand upon the existing priority habitat along the Strait of Georgia shoreline and riparian areas along Stream 2 and 2A. The few large coniferous trees near the old house foundation will be left undisturbed.

5.0 REFERENCES

AMEC Environment and Infrastructure, Inc. (AMEC). 2008. Wetland Determination and Delineation Report, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

AMEC. 2012. Avian Presence Report, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

Hruby, T. 2004. Washington State Wetland Rating System for Western Washington—Revised. Washington Department of Ecology #04-06-025.

Natural Resources Conservation Service (NRCS). 2007. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Last revision, September 11, 2009. Accessed January 7, 2011.

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Whatcom County. 2005a. Whatcom Critical Areas Ordinance – Salmonid Fish Habitat Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

Whatcom County. 2005b. Whatcom Critical Areas Ordinance – Wildlife Habitat Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- APPROXIMATE DRAINAGE
- APPROXIMATE STREAM
- SURVEYED STREAM
- STREAM AND DRAINAGE FLOW DIRECTION
- WETLAND FLOW DIRECTION
- EXISTING WETLAND AREA
- PROPOSED MITIGATION AREA
- PROJECT AREA BOUNDARY

Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

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DWN BY: SD
CHK'D BY: JG
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: 1 inch = 100 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA A
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE A-1

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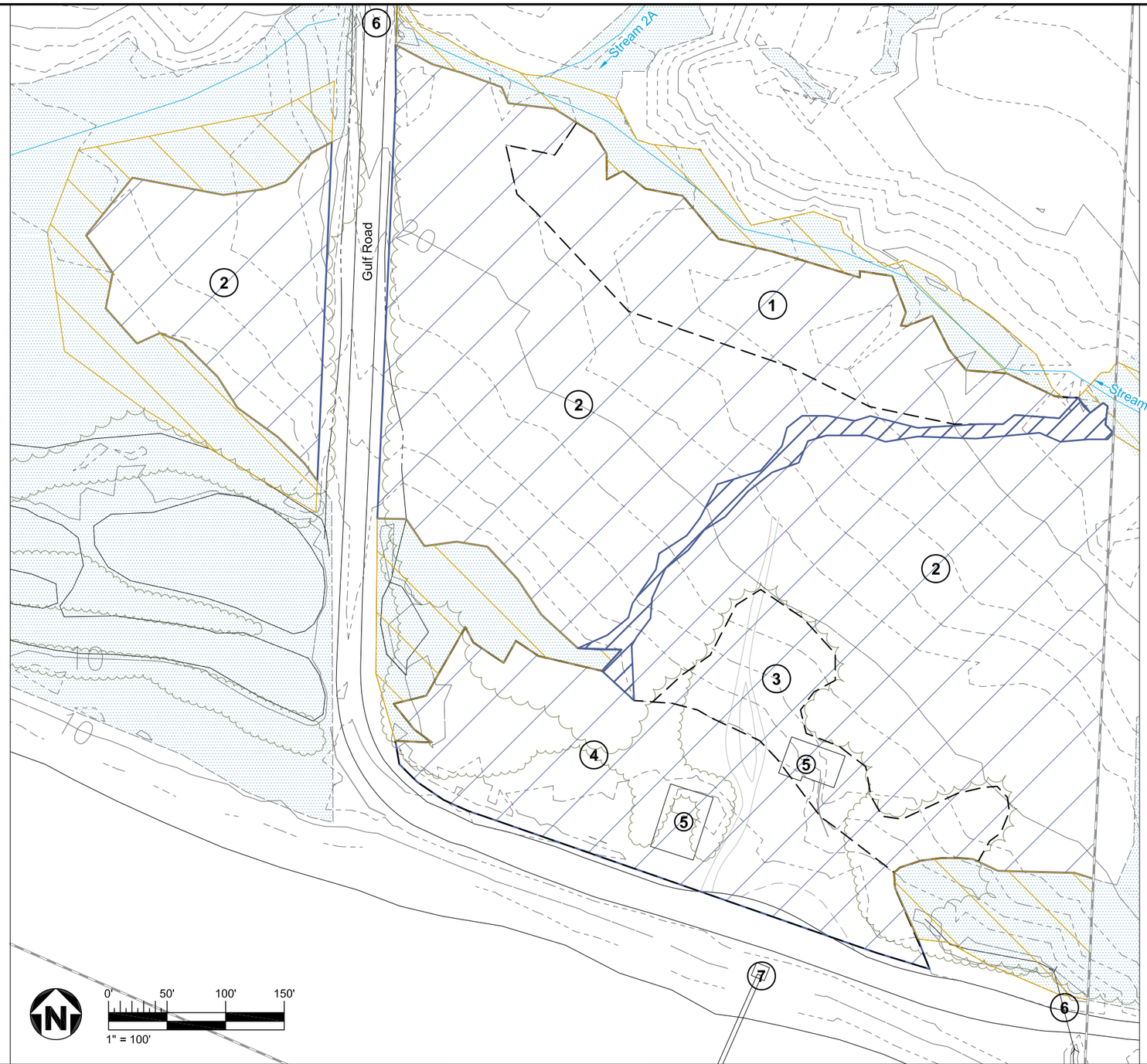

LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROJECT AREA BOUNDARY
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT
- PROPOSED STREAM RELOCATION

1. PFO/braided wetland creation.
2. PFO wetland creation.
3. PSS wetland creation.
4. Emergent wetland and aquatic bed creation.
5. Existing structures to be removed.
6. Existing culvert to be used as outlet.
7. Derelict structure to be removed.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
David Evans & Associates, 2010-04-01

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DWN BY: dp
CHK'D BY: KD
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA A

DATE: FEBRUARY 2012
PROJECT NO: 091515338C-01-03
REV. NO.: 1
FIGURE No. A-2

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APPENDIX B

Mitigation Area B

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1.0 INTRODUCTION

Mitigation Area B is located on the western portion of the Gateway Pacific Terminal ("Terminal") site and is currently an area of abandoned field (Figure B-1). Mitigation Area B provides the opportunity to increase wetland area and wetland functions, including improving water quality, flood attenuation, and habitat.

The proposed actions are to:

1. Create approximately 1.8 acres of Category II forested wetland from existing upland areas.
2. Enhance approximately 3.7 acres of Category III wetlands adjacent to the created areas by increasing plant diversity, providing habitat features where appropriate, and reducing invasive species.
3. Reduce the presence of invasive species.
4. Plant conifer species to increase habitat functions.

2.0 EXISTING CONDITIONS

Mitigation Area B is a 5.5 acre field in the northwest quadrant of the Henry Road and Gulf Road intersection. It is located adjacent to the eastside of Wetland 7A, a 40.1-acre Category III forested slope wetland (Table B-1). Two roadside drainages currently abut the east and south side of this mitigation area. Drainage 5 flows south along the west side of Gulf Road until it intersects Stream 5, which flows west along the north side of Henry Road to Stream 1. Topography on Mitigation Area B slopes gently down to the southwest.

Figure B-1 shows the existing stream network, wetlands, and hydrologic flow at Mitigation Area B. Wetlands are hydrologically connected to Stream 1 and the Strait of Georgia via surface water or groundwater. See the *Wetland Determination and Delineation Report* (AMEC 2008) for more details on this area's wetlands and streams.

Soils mapped within Mitigation Area B include Whitehorn silt loam 0 to 2 percent slopes (NRCS 2007). These soils are listed as poorly drained with frequent ponding. The presence of a shallow water table and existing wetlands indicates that the soils in this area are conducive to creating wetlands in this area.

Stream 5 and Drainage 5 flow in excavated and maintained roadside ditches that flow seasonally for at least three months out of the year. Stream 5 and Drainage 5 are partially or wholly vegetated, primarily with reed canarygrass, and annually maintained. Stream 5 and Drainage 5 provide little habitat for aquatic or terrestrial species. They have little to no overstory cover, are of relatively

constant width (3 to 5 feet), and have steep, compacted stream banks. Stream 5, adjacent to Mitigation Area B, has not been identified as potential or documented fish-bearing waters. As such, fish habitat is not present at or adjacent to Mitigation Area B.

Uplands at and in the vicinity of Mitigation Area B consist of typical red alder forested areas, scrub-shrub areas, and maintained or grazed pastures. Red alder forests in the area are largely homogeneous, with little variation in stand age or community composition. Coniferous species are relatively rare, usually only one or two trees per acre. Upland pastures are vegetated with predominantly grass species such as fescue and bentgrass.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREA B

The proposed actions would create approximately 1.8 acres of Category II forested wetlands and enhance approximately 3.7 acres of Category III emergent wetlands in an actively used agricultural field. Wetland hydrology for the area will be established by lowering grades in the uplands to intercept the groundwater table. Treated stormwater from the adjacent West Loop will also contribute to hydrologic conditions in this location. Drainage 5 will be re-directed to this wetland area to increase water quality and hydrologic functioning of this created and enhanced wetland mitigation area.

The goals of the action at Mitigation Area B is to create wetlands from upland areas and enhance existing wetlands to increase hydrologic and habitat connectivity between existing wetlands to provide increased water quality and habitat functions in these areas. The compensation area will expand upon the existing portions of Wetland 7A. Enhancing wetlands in the field by planting trees and shrub species will increase habitat functions.

The specific objectives of the proposed compensation are as follows:

1. Create approximately 1.8 acres of Category II scrub-shrub and forested wetlands.
2. Enhance approximately 3.7 acres of Category III forested wetlands.
3. Improve water quality functions for downstream resources.
4. Improve hydrologic functions for downstream resources.
5. Improve habitat functions for known and presumed on-site wildlife.

Mitigation objectives would be attained through the following actions:

1. Excavate the existing topographic contours 1 to 2 feet in the uplands to create wetland hydrologic conditions.
2. Replant the re-graded areas with native forest wetland vegetation.

3. Divert Drainage 5 and stormwater inputs from the proposed development into Mitigation Area B.
4. Plant conifer species to increase habitat functions.

Table B-1 identifies the scores of Mitigation Area B and compensatory functions that the created wetlands would provide 15 years postconstruction after performance standards are met, based on the *Wetland Rating System for Western Washington* (Hruby 2004).

4.0 REFERENCES

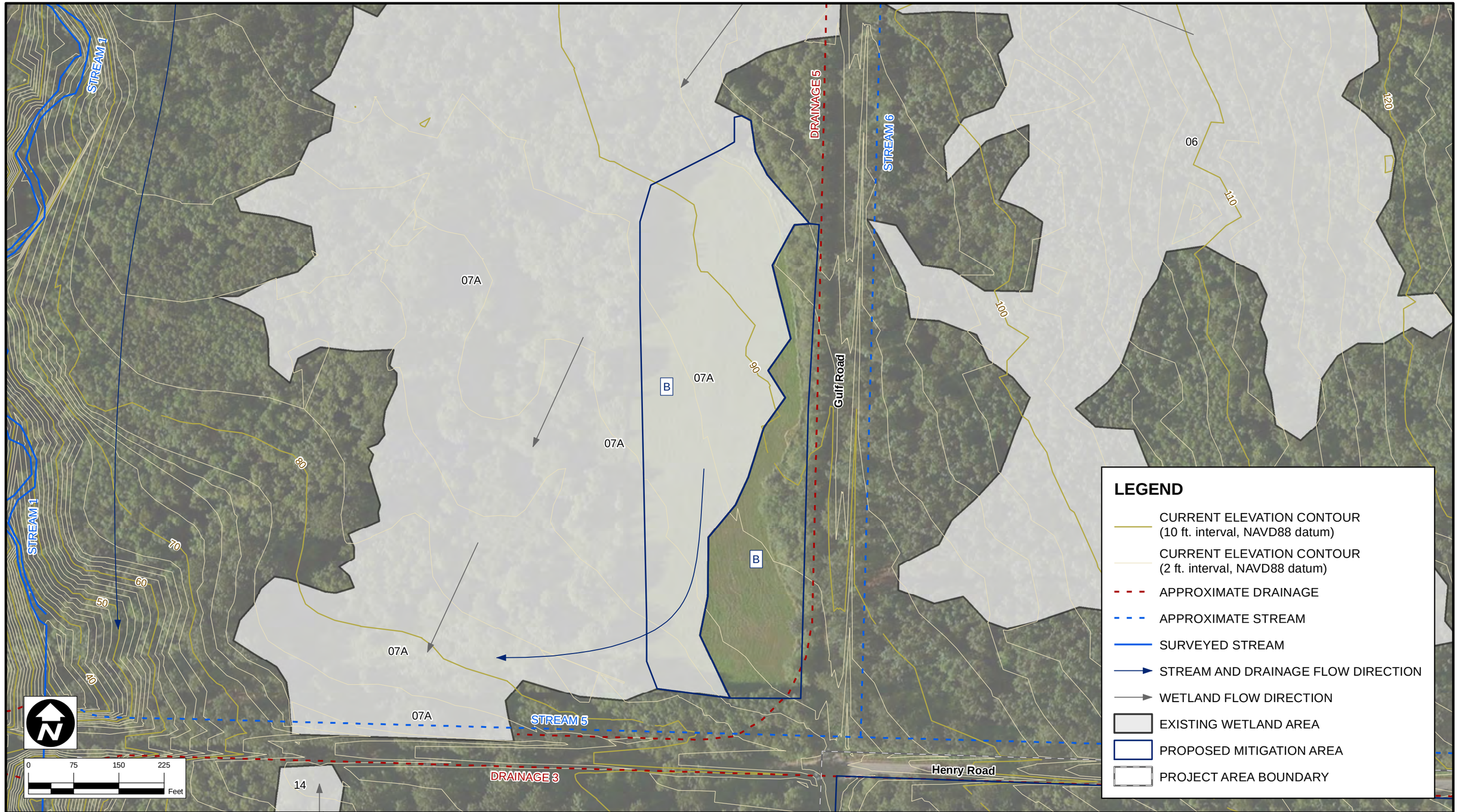
AMEC Environment and Infrastructure, Inc. (AMEC). 2008. *Wetland Determination and Delineation Report*, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

Hruby, T. 2004. *Washington State Wetland Rating System for Western Washington—Revised*. Washington State Department of Ecology, Publication #04-06-025.

Natural Resources Conservation Service (NRCS). 2007. *Web Soil Survey*. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Last revision, September 11, 2009. Accessed January 7, 2011.

Table B-1 Hydrologic, Water Quality, and Biological Characteristics and Functions to be Provided by Mitigation Area B

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
Water Quality	19	• Intermittently flowing outlets • Soil 2 inches below the surface is not clay or organic • Persistent ungrazed vegetation ≥95% of areas • Area seasonally ponded is >1/4 total area but <1/2 total area • Untreated stormwater discharges to wetlands; stream discharges into wetlands that drain farmed field and roads; developed areas within 150 feet (ft) • Depressions that cover <1/2 wetland area and trees or shrubs >2/3 wetland area	• Filter out and retain sediment and pollutants from adjacent development • Increased water quality for on-site and downstream aquatic resources
Hydrologic	8	• Intermittently flowing outlets • Marks of ponding at least 0.5 to <2 ft from surface or bottom of outlets • Area of watershed basins are more than 100 times the area of the wetland units • Opportunity to reduce flooding and erosion is low • Ratio of wetland unit to stream is between 10 and 20 and forested or shrub >1/3 area	• Improved downstream hydrologic conditions for Stream 1 as stormwater and ditch flows are diverted to Mitigation Area B.
Habitat	24	• Cowardin classes present: scrub-shrub, forested, forested class has three out of five strata • Hydroperiods: occasionally flooded, seasonally flooded, saturated only, seasonally flowing stream in or adjacent to the wetland • Plant richness: Mitigation Area B, 5–19 species • Interspersion of Cowardin classes: moderate • Large woody debris (LWD), standing snags, overhanging vegetation at least 3.3 ft over a stream contiguous with the unit for at least 33 ft, invasive plants cover less than 25% of wetland in each stratum • Buffers: 330 ft relatively undisturbed vegetated areas >25% or >50% circumference • Within 5 miles of a brackish or saltwater estuary • Priority habitats within 330 ft: biodiversity areas and corridors, riparian, in stream, nearshore, snags, and logs • At least three other wetlands within 1/2 mile; connections between them are relatively undisturbed	• The following will provide several niches and habitat connectivity for a variety of species: o Multiple Cowardin classes o Multiple hydroperiods o Multiple special habitat features o Relatively undisturbed buffers o Multiple priority habitats within 330 ft o Other wetlands within the vicinity
Total	51 (Cat. II)	Moderate to High Water Quality Functions Low Hydrologic Functions High Habitat Functions	



Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

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CHK'D BY: JG
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: 1 inch = 150 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA B
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE B-1

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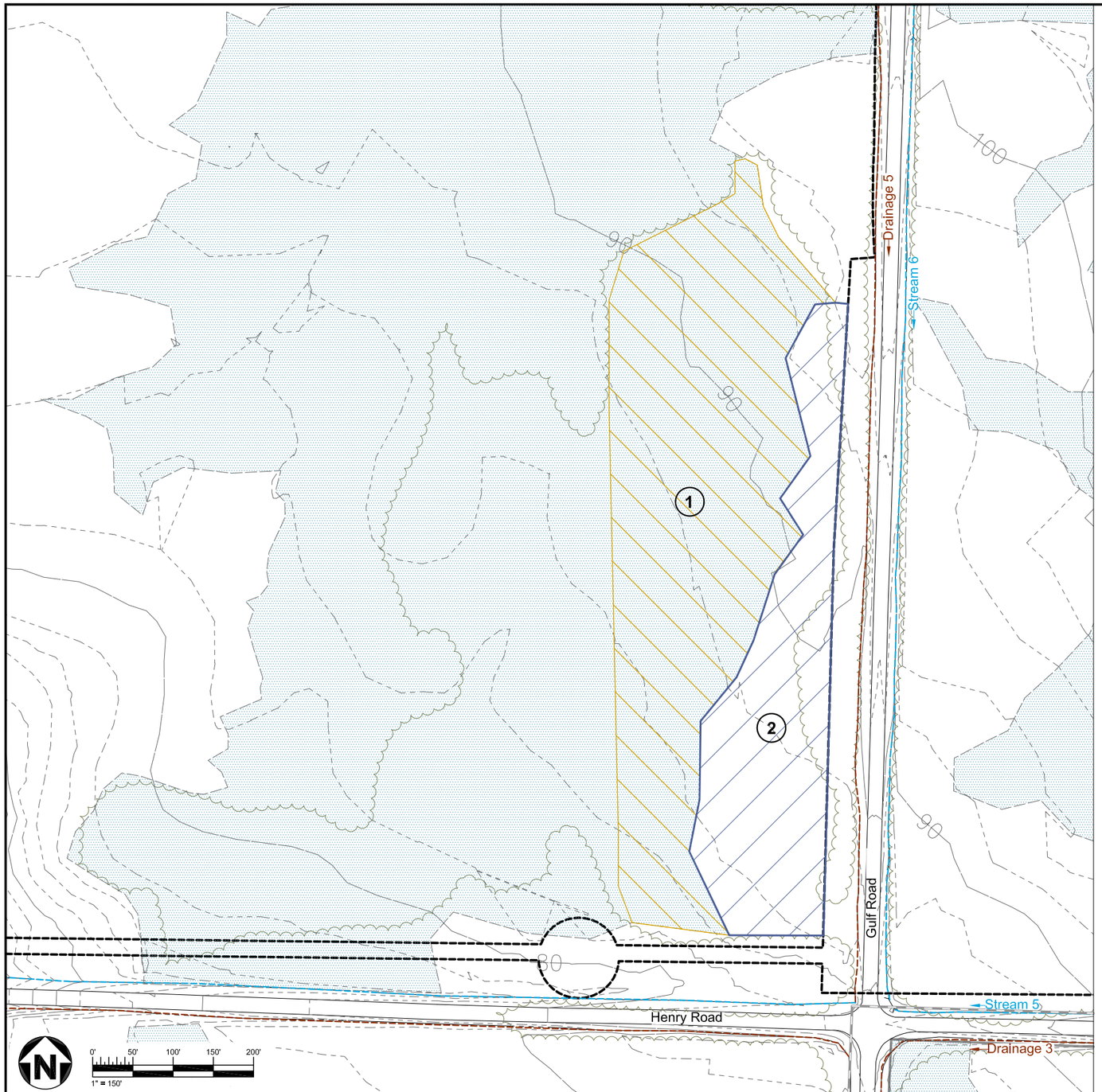

LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY
- PROPOSED DEVELOPMENT FOOTPRINT
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT

1. Wetland enhancement. Proposed PFO wetland.
2. PFO wetland creation.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
David Evans & Associates, 2010-04-01

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DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA B

DATE: FEBRUARY 2012
PROJECT NO: 091515338C-01-03
REV. NO.: 1
FIGURE No. B-2

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APPENDIX C

Mitigation Area C

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1.0 INTRODUCTION

Mitigation Area C is located on the western portion of the Gateway Pacific Terminal ("Terminal") site, and currently consists of forested areas, a paved road, and agricultural fields. The proposed mitigation is designed to increase habitat functions for wildlife by expanding and creating wetlands adjacent to the Strait of Georgia and increasing habitat access for fish on Stream 1. Significant water quality and hydrologic functions will be provided by Mitigation Area C as these wetlands will receive stormwater from the project area, which will protect water quality, downstream aquatic resources, and infrastructure.

Mitigation Area C provides the opportunity to improve water quality, hydrologic, and habitat functions through the following actions:

1. Create approximately 37.5 acres of Category II scrub-shrub and forested wetland from existing upland areas.
2. Enhance approximately 7.1 acres of existing Category III scrub-shrub and forested wetlands.
3. Replace the culvert under Henry Road on Stream 1 with fish friendly open bottom culverts to increase access to 4,000 linear feet of stream.
4. Restore hydrological connectivity by removing the Henry Road sub-base and road prism, and plugging the roadside ditches.

2.0 EXISTING CONDITIONS

Mitigation Area C consists of four adjacent areas on the southwest portion of site, totaling 44.6 acres. Additional mitigation actions are proposed at the Stream 1 culvert underneath Henry Road, which currently blocks fish access to suitable habitat in Stream 1 north of Henry Road.

The larger portion of Mitigation Area C is an approximately 32.2-acre area located south of Henry Road, and consists almost entirely of an agricultural field with a few fringe scrub-shrub and forested areas. Mitigation Area C will envelop Wetland 10B, a 0.1-acre Category III scrub-shrub depressional wetland, and Wetland 10A, a 3.7-acre Category III forested slope wetland. Wetlands 10A and 10B have no surface outlet and drain to groundwater before flowing south to the Strait of Georgia. Detailed descriptions are provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

The portion of Mitigation Area C north of Henry Road along the southwestern site boundary consists of a 5.7-acre forested area adjacent to the west of Wetlands 9A and 9C. Wetland 9A, a 25.7-acre Category III slope wetland that includes a mix of forested, scrub-shrub, and emergent areas, is located on the north side of Henry Road (Table C-1). An existing 2.9-acre wetland enhancement area

is located within Wetland 9A. Wetland 9C is a 0.2-acre Category III forested depressional wetland located south of Wetland 9A. This portion of Mitigation Area C is predominantly forested, and topography generally slopes to the southeast.

Table C-1 Mitigation Area C Existing Wetland Characteristics

Wetland Name	Hydro-geomorphic Class[1]	Rating[2]	Total Area (acres)	Location[3]	Hydrologic Connection
9A	Slope	III	25.7	North of Henry Road on southwestern portion	Flows south to Drainage 7, then to Stream 1 and Strait of Georgia
9C	Depressional	III	0.2	North of Henry Road on southwestern portion, along west site boundary	Contiguous with Wetland 9A; flows south to Drainage 7, then to Stream 1 and Strait of Georgia
10A	Slope	III	3.7	South of Henry Road on southwestern portion	Abuts Drainage 4 on south side of Henry Road – No apparent outlet; likely drains to groundwater flowing downslope to Strait of Georgia
10B	Depressional	III	0.1	South of Henry Road on southwestern portion	Isolated – No apparent outlet; likely drains to groundwater flowing downslope to Strait of Georgia

[1] Brinson (1993)
[2] Hruby (2004)
[3] Refer to Figure C-1.

Figure C-1 shows the existing stream network, wetlands, and hydrologic flow at Mitigation Area C. Drainage 4 flows east along the south side of Henry Road, and Drainage 7 flows east along the north side of Henry Road, both towards Stream 1. As these drainages are roadside ditches, habitat value is considered very low. All wetlands are hydrologically connected to Stream 1 and the Strait of Georgia via surface water or groundwater.

Soils mapped within the wetlands identified above and Mitigation Area C include Whitehorn silt loam with 0- to 2-percent slopes (NRCS 2007). These soils are poorly drained with water at or near the surface, and have a high frequency of ponding available water capacity. The presence of a shallow water table and existing wetlands indicates that the soils in this area are conducive to wetland hydrology once excavated in the mitigation areas.

Uplands at and in the vicinity of Mitigation Area C consist of typical red alder forested areas, scrub-shrub areas, and maintained or grazed pastures. Red alder forests in the area are largely

homogeneous, with little variation in stand age or community composition. Abundant standing or fallen dead trees (mainly smaller-diameter red alder) and very few light gaps characterize the forests. Dense thickets of Nootka rose and Himalayan blackberry are common along forest edges. Coniferous species are relatively rare, usually only one or two trees per acre, some of which appear to be much older than the surrounding red alder forest. Upland pastures are vegetated with predominantly grass species such as reed canarygrass and bentgrass.

2.1 WILDLIFE

2.1.1 Fish

Drainages 4 and 7 adjacent to Mitigation Area C have not been identified as potential or documented fish-bearing waters. Fish habitat is not present at or adjacent to Mitigation Area C beyond the replacement of the culvert on Stream 1 under Henry Road.

Stream 1 is the only on-site stream identified as having current fish distribution (Whatcom County 2005a). WDFW indicated that the stream is unlikely to be used by salmon, but could be potential habitat for cutthroat and other salmonids. There is considerable potential to improve conditions for fish species, such as increasing habitat accessibility to the upper reaches of Stream 1 by removing the culvert that is currently a barrier to fish passage.

2.1.2 Birds

The southern portion of the Terminal site along the shoreline is mapped by the Washington Department of Fish and Wildlife (WDFW) as peregrine falcon (*Falco peregrinus*) winter habitat, as the area coincides with the wintering waterfowl areas on Bellingham Bay, Lummi Bay, and the Lummi Flats (WDFW 2006). Mitigation Area C is close to these priority habitats. This area is also mapped by WDFW as urban natural open space and is characterized as having steep bluffs with some forested crest and many large perch trees. The area is used by bald eagles (*Haliaeetus leucocephalus*) for foraging year-round and by peregrine falcons in winter (WDFW 2006); an active bald eagle nest is located at the mouth of Stream 1.

AMEC conducted bird surveys in representative areas from 2008 to 2009 at the Terminal site to determine bird presence and use of the site.

Point Count Station 9 was located in the forested riparian area along Stream 1 to the southeast of Wetland 10A. Birds observed from this location during the winter and breeding seasons include American robin (*Turdus migratorius*), Bewick's wren (*Thyrothorus ludovicianus*), black-capped chickadee (*Poecile rufescens*), winter wren (*Troglodytes troglodytes*), song sparrow (*Melospiza melodia*), spotted towhee (*Pipilo maculatus*), western grebe (*Aechmophorus occidentalis*), and American goldfinch (*Carduelis tristis*) (AMEC 2009).

Area Count Station 1 was located in the upland meadow to the west of Wetland 10B. Birds observed from this location during the winter and breeding seasons include American robin, Bewick's wren, red-tailed hawk (*Buteo jamaicensis*), song sparrow, spotted towhee, orange-crowned warbler (*Vermivora celata*), savannah sparrow (*Passerculus sandwichensis*), yellow-rumped warbler (*Dendroica coronata*), western grebe, and unidentified gulls (AMEC 2009).

The presence of multiple songbirds indicates that suitable songbird habitat is present in this area. No candidate, threatened, or endangered species of birds under the Endangered Species Act were observed during the bird surveys. Breeding habitat for common loons, great blue herons, and Barrow's goldeneyes is listed as priority habitat by the state of Washington. Although these species were observed during surveys, the study area contains no breeding habitat for these species.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREA C

The proposed actions would create approximately 37.5 acres of Category II forested wetlands, and enhance approximately 7.1 acres of Category III scrub-shrub and forested wetlands.

Wetland hydrology for the mitigation area will be established by lowering grades to intercept the groundwater table, and will be augmented by treated stormwater from the adjacent West Loop to contribute to hydrologic functions.

Opportunities to increase fish and wildlife habitat functions are provided by Mitigation Area C because of its proximity to other wetlands and priority areas, especially suitable fish habitat north of Henry Road (Whatcom County 2005a & 2005b). Mitigation Area C will increase connectivity between habitats on the northern and southern portions of Stream 1 as the culvert under Henry Road is replaced with a fish-friendly bottomless culvert.

The goal of the action at Mitigation Area C is to create wetlands from upland areas and enhance existing wetlands. These actions will increase hydrologic and habitat connectivity between existing wetlands to provide increased water quality and habitat functions in this area of the project.

The specific objectives of the proposed compensation are as follows:

1. Create approximately 37.5 acres of Category II scrub-shrub and forested wetlands from existing upland areas.
2. Enhance approximately 7.1 acres of existing Category III scrub-shrub and forested wetlands.
3. Improve water quality functions for downstream resources.
4. Improve hydrologic functions for downstream resources.

5. Improve habitat functions for known and presumed on-site wildlife.

Mitigation objectives would be attained through the following actions:

1. Excavate the existing topographic contours by 2 to 3 feet to create wetland hydrologic conditions in specified areas.
2. Replant the re-graded areas with native scrub-shrub and forest wetland vegetation.
3. Plant conifer species to increase habitat functions.
4. Remove the Henry Road subbase and road prism, and plug existing roadside ditches to connect existing and proposed wetlands north and south of Henry Road.
5. Remove invasive vegetation and replant with native species.
6. Install a fish-friendly bottomless culvert on Stream 1 underneath Henry Road to increase access to 4,000 linear feet of suitable fish habitat.

Table C-2 identifies the average scores of Mitigation Area C and compensatory functions that the created wetlands would provide 15 years post-construction after performance standards are met, based on the *Wetland Rating System for Western Washington* (Hruby 2004). All wetlands were classified as depressional.

Table C-2 Hydrologic, Water Quality, and Biological Characteristics and Functions to Be Provided by Mitigation Area C

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
Water Quality	19	• Intermittently flowing outlets • Soil 2 inches below the surface is not clay or organic • Persistent ungrazed vegetation ≥95% of areas • Area seasonally ponded is >1/4 total area but <1/2 total area • Untreated stormwater discharges to wetlands; stream discharges into wetlands that drain farmed field and roads; developed areas within 150 ft	• Filter out and retain sediment and pollutants from adjacent development • Increased water quality for on-site and downstream aquatic resources
Hydrologic	8	• Intermittently flowing outlets • Marks of ponding at least 0.5 to <2 ft from surface or bottom of outlets • Area of watershed basins are more than 100 times the area of the wetland units • Opportunity to reduce flooding and erosion is low	• Improved downstream hydrologic conditions for Stream 1 stormwater is captured and filtered before entering Stream 1
Habitat	24	• Cowardin classes present: scrub-shrub, forested, forested class has three out of five strata • Hydroperiods: occasionally flooded, seasonally flooded, saturated only, seasonally flowing stream in or adjacent to the wetland • Plant richness: >19 species • Interspersion of Cowardin classes: high • LWD, standing snags, overhanging vegetation at least 3.3 ft over a stream contiguous with the unit for at least 33 ft, invasive plants cover less than 25% of wetland in each stratum • Buffers: 330 ft relatively undisturbed vegetated areas >25% or >50% circumference; • Within 5 miles of a brackish or saltwater estuary • Priority habitats within 330 ft: biodiversity areas and corridors, riparian, in stream, near shore, snags, and logs • At least three other wetlands within 1/2 mile; connections between them are relatively undisturbed	• The following will provide several niches and habitat connectivity for a variety of species: o Multiple Cowardin classes o Multiple hydroperiods o Multiple special habitat features o Relatively undisturbed buffers o Multiple priority habitats within 330 ft o Other wetlands within the vicinity
Total	51(Cat. II)	Moderate to High Water Quality Functions Low Hydrologic Functions High Habitat Functions	

[1] Brinson (1993)

[2] Hruby (2004)

4.0 REFERENCES

AMEC Earth & Environmental, Inc. (AMEC). 2008. Wetland Determination and Delineation, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

AMEC. 2012. Avian Presence Report, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

Hruby, T. 2004. Washington State Wetland Rating System for Western Washington—Revised. Washington State Department of Ecology, Publication #04-06-025.

Natural Resources Conservation Service (NRCS). 2007. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Last revision, September 11, 2009. Accessed January 7, 2011.

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Whatcom County. 2005a. Whatcom Critical Areas Ordinance –Salmonid Fish Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

Whatcom County. 2005b. Whatcom Critical Areas Ordinance –Wildlife Habitat Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

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LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- APPROXIMATE DRAINAGE
- APPROXIMATE STREAM
- SURVEYED STREAM
- STREAM AND DRAINAGE FLOW DIRECTION
- WETLAND FLOW DIRECTION
- EXISTING WETLAND AREA
- PROPOSED MITIGATION AREA
- PROJECT AREA BOUNDARY

Strait of Georgia

Henry Road

DRAINAGE 7

DRAINAGE 4

DRAINAGE 3

STREAM 1

STREAM 5

08A

09A

09C

10A

10B

11A

07A

14

C

100

90

80

70

60

50

40

30

20

10

0 150 300 450 Feet

Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

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AMEC
11810 North Creek Parkway N
Bothell, WA 98011

amec

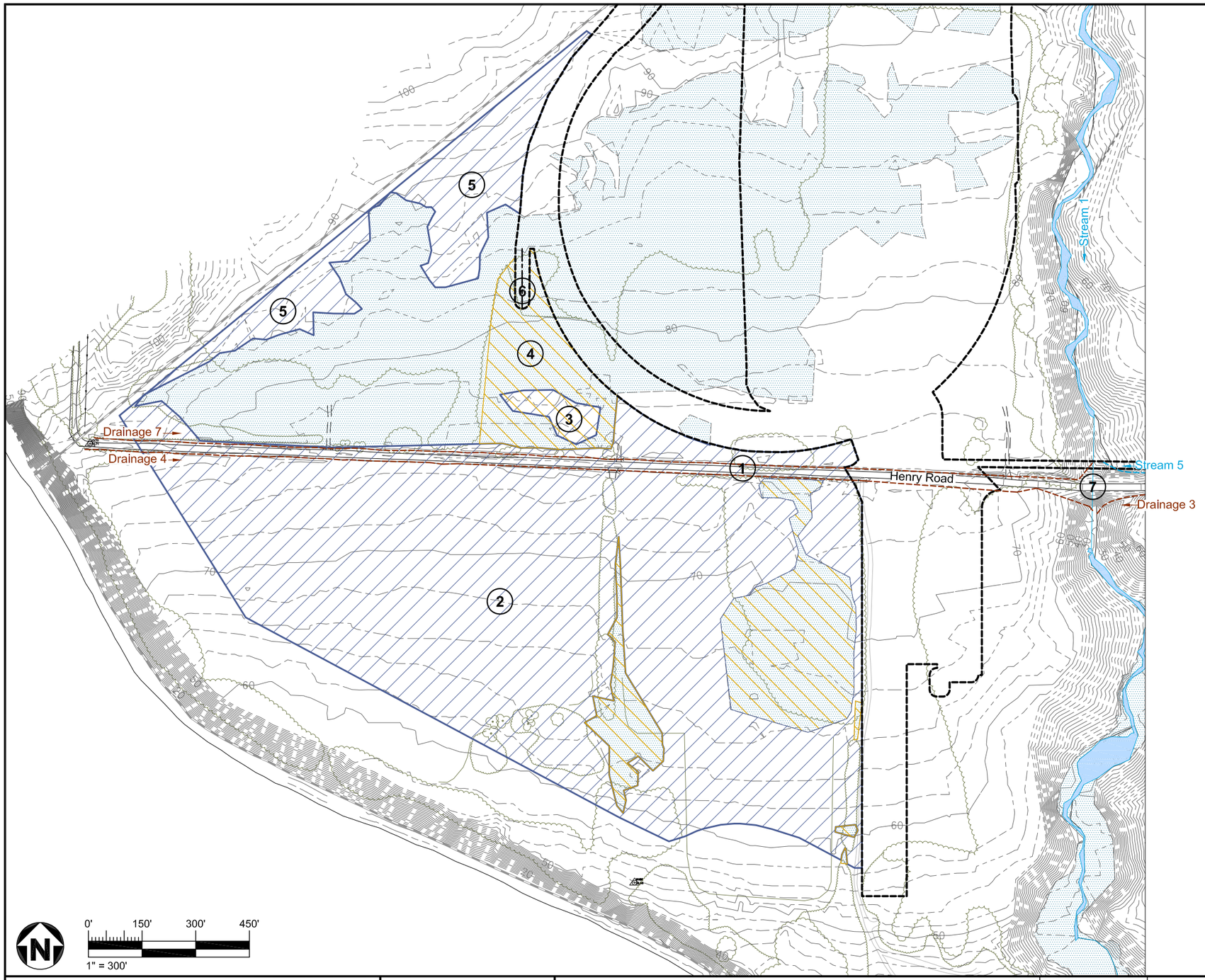
DWN BY:	SD
CHK'D BY:	JG
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	1 inch = 300 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA C
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE:	MARCH 2012
PROJECT NO.:	091515338C-01-03
REV. NO.:	-
FIGURE NO.:	FIGURE C-1

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure C-1 - Mitigation Areas C - Existing Stream Network.mxd



LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROJECT AREA BOUNDARY
- PROPOSED DEVELOPMENT FOOTPRINT
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT

1. Henry road and subbase to be removed and flow from Drainage 4 and 7 to be utilized in wetland creation.
2. PFO and PSS wetland creation.
3. PFO wetland creation.
4. Wetland enhancement. Proposed PFO wetland.
5. PFO wetland creation.
6. Flow from proposed ditch to be utilized in wetland creation.
7. Existing culvert to be removed.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
David Evans & Associates, 2010-04-01

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AMEC
11810 North Creek Parkway North
Bothell, WA, U.S.A. 98011

amec

DWN BY: dp
CHK'D BY: KD
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA C

DATE: FEBRUARY 2012
PROJECT NO: 091515338C-01-03
REV. NO.: 1
FIGURE No. C-2

APPENDIX D

Mitigation Area D

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1.0 INTRODUCTION

Mitigation Area D is located on the western portion of the Gateway Pacific Terminal ("Terminal") site, which currently consists of a mix of forested areas, paved roads, and maintained pastures (Figure D-1). The proposed mitigation will provide significant habitat functions for bird species and other wildlife by expanding, enhancing, and creating wetlands. Mitigation Area D provides the opportunity to improve water quality, hydrologic, and habitat functions in the following ways:

1. Create approximately 6.4 acres of Category II forested wetland from existing upland areas.
2. Enhance approximately 0.5 acres of Category III scrub-shrub and forested wetlands.

Mitigation Area D is split between cells D1 and D2, as D1 drains to the Birch Bay watershed and D2 drains to the Gateway Pacific Terminal watershed.

2.0 EXISTING CONDITIONS

Mitigation Area D is an approximately 6.9-acre north-south-oriented linear area contiguous with and parallel to the western site boundary. This area is generally bisected by Lonseth Road, which is proposed to be removed as part of the mitigation actions. Topography generally slopes to the southeast.

Wetlands in the area include Wetland 8A, a 24.7-acre Category III slope wetland is adjacent to the east, and Wetland 1, a 44.3-acre Category III depressional wetland adjacent to the north (Table D-1). Wetlands 1 and 8A both consist of forested, scrub-shrub, and emergent areas. South of Lonseth Road, Mitigation Area D consists of emergent and scrub-shrub uplands, and north of Lonseth Road, forested uplands. Detailed descriptions are provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

Table D-1 Mitigation Area D Existing Wetland Characteristics

Wetland Name	Hydro-geomorphic Class	Rating[1]	Total Area (acres)	Location[2]	Hydrologic Connection
1	Depressional	III	44.3	South of Aldergrove Road and west of Gulf Road	Abuts Stream 3 on south side of Aldergrove Road and Drainage 5 on west side of Gulf Road, then to Stream 1 and Strait of Georgia
8A	Slope	III	24.7	South of Lonseth Road east of western site boundary	Abuts Stream 1, then flows to Strait of Georgia

1 Hruby (2004)

2 Refer to Figure B-2.

Wetland 8A abuts and drains southeast to Stream 1 via constructed drainages, and ultimately to the Strait of Georgia.

Wetland 1 is hydrologically separated from the rest of the Terminal site 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.

Soil units mapped within Mitigation Area D include the Whitehorn silt loam 0- to 2-percent slopes, the Birch Bay silt loam 3- to 8-percent slopes, and the Kickerville silt loam 3- to 8-percent slopes.

As evidenced by the characteristics in Table D-2, a majority of the soils at Wetland Mitigation Area D (Whitehorn series) are poorly drained, with water at or near the surface, high frequency of ponding, and high available water holding capacity. The presence of a shallow water table and existing wetlands indicates that the soils in this area are conducive to wetland hydrology. The Birch Bay silt loam soil units have a depth to water table of 24 to 48 inches, which will also be conducive to wetland hydrology once excavated in the mitigation areas (NRCS 2007). The Kickerville unit is a minor component of the mitigation area.

Table D-2 Mitigation Area D Existing Soils Characteristics

Soil Unit	Drainage Class	Depth to Water Table (inches)	Frequency of Flooding	Frequency of Ponding	Available Water Capacity
Whitehorn silt loam, 0%–2% slopes	Poorly Drained	0	None	Frequent	High (about 10.5 inches)
Birch Bay silt loam, 3%–8% slopes	Moderately Well Drained	24–48	None	None	Low (about 1.5 inches)
Kickerville silt loam, 3%–8% slopes	Well Drained	>80	None	None	Moderate (about 7.7 inches)

Source: NRCS (2007)

Uplands at and in the vicinity of Mitigation Area D consist of typical red alder forested areas, scrub-shrub areas, and maintained or grazed pastures. Red alder forests in the area are largely homogeneous, with little variation in stand age or community composition. Dense thickets of Nootka rose and Himalayan blackberry are common along forest edges. Coniferous species are relatively rare. Upland pastures are vegetated with predominantly grass species such as reed canarygrass and bentgrass. Soil types within the uplands are generally the same as previously described.

No other drainages or streams are located on Mitigation Area D. Drainages 8 and 9 are located approximately 500 feet to the east on the south and north sides of Lonseth Road, respectively.

None of the drainages near Mitigation Area D have been identified as potential or documented fish-bearing waters. As such, fish habitat is not present at or adjacent to Mitigation Area D.

AMEC conducted bird surveys in representative areas from 2008 to 2009 at the Terminal site to determine bird presence and use of the site. Point Count Station 6 was located in the scrub-shrub and emergent portions of Wetland 8A to the east of Mitigation Area D. Birds observed from this location during the winter and breeding seasons include American robin, golden-crowned kinglet (*Regulus satrapa*), merlin (*Falco columbarius*), northern harrier (*Circus cyaneus*), pine siskin (*Carduelis pinus*), song sparrow, and spotted towhee (AMEC 2012).

The presence of multiple songbirds indicates that suitable songbird habitat is present in this area. No candidate, threatened, or endangered species of birds under the Endangered Species Act were observed during the bird surveys at this location.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREA D

3.1 SITE SELECTION RATIONALE

Mitigation Area D has been located directly adjacent to the Terminal facility to intercept stormwater and expand upon existing wetlands that will remain. Stormwater flowing in railroad ditches will be diverted to wetlands, which will provide opportunities to improve water quality and hydrologic conditions for aquatic resources lower in the watershed. Abundant red alder forest with occasional large coniferous tree species adjacent to high-quality wetlands provides the opportunity to convert these upland forested areas to wetlands while leaving the coniferous trees to become standing snags essential for perching bird species.

3.2 COMPENSATORY MITIGATION GOALS AND OBJECTIVES

The goal of the action at Mitigation Area D is to create wetlands from upland areas to increase hydrologic and habitat connectivity between existing wetlands to provide increased water quality and habitat functions in these areas. Enhancing existing wetlands will improve wildlife habitat conditions. The compensation area will expand upon the existing portions of Wetlands 1 and 8A that will remain after construction of the Terminal (Figure D-2).

The specific objectives of the proposed compensation are as follows:

1. Create approximately 6.4 acres of Category II forested wetlands from existing upland areas.

2. Enhance approximately 0.5 acres of Category III scrub-shrub and forested wetlands.
3. Improve water quality functions for aquatic resources lower in the Birch Bay and Gateway Pacific watersheds.
4. Improve hydrologic functions for aquatic resources lower in the Birch Bay and Gateway Pacific watersheds.
5. Improve habitat functions for known and presumed on-site wildlife.

Mitigation objectives would be attained through the following actions:

1. Excavate the existing topographic contours to create wetland hydrologic conditions in specified areas.
2. Replant the re-graded areas with native forest wetland vegetation.
3. Enhance existing wetlands with planted tree species to improve wildlife habitat.
4. Remove the Lonseth Road subbase and road prism, loosen compacted soils, and create hydrologically connectivity between areas D1 and D2.
5. Reduce cover by invasive plant species.

3.3 FUNCTIONAL ASSESSMENT

Table D-3 identifies the score of Mitigation Area D and compensatory functions that the created wetlands would provide 15 years postconstruction after performance standards are met, based on the Wetland Rating System for Western Washington (Hruby 2004). All wetlands were classified as depressional.

Table D-3 Hydrologic, Water Quality, and Biological Characteristics and Functions to Be Provided by Mitigation Area D

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
Water Quality	19	• Intermittently flowing outlets • Soil 2 inches below the surface is not clay or organic • Persistent ungrazed vegetation ≥95% of areas • Area seasonally ponded is >1/4 total area but <1/2 total area • Untreated stormwater discharges to wetlands; stream discharges into wetlands that drain farmed field and roads; developed areas within 150 ft	• Filter out and retain sediment and pollutants from adjacent development • Increased water quality for on-site and downstream aquatic resources
Hydrologic	8	• Intermittently flowing outlets • Marks of ponding at least 0.5 to <2 ft from surface or bottom of outlets • Area of watershed basins are more than 100 times the area of the wetland units • Opportunity to reduce flooding and erosion is low	• Improved hydrologic conditions lower in the watershed as stormwater is diverted to Mitigation Area D and infiltrates to groundwater
Habitat	24	• Cowardin classes present: scrub-shrub, forested, forested class has three out of five strata • Hydroperiods: occasionally flooded, seasonally flooded, saturated only, seasonally flowing stream in or adjacent to the wetland • Plant richness: >19 species • Interspersion of Cowardin classes: moderate • LWD, standing snags, overhanging vegetation at least 3.3 ft over a stream contiguous with the unit for at least 33 ft, invasive plants cover less than 25% of wetland in each stratum • Buffers: 330 ft relatively undisturbed vegetated areas >25% or >50% circumference • Within 5 miles of a brackish or saltwater estuary • Priority habitats within 330 ft: biodiversity areas and corridors, riparian, in stream, snags, and logs • At least three other wetlands within 1/2 mile; connections between them are relatively undisturbed	• The following will provide several niches and habitat connectivity for a variety of species: o Multiple Cowardin classes o Multiple hydroperiods o Multiple special habitat features o Relatively undisturbed buffers o Multiple priority habitats within 330 ft o Other wetlands within the vicinity
Total	51(Cat. II)	Moderate to High Water Quality Functions Low Hydrologic Functions High Habitat Functions	

4.0 REFERENCES

AMEC Earth & Environmental, Inc. (AMEC). 2008. Wetland Determination and Delineation, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

AMEC. 2012. Avian Presence Report, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

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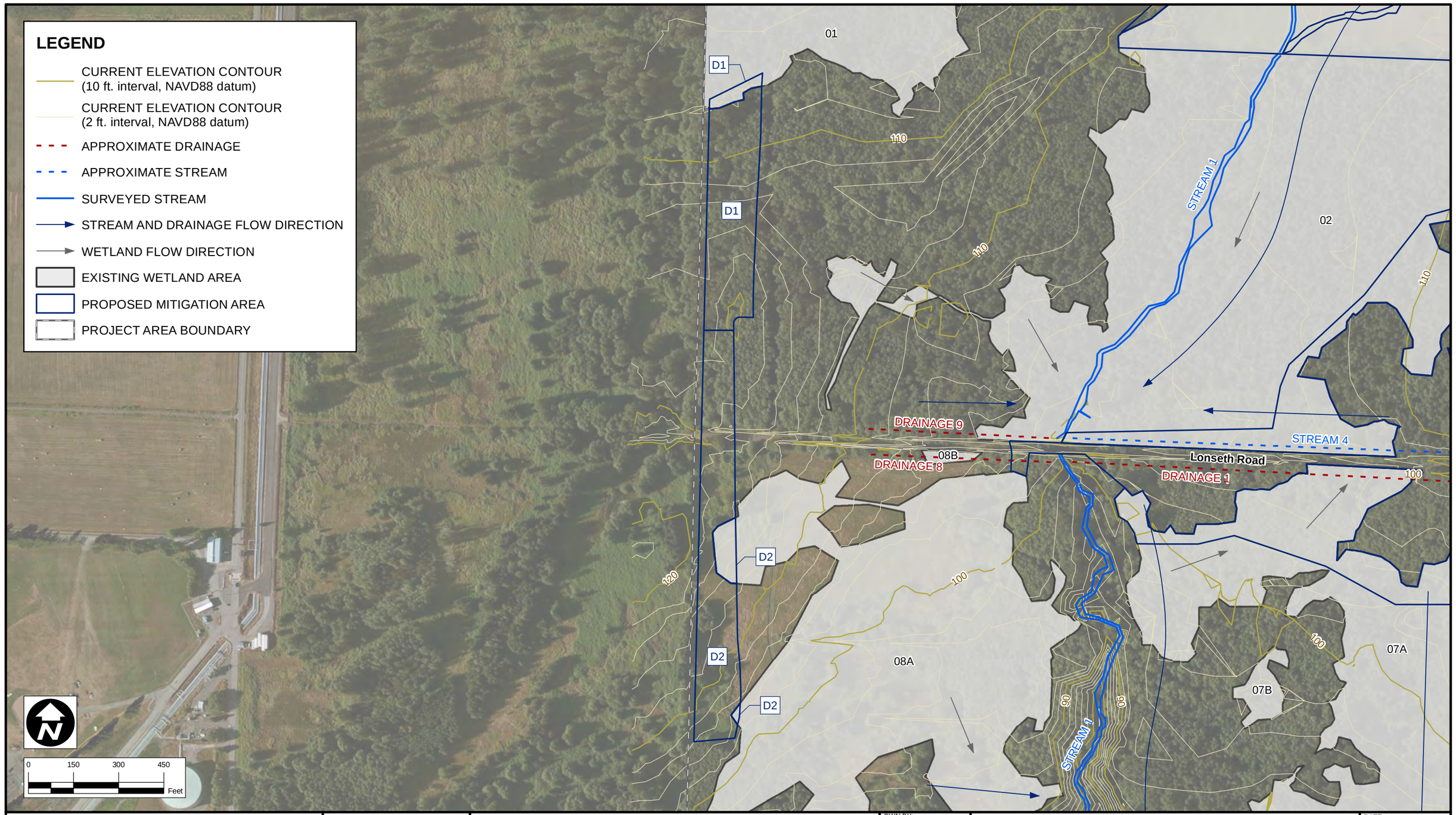
Natural Resources Conservation Service (NRCS). 2007. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Last revision, September 11, 2009. Accessed January 7, 2011.

Washington Department of Fish and Wildlife (WDFW). 2006. Priority Habitats and Species Map for S17T39R01E. July.

Whatcom County. 2005a. Whatcom Critical Areas Ordinance –Salmonid Fish Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- APPROXIMATE DRAINAGE
- APPROXIMATE STREAM
- SURVEYED STREAM
- STREAM AND DRAINAGE FLOW DIRECTION
- WETLAND FLOW DIRECTION
- EXISTING WETLAND AREA
- PROPOSED MITIGATION AREA
- PROJECT AREA BOUNDARY



Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

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AMEC
11810 North Creek Parkway N
Bothell, WA 98011

amec

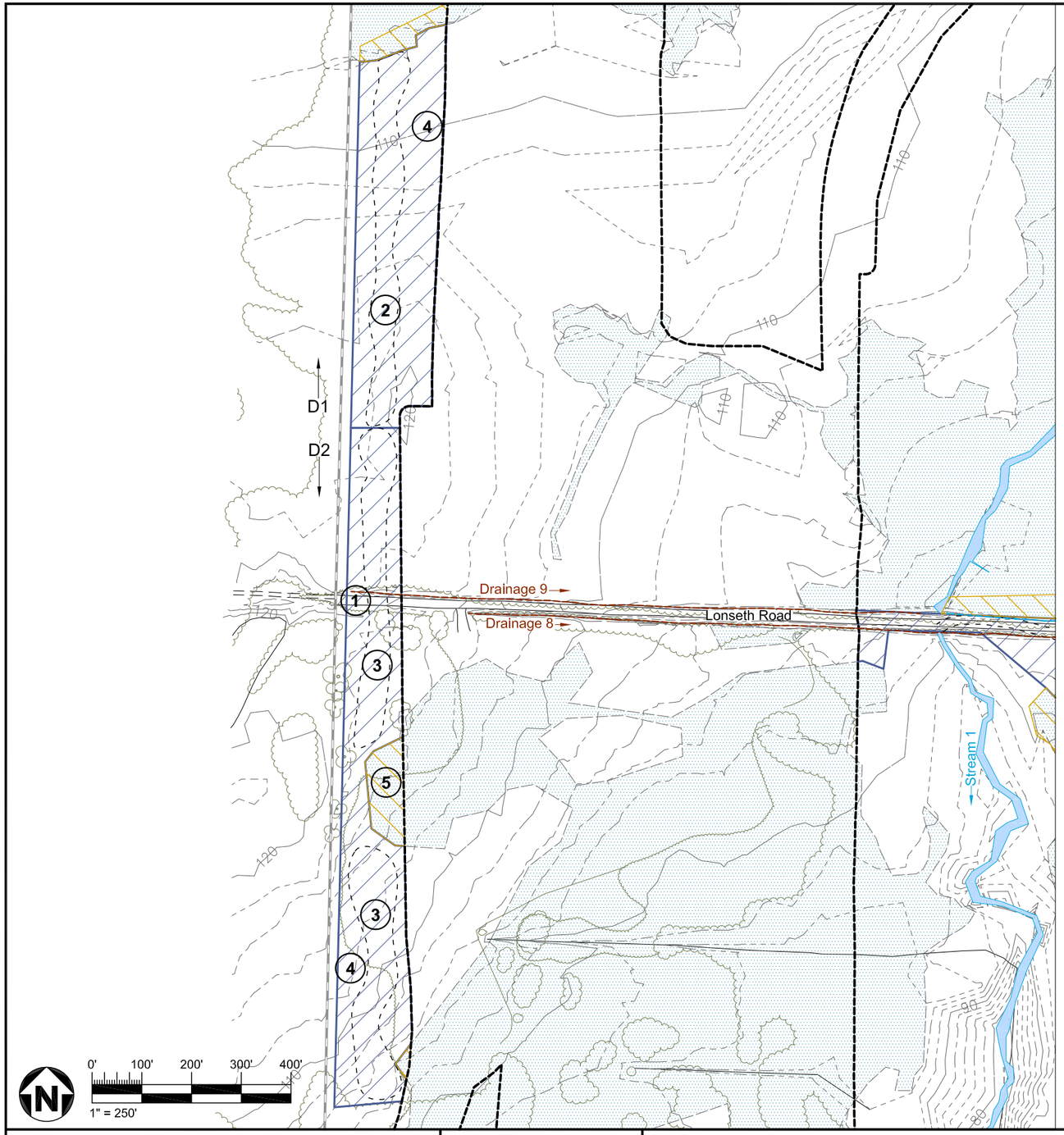
DWN BY:	SD
CHK'D BY:	JG
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	1 inch = 300 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA D
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE:	MARCH 2012
PROJECT NO.:	091515338C-01-03
REV. NO.:	-
FIGURE NO.:	FIGURE D-1

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure D-1 - Mitigation Areas D - Existing Stream Network.mxd



LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROJECT AREA BOUNDARY
- PROPOSED DEVELOPMENT FOOTPRINT
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT

1. Lonseth road and subbase to be removed. Flow from Drainage 8 and 9 to be utilized for wetland creation.
2. Depressional PFO wetland creation to flow north.
3. Depressional PFO wetland creation to flow south.
4. PFO wetland creation.
5. Wetland enhancement. Proposed PFO wetland.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
David Evans & Associates, 2010-04-01

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PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway North
Bothell, WA, U.S.A. 98011

DWN BY:	dp
CHK'D BY:	KD
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA D1 AND D2

DATE:	FEBRUARY 2012
PROJECT NO:	091515338C-01-03
REV. NO.:	1
FIGURE No.	D-2

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APPENDIX E

Mitigation Area E

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1.0 INTRODUCTION

Mitigation Area E is located in the northwestern corner of the Gateway Pacific Terminal ("Terminal") site (Figure E-1) and is located in the Birch Bay Watershed.

Mitigation Area E provides the opportunity to increase wetland area and wetland functions, including improving water quality and habitat. This proposed compensation area is one of the only portions of the Birch Bay Watershed within the project area that is not already wetland. Utilizing this area for mitigation will enable the project impacts in the Birch Bay Watershed to be compensated within the watershed and on-site.

The proposed actions are to:

1. Create approximately 8.5 acres of Category II forested and shrub wetland from existing upland area.
2. Enhance approximately 2.9 acres of Category III forested wetland adjacent to the created areas by increasing plant diversity, providing habitat features where appropriate, and reducing invasive species.
3. Use culverts to create and maintain surface water connection between the two portions of the proposed area
4. Plant conifer species to increase habitat functions.
5. Reduce the prevalence of invasive species.

2.0 EXISTING CONDITIONS

Mitigation Area E is located on the northwest corner of the property near Aldergrove Road. The 11.4-acre red alder forested area includes 2.9-acres of adjacent section of Wetland 1. Wetland characteristics of Wetland 1 are summarized in Table E-1. Detailed descriptions are provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

Table E-1 Mitigation Area E Existing Wetland Characteristics

Wetland Name	Hydro-geomorphic Class	Rating[1]	Total Area (acres)	Location[2]	Hydrologic Connection
1	Depressional	III	44.3	South of Aldergrove Road and west of Gulf Road	The portion of Wetland 1 in the mitigation area has no surface connections

1 Hruby (2004)

2 Refer to Figure E-1.

Elevation in this area is approximately 100 feet msl, with a small round mound in the central portion at approximately 110 feet. The western boundary of the property lies nearby to the west. Soil units mapped within Mitigation Area E include Whitehorn silt loam and Birch Bay silt loam (Table E-2).

Table E-2 Mitigation Areas E Existing Soils Characteristics

Soil Unit	Drainage Class	Depth to Water Table (inches)	Frequency of Flooding	Frequency of Ponding	Available Water Capacity
Whitehorn silt loam, 0%–2% slopes	Poorly Drained	0	None	Frequent	High (about 10.5 inches)
Birch Bay silt loam, 0%–3% slopes	Moderately Well Drained	24–48	None	None	High (about 10.7 inches)

Source: NRCS (2007)

Wetland 1 is a 44.3-acre wetland that is hydrologically separated from the rest of the Terminal site 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.

Figure E-1 shows Stream 3 that flows east-west in a deep ditch on BP property on the northside of Aldergrove Road. While the wetlands adjacent to and within Mitigation Area E are hydrologically connected to Stream 3 due to landscape gradient, there is no defined outlet from the south side of Aldergrove draining to the northside in this area.

In the vicinity of Mitigation Area E, Stream 3's banks are partially vegetated with annually-mowed reed canarygrass. Stream 3 provides little habitat for aquatic or terrestrial species. It has little to no overstory cover, is of relatively constant width (3 to 5 feet), and has a steep, compacted stream bank. Stream 3, adjacent to Mitigation Area E, has not been identified as potential or documented fish-bearing waters. As such, fish habitat is not present at or adjacent to Mitigation Area E.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREA E

The proposed actions would create approximately 8.5 acres of Category II forested and shrub wetlands, and enhance approximately 2.9 acres of adjacent Category III forested wetlands.

Wetland hydrology for the area will be established by lowering grades to intercept the groundwater table. Potentially, Area D surface flows could be directed to Area E. Treated stormwater from the adjacent West Loop will also contribute to hydrologic conditions in this location.

The goal of the action at Mitigation Area E is to create wetlands from upland areas and enhance existing wetlands in order to increase hydrologic and habitat connectivity between existing aquatic resources and provide increased water quality and habitat functions in this area. The compensation area will expand Wetland 1.

The specific objectives of the proposed compensation are as follows:

1. Create approximately 8.5 acres of Category II forested and shrub wetlands.
2. Enhance approximately 2.9 acres of Category III forested wetlands.
3. Improve water quality and hydrologic functions for downstream resources.
4. Improve habitat functions for known and presumed on-site wildlife.

Mitigation objectives would be attained through the following actions:

1. Excavate the existing topographic contours to create wetland hydrologic conditions in specified areas.
2. Retain, as far as possible, any coniferous tree species.
3. Replant the regraded areas with native forest and shrub wetland vegetation.
4. Plant conifer species to increase habitat functions.

Table E-3 identifies the average scores of Mitigation Area E and compensatory functions that the created and enhanced wetlands would provide 15 years postconstruction after performance standards are met based on the *Wetland Rating System for Western Washington* (Hruby 2004). Wetlands were classified as depressional.

Table E–3 Hydrologic, Water Quality, and Biological Characteristics and Functions to be Provided by Mitigation Area E

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
Water Quality	19	• Intermittently flowing outlets • Soil 2 inches below the surface is not clay or organic • Persistent ungrazed vegetation ≥95% of areas • Area seasonally ponded is >1/4 total area but <1/2 total area • Developed areas within 150 feet (ft)	• Filter out and retain sediment and pollutants from adjacent development • Increased water quality for on-site and downstream aquatic resources
Hydrologic	8	• Intermittently flowing outlets • Marks of ponding at least 0.5 to <2 ft from surface or bottom of outlets • Area of watershed basins are more than 100 times the area of the wetland units • Opportunity to reduce flooding and erosion is low	• Improved downstream hydrologic conditions for Birch Bay watershed
Habitat	24	• Cowardin classes present: scrub-shrub, forested, forested class has three out of five strata • Hydroperiods: occasionally flooded, seasonally flooded, saturated only, seasonally flowing stream in or adjacent to the wetland • Plant richness: >19 species • Interspersion of Cowardin classes: moderate • Invasive plants cover less than 25% of wetland in each stratum • Buffers: 330 ft relatively undisturbed vegetated areas >25% or >50% circumference • Within 5 miles of a brackish or saltwater estuary • Priority habitats within 330 ft: biodiversity areas and corridors, riparian, in stream, nearshore, snags, and logs • At least three other wetlands within 1/2 mile; connections relatively disturbed	• The following will provide several niches and habitat connectivity for a variety of species: o Multiple Cowardin classes o Multiple hydroperiods o Multiple special habitat features o Relatively undisturbed buffers o Multiple priority habitats within 330 ft o Other wetlands within the vicinity
Total	51 (Cat. II)	Moderate to High Water Quality Functions Low Hydrologic Functions High Habitat Functions	

[1] Brinson (1993)

[2] Hruby (2004)

4.0 REFERENCES

AMEC Earth & Environmental, Inc. (AMEC). 2008. Wetland Determination and Delineation, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

Hruby, T. 2004. Washington State Wetland Rating System for Western Washington—Revised. Washington State Department of Ecology, Publication #04-06-025.

Natural Resources Conservation Service (NRCS). 2007. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Last revision, September 11, 2009. Accessed January 7, 2011.

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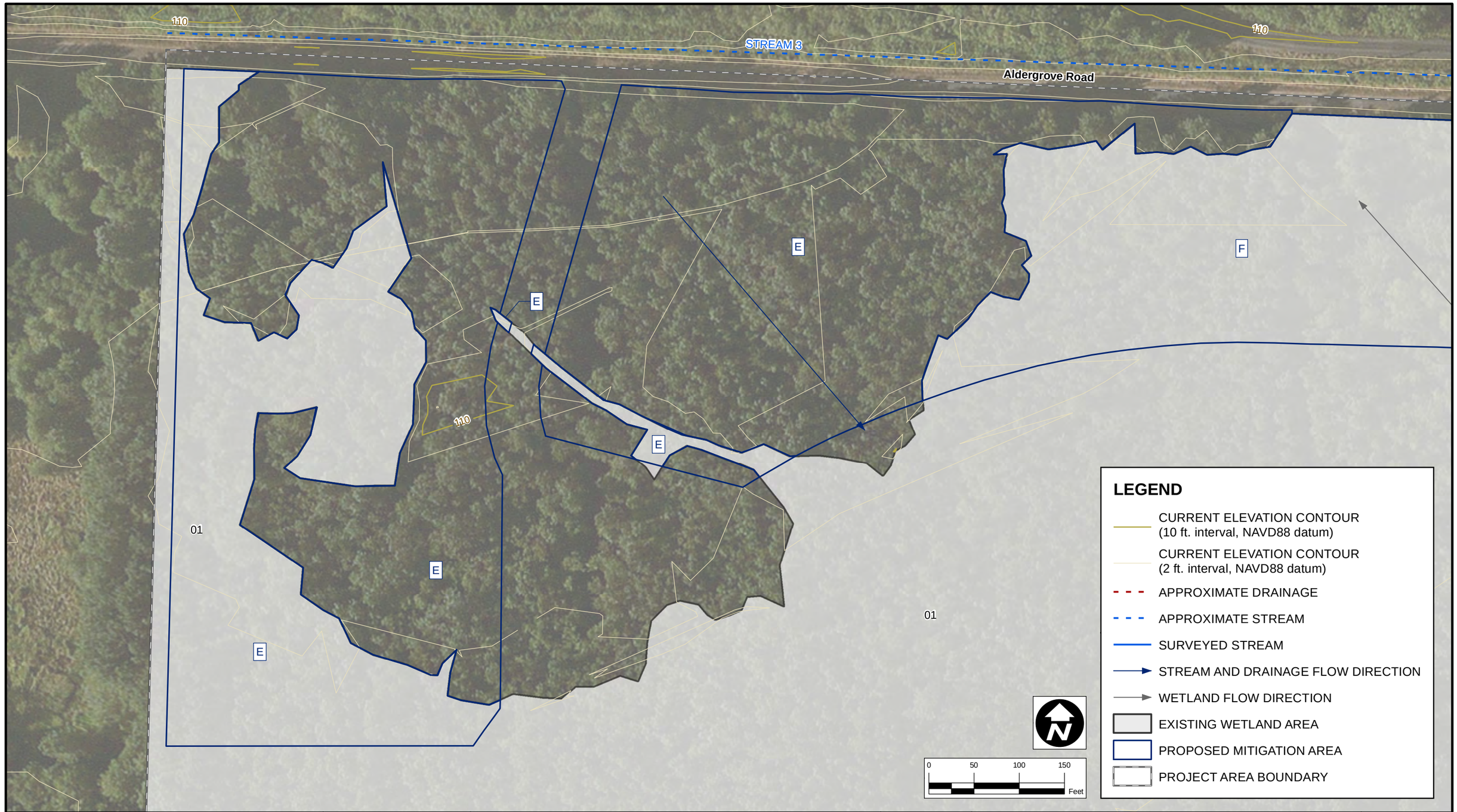

LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- APPROXIMATE DRAINAGE
- APPROXIMATE STREAM
- SURVEYED STREAM
- STREAM AND DRAINAGE FLOW DIRECTION
- WETLAND FLOW DIRECTION
- EXISTING WETLAND AREA
- PROPOSED MITIGATION AREA
- PROJECT AREA BOUNDARY

Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

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AMEC
11810 North Creek Parkway N
Bothell, WA 98011

amec

DWN BY: SD
CHK'D BY: JG
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: 1 inch = 100 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA E
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE E-1

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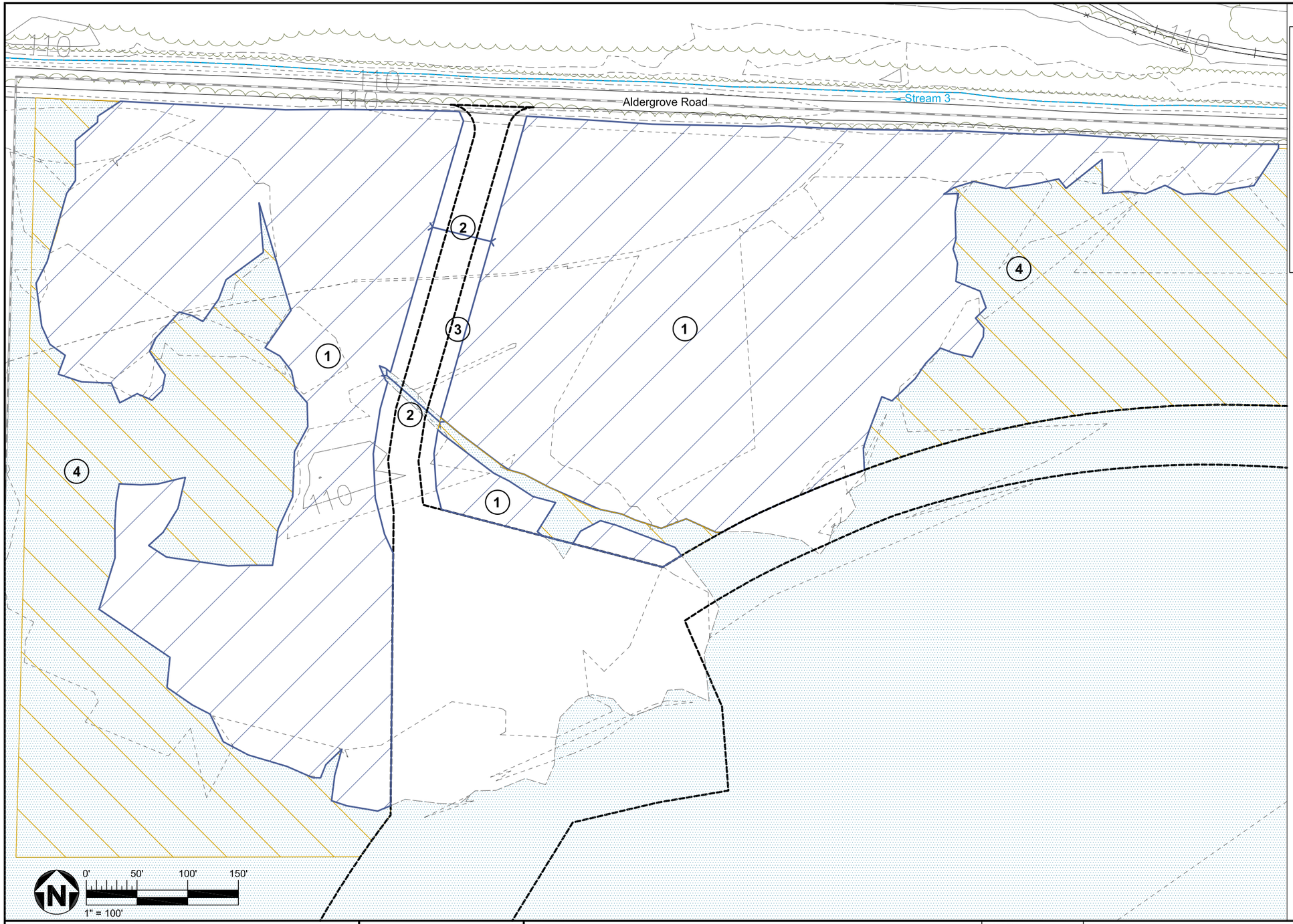

LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROJECT AREA BOUNDARY
- PROPOSED DEVELOPMENT FOOTPRINT
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT

1. PFO wetland creation.
2. Proposed maintenance road with culverts to connect wetlands.
3. 15' vegetation buffer on each side of road.
4. Wetland enhancement. Proposed PFO wetland.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
David Evans & Associates, 2010-04-01

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amec

DWN BY: dp
CHK'D BY: KD
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA E

DATE: FEBRUARY 2012
PROJECT NO: 091515338C-01-03
REV. NO.: 1
FIGURE No. E-2

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APPENDIX F

Mitigation Area F

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1.0 INTRODUCTION

Mitigation Area F in the north-central portion of the Gateway Pacific Terminal ("Terminal") site (Figure F-1). Mitigation Area F is an approximately 101.9 acre area that currently consists of wet pasture with smaller portions of shrub and forested wetlands. It is primarily located in Wetlands 2 and 3 the associated Stream 1 and its tributary. Area F is located within the north hoop of the East Loop and also includes area to the west and north incorporating Stream 1.

1. Create approximately 11.3 acres of Category II forested wetland from existing upland areas.
2. Enhance approximately 90.6 acres of Category III forested, scrub-shrub, and emergent wetlands.
3. Remove Gulf Road and the associated culvert for Stream 1, and relocate Stream 1 into a natural, sinuous channel.
4. Restore approximately 7,790 linear feet of stream by relocating Stream 4 and Drainage 1 into a relic stream channel to connect to Stream 1.
5. Install large woody debris (LWD) and fish gravels in strategic locations and leave existing large upland coniferous trees to become standing snags.

2.0 EXISTING CONDITIONS

Figure F-1 shows the existing stream network, wetlands, and hydrologic flow at Mitigation Area F. More details are provided in the *Wetland Determination and Delineation Report* (AMEC 2008). Topography is generally flat across the mitigation area, but slopes to the west and southwest.

Wetland 3 is an approximately 143.4-acre Category III slope wetland that is a mix of emergent pastures and forested areas, with some shrub areas located at the fence lines. Wetland 2 is a 53.2-acre Category III slope wetland with its northern portion in pasture.

Wetland 1 is a 44.2-acre Category III depressional wetland that drains to the Birch Bay watershed (Table F-1).

Table F-1 Characteristics of Existing Wetlands at and Adjacent to Mitigation Area F

Wetland Name	Hydro-geomorphic Class	Rating[1]	Total Area (acres)	Location[2]	Hydrologic Connection
1	Depressional	III	44.2	North of Lonseth Road, west of Gulf Road, south of Aldergrove Road	Drains to Stream 3; located within the Birch Bay Watershed
2	Slope	III	49.0	North of Lonseth Road, west of Gulf Road, south of Aldergrove Road	Abuts and drains to Streams 1 and 4
3	Slope	III	143.4	North of Lonseth Road, east of Gulf Road, south of Aldergrove Road	Abuts and drains to Streams 1, 3, 4, and 6

1 Hruby (2004)
2 Refer to Figure F-2.

Pasture areas in Wetlands 1, 2, and 3 are vegetated with wet pasture grasses, rushes, and sedges. Thickets of rose, snowberry, and Himalayan blackberry are common along the transition from forest to pasture and along the roadway in Wetlands 2 and 3. Reed canarygrass dominates the area surrounding Stream 1 in the pasture.

The slightly wetter conditions in the vicinity of the Wetland 3 outlet at Gulf Road support a willow shrub community interspersed with small, open water areas with cattail, rushes, and sedges.

Soils mapped within Mitigation Area F and adjacent wetlands include the Whitehorn silt loam 0 to 2 percent slopes and the Birch Bay silt loam 0 to 3 percent soil unit. Table F-2 identifies characteristics of these soil units.

Table F-2 Mitigation Area F Existing Soils Characteristics

Soil Unit	Drainage Class	Depth to Water Table (inches)	Frequency of Flooding	Frequency of Ponding	Available Water Capacity
Whitehorn silt loam, 0%–2% slopes	Poorly Drained	0	None	Frequent	High (about 10.5 inches)
Birch Bay silt loam, 0%–3% slopes	Moderately Well Drained	24–48	None	None	High (about 10.7 inches)

Source: NRCS (2007)

Avian Point Count Station 5 was located in a shrub area of Wetland 3 near Mitigation Area F. Birds observed from this location during the winter and breeding seasons include American robin (*Turdus migratorius*), American goldfinch (*Carduelis tristis*), Bewick's wren (*Thyrothorus ludovicianus*), black-

capped chickadee (*Poecile rufescens*), dark-eyed junco (*Junco hyemalis*), pine siskin (*Carduelis pinus*), song sparrow (*Melospiza melodia*), chestnut-backed chickadee (*Poecile rufescens*), ruby-crowned kinglet (*Regulus calendula*), common yellowthroat (*Geothlypis trichas*), golden-crowned sparrow (*Zonotrichia atricapilla*), and white-crowned sparrow (*Zonotrichia leucophrys*) (AMEC 2012).

Stream 1 flows west in a ditch along the north side of Aldergrove Road, then flows south in a culvert beneath Aldergrove and flows into Wetland 3. In Wetland 3, the stream is surrounded by wetland and loses much of its bed and bank character. The stream flows out of Wetland 3 west beneath Gulf Road into Wetland 2.

Streams 4 and 6 maintained roadside ditches. Stream 4 flows west along the north side of Lonseth Road until it empties into Stream 1 west of Gulf Road.

Stream 6 is located along the east side of Gulf Road and has a hydrologic divide just south of Stream 1, where water flows either north to Stream 1 or south to Stream 4. Another section of Stream 6 to the north flows south to Stream 1. Streams 4 and 6 provide little habitat for aquatic or terrestrial species. They have little to no overstory cover.

Drainage 5 is located adjacent to Mitigation Area F and adjacent wetlands. It is located along the west side of Gulf Road and has the same hydrologic divide as Stream 6 between Aldergrove Road and Lonseth Road. It ultimately flows to Stream 1. Drainage 5 is essentially a roadside ditch and habitat value is considered very low.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREA F

The proposed actions would create approximately 11.3 acres of Category II forested wetlands and enhance approximately 90.6 acres of wet pasture to forest and shrub wetlands. Mitigation Area F was classified as slope wetland system.

Stream 1 will be relocated to flow in a natural channel through Mitigation Area F. Wet pasture areas with low-quality wetlands provides the opportunity to enhance these areas.

Stormwater inputs from adjacent development will provide the opportunity for Mitigation Area F to filter out and retain sediment and pollutants, increasing water quality for downstream aquatic resources. Mitigation Area F has much higher potential and opportunity to provide hydrologic functions due to its location along and adjacent to Stream 1 and Stream 4, which will lessen the erosive severity of floodwaters downstream and protect fish habitat. As previously stated, the location of Washington Department of Fish and Wildlife (WDFW) and Whatcom County riparian priority habitats along Stream 1 (which will be expanded to Stream 4) presents the opportunity to improve upon this habitat

for fish, birds, and amphibians. Based on the location of Mitigation Area F adjacent to developed areas, Stream 1, Stream 4, and WDFW priority habitats, this mitigation area has high potential and opportunity to provide water quality, hydrologic, and habitat functions on-site.

3.1 GOALS AND OBJECTIVES OF THE PROPOSED MITIGATION

The goal of the action at Mitigation Area F is to create wetlands from upland areas and enhance existing aquatic resources to increase hydrologic and habitat connectivity between the portions of existing wetlands that will remain to provide increased water quality, hydrologic, and habitat functions in these areas. The compensation areas will expand and/or enhance the existing portions of Wetlands 2 and 3 (Figure F-2).

The specific objectives of the proposed compensation are:

- Create approximately 11.3 acres of Category II forest and shrub wetlands.
- Enhance approximately 90.6 acres of Category III forested, shrub, and emergent wetlands.
- Restore or relocate approximately 7,790 linear feet of streams.
- Improve water quality functions.
- Improve hydrologic functions.
- Improve habitat functions.

Mitigation objectives would be attained through the following actions:

- Excavate the existing topographic contours where needed to create wetland hydrologic conditions in specified areas.
- Remove the Gulf Road sub-base and road prism culvert for Stream 1.
- Replant the re-graded areas with native scrub-shrub and forest wetland vegetation.
- Prepare and plant wet pasture areas with forest and shrub wetland plants.
- Install habitat features including LWD in strategic locations.
- Reduce invasive vegetation.

Table F-3 identifies compensatory functions that the created and enhanced wetlands would provide 15 years postconstruction, after performance standards are met, based on the *Wetland Rating System for Western Washington* (Hruby 2004).

Table F-3 Hydrologic, Water Quality, and Biological Characteristics and Functions to be Provided by Mitigation Area F

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
Water Quality	16	• Intermittently flowing outlets • Soil 2 inches below the surface is not clay or organic • Persistent ungrazed vegetation ≥95% of areas • Area seasonally ponded is >1/4 total area but <1/2 total areas • Untreated stormwater discharges to wetlands; stream discharges into wetlands that drains farmed field and roads; developed areas within 150 feet (ft) • Depressions that cover <1/2 wetland area and trees or shrubs >2/3 wetland area • Slope is 1%–2%, dense woody vegetation >1/2 wetland area	• Filter out and retain sediment and pollutants from adjacent development • Increased water quality for on-site and downstream aquatic resources
Hydrologic	17	• Intermittently flowing outlets • Marks of ponding at least 0.5 to <2 ft from surface or bottom of outlets • Area of watershed basins are 10 to 100 or >100 times the area of the wetland units • Opportunity to reduce flooding and erosion is high because of downstream aquatic resources and infrastructure • Dense, uncut, rigid vegetation >90% wetland area; small surface depressions that retain water over >10% of wetland area	• Improved hydrologic conditions for Stream 1 • Reduced potential for stormwater erosion along Stream 1
Habitat	24	• Cowardin classes present: scrub-shrub, forested, forested class has three out of five strata • Hydroperiods: occasionally flooded, seasonally flooded, saturated only, seasonally flowing stream in or adjacent to the wetland • Plant richness: >19 species • Interspersion of Cowardin classes: high • Buffers: 170 ft of undisturbed vegetated areas >50% circumference; • Within 5 miles of a brackish or salt water estuary • Priority habitats within 330 ft: biodiversity areas and corridors, riparian, in stream, nearshore, snags, and logs • At least three other wetlands within 1/2 mile; connections between them are relatively undisturbed	• The following will provide several niches and habitat connectivity for a variety of species: o Multiple Cowardin classes o Multiple hydroperiods o Multiple special habitat features o Relatively undisturbed buffers o Multiple priority habitats within 330 ft o Other wetlands within the vicinity
Total	57 (Cat. II)	Moderate Water Quality Functions Moderate Hydrologic Functions High Habitat Functions	

1 Hruby (2004)

2 The score represents anticipated site conditions 15 years postconstruction.

4.0 REFERENCES

AMEC Earth & Environmental, Inc. (AMEC). 2008. Wetland Determination and Delineation, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

AMEC. 2012. Avian Presence Report, Gateway Pacific Terminal, Whatcom County, Washington. Prepared for Pacific International Terminals, Inc.

Hruby, T. 2004. Washington State Wetland Rating System for Western Washington—Revised. Washington State Department of Ecology, Publication #04-06-025.

Natural Resources Conservation Service (NRCS). 2007. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Last revision, September 11, 2009. Accessed January 7, 2011.

Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

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AMEC
11810 North Creek Parkway N
Bothell, WA 98011

amec

DWN BY: SD
CHK'D BY: JG
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: 1 inch = 400 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA F
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE F-1

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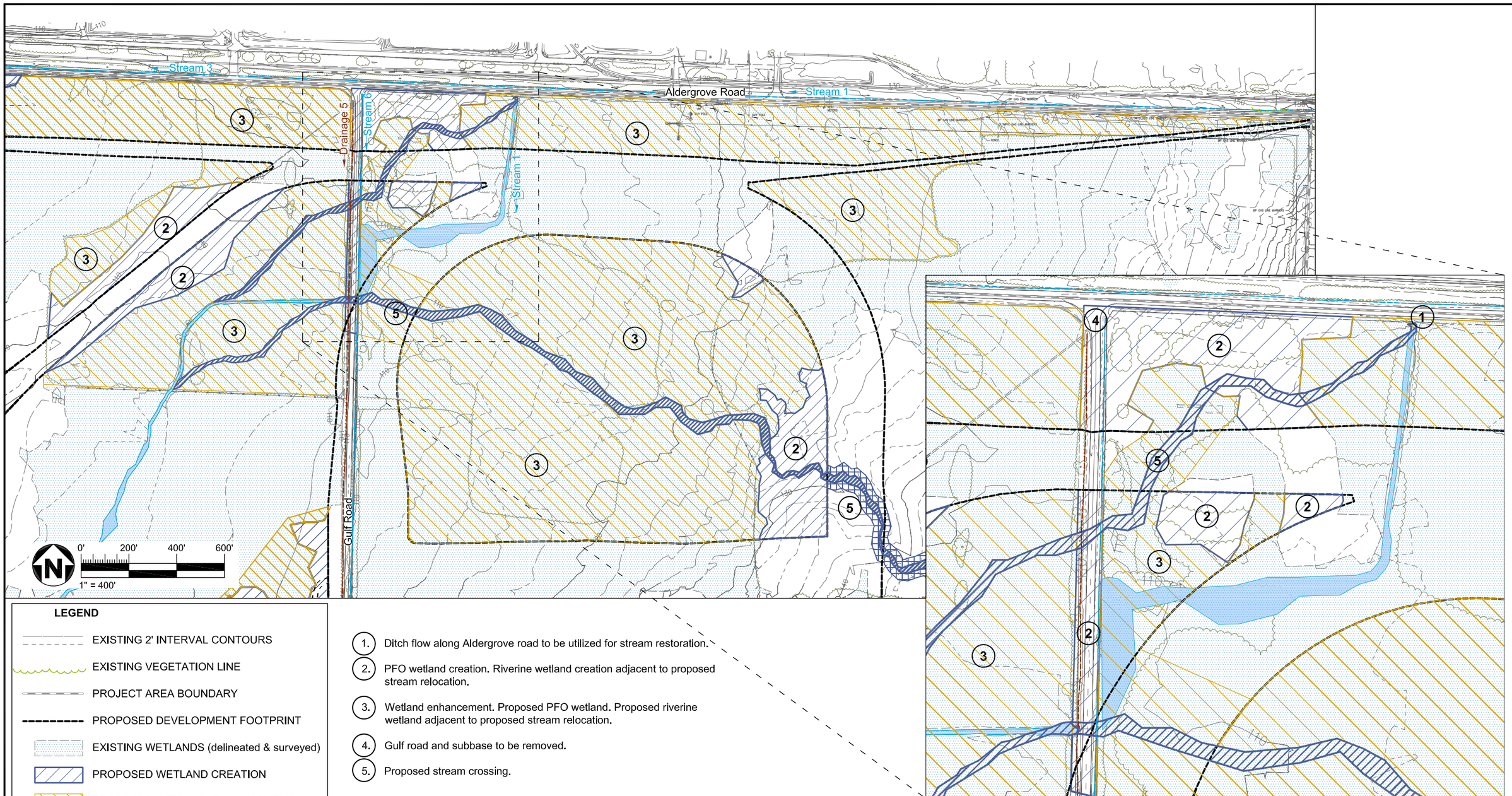

LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROJECT AREA BOUNDARY
- PROPOSED DEVELOPMENT FOOTPRINT
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT
- PROPOSED STREAM RELOCATION
- PROPOSED RIPARIAN PLANTING

1. Ditch flow along Aldergrove road to be utilized for stream restoration.
2. PFO wetland creation. Riverine wetland creation adjacent to proposed stream relocation.
3. Wetland enhancement. Proposed PFO wetland. Proposed riverine wetland adjacent to proposed stream relocation.
4. Gulf road and subbase to be removed.
5. Proposed stream crossing.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
David Evans & Associates, 2010-04-01

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11810 North Creek Parkway North
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DWN BY:	dp
CHK'D BY:	KD
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA F

DATE:	FEBRUARY 2012
PROJECT NO:	091515338C-01-03
REV. NO.:	1
FIGURE No.	F-2

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APPENDIX G

Mitigation Area G

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1.0 INTRODUCTION

Mitigation Area G is an approximately 20.9-acre area between the East and West Loops and includes the Lonseth Road (Figure G-1).

1. Create approximately 11.2 acres of Category II forested wetland from existing upland areas.
2. Remove Lonseth Road between the West Loop and East Loop.
3. Create wetlands that would connect Wetlands 2, 8A, and 7A creating one large continuous wetland in this location adjacent to Stream 1.
4. Eliminate Drainages 1, 5, 8, and 9 and create one large continuous wetland area.
5. Reroute Stream 4 into a natural channel and provide natural confluence with Stream 1.
6. Reroute flows from Drainage 5 into natural channel in wetlands.
7. Remove culvert and restore area at Stream 1.
8. Enhance existing wetlands by reducing invasive species and increasing plant and habitat diversity with planting.
9. Install large woody debris (LWD) and fish gravels in appropriate locations in new streambeds.

2.0 EXISTING CONDITIONS

At this location, portions of three named wetlands, two streams, and five named drainages currently exist along with Lonseth Road. Figure G-1 shows the existing stream network, locations of wetlands, and hydrologic flow direction at Mitigation Area G. The topography slopes towards Stream 1.

Wetland characteristics are summarized in Table G-1.

Table G-1 Characteristics of Existing Wetlands at and Adjacent to Mitigation Area G

Wetland Name	Hydro-geomorphic Class	Rating[1]	Total Area (acres)	Location	Hydrologic Connection
2	Slope	III	53.2	North of Lonseth Road, west of Gulf Road, south of Aldergrove Road	Abuts and drains to Streams 1 and 4, then flows to Strait of Georgia
7A	Slope	III	40.1	South of Henry Road between Gulf Road and Stream 1	Abuts Stream 5, Drainages 5 and 8, then flows to Stream 1 and Strait of Georgia

Source: Hruby (2004)

All of the wetlands at or adjacent to Mitigation Area G have relatively large expanses of forested areas consisting of red alder (*Alnus rubra*) forest typical of the area, with an understory of salmonberry (*Rubus spectabilis*), common rush (*Juncus effuses*), and slough sedge (*Carex obnupta*). Wetlands 2 and 7A also contain shrub and emergent areas near Lonseth Road. In general, shrub communities consist of Twinberry, Douglas spirea (*Spiraea douglasii*), and Himalayan blackberry (*Rubus armeniacus*)—with emergent vegetation including bentgrass (*Agrostis sp*.), red clover (*Trifolium pratense*), and common rush.

Thickets of rose, snowberry, and Himalayan blackberry are common along the transition from forest along the roadway.

Soils mapped within Mitigation Area G and adjacent wetlands include the Whitehorn silt loam 0- to 2-percent slopes. Table G-2 identifies characteristics of this soil unit.

Table G-2 Mitigation Area G Existing Soils Characteristics

Soil Unit	Drainage Class	Depth to Water Table (inches)	Frequency of Flooding	Frequency of Ponding	Available Water Capacity
Whitehorn silt loam, 0%–2% slopes	Poorly Drained	0	None	Frequent	High (about 10.5 inches)

Source: NRCS (2007)

As the Whitehorn series soils are poorly drained with water at or near the surface and have a high frequency of ponding and high available water capacity, these soils are very conducive to wetland hydrology.

2.1.1 Streams 1 and 4

Stream 1 in this area flows through a culvert at Lonseth Road. North of Lonseth Road the Stream flows through wetland and has a poorly defined bed and bank. At Lonseth Road, the Stream begins to flow through a ravine where the channel is narrow with an unvegetated bed, and no riverine wetlands in the ravine.

The riparian areas along Stream 1 are identified as priority habitat from the Strait of Georgia to just north of Lonseth Road by WDFW (2006) and Whatcom County (2005b). This area is generally defined by the ravine along Stream 1 and likely provides habitat for a variety of amphibian and bird species.

Stream 4 flows in an excavated and maintained roadside ditch that flows west along the north side of Lonseth Road until it empties into Stream 1. Stream 4 banks are is partially or wholly vegetated with

primarily hydrophytic species including reed canarygrass, field horsetail, birds-foot trefoil, and small-fruited bulrush. Similar to all the Streams located in roadside ditches, Stream 4 provides little habitat for aquatic or terrestrial species.

2.1.2 Drainages 1 and 5

Two roadside drainages (Drainages 1 and 5) are in the Mitigation Area G. Drainage 1 flows west along the south side of Lonseth Road until it empties into Stream 1. Drainage 5 is located along the west side of Gulf Road. As these drainages are essentially roadside ditches, habitat value is considered very low.

2.1.3 Drainages 8 and 9

West of Stream 1, Drainages 8 and 9 are roadside ditches at Lonseth. Water in these two ditches flows east to confluence with Stream 1. They have low habitat value currently.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREA G

The removal of Lonseth Road within Mitigation Area G will provide the opportunity to remove the existing culvert that potentially restricts fish passage. The presence of priority habitat along Stream 1 up to Lonseth road presents a unique opportunity to improve and increase habitat area and functions. The goal of the action at Mitigation Area G is to create wetlands and to increase hydrologic and habitat connectivity.

Mitigation objectives would be attained through the following actions:

- Remove Lonseth Road by grading out the roadbed and removing the impervious surface.
- Remove and restore culvert at Stream 1.
- Restore stream grades and install LWD to provide pools as the stream transitions from flat to a defined channel in a ravine.
- Install fish gravels and other habitat features in strategic locations.
- Provide a new channel for flows in from Drainage 1 and 5 and Stream 4.
- Along the former Lonseth Road corridor, excavate the grade to create wetlands.
- Plant the re-graded areas with native scrub-shrub and forest wetland vegetation.
- Reduce invasive vegetation and plant conifers to increase plant and habitat diversity.

Table G-3 identifies the score of Mitigation Area G and compensatory functions that the created wetlands would provide 15 years post-construction, after performance standards are met, based on the Wetland Rating System for Western Washington (Hruby 2004). Mitigation Area G was classified as slope wetland system.

Mitigation Area G has high potential and opportunity to provide hydrologic functions due to its developing new stream channels, which will lessen the erosive severity of floodwaters downstream and protect fish habitat. Once completed, the proposed mitigation area will provide increased habitat functions for priority species and other wildlife. Dense persistent vegetation and depressions in Mitigation Area G will slow and filter water flowing to Stream 1, and will allow sediment and pollutants to settle in wetland depressions.

Table G-3 Hydrologic, Water Quality, and Biological Characteristics and Functions to Be Provided by Mitigation Area G

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
Water Quality	16	• Soil 2 inches below the surface is not clay or organic • Persistent ungrazed vegetation ≥95% of areas • Untreated stormwater discharges to wetlands; stream discharges into wetlands that drains farmed field and roads; developed areas within 150 ft • Slope is 1%–2%, dense woody vegetation >1/2 wetland area	• Filter out and retain sediment and pollutants from adjacent development • Increased water quality for on-site and downstream aquatic resources
Hydrologic	17	• Area of watershed basins are 10 to 100 or >100 times the area of the wetland units • Opportunity to reduce flooding and erosion is high because of downstream aquatic resources and infrastructure • Dense, uncut, rigid vegetation >90% wetland area;	• Improved downstream hydrologic conditions for Stream 1 • Reduced potential for stormwater erosion along Stream 1
Habitat	24	• Cowardin classes present: forested, forested class has three out of five strata • Hydroperiods: occasionally flooded, seasonally flooded, saturated only, seasonally flowing stream in or adjacent to the wetland • Plant richness: >19 species • Interspersion of Cowardin classes: high	• The following will provide several niches and habitat connectivity for a variety of species: o Multiple Cowardin classes o Multiple hydroperiods o Multiple special habitat features o Relatively undisturbed buffers o Multiple priority habitats within 330 ft

Table G-3 Hydrologic, Water Quality, and Biological Characteristics and Functions to Be Provided by Mitigation Area G

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
		• Buffers: 100 m (330 ft) relatively undisturbed vegetated areas >25% or >50% circumference • Within 5 miles of a brackish or salt water estuary • Priority habitats within 330 ft: biodiversity areas and corridors, riparian, in stream, near shore, snags, and logs • At least three other wetlands within 1/2 mile; connections relatively disturbed	o Other wetlands within the vicinity
Total	57 (Cat. II)	Moderate Water Quality Functions Moderate Hydrologic Functions High Habitat Functions	

1 Hruby (2004)

2 The score represents anticipated site conditions 15 years post-construction.

4.0 REFERENCES

Hruby, T. 2004. Washington State Wetland Rating System for Western Washington—Revised. Washington State Department of Ecology, Publication #04-06-025.

Natural Resources Conservation Service (NRCS). 2007. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Last revision, September 11, 2009. Accessed January 7, 2011.

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Whatcom County. 2005a. Whatcom Critical Areas Ordinance – Salmonid Fish Habitat Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

Whatcom County. 2005b. Whatcom Critical Areas Ordinance – Wildlife Habitat Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

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LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- APPROXIMATE DRAINAGE
- APPROXIMATE STREAM
- SURVEYED STREAM
- STREAM AND DRAINAGE FLOW DIRECTION
- WETLAND FLOW DIRECTION
- EXISTING WETLAND AREA
- PROPOSED MITIGATION AREA
- PROJECT AREA BOUNDARY

Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

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CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway N
Bothell, WA 98011

DWN BY: SD
CHK'D BY: JG
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: 1 inch = 200 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA G
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE G-1

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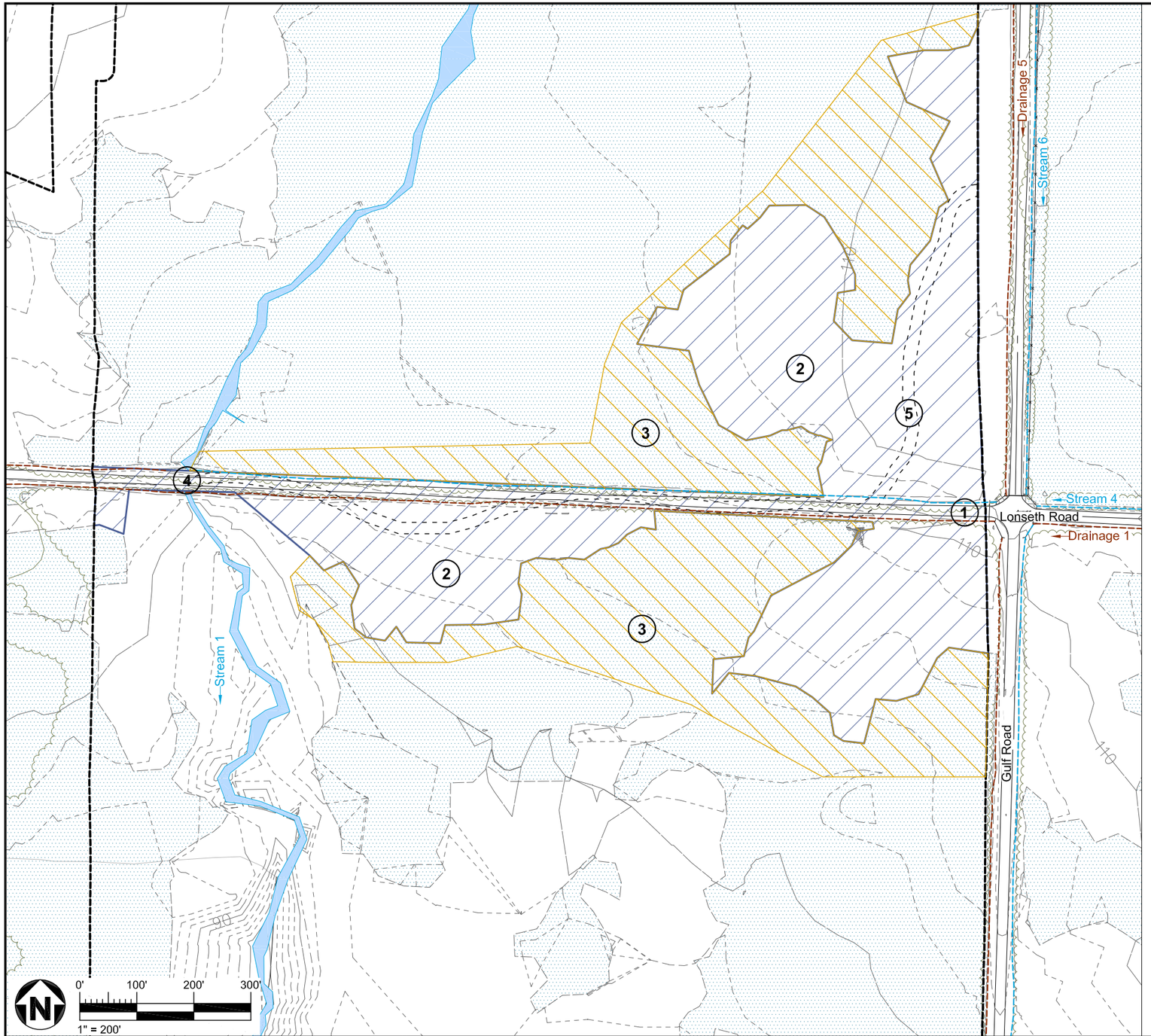

LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROJECT AREA BOUNDARY
- PROPOSED DEVELOPMENT FOOTPRINT
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT

1. Lonseth road and subbase to be removed. Flow from Stream 4 and 6 and Drainage 1 and 5 to be utilized for wetland creation.
2. PFO wetland creation.
3. Wetland enhancement. Proposed PFO wetland.
4. Culvert to be removed.
5. Proposed high flow wetland creation.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
David Evans & Associates, 2010-04-01

CLIENT LOGO

Pacific International Terminals
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CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway North
Bothell, WA, U.S.A. 98011

DWN BY: dp
CHK'D BY: KD
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA G

DATE: FEBRUARY 2012
PROJECT NO: 091515338C-01-03
REV. NO.: 1
FIGURE No. G-2

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APPENDIX H

Mitigation Area H

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1.0 INTRODUCTION

Mitigation Area H is located on the eastern portion of the Gateway Pacific Terminal ("Terminal") site (Figure H-1). Mitigation Area H consists of the portion of Lonseth Road planned to be removed running from the rail line to the West Loop rail bed and also includes restoration of flows to a relic channel of Stream 4. The area totals 3.2-acres.

2.0 EXISTING CONDITIONS

Topography at Mitigation Area H is generally defined by the Lonseth Road prism, which is flat on the paved road and slopes down sharply to roadside Stream 4 and Drainage 1. Wetlands 3 and 5A occur adjacent to Lonseth Road. Invasive Himalayan blackberry bushes dominate wetland edges between Lonseth Road and the forested wetland interiors. The relic channel drains to the northwest towards Wetland 3 and the upper reach of Stream 1. Figure H-1 shows the existing stream network, wetlands, and hydrologic flow at Mitigation Area H.

2.1 WETLANDS

Wetland 3 is a 143.4-acre Category III slope wetland that is located to the north of Mitigation Area H (Table H-1). The main portion of Wetland 3 and the adjacent areas are connected by a long, narrow, meandering relic channel that appears to be the old Stream 4 channel before watercourses were ditched across the site. There is currently none to very little flow in the relic channel.

Wetland 5A, a 95.3-acre Category III primarily forested slope wetland, is located adjacent to the south of Mitigation Area H (Table H-1).

Table H-1 Characteristics of Existing Wetlands Adjacent to Mitigation Area H

Wetland Name	Hydro-geomorphic Class	Rating[1]	Total Area (acres)	Location[2]	Hydrologic Connection
3	Slope	III	150.7	North of Lonseth Road, east of Gulf Road, south of Aldergrove Road	Abuts and drains to Streams 1, 3, 4, and 6,
5A	Slope	III	109.2	South of Lonseth Road, west of railroad	Northern portion abuts and drains to Drainage 1 and Stream 1.

1 Hruby (2004)

2 Refer to Figure H-2.

Two soil types are mapped in the vicinity of Mitigation Area H: the Whitehorn silt loam 0- to 2-percent slopes and the Birch Bay silt loam 0- to 3-percent soil units (Table H-2).

Table H-2 Mitigation Area H Existing Soils Characteristics

Soil Unit	Drainage Class	Depth to Water Table (inches)	Frequency of Flooding	Frequency of Ponding	Available Water Capacity
Whitehorn silt loam, 0%–2% slopes	Poorly Drained	0	None	Frequent	High (about 10.5 inches)
Birch Bay silt loam, 0%–3% slopes	Moderately Well Drained	24–48	None	None	High (about 10.7 inches)

Source: NRCS (2007)

Soils at Mitigation Area H likely consist of fill associated with the road prism of Lonseth Road. The vicinity of Lonseth Road is predominantly mapped as the Whitehorn silt loam soil.

2.1.1 Stream 4

Stream 4 begins northeast of the project area and flows in an excavated and maintained roadside ditch west along the north side of Lonseth Road. Stream 4 is mowed annually and excavated approximately once every 3 years. Stream 4 provides little habitat for aquatic or terrestrial species as it has little to no overstory cover,

2.1.2 Drainages 1 and 6

Drainages 1 and 6 drain Wetlands 4A, 4B, and 5A in the vicinity of Mitigation Area H.

Drainage 6 flows north along the west side of Kickerville Road and then turns west, where it meets the south side of Lonseth Road. Drainage 6 continues west along Lonseth Road, then flows through a culvert under the railroad tracks to Drainage 1. Drainage 1 flows west along the south side of Lonseth Road and empties into Stream 1. As these drainages are essentially roadside ditches, habitat value is considered very low.

Uplands in the vicinity of the relict channel are vegetated mainly with young red alder. Coniferous species are relatively rare, usually only one or two trees per acre, some of which appear to be much older than the surrounding red alder forest.

3.0 COMPENSATORY MITIGATION GOALS AND OBJECTIVES

The goal of Mitigation Area H is to increase hydrologic and habitat connectivity between adjacent wetlands to provide increased water quality, hydrologic, and habitat functions in these areas. Lonseth Road and its road prism would be removed from Mitigation Area H and the area would be excavated to match the existing grades of adjacent Wetlands 3 and 5A to create wetlands. The proposed actions

would create approximately 1.5 acres of Category II forested wetlands, and enhance 1.7 acres of Category III forested wetlands.

Flows of Stream 4 and Drainage 1 would be directed into the relic channel. With the removal of Lonseth Road, Mitigation Area H would connect Wetlands 3 and 5A to increase hydrologic and habitat connectivity between these two large wetland areas. Undisturbed habitat connectivity between Wetlands 3 and 5A would allow species of birds and amphibians to migrate freely between these areas (Figure H-2).

Hydrological connectivity between existing Wetlands 3 and 5A located to the north and south of Lonseth Road will be restored, functioning to support base flows in the restored stream channel. Relocating Stream 4 and Drainage 1 into a natural stream channel with a functioning riparian buffer would also provide water quality and hydrologic functions by intercepting, storing, and filtering water flowing on site from streams and drainages that begin offsite.

The wetland swale within the upland forest is most likely a relic stream channel from before the time when watercourses were ditched along roadsides on the site. Stream 4 and Drainage 1 are situated in a suitable position near the existing relic channel to be relocated out of the roadside ditches, and returned to a natural stream channel. Restoring the relic channel would not require additional construction activities within the forest interior, and riparian buffer plantings would be done manually to reduce temporary impacts.

The overall goals of the compensatory mitigation at Area H are as follows:

- Increase the extent of high-functioning freshwater forested wetlands.
- Enhance habitat functions of existing forested wetlands.
- Connect wetlands that are close to each other to improve hydrologic and habitat connectivity between them.
- Provide wetland area for Stream 4 and Drainage 1 to flow through before flowing to into the relic channel and Wetland 3.

The specific objectives of the proposed compensation are as follows:

1. Create approximately 1.5 acres of Category II forested wetland by removing Lonseth Road and its impervious surface.
2. Reconnect Wetlands 3 and 5A currently separated by Lonseth Road.

3. Enhance approximately 1.7 acres of existing wetland by planting conifers, and reducing invasive vegetation and planting with native species.
4. Relocate roadside Stream 4 and Drainage 1 into 6,140 linear feet of their likely natural stream channel through a forested setting.
5. Enhance 3.4 acres of riparian buffer.
6. Install large woody debris (LWD) in strategic locations.

- Leave existing large upland coniferous trees to become standing snags.

Mitigation objectives would be attained through the following actions:

- Excavate the existing topographic contours to create wetland hydrologic conditions in specified areas, and replant the re-graded areas with native forest wetland vegetation.
- Install habitat features including LWD in strategic locations, and plant coniferous species in the riparian buffer.
- Remove invasive vegetation and replant with native species.
- Relocate Stream 4 and Drainage 1 into a natural stream channel, thereby restoring 6,140 linear feet of tributaries to Stream 1 – a priority habitat.
- Remove the Lonseth Road subbase and road prism between Wetlands 3 and 5A for wetland creation in Mitigation Area H.

3.1 FUNCTIONAL ASSESSMENT

Table H-3 provides the score of Mitigation Area H created wetlands and compensatory functions that the created wetlands would provide 15 years post-construction after performance standards are met, based on the *Wetland Rating System for Western Washington* (Hruby 2004). As discussed previously, Mitigation Area H would provide primarily water quality and habitat functions, with increase in wetland habitat connectivity.

Table H-3 Hydrologic, Water Quality, and Biological Characteristics and Functions to Be Provided by Mitigation Area H

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
Water Quality	20	Depressions present but cover <1/2 wetland area Trees or shrubs >2/3 wetland area Opportunity to improve water quality as Stream 4 drains developed areas and flows through wetland	Filter and retain sediment and pollutants. Increased water quality for on-site and downstream aquatic resources
Hydrologic	18	Ratio of width of unit to width of Stream 4 is 1 to <5 Forested or shrub for >1/3 area Opportunity to reduce flooding and erosion due to the presence of downstream aquatic resources and infrastructure	Reduced potential for downstream flooding and erosion.
Habitat	24	Cowardin classes present: scrub-shrub, forested, forested class has three out of five strata Hydroperiods: occasionally flooded, seasonally flooded, saturated only, seasonally flowing stream in wetland Plant richness: 5–19 species Moderate interspersion of Cowardin classes LWD, standing snags, and overhanging vegetation at least 3.3 ft over a stream contiguous with the unit for at least 33 ft, invasive plants cover less than 25% of wetland in each stratum Buffers: 330 ft of relatively undisturbed vegetated areas or open water for >50% circumference Within 5 miles of a brackish or saltwater estuary Priority habitats within 330 ft: riparian, in stream, snags, and logs At least three other wetlands within 1/2 mile and connections between them are relatively undisturbed	The following will provide several niches and habitat connectivity for a variety of species, specifically birds and amphibians: Multiple Cowardin classes Multiple hydroperiods Moderate plant richness and interspersion of Cowardin classes Multiple special habitat features Relatively undisturbed buffers Multiple priority habitats within 330 ft Relatively undisturbed connections to other wetlands within 1/2 mile
Total	62 (Cat. II)	High Water Quality Functions Moderate Hydrologic Functions High Habitat Functions	

1 Hruby (2004)

2 The score represents anticipated site conditions 15 years post-construction.

4.0 REFERENCES

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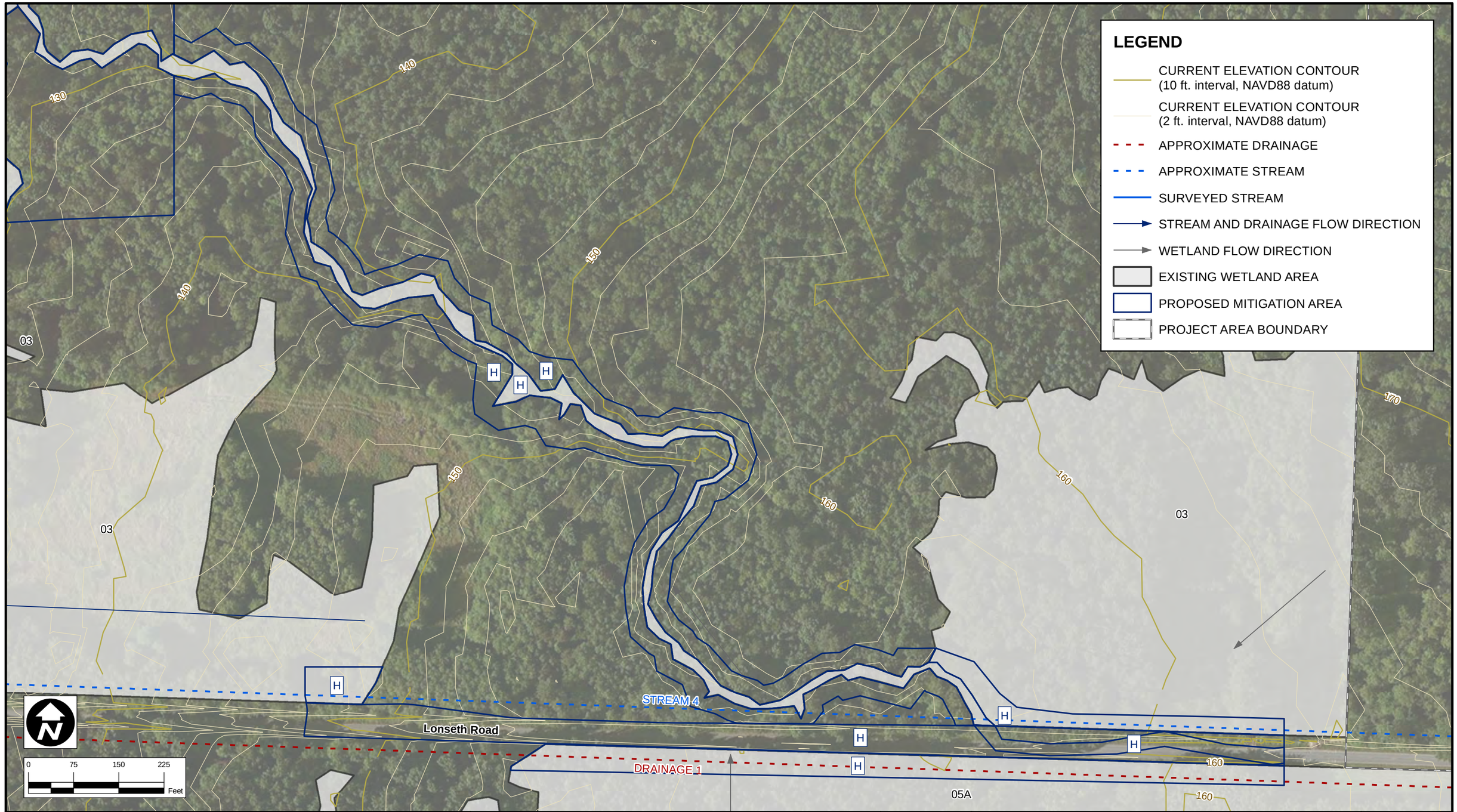
Hruby, T. 2004. Washington State Wetland Rating System for Western Washington—Revised. Washington State Department of Ecology, Publication #04-06-025.

Natural Resources Conservation Service (NRCS). 2007. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Last revision, September 11, 2009. Accessed January 7, 2011.



Source:
David Evans & Associates, svTPXpiti0006-DEGROSS.dwg, 01/16/2012.

Pacific International Terminals
A Gemix Enterprise

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway N
Bothell, WA 98011

amec

DWN BY:	SD
CHK'D BY:	JG
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	1 inch = 150 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA H
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE:	MARCH 2012
PROJECT NO.:	091515338C-01-03
REV. NO.:	-
FIGURE NO.:	FIGURE H-1

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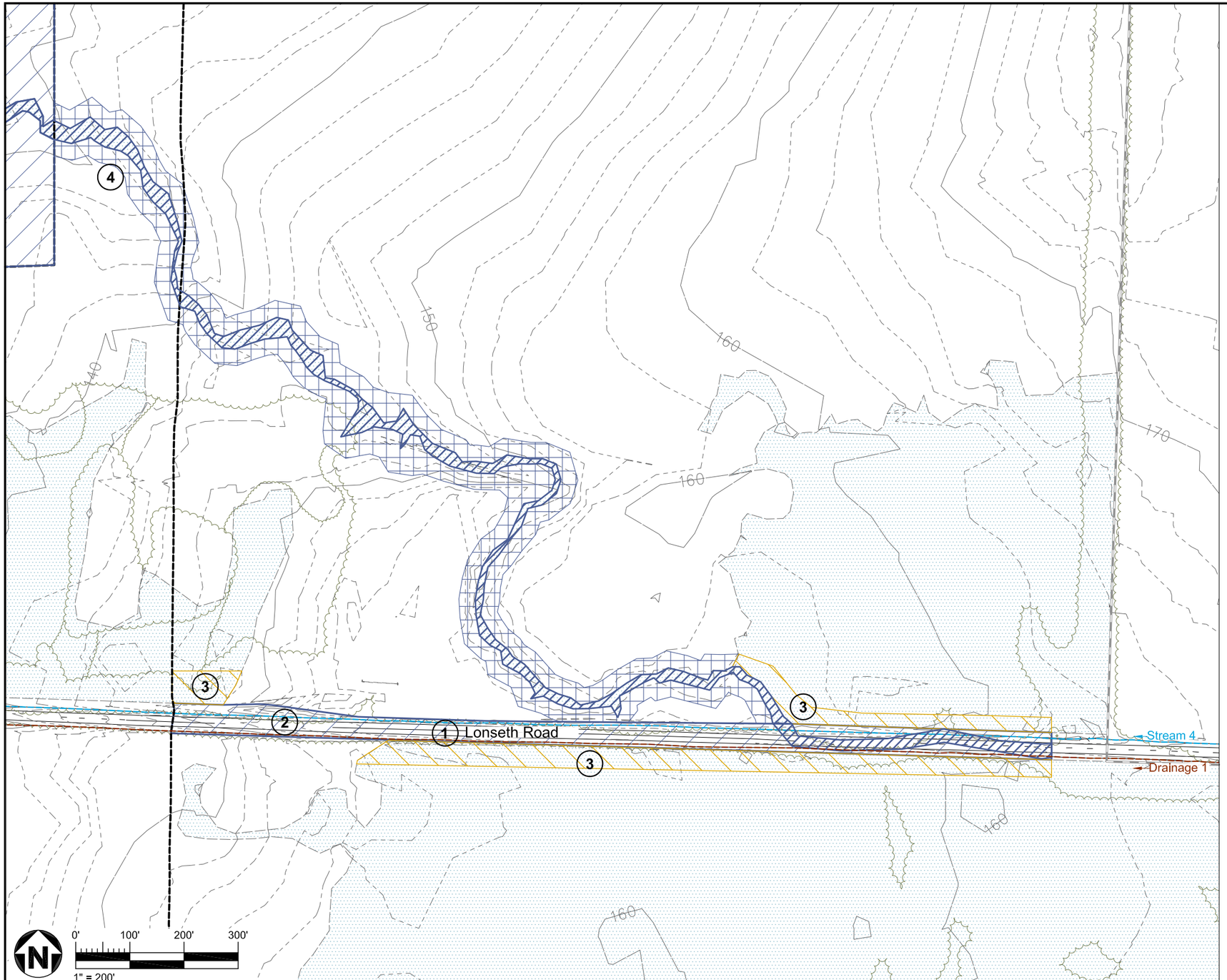

LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROJECT AREA BOUNDARY
- PROPOSED DEVELOPMENT FOOTPRINT
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT
- PROPOSED STREAM RELOCATION
- PROPOSED RIPARIAN PLANTING

1. Lonseth road and subbase to be removed. Flow from Stream 4 and Drainage 1 to be utilized for stream restoration.
2. PFO wetland creation.
3. Wetland enhancement. Proposed PFO wetland.
4. Proposed stream crossing.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
David Evans & Associates, 2010-04-01

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CLIENT:
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AMEC
11810 North Creek Parkway North
Bothell, WA, U.S.A. 98011

amec

DWN BY:	dp
CHK'D BY:	KD
DATUM:	NAD83
PROJECTION:	WA SP North, Ft.
SCALE:	AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA H

DATE:	FEBRUARY 2012
PROJECT NO:	091515338C-01-03
REV. NO.:	1
FIGURE No.	H-2

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APPENDIX I

Mitigation Area I

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1.0 INTRODUCTION

Mitigation Area I is a 335-acre parcel located off-site from the proposed Gateway Pacific Terminal ("Terminal") project boundary. This property is of the second largest piece of property in the watershed. The property is located directly south of the Terminal project area, and is bounded by Gulf Road to the south and west, by Henry Road to the north, and the BNSF railroad and Intalco property to the east (Figure I-1). Steep bluffs front the Strait of Georgia on the south.

This area consists of upland forests, agricultural fields used for pasture and harvesting hay, emergent wetlands in agricultural fields, and forested and scrub-shrub wetlands interspersed throughout the site. Stream 2 flows from east to west through the center of Mitigation Area I, and a small tributary (Stream 2A) located on the western half of the area flows south to Stream 2 (confluence on Pacific International Terminals, Inc. property – see Mitigation Area A).

Mitigation Area I provides the opportunity to expand upon existing wetlands and priority habitat associated with Stream 2, to improve water quality, hydrologic, and habitat functions in the Gateway Pacific Terminal watershed in the following ways:

1. Create approximately 68.7 acres of emergent, shrub, and forested wetland from existing upland areas.
2. Enhance approximately 27.6 acres of existing emergent wetlands now located in agricultural fields.
3. Restore natural hydrologic conditions to 5,000 linear feet of Stream 2, and create an additional 2,000 linear feet on Stream 2 by restoring a roadside drainage to a new natural stream channel.
4. Remove man-made barriers and provide functioning hydrologic connectivity between Stream 2 and the Strait of Georgia.
5. Enhance 10.4 acres of riparian buffer along Stream 2.
6. Remove approximately 106,250 square feet of unused concrete foundations and a subsurface stormwater system associated with the foundations.
7. Remove an older single-family residence, related farm structures, and the associated septic system.
8. Preserve wetlands and uplands in the Gateway Pacific Terminal watershed.

The proposed compensation will provide significant habitat functions for priority species and other wildlife by expanding wetlands and riparian areas associated with Stream 2, and increasing hydrologic

and habitat connectivity of wetlands. Additional wetlands will also maintain water quality and provide flood attenuation that will help to protect downstream aquatic resources in the watershed.

2.0 EXISTING CONDITIONS

Mitigation Area I is a 336-acre property with multiple vegetation cover types resulting from different historical land uses. Five agricultural fields are utilized as pastures or for harvesting hay. A single-family house and driveway are located in the southern half of the property along with a barn, three stock ponds, and feeding areas for cattle. An abandoned industrial site in the northwest corner includes two unused concrete pads (approximately 53,125 square feet each), stormwater collection facilities and underground drainage systems, gravel roads, soil mounds, and a stormwater detention pond.

Young red alder (*Alnus rubra*) forest stands dominate the forested areas, which cover approximately half of the mitigation site. Former access trails, large stumps, and young red alder stands indicate that these areas have been logged and/or cleared in the past. Forested areas generally surround the agricultural lands that are located in the center of the parcel. Invasive plant species are common in some portions.

Several watercourses are located on or adjacent to Area I. Surface water from Area I drains to Mitigation Area A on Pacific International Terminals, Inc. property. An intermittent stream (Stream 2A) extends from the concrete pad area in Mitigation Area I's northwest corner towards the south where it confluences with Stream 2. A forested riparian corridor crosses the site in a general east-west direction (Stream 2), and includes another intermittent tributary that drains to a farm pond near the western site border. Stream 2 and 2A confluence west of Mitigation Area I in Area A and there waters drain through a culvert underneath Gulf Road to Wetland 12.

2.1 WETLANDS

Wetlands currently cover approximately 49.9 acres of Mitigation Area I. Wetlands were delineated in 2011 but boundary locations have not yet been confirmed by any agency. Wetland cover types onsite, in accordance with the Cowardin classification system, include palustrine forested (PFO), palustrine scrub-shrub (PSS), palustrine emergent (PEM), and palustrine open water (POW). Total cover by these vegetation types included 22.24 acres of PFO, 0.99 acres of PSS, 23.92 acres of PEM, and 2.74 acres of POW. The wetlands occurred as 27 separate wetland polygons. In accordance with the hydrogeomorphic (HGM) wetland classification system, the 27 different wetland areas occurred as either slope, riverine, or depressional wetlands.

2.1.1 Vegetation

Typical vegetation in the forested wetlands included red alder, black cottonwood (*Populus balsamifera*), and western red cedar (*Thuja plicata*). Understory vegetation included salmonberry (*Rubus spectabilis*), ladyfern (*Athyrium filix-femina*), and slough sedge (*Carex obnupta*). Shrub wetland vegetation communities were dominated by Nootka rose (*Rosa nutkana*), Douglas spirea (*Spiraea douglasii*), and Himalayan blackberry (*Rubus armenciacus*). Emergent wetland vegetation communities were most often found in the agricultural fields, and were dominated by soft rush (*Juncus effusus*), reed canarygrass (*Phalaris arundinacea*), bentgrass species (*Agrostis* spp.), creeping buttercup (*Ranunculus repens*), and fescue species (*Festuca* spp.).

2.1.2 Hydrology

Wetlands on Mitigation Area I are hydrologically connected to the Strait of Georgia via surface or groundwater connection to Stream 2 and/or Stream 2A. Hydrologic sources for the wetlands include groundwater seeps, surface runoff from uplands, and overbank flow in riparian zones along streams. Most wetlands exhibit multiple hydrologic regimes. Three farm ponds are centrally located on Mitigation Area I, and constructed berms retain water from agricultural ditches to create these open water features. A fourth farm pond is located on the Stream 2 channel, and a concrete weir creates hydrologic conditions for an emergent wetland complex just upstream from this fourth pond.

2.1.3 Soils

Soil units mapped within wetlands on Mitigation Area I include the Whitehorn silt loam 0- to 2-percent slopes, Neptune very gravelly sandy loam 0- to 3-percent slopes, and Birch Bay silt loam 3- to 8-percent slopes (NRCS 2007).

As evidenced by the characteristics in Table I-1, soils at Wetland Mitigation Area I have a wide range of depth to water table and ability to infiltrate and retain water. Soils at Wetland Mitigation Area I generally grade from poorly drained with a water table at the soil surface, high available water holding capacity, and frequent ponding (Whitehorn series) to somewhat excessively drained with a water table at about 80 inches (Neptune series) (NRCS 2007). The Birch Bay series soil characteristics lie between these other two series with respect to hydrologic conditions.

Table I-1 Mitigation Area I Existing Soils Characteristics

Soil Unit	Drainage Class	Depth to Water Table (inches)	Frequency of Flooding	Frequency of Ponding	Available Water Holding Capacity
Whitehorn silt loam, 0%–2% slopes	Poorly Drained	0	None	Frequent	High (about 10.5 inches)
Birch Bay silt loam, 3%–8% slopes	Moderately Well-Drained	24–48	None	None	Low (about 1.5 inches)
Neptune very gravelly sandy loam	Somewhat Excessively Drained	80	None	None	Very Low (about 2.3 inches)

Source: NRCS (2007)

2.2 STREAMS 2 AND 2A

Two intermittent streams are located on Mitigation Area I. The riparian areas of Stream 2 are identified as priority habitat by WDFW and Whatcom County, and the stream itself is identified as having potential/historical fish distribution (Whatcom County 2005a; WDFW 2006).

Approximately 1,573 linear feet of Stream 2A is located on Mitigation Area I. This smaller tributary receives surface water and groundwater inputs and begins as a groundwater seep near the concrete pads, as shown on Figure I-1. The upper most reach has shallow-but-defined bed and banks as it initially flows through a young red alder setting, and the reach section just downstream has a mature Western red cedar canopy. The associated forested wetlands draining to Stream 2A via surface and groundwater flow during periods of saturation.

Stream 2 begins along the east side of the mitigation area and flows from east to west through the center of the mitigation area within a channel with defined bed and banks. Approximately 5,344 linear feet of the stream are located on Mitigation Area I, with the lower reaches on Pacific International Terminals property (See Appendix A – Mitigation Area A). The ravine that contains Stream 2 is vegetated with a mixture of deciduous trees and conifers, and Western red cedar is common.

As mentioned earlier, a farm pond was constructed in the stream channel by placement of fill in the channel. Stream flows end at the pond and only resume downstream due to groundwater recharge along the lower reach. On the occasions when the pond is full, water will overflow from the pond around the berm. Some of this water returns to the stream channel but pond overflow has also been observed to flow to the south via sheet flow through the adjacent young alder forest.

During a field investigation in December 2011, shallow stream flows were present in Stream 2 starting at a point near the confluence with an agricultural ditch near the center of the property (Figure I-1). However, no surface flows were evident in the upper reaches of Stream 2 on the eastern half of the property. At that time it appeared that a clogged stream culvert underneath the Custer Spur appeared to result in diverting water from the natural channel to flow instead north along the railbed ditch, leaving the Stream 2 natural channel dry.

The water flowing along the railbed appears to flow directly to the roadside ditch (Drainage 3) on the south side of Henry Road.

Stream 2 appears to have an altered hydrologic regime due to the action of agricultural ditches, four farm ponds, the earthen dam and created pond on the main stem of the stream channel, and due to lack of flow from areas east of the Custer Spur.

2.3 ROADSIDE DRAINAGES

Roadside drainages are present adjacent to Mitigation Area I at the southern edge of Henry Road (Drainage 3), and along the eastern edge of Gulf Road. Drainages are also located along the western and eastern sides of the Custer Spur in gravel-lined ditches. Agricultural drainages are present in the fields (see Figure I-1).

Both of the railroad drainages flow north to Henry Road where culverts turn to the flow west towards into Drainage 3. Drainage 3 flows continue west adjacent to the Mitigation Area I. Drainage 3 confluences with Stream 1 at the ravine at Henry Road. It appears that overflow from Drainage 3 at the Henry Road at the intersection with Gulf Road drains south along Gulf Road during storm events or other periods of high flows returning flows to Stream 2.

An agricultural ditch that drains to Stream 2 is located in the center of the property. It is approximately 3,166 linear feet long, and has berms of side-casted material that parallel it. This ditch overflows into the agricultural ponds during periods of high flows.

2.4 UPLANDS

Uplands within Mitigation Area I are predominantly forested and are largely homogeneous, with little variation in stand age or community composition. Abundant standing or fallen dead trees (mainly smaller-diameter red alder) and very few light gaps characterize the forests. Dense thickets of Nootka rose and Himalayan blackberry are common along forest edges. Coniferous species are relatively rare throughout most of Wetland Mitigation Area I—usually only one or two trees per acre, some of which appear to be much older than the surrounding red alder forest.

2.5 WILDLIFE

2.5.1 Fish

The riparian area of Stream 2 is mapped as priority habitat by WDFW (2006) and Whatcom County (2005b). Stream 2 is mapped by Whatcom County (2005b) as having potential/historical fish distribution. Thus, while Stream 2 is not a known fish-bearing stream, it provides potential habitat for fish species. WDFW (2006) identifies the riparian zone of Stream 2 as providing habitat for many wildlife species. The potential for fish to use Stream 2 is reduced by the lack of flow in the lowest reach and the earthen berm across the main stem of the channel.

2.5.2 Birds

The coastal area of this area is mapped by WDFW as peregrine falcon (*Falco peregrinus*) winter habitat, as the area coincides with the wintering waterfowl areas on Bellingham Bay, Lummi Bay, and the Lummi Flats (WDFW 2006). This area is reported to be used by bald eagles (*Haliaeetus leucocephalus*) for foraging year-round and by peregrine falcons in winter (WDFW 2006).

3.0 PROPOSED COMPENSATORY MITIGATION AT AREA I

The presence of Streams 2 and 2A, multiple HGM and Cowardin classes of wetlands, and priority habitats (riparian areas, urban natural open space) within and adjacent to Mitigation Area I provides the opportunity to increase habitat and hydrologic connectivity and improve water quality for on-site and downstream aquatic resources.

Abundant red alder forest with occasional large coniferous tree species adjacent to wetlands provides the opportunity to increase wildlife functioning and in the Gateway Pacific Terminal watershed to offset project habitat impacts. Low functioning upland and wetland agricultural areas could be enhanced or converted to higher functioning wetlands.

The range of topography, soil types, and existing hydrology at Mitigation Area I will allow for aquatic bed, emergent, scrub-shrub, and forested wetlands to be created between existing wetlands on Mitigation Area A. This will increase habitat and hydrologic connectivity, while providing water-quality improvements.

Removing the 106,250 square feet of remnant structures and concrete foundations on the northern portion of Mitigation Area I will decrease impervious surface and provide suitable area for wetland creation. Existing impervious surface will be reduced further when the single-family residence and farm structures are also removed from the site

3.1 GOALS OF THE PROPOSED MITIGATION

The goal of the action at Mitigation Area I is to create wetlands that will provide the type of biological, chemical, and physical conditions typical of a freshwater ecosystem adjacent to a coastal setting. The compensation area will be adjacent to Mitigation Area A, a planned estuarine coastal lagoon to the east of Gulf Road, and adjacent to the north of the Strait of Georgia. In accordance with restoration principles, restoring the lands and aquatic resources upslope of Mitigation A should ensure the long-term success of the mitigation in that area. In addition, the project aims to expand upon the existing riparian priority habitats along Stream 2 to increase habitat and water quality functions.

Mitigation Area I provides a unique opportunity to completely replace the functions lost due to project effects on the local watershed. Restoring existing stream channels, removing concrete pads and related infrastructure, creating and enhancing wetlands, and reconnecting freshwater aquatic systems in the watershed to coastal systems along the Strait of Georgia will serve to restore the functions provided by this coastal watershed that have been lost due to historical land uses.

3.2 OBJECTIVES OF THE PROPOSED MITIGATION

The specific objectives of the proposed compensation are as follows:

- Create approximately 68.7 acres of emergent, scrub-shrub, and forested wetland from existing upland areas.
- Enhance approximately 27.6 acres of existing emergent wetlands in agricultural fields.
- Enhance 10.4 acres of riparian buffer along Stream 2.
- Improve habitat functions for known and presumed on-site wildlife.

Mitigation objectives would be attained through the following actions:

- Excavate the existing topographic contours in upland areas and remove agricultural drainage to create wetland hydrologic conditions.
- Create an additional 2,000 linear feet tributary stream to Stream 2.
- Restore stream flows to their natural channels for approximately 2,100 linear feet.
- Remove the earthen berm and concrete weir on Stream 2 to restore fish access.
- Remove approximately 106,250 square feet of concrete foundations remaining from a former factory operation at the site.
- Replant the regraded area with native emergent, scrub-shrub, and forest wetland vegetation.
- Reduce invasive vegetation and replant areas with native species.

- Install habitat features, including fish gravels in Stream 2 and LWD in strategic locations.

3.3 FUNCTIONAL ASSESSMENT

The proposed actions at Mitigation Area I would create approximately 68.7 acres of depressional, slope, and riverine wetlands, and enhance approximately 27.6 acres. The compensatory functions that the created and enhanced wetlands would provide 15 years post-construction, after performance standards are met, based on the *Wetland Rating System for Western Washington* (Hruby 2004) would provide a substantial increase in overall functioning in the Gateway Pacific Terminal watershed.

The proposed actions at Mitigation Area I will increase water quality and habitat functions in the watershed. Hydrologic conditions on Stream 2 and Stream 2A will improve when water is returned to their natural channels, which will flow through extensive restored and created wetland systems. Persistent vegetation will attenuate potential flooding, and depressional areas will be able to store water in the watershed.

Actions taken in Mitigation Area I will restore fish and wildlife habitat. Expanded wetlands along Stream 2 and Stream 2A will provide additional amphibian habitat while improving water quality in Stream 2 and 2A for downstream aquatic species.

Eliminating the fish passage block at the farm pond and through restoration of in-stream flows and habitat will result in increased suitable habitat for fish species.

High interspersion of Cowardin classes, multiple hydroperiods, and special habitat features in the created wetlands will provide numerous niches for wildlife species, especially amphibians and birds. The presence of other wetlands and priority habitats in the vicinity increases the likelihood of species dispersion to and from Mitigation Area I. Therefore, Mitigation Area I has high potential for habitat mitigation opportunities, in addition to water quality and hydrologic functions.

4.0 REFERENCES

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Whatcom County. 2005a. Whatcom Critical Areas Ordinance – Salmonid Fish Habitat Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

Whatcom County. 2005b. Whatcom Critical Areas Ordinance – Wildlife Habitat Conservation Areas Map. Whatcom County Planning and Development Services Geographic Information System (GIS).

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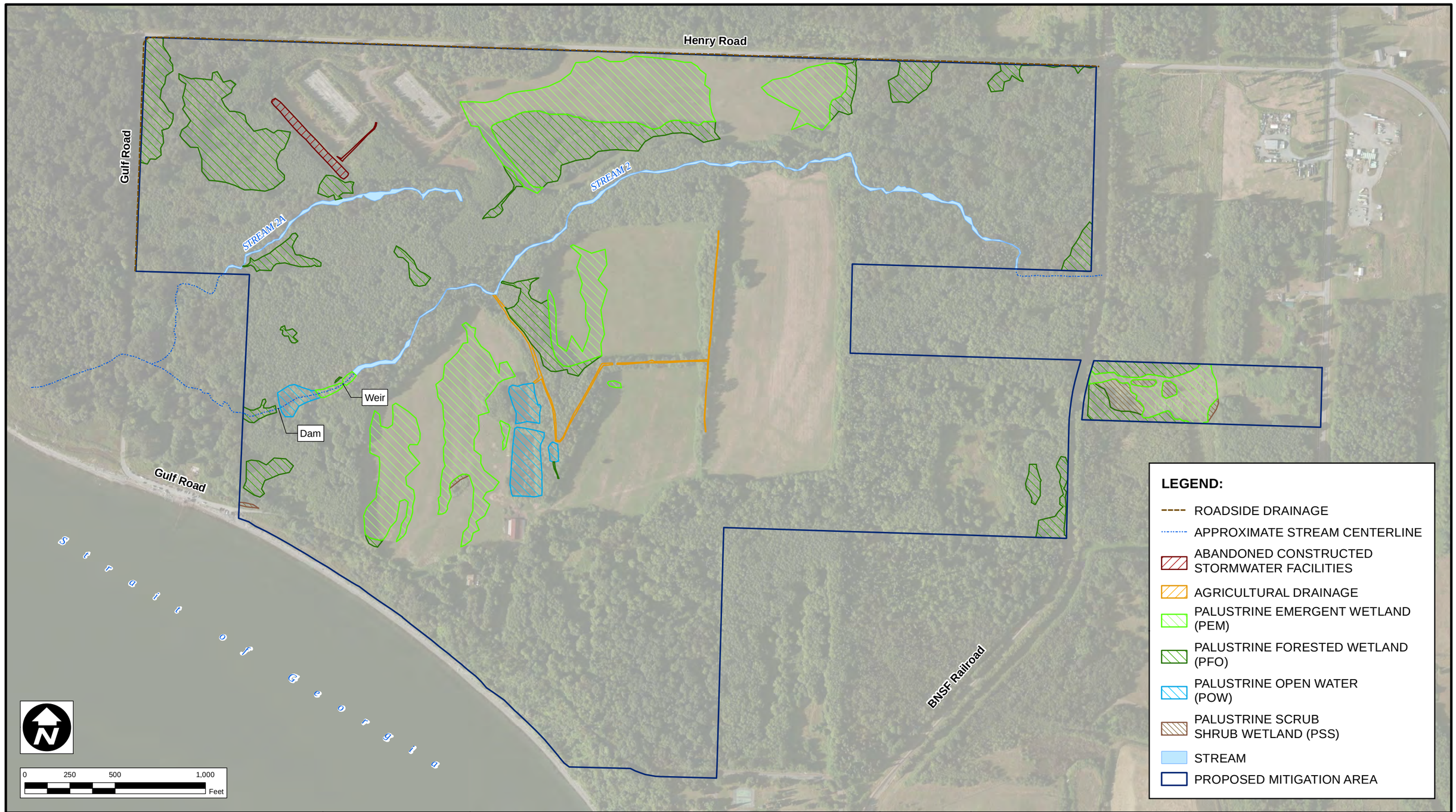


Pacific International Terminals
A Cermix Enterprise

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway N
Bothell, WA 98011

amec

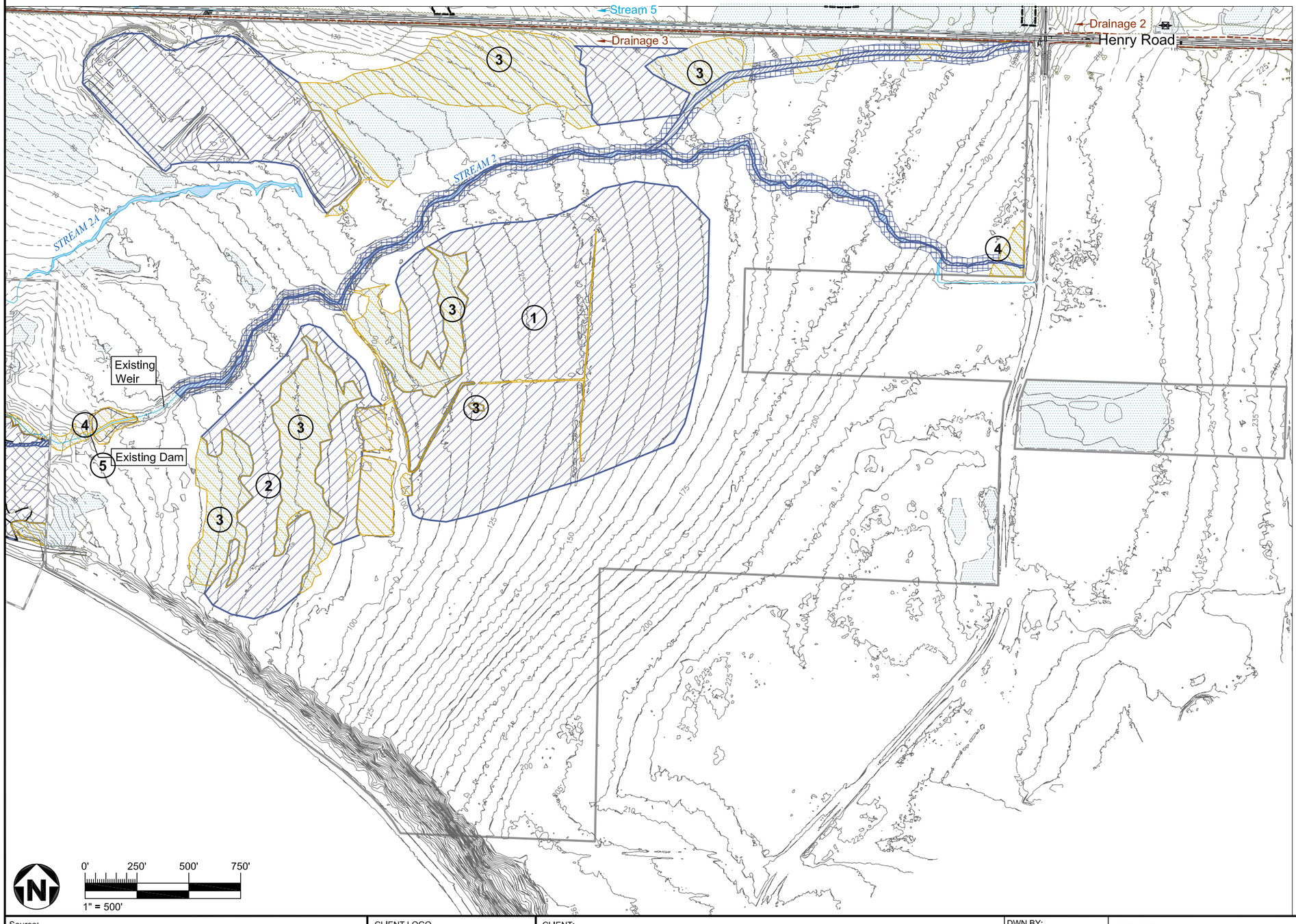
DWN BY: SD
CHK'D BY: JG
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: 1 inch = 500 feet

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
MITIGATION AREA I
EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW

DATE: MARCH 2012
PROJECT NO.: 091515338C-01-03
REV. NO.: -
FIGURE NO.: FIGURE I-1

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Revised\Figure I-1 - Mitigation Areas I - Existing Stream Network v2.mxd



LEGEND

- EXISTING 2' INTERVAL CONTOURS
- EXISTING 5' INTERVAL CONTOURS
- EXISTING VEGETATION LINE
- PROPERTY BOUNDARY
- PROJECT AREA BOUNDARY
- PROPOSED DEVELOPMENT FOOTPRINT
- EXISTING WETLANDS (delineated & surveyed)
- PROPOSED WETLAND CREATION
- PROPOSED WETLAND ENHANCEMENT
- PROPOSED STREAM RELOCATION
- PROPOSED RIPARIAN PLANTING

1. PFO/PSS wetland creation.
2. PSS/PEM wetland creation.
3. Wetland enhancement. Proposed PEM wetland.
4. Wetland enhancement. Proposed PFO wetland.
5. Existing dam to be removed.

Notes:
1. Development of creation and enhancement areas will require grading and selective tree removal. Trees will be used for habitat structures.

Source:
2' Interval Contours: David Evans & Associates, 2010-04-01
5' Interval Contours: LIDAR Imagery

CLIENT LOGO

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A Carrix Enterprise

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC
11810 North Creek Parkway North
Bothell, WA, U.S.A. 98011

DWN BY: dp
CHK'D BY: KD
DATUM: NAD83
PROJECTION: WA SP North, Ft.
SCALE: AS SHOWN

PROJECT
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE
MITIGATION AREA I

DATE: FEBRUARY 2012
PROJECT NO: 091515338C-01-03
REV. NO.: 1
FIGURE No. I-2