Preliminary Conceptual Compensatory Mitigation Plan

Gateway Pacific Terminal

Whatcom County, Washington

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

February 28, 2011

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CWA	Clean Water Act
dwt	Dead weight tons
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
HGM	Hydrogeomorphic
MHHW	Mean higher high water
MLLW	Mean lower low water
Mtpa	Million metric tons per annum
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

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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PRELIMINARY CONCEPTUAL COMPENSATORY MITIGATION PLAN

Gateway Pacific Terminal
Whatcom County, Washington

1.0 PREFACE

Pacific International Terminals, Inc., proposes to construct and operate the Gateway Pacific Terminal, a dry bulk multimodal terminal at Cherry Point, Washington. Construction and operation of the Terminal will require permitting by several local, state and federal agencies. Some individual permits require technical studies concerning site conditions, project effects and proposed mitigation. This document has been prepared in support of the Joint Aquatic Resources Permit Application filed by Pacific International Terminals, to obtain permits related to disturbance of aquatic resources by the project.

2.0 INTRODUCTION

Pacific International Terminals, 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, Inc., to provide full compensation for lost area and functions that may result from project construction and operation.

The US Army Corps of Engineers (USACE) confirmed all wetlands (approximately 530 acres), streams, and ditches in the project area on March 5, 2009, to be jurisdictional because they either abut or are adjacent to unnamed tributaries of the Strait of Georgia, 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 *Wetland Determination and Delineation Report* (AMEC 2008).

Wetland impact assessment has determined that approximately 140.6 acres of wetlands and 12,800 feet of roadside streams and ditches will be directly impacted. Approximately 21 acres of wetlands will be temporarily impacted during construction of the project.

These impacts may be compensated by a combination of:

- Onsite restoration or creation of wetlands;
- Offsite restoration or creation of wetlands;
- Mitigation banking credit; and
- In-lieu fees to Whatcom County or other designated agency 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 the Washington State Department of Ecology (Ecology).

The preliminary conceptual-level plan presented here for providing on-site compensation for minimized, unavoidable impacts to wetlands indicates that approximately 136 acres of wetlands can be created, 85 acres can be enhanced and 305 acres of wetland can be preserved within the current Gateway Pacific Terminal property. Together, using Whatcom County's guidelines for wetland mitigation, these actions represent 93.9 acres of the equivalent wetland mitigation required to offset the 140.6 acres to be impacted. To provide additional wetland mitigation, Pacific International Terminals, Inc., proposes implementation of three strategies:

- Additional land acquisition: Pacific International Terminals, Inc., has identified and is attempting to acquire additional property to append to the current project area and increase the available on-site acreage for restored or created wetlands. Property in the project vicinity is also being sought.
- Establish In-lieu fee program with Whatcom County: Recent guidance by the USACE, EPA, and Ecology indicates a preference for In-lieu fee programs and mitigation banking approaches over applicant-installed on-site approaches because the former are expected

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CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: VICINITY MAP	CHK'D BY: TQ	REV. NO.: 1	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\Figure 1 - Vicinity Map.mxd

to provide greater benefit to the watershed and less risk of mitigation failure. Pacific International Terminals proposes to assist Whatcom County to establish an In-lieu fee program using programs established in nearby counties as a guideline and pay appropriate fees to mitigate for all or a portion of the remaining mitigation requirement.

- Obtain wetlands banking credits: We are aware of one proposal for a Mitigation bank that has been proposed with a service area including the project area. As far as we are aware, the bank has not been commissioned; however, Pacific International Terminals would work in collaboration with the bank sponsors towards a mutually beneficial arrangement.

This initial compensatory wetlands mitigation plan incorporates conceptual-level design information and is intended to facilitate early project-phase review and collaboration on appropriate approaches with Agency staff and other interested stakeholders. Feedback gained during these discussions will be incorporated into draft and final plans to be developed at appropriate future stages in the project permitting process.

This report focuses on freshwater wetlands, streams, and ditches within the Gateway Pacific Terminal project area. 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 *Gateway Pacific Terminal Project Information Document* (Pacific International Terminals, Inc. 2011), and in the *Biological Assessment* prepared for the project (AMEC, in preparation).

Wetland, stream, and other areas require buffer offsets (Whatcom County Code [WCC] 2010) to provide protection to sensitive and critical functions. Buffers will be provided at the Gateway Pacific Terminal for all areas as appropriate and required. However, for this preliminary conceptual Plan, buffers are not shown nor discussed. We anticipate one or more revisions as the preliminary plan matures and is refined through agency discussions and other coordination. Future plans will develop offset areas and provide for buffer establishment and restoration as appropriate to meet the requirements of the County and expectations of the state and federal agencies for the protection of sensitive areas.

3.0 IN-LIEU FEE PROGRAM

Studies of wetland mitigation in Washington and other states indicate high rates of failure. The primary reasons include inappropriate selection of mitigation sites, poor site design, inadequate construction techniques, 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 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.

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 by early 2011 (King County, 2011; L. Driscoll personal communication 2011). 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).

Although an In-lieu fee program does not exist north of King County at this time, Whatcom County has previously shown interest in developing an In-lieu fee program (L. Driscoll, personal communication, 2011). Whatcom County Code does not specifically allow In-lieu fee as mitigation for impacts to

critical areas, but 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 mitigation option for impacts at Gateway Pacific Terminal.

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).

4.0 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.[1] 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[2] and Panamax.[3]

The Terminal will handle a variety of dry bulk commodities throughout its lifetime. In the first 10 years after construction is completed, the Terminal would likely manage exports of coal, potash, and calcined petroleum coke.[4]

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;

[1] In general, dry bulk commodities are those agricultural or mining products that are particulate in nature, minimally processed (if at all), and not bagged or wrapped. Grain, iron ore, salts, coal, and alumina are dry bulk commodities. They are transported as shiploads or trainloads and handled using large-capacity containers or storage pads, and large dedicated transfer machinery generally incorporating conveyor systems. Bulk commodities can be thought of as the "raw material" upon which many industrial processes depend.
[2] Capesize vessels are defined as a class of bulk carrier with beams greater than 105.6 feet that cannot transit the Panama Canal because they are too wide, and therefore must travel south around the Cape of Good Hope or Cape Horn. The majority of the present capesize fleet have capacities between 160,000 and 180,000 long tons dead weight (dwt).
[3] Panamax vessels, the largest vessels that currently transit the Panama Canal, can carry approximately 65,000 to 85,000 dwt. These vessels are a little over a third the size of a capesize vessel.
[4] Calcined coke is a by-product of oil refining and is used as an energy source or as a carbon-rich starting material for other manufacturing, such as for dry cells.

- 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 layout and the locations of these general functional areas are shown in Figure 2.

4.1 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.

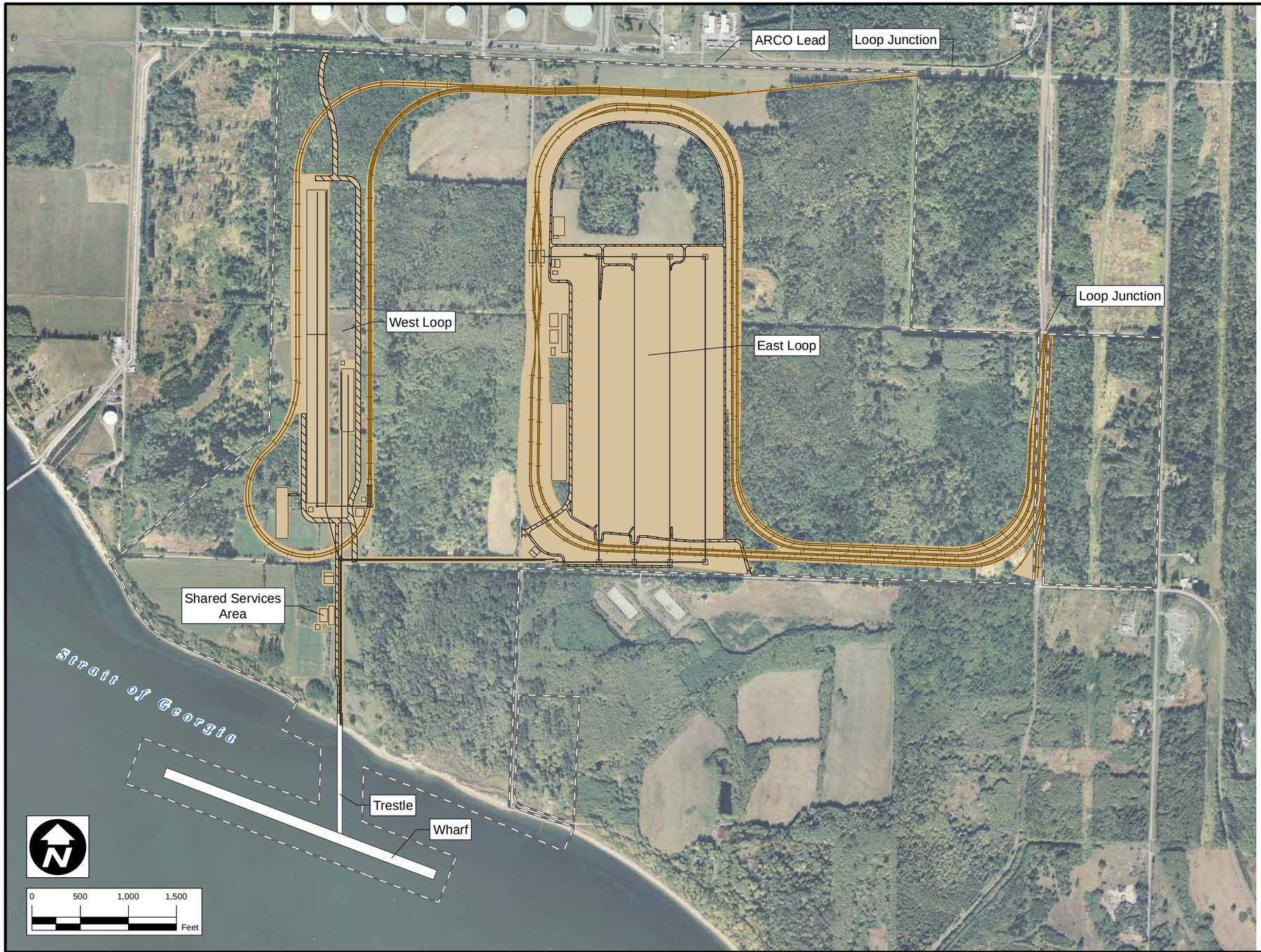
The project area, which is zoned for heavy-impact Industrial use, is located within unincorporated Whatcom County and is in Whatcom County's designated Cherry Point Industrial Urban Growth Area 9 (Whatcom County 2006). The wharf would be located in the Strait of Georgia between the BP Cherry Point Refinery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

4.2 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 (see Figure 2). The highest portion occurs nearest the eastern project site boundary, with site elevation gradually decreasing to the west and to the south. Moderate



LEGEND

- RAILROAD
- ROAD
- DEVELOPMENT FOOTPRINT
- PROJECT AREA BOUNDARY

Source:
Ausenco Sandwell, 154199-A100-42S01.dwg (Rev. J), 12/24/2010.

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amec

DWN BY:	SD
CHK'D BY:	KD
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:	FEBRUARY 2011
PROJECT NO.:	091515338C-01-03
REV. NO.:	1
FIGURE NO.:	FIGURE 2

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slopes and steep bluffs border the westernmost and easternmost stretches of shoreline. 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 2008 resulted in delineation of wetlands on approximately 530.6 acres of the property owned by Pacific International Terminals, Inc., (Figure 3). 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 wet 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 located within upland forests and shrub habitats and are dominated by native plant species. One wetland is a coastal lagoon system.

Seven streams were identified within the project area (AMEC 2008), including two natural watercourses (Streams 1 and 2) and five roadside ditches (Streams 3 through 7). Stream 1 (Stream number 01.0100 in WRIA 1) drains the north, central, and western project area, while Stream 2 drains the southeastern portion.

4.3 PROPERTY OWNERSHIP

The proposed Terminal would be developed on approximately 350 acres of the project area, which includes approximately 1,109 acres of heavy-impact industrial zoned land owned by Pacific International Terminals, Inc. In addition to the Pacific International Terminals, Inc.,-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 the DNR.

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	29.6	0.0	29.6
State lands managed by DNR	0.0	43.3	43.3
Total	**1,140.0**	**61.5**	**1,201.5**

4.4 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. Active 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.

4.4.1 Parcel 14

Parcel 14 is a 29.6-acre privately held parcel adjacent to Henry Road. Pacific International Terminals, Inc., 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. Based on the distribution of known wetlands, other wetlands are anticipated to occur in this, but these have not been identified or delineated at the time of this report. As a conservative estimate in this report, any proposed development on this parcel was assumed to result in direct wetland loss for the full development area.

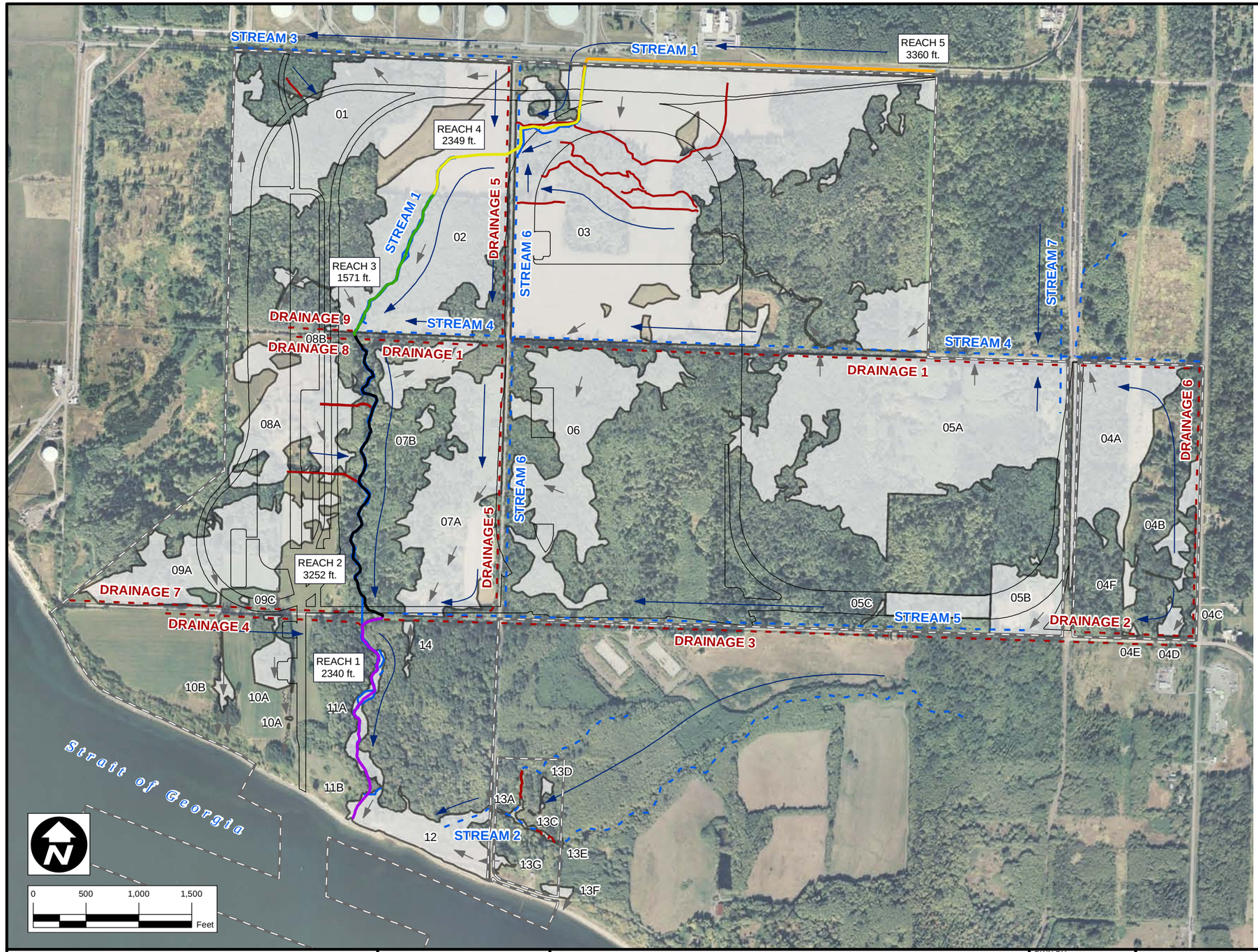
4.4.2 County Rights-of-Way

Approximately 19.9 acres of Whatcom County rights-of-way currently bisecting the Pacific International Terminals, Inc., property would be petitioned by Pacific International Terminals, Inc., for vacating (Table 2). Portions of these roadways to be vacated have been closed to vehicular traffic for a number of years. Approximately 13 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 west to western property line	3.9	0.5
Powder Plant Road	Henry Road to Aldergrove Road	6.0	6.0
Total		**19.9**	**13.5**

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.



LEGEND

- APPROXIMATE DRAINAGE
- SURVEYED 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
- PROJECT AREA BOUNDARY

Pacific International Terminals
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CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

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

DWN BY: SD
CHK'D BY: KD
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: FEBRUARY 2011
PROJECT NO.: 091515338C-01-03
REV. NO.: 1
FIGURE NO.: FIGURE 3

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

4.4.3 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 DNR (2010). The existing near-shore and marine shoreline conditions, potential effects, and compensation are discussed further in the *Biological Assessment* (AMEC, in preparation).

4.5 GATEWAY PACIFIC TERMINAL DEVELOPMENT

Terminal development, including roadways, rail loops, and other infrastructure would affect approximately 350 acres of the project area, including uplands, wetlands, streams, and ditches. Of the approximately 350 acres of Gateway Pacific Terminal property needed for this project, approximately 140.6 acres qualify as jurisdictional wetland.

Wetlands would be directly impacted by grading to develop the Terminal (Table 3), including filling to raise some areas and grading and fill for rail embankments. Terminal development would also permanently affect a total of approximately 12,800 linear feet of streams and ditches (Table 4). Most of these are roadside ditches.

Table 3 Summary of Direct Permanent and Temporary Wetland Impacts

Project Area	Permanent Wetland Impacts (acres)	Temporary[4] Wetland Disturbance (acres)
East Loop[1]	102.3	7.9
West Loop[2]	37.7	13.2
Shared Services Area[3]	0.6	0.2
Total	**140.6**	**21.3**

1 This area includes the East Loop from the junction at Elliot Yard, all infrastructures within the loop, and the load-out conveyor servicing the shared services area.

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 includes 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 20 feet beyond the proposed cut and fill line on rail embankments and any other proposed infrastructure footprint.

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.)**	**Linear feet**	**Area (sq. ft.)**
East Loop	11,531	46,092	4,025	15,037
West Loop	977	3,799	447	1,662
Shared Services Area	306	958	60	200
Total	12,814	50,850	4,532	16,899

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.

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 *Project Information Document* (AMEC 2011).

For the East Loop area, approximately 2.7 million cubic yards of material would be cut, and about the same quantity would be needed to fill, to create a large level area and for rail embankments. Cut and fill quantities for the West Loop are also estimated to balance on site, with quantities of earth moved estimated to be approximately 700,000 cubic yards. Grading of minimal amounts would be needed for the construction of the shared services area and for the abutment of the trestle.

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.

Three stormwater treatment areas are currently planned within the project impact footprint. 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. After collection and treatment, the treated stormwater would be released to restored and created wetland areas. “Natural runoff,” that is, stormwater from areas in the project area that does not have the potential for becoming contaminated with pollutants, will be directed to natural and restored drainages and streams.

5.0 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 is provided to support the discussion on impacts and functional assessments. Information presented here comes from both existing documents and previously unpublished data.

Approximately 1,132 acres of the project area lies within the Gateway Pacific Terminal watershed (Figure 4), while approximately 68 acres does not drain to Stream 1 or 2, but probably drains to the Birch Bay Watershed. The following sections provide descriptions of the characteristics, function, and process of these two coastal watersheds. More detail is provided for the Gateway Pacific Terminal Watershed characteristics and conditions. Wetlands, streams and ditches are discussed within their respective watershed location. Summary information on all wildlife habitat across the project area is provided because most of wildlife habitats on the project area include both upland and aquatic areas.

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

5.1 BIRCH BAY WATERSHED CHARACTERISTICS

The northwest corner of the project area (68 acres) possibly lies within the 31-square-mile Birch Bay Watershed. Stream 3 is located on BP property on 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. We have not confirmed the connection, but since no alternative is apparent, we have made the assumption that this connection occurs.

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 important 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. In addition to the variety of waterfowl at Lake Terrell, the second largest heron rookery in Washington is in the watershed on Birch Bay (ESA Adolfson 2007), approximately 2.1 miles northwest from the project area. Planning efforts led by Whatcom County and the Washington State Department of Ecology identified goals to meet natural resource objectives for maintaining the health of Birch Bay. 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

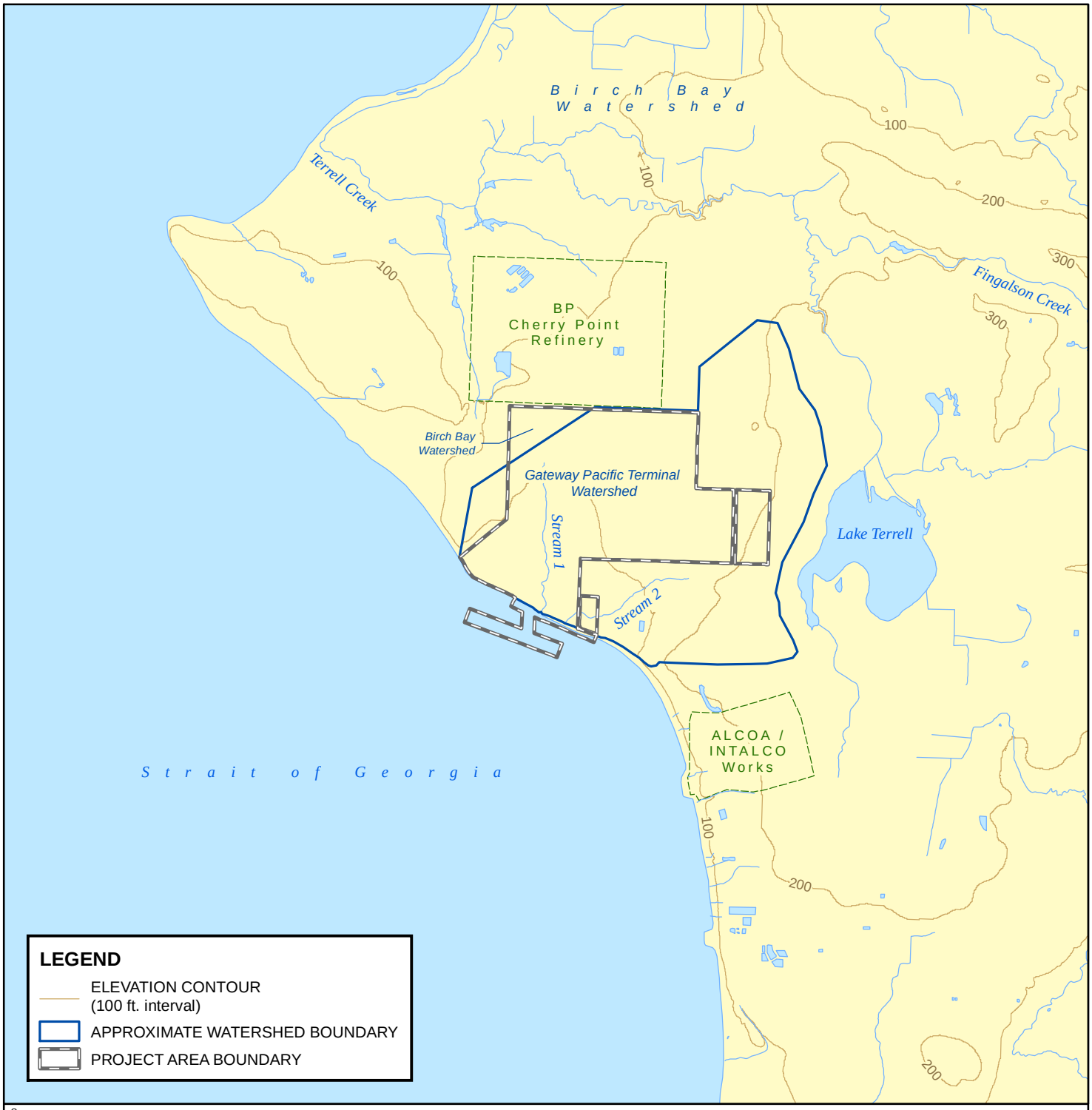
Stream or Wetland ID	State of Washington Stream Type/ Wetland Rating[1]	Whatcom County Stream Type[2]	Water Flow Characteristic/ Classification	Location
Stream 3 (the "Industrial Tributary to Terrell Creek")	Ns	HCA 1c	2,000 linear feet are adjacent to property. Relatively permanent water. Drains to Terrell 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

5.2 GATEWAY PACIFIC TERMINAL WATERSHED CHARACTERISTICS

The project area encompasses a major portion of an unnamed small coastal watershed, which we are calling the Gateway Pacific Terminal watershed in this document. 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 first-order streams to the Strait of Georgia. A coastal lagoon lies at the mouth of the streams at the strait. Approximately 924 acres of the watershed are wetlands, or approximately 41 percent of the watershed. The following subsections provide details on the



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 Earth & Environmental 11810 North Creek Parkway N Bothell, WA 98011			CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.
PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL		DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: WATERSHEDS WITHIN THE GATEWAY PACIFIC TERMINAL PROJECT SITE		CHK'D BY: RH	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\Figure 4 - Watersheds.mxd

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 Gateway Pacific Terminal development.

5.2.1 Land Uses

Existing land use of the watershed includes pastures, hay farming, and wood production. 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 occurred as recently as 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 extensive 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.

5.2.2 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 Delineation Report.

5.2.2.1 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*). Overall, 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—vine maple (*Acer circinatum*), common snowberry (*Symphoricarpos alba*), salmonberry (*Rubus spectabilis*), Indian plum (*Oemleria cerasiformis*), clustered rose (*Rosa pisocarpa*), and red elderberry (*Sambucus racemosa*)—and forested wetlands with red osier dogwood (*Cornus sericea*), willows (*Salix* spp), and twinberry (*Lonicera involucrata*). Where present, the herbaceous layer is dominated by sword fern (*Polystichum*

munitum), bracken fern (*Pteridium aquilinum*), and Pacific blackberry (*Rubus ursinus*); piggyback plant (*Tolmiea menziesii*), with the addition of soft rush, and slough sedge in some forested wetland areas.

5.2.2.2 Shrub Vegetation

Dense thickets of Nootka rose (*Rosa nutkana*) and Himalayan blackberry (*Rubus armeniacus*) are common along forest and pasture boundaries and 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.

5.2.2.3 Herbaceous Vegetation

Vegetation in hayfields that are occasionally seeded and hayed annually consists of grasses and forbs, including red fescue (*Festuca rubra*), 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*).

5.2.2.4 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 Gateway Pacific Terminal Biological Assessment (AMEC, in preparation).

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. 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 of features common in other tidal influences Puget Sound coastal lagoons. Features such as areas dominated by salt marsh vegetation, areas of seagrasses, or unvegetated intertidal flats are not

present. Strong storms can lead to overwash of the barrier beach and relocation of the stream outlet. The area was likely formed by interacting effect 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.

5.2.2.5 Priority Habitats

Wetlands and streams are priority habitats and are extensive 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).

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 regularly observed roosting in trees along the shoreline bluff in the southwestern portion of the site, which would be considered a priority area. 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. As such, priority areas for pileated woodpeckers are considered to be present on the site. Birds were detected during three of the four point counts in 2008, and are assumed to be breeding on the site.

The riparian areas of Streams 1 and 2 were mapped as priority habitat by WDFW (2010) and Whatcom County (2005b). 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 portions of the project area. The *Biological Assessment* written for the project addresses ESA-listed marine species in the Strait of Georgia (AMEC, in preparation).

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 (Shapiro and Associates 1994).

5.3 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 ultimately 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.

5.3.1 Stream 1

As stated in Section 2.3, the greater part of the site is contained within the Gateway Pacific Terminal Watershed, which drains to a first-order 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, and then turns south entering, the project area near the intersection of Gulf Road and Aldergrove Roads. The stream flows into Wetland 3, the large pasture in the northern portion of the project area. The stream then flows southwest through the pasture as a ditch and through forested wetlands (Wetland 2) until it regains a natural ravine approximately 2,000 feet downstream. 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 and Table 8).

Table 6 Stream Characteristics in the Gateway Pacific Terminal Watershed

Stream ID	State of Washington Stream Type[1]	Whatcom County Stream Type[2]	Water Flow Characteristic[3]	Location
Stream 1	F – Reach 1 Ns – Reaches 2-5	HCA 1b	Relatively Permanent Water	First-order stream. Flows mainly south through the project area.
Stream 2	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	Ns	HCA 1c	Relatively Permanent Water	Drainage ditch on the north side of Lonseth Road
Stream 5	Ns	HCA 1c	Relatively Permanent Water	Drainage ditch on the north side of Henry Road
Stream 6	Ns	HCA 1c	Relatively Permanent Water	Drainage ditch on the east side of Gulf Road
Stream 7	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

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. Table 7 provides 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. The only fish species identified within the stream channel was the three-spine stickleback (*Gasterosteus aculeatus*), schools of which were located in Reach 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.

5.3.2 Stream 2

Stream 2 is approximately 1-mile long, approximately 1,160 linear feet of which are located on Pacific International Terminals, Inc., property, with the remaining area on adjacent parcels owned by others. While only a short reach of this stream is on the Pacific International Terminals, Inc., property,

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	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	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	1,571	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

information is provided to support discussion presented later on how this stream and its associated wetlands might be enhanced.

Stream 2 drains from the eastern portion of the Terminal 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.

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.

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.

5.3.3 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 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

5.3.4 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.

5.4 WETLANDS

Over the last 20 years, efforts to evaluate wetlands on the Pacific International Terminals, Inc., 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, Inc., 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 *Wetland Determination and Delineation Report* (AMEC 2008).

We have assumed that any wetlands on Parcel 14 would be considered jurisdictional.

Wetlands comprise approximately 530.6 acres, or approximately 49 percent of the Pacific International Terminals, Inc., property (Table 11). 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 514 acres are rated as Category III: wetland (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. Wetland functional characteristics was described with each wetlands in the *Gateway Pacific Terminal Wetland Determination and Delineation* report (AMEC 2008).

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

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

1 Cowardin et al. (1979)

2 Hruby (2004)

3 Estuarine, not palustrine wetland

5.4.1 Water Quality Functions

Wetlands in the project area have low to moderate potential to provide water quality functions. A majority of the wetlands that are forested lack defined outlets, which help 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 as they are pastures, their low vegetation biomass reduces the actual water quality functions

5.4.2 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 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 developed and farmed 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. This mildly protective water quality functions would be impaired because of loss of wetlands due to the Gateway Pacific Terminal 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	95.24 (on site)	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
5C	Eastern portion	0.22	Adjacent to but not abutting Stream 5	Slope	30 ft	1.9 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	0.59	Isolated	Depressional	500 ft.	0.8 mi.	Infiltrates to groundwater

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						
8A	Western portion	24.69	Abuts Stream 1	Slope	0	0.6 mi.	Stream 1 to Strait of Georgia
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

5.4.3 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.

5.4.4 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, 5C, 7A, 8A, 9A, 11A, 13A, and 13E). Adjacent roads and land uses inhibit undisturbed corridors and connections to other habitats and reduce the ability of wetland buffers to provide habitat functions. However, 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.

6.0 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 an intermodal Terminal (See Section 4.0). Development of the Terminal would result in direct permanent impacts to 140.6 acres of wetlands (Figure 5) and 12,814 linear feet (approximately 50,850 sq. ft.) of streams and ditches (Figure 6). Temporary impacts are estimated to include 21.3 acres of wetlands and 4,532 linear feet (16,899 sq. ft.) of streams and ditches.

6.1 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 potential effects on aquatic systems in the project area was performed using GIS analysis.

Considerations were as follows:

- Unavoidable direct areal effects due to grading and other permanent land disturbance.
- Potential temporary effects that would likely occur as a result of construction.
- Potential indirect effects from construction and operation of the Terminal.

Base maps showing the locations of existing aquatic features were overlain with detailed drawings of the proposed development from which areas of direct impact were calculated. Cut/fill lines for the rail embankments were used as the effects area limit. However, for other infrastructure, a 20-foot offset was added to the perimeter of the feature to capture permanent land disturbance that could potentially occur as a result of development.

To evaluate direct temporary effects, a 20-foot offset beyond all direct effect limits was added to the drawings. Temporary impacts were defined as those areas that are expected to incur disturbance, usually vegetation removal, followed by active restoration. These types of effects were grouped with permanent effects for the sake of providing appropriate mitigation and compensation, if needed.

The evaluation of indirect effects includes consideration of actions or activities that—while they do not directly alter the area—may still result in negative changes to wetland functions. Examples of indirect effects include effects on the quality of wildlife habitat by 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 all 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 under investigation (AMEC unpublished study plan). 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 that is 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. Currently, 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 process in the wetland and surrounding landscape reach the dynamic equilibrium necessary to achieve the highest sustainable functional capacity.”

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.

LEGEND

- CURRENT ELEVATION CONTOUR (10 ft. interval, NAVD88 datum)
- CURRENT ELEVATION CONTOUR (2 ft. interval, NAVD88 datum)
- RAILROAD
- ROAD

WETLAND IMPACT AREA (161.86 acres):

- PERMANENT (140.60 acres)
- TEMPORARY (21.26 acres)
- DEVELOPMENT FOOTPRINT
- PROJECT AREA BOUNDARY

VEGETATION TYPE:

- FRESHWATER FORESTED WETLAND (PFO)
- FRESHWATER SHRUB WETLAND (PSS)
- FRESHWATER EMERGENT WETLAND (PEM)

Source:
Ausenco Sandwell, 154199-A100-42S01.dwg (Rev. I), 12/09/2010.
David Evans & Associates, 2010-04-14-svTPXpiti0006-DEGROSS.dwg, 07/20/2010.

Pacific International Terminals
A Cermix Enterprise

CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

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

amec

DWN BY:	SD
CHK'D BY:	RH
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:	FEBRUARY 2011
PROJECT NO.:	091515338C-01-03
REV. NO.:	1
FIGURE NO.:	FIGURE 5

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

6.2 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 needed to develop the shared services area, the East Loop rail, and the entire infrastructure for the East Loop area. Stage 2 is scheduled to begin once Stage 1 construction is complete, and would develop the West loop rail and the entire needed infrastructure to service this area.

6.3 DIRECT WETLAND IMPACTS

6.3.1 Permanent

Direct permanent wetland impacts are expected to total approximately 140.6 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.

Table 13 Permanent Wetland Impacts

Wetland ID	Category[2]	Wetland Vegetation Community[1] (acre)			Total (acre)
		PEM	PFO	PSS	
1	III	0.7	6.6	0	7.3
2	III	0.6	1.2	0.1	1.9
3	III	38.6	10.1	6.8	55.5
4A	III	0	1.8	1.5	3.3
5A	III	2.1	2.0	2.9	7.0
5B	III	0	<0.1	0	<0.1
5C	III	0	0.1	0	0.1
6	III	0	34.8	0	34.8
7A	III	<0.1	1.2	0.3	1.5
8A	III	3.2	4.6	7.3	15.1
8B	III	<0.1	0	<0.1	<0.1
9A	III	3.5	2.4	2.3	8.2
9C	IV	0.1	0	0	0.1
10A	III	0	0.6	0	0.6
Parcel 14(estimated)	N/A	0	5.1	0	5.1
Total		**48.9**	**70.5**	**21.2**	**140.6**

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

2 Hruby (2004)

6.3.2 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 here, but 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 20 feet in width beyond the outer edge of the permanent infrastructure for all of the development footprint. 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 wetlands areas for the installation of water and electrical utilities.

Invasive plant species are dominant in some locations within the project area; especially extensive Himalayan blackberry bush hedges in abandoned hayfields and along roadsides, and reed canarygrass dominated areas along utility corridors, roadsides, and 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.

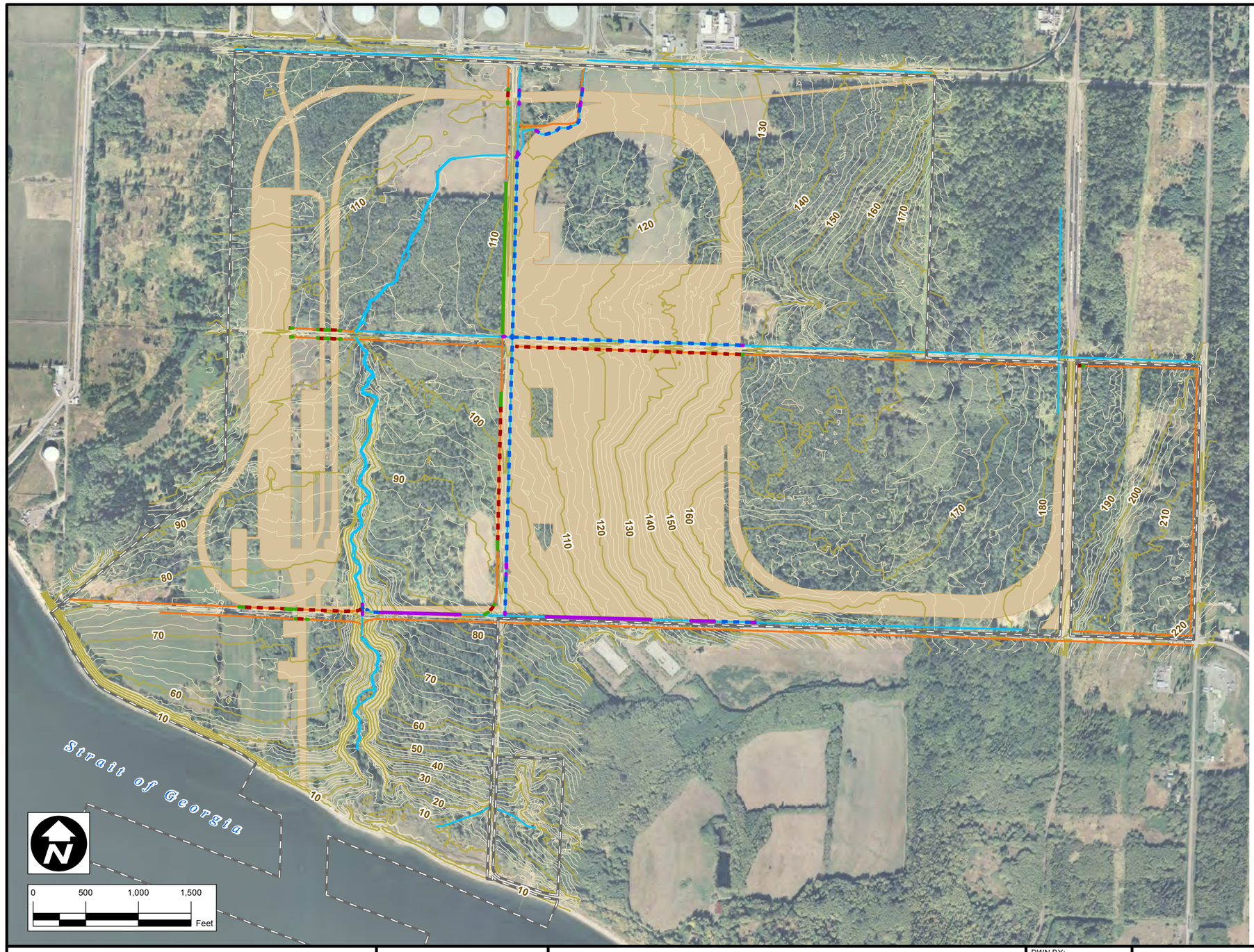
Following construction, soil in these areas would be re-graded to the natural topography and the areas would be replanted with appropriate native forest and shrub wetland vegetation. Temporal losses would be accounted for with permanent impacts compensation. Areas that are now hayfields or pastures would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

6.4 DIRECT STREAMS AND DITCH IMPACTS

6.4.1 Permanent

Gateway Pacific Terminal development would permanently affect 12,816 linear feet (approximately 50,850 sq. ft.) of streams and drainages at the project area. Impacts would primarily be to roadside streams and roadside ditches. Flows from these waters would be permanently rerouted to natural channels and wetlands in most cases. Reach 4 of Stream 1 that currently flows through the Wetland 3 pasture area would be rerouted and one roadside ditch flow would be piped in place. 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. More details on each of these mitigation areas are provided in the Appendices to this document.



LEGEND

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

STREAMS AND DRAINAGES IMPACT (17,345 linear feet)

PERMANENT IMPACT (12,814 linear feet):

- DRAINAGE (5032 linear feet)
- STREAM (7782 linear feet)

TEMPORARY IMPACT (4531 linear feet):

- DRAINAGE (2156 linear feet)
- STREAM (2375 linear feet)
- DEVELOPMENT FOOTPRINT
- PROJECT AREA BOUNDARY

Source:
David Evans & Associates, 2010-04-14-svTPXpiti0006-DEGROSS.dwg, 07/20/2010.

Pacific International Terminals
A Cairnix Enterprise

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

AMEC Earth & Environmental
11810 North Creek Parkway N
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amec

DWN BY:	SD
CHK'D BY:	RH
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:	FEBRUARY 2011
PROJECT NO.:	091515338C-01-03
REV. NO.:	1
FIGURE NO.:	FIGURE 6

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

Table 14 Temporary Wetland Impacts

	Wetland Vegetation Community[1] (acre)			
Wetland ID	**PEM**	**PFO**	**PSS**	**Total**
1	0.31	3.72		4.02
2	0.25	0.50	0.13	0.89
3	3.71	1.76	0.48	5.95
4A	0	0.72	0.00	0.72
5A	0.35	0.58	0.34	1.28
5B	0	0.01	0	0.01
5C	0	0.02	0	0.02
6	0	0.64	0	0.64
7A	0.01	0.92	0.13	1.06
8A	0.53	1.29	1.28	3.10
8B	0.01	0	0.02	0.03
9A	1.37	0.79	0.24	2.40
10A	0	0.23	0.00	0.23
Parcel 14 (Estimated)	0	0.91	0	0.91
Total	**6.54**	**12.09**	**2.64**	**21.26**

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

6.4.2 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 20 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.

Other than temporary impacts to Stream 1 during replacement of an existing undersized culvert with a fish passage-friendly bottomless box culvert between Reaches 3 and 4, all other temporary impacts to streams would be for maneuvering 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.)
Stream 1 – Reach 4 in active pasture (Wetland 3)	Stage 1/ East Loop and portion of West Loop	Stream would be piped under East Loop and West Loop rail embankments in approximately same location as current stream.	774	7,737
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. Length to be routed through culvert at rail embankment.	2,240	8,958
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). Small portion of reroute in culvert.	2,144	6,433
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 diverted to Wetland 5.	488	1,951
Drainage 6 – West-flowing roadside ditch south side of Lonseth Road, east of Custer Spur	Stage 1/East Loop	Fill for culvert beneath rail embankment.	57	114
Stream 6 – South-flowing roadside ditch on east side of Powder Plant Road	Stage 1/East Loop	Fill for rail embankment. Flow combined with Drainage 5.	4,281	17,125
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.	1,459	4,370
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.	1,001	3,003
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.	83	290
Drainage 8 – East-flowing roadside ditch on south side of Lonseth Road	Stage 2/West Loop	Culvert under rail bed, eastern portion restored to wetland when roadbed removed	143	428
Drainage 9 – East-flowing roadside ditch on north side of Lonseth Road	Stage 2/West Loop	Culvert (same as Drainage 8), eastern portion restored to wetland when roadbed removed	144	433
Total			12,814	50,850

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.)
Stream 1 – Reach 3 in Wetland 3	Stage 1/ West Loop	155	1,546
Stream 4 – West-flowing roadside ditch on north side of Lonseth Road	Stage 1/ East Loop	41	162
Stream 5 – West-flowing roadside ditch on north side of Henry Road	Stage 1/ East Loop and West Loop	2,016	8,062
Stream 6 – South-flowing roadside ditch on east side of Powder Plant Road	Stage 1/ East Loop	165	659
Drainage 1 – West-flowing ditch on south side of Lonseth Road	Stage 1/ East Loop	20	60
Drainage 2 – West-flowing ditch on south side of Henry Road	Stage 1/ East Loop	9	28
Drainage 4 – East-flowing roadside ditch on south side of Henry Road, West of Stream 1	Stage 1/ West Loop	40	140
Drainage 5 – South-flowing roadside ditch on west side of Powder Plant Road	Stage 1/East Loop	1,721	5,163
Drainage 6 – West-flowing roadside ditch south side of Lonseth Road, east of Custer Spur	Stage 1/East Loop	20	40
Drainage 7 – East-flowing roadside ditch on north side of Henry Road, West of Stream 1	Stage 1/West Loop	146	438
Drainage 8 – East-flowing roadside ditch on south side of Lonseth Road	Stage 2/West Loop	100	300
Drainage 9 – East-flowing roadside ditch on north side of Lonseth Road	Stage 2/West Loop	100	300
Total		**4,532**	**16,899**

6.5 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 AU there is only one large wetland; where there is more than one, wetland names included a letter. Appendices to this document provide further information regarding conceptual level on-site mitigation designs. Where compensatory actions are discussed in the following paragraphs, the reader is encouraged to refer to the appendix.

Direct effects 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, 5 and 7 had minor effects, and

AUs 1, 3, 8, 9 would be greatly reduced in area. Wetlands in AU 6 would be almost completely eliminated.

Bird habitat would be reduced because of the loss of 70 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. Even with on-site compensation of nearly the same area lost, there would be an overall temporal loss of forest vegetation because newly planted areas take up to 20 years to establish a closed canopy typical of forests. During the time that it takes for reestablishment, those species dependent on mature forest habitat would be unlikely to use the reestablishing areas.

The lack of open water or aquatic bed habitats, as well as the lack of conifer forest, limits the area from reaching full potential. Once the terminal was developed, wildlife corridors would be limited. 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 areas where the only routes for wildlife access would require crossing the embankments. 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.

6.5.1 Stage 1 Construction Area

Stage 1 construction would result in impacts to approximately 110 acres of wetlands. This would be comprised of approximately 50 percent pasture area (PEM) and 50 percent deciduous forest area (PFO). Five acres of impact are estimated at Parcel 14 as a conservative estimate until delineation is completed. Wetlands located within the rail loops would have extensive areas affected, while those on the outside rail loops would be directly affected primarily by the outside foot of the rail embankments.

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 17, which provides the total acreage of wetland in the assessment unit, as well as the estimated impact area.

Following Stage 1 construction, approximately 2 acres of Wetland 6 would remain in AU 6; however, these forested acres are located adjacent to one of the stormwater treatment areas, are separated from the active portions of the stockyard by a road, and were evaluated as likely to retain a level of hydrologic function, although greatly reduced. Therefore, the 2 acres are included as direct permanent

Table 17 Stage 1 Construction Direct Permanent Wetland Impact Areas – Summarized by Vegetation Community Type

Wetland Assessment Unit[1]	Total Wetland Area in Assessment Unit (acres)	Wetland Community Type[2]			Total Impact Area (acres)
		PEM[3]	PFO	PSS	
2	53.3	0.63	1.18	0.09	1.90
3	150.7	38.63	10.12	6.77	55.52
4	26.6	0.0	1.78	1.54	3.31
5	95.5	2.12	2.15	2.85	7.12
6	36.9	0.0	34.75	0.0	34.75
7	40.1	0.0	1.23	0.25	1.48
10	3.7	0.0	0.60	0.0	0.60
Parcel 14 (estimated)	unknown	0	5.1	0	5.1
		41.34	**56.88**	**11.50**	**109.76**

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.

impacts. Importantly, no significant habitat function relative to the undisturbed condition at AU 6 is anticipated to be retained, because the 2 forested wetland acres would be completely surrounded by development.

AU 5 and 4 would be impacted by linear corridors for rail embankments. As we have said earlier, impacts to the portion of AU 5 assumed to occur on the Parcel 14 are currently estimated. 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 wetland would be avoided, and a portion of AU 4 would include wetland creation and enhancement following construction.

Direct area 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, joining these two areas and restoring flows of roadside Stream 4 and Drainage 1 to the wetlands. In this same vicinity, a culvert in Stream 1 would be removed. 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 17). 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. Following construction, this area would be enhanced to include an open water area with a vegetated buffer and would serve to help manage hydrologic functions for Stream 1 and its tributaries Stream 4, Stream 6, Drainage 1, and Drainage 6 in this area.

6.5.2 Stage 2 Construction Area

Table 18 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.

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

Table 18 Stage 2 Development Area Impacts and Summary of Both Construction Stages

Wetland Assessment Unit	Total Wetland Area in Assessment Unit (acres)	Wetland Community Type			Total Impact Area (acres)
		PEM	PFO	PSS	
1	44.2	0.74	6.63	0.00	7.37
8	24.9	3.21	4.61	7.28	15.10
9	28.3	3.63	2.44	2.30	8.37
Total Stage 2		**7.57**	**13.68**	**9.59**	**30.84**
Total BOTH Stage 1 and 2 Construction		**48.85**	**70.56**	**21.19**	**140.6**

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.

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.

6.6 INDIRECT EFFECTS

Indirect effects to aquatic systems 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.

6.6.1 Potential Negative Changes 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 and a large open-water area 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, which triggers a cascade of negative effects.

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.

6.6.2 Soil Erosion and Sedimentation

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 were 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.

6.6.3 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.

Inadvertent spills of bulk commodities into aquatic systems 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 drainages 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.

7.0 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)

7.1 AVOIDANCE

Adverse aquatic impacts have been avoided to the extent practicable. Site layout alternatives were generated in the 1990s and evaluated for potential impacts. One of these earlier project designs would have had a rail crossing the Stream 1 ravine, and 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. More recent designs estimated up to 180 acres of direct wetland impacts prior to efforts to avoid wetland and stream areas.

Terminal infrastructure was repositioned to be more densely developed, leaving large areas of the property undisturbed. Priority wildlife habitats are present in the project area and a goal was set to

avoid these areas to the extent possible. The current design avoids the highest functioning wetland and stream systems in the project area:

- Impacts have been avoided at:
    - Reaches 1, 2, 3, and 5 of Stream 1,
    - All parts of Stream 2, and
    - All parts of Category I Wetlands (11A, 12, 13A and 13E).
- Direct permanent impacts to Category III Wetlands 4B, 4C, 4D, 4E, 4F, 7B, 10B, and 14 have been completely avoided.
- 305 acres of wetlands in the project area will be avoided during development of the Terminal.
- The project does not require dredging for construction or maintenance.
- The shoreline area has been avoided, with the exception of the trestle area.

Terminal infrastructure has been located as far from these sensitive and priority habitat areas as possible.

7.2 MINIMIZATION

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

- Rail lines 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 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.
- 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 natural stream.
- Development of Terminal infrastructure in a single construction period, which avoids repeated disturbances to areas over time and provision of compensation up to 2 years

prior to actual impacts in some cases that minimizes temporal loss and reduces the potential effects of compensation failure.

- Temporary construction impacts minimized by locating construction lay down and staging in areas that will be ultimately be developed, using high visibility fencing to locating construction limits, and designing and enforcing an effective construction stormwater plan.

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, an overall improvement in water quality is expected because the Terminal development results in:

- Removing animal grazing from over 100 acres,
- Providing effective stormwater treatment systems, and
- Rerouting almost all roadside streams and drainages into new or restored natural stream systems.

No grazing would remain in the project area following construction. Some of the currently grazed acres would be impacted by terminal development but approximately 35 acres would be enhanced from emergent pasture to forested wetland, a portion would be re-graded to create wetlands, and approximately 35 acres would be used for an open water area.

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.

7.3 RECTIFICATION/RESTORATION/ENHANCEMENT

Restoration of areas temporarily affected by vegetation removal during construction will be undertaken. This will reestablish wetland functions and improve functions in area 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 which will further increase the wetland habitat functions. Some minor grading is envisioned in limited enhancement area to increase the diversity of duration of inundation.

8.0 COMPENSATION

Compensatory mitigation for unavoidable, minimized impacts to wetlands, 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.

Federal guidance outlined three acceptable mechanisms for providing compensatory mitigation: permittee-responsible mitigation, mitigation banking, and In-lieu fee mitigation. The guidance recommends using mitigation bank credits and In-lieu fee credits in preference to permittee-responsible mitigation when such credits are available. Currently, we know of only one potential source of mitigation bank credits, and while In-lieu fee credits may be available in the future, there is no existing In-lieu fee program for the area at this writing. Therefore, the following describes a permittee-responsible approach for the Gateway Pacific Terminal for on-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, and a stormwater quality and quantity control.

In addition to guidance from state and federal agencies, Whatcom County provides guidance on appropriate compensation ratios for impacts (Table 19).

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

- Creating wetland areas to provide as nearly as feasible no-net loss of wetland area in the watershed,
- Providing replacement hydrologic and water quality functions high in the watershed,

Table 19 Approximate Area of Compensatory Mitigation Required for Category III Wetland Impacts

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

Whatcom County Code (16.16.680)

- 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.

8.1 COMPENSATORY MITIGATION SITE SELECTION

Site selection for compensation focused on the Gateway Pacific Terminal watershed. 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 for many years once established.

Because the project controls a significant portion of a single watershed, this provided a unique opportunity to take a recovering, moderately-functioning watershed area, and while developing it in part, actively work to provide the adequate and appropriate compensation so that the overall watershed function does not decline as a result of development. We know of no other location where an opportunity such as this has been presented.

Once the facility 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, we looked for areas 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, recreate or even improve lost hydrologic functions.
- Areas where one or more wetland functions and values have been eliminated by prior human activity and can be restored to their previous type, size, and vigor.

- Areas where wetland functions and values have been severely degraded by prior human activity and can be enhanced to their previous type, size, and vigor.
- Areas where development, management, and maintenance could appropriately enhance one or more existing wetland functions and values.

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

- Property is owned by Pacific International Terminals, Inc.,, and will place conservation easements, or other legal protections on the areas to ensure long-term protection of the mitigated areas.
- The proposed strategy proposes to reestablish some of the ecological conditions and functions that were historically provided at or near the site.
- Activities will retain, and in some cases improve, fish and wildlife habitat in the watershed.

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 site 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, 12 areas on-site were selected for conceptual design and analyses (Compensatory Mitigation Areas A through L, locations shown in Figure 7, and described in further detail in Appendices A through E). The areas were selected because they offer the most comprehensive opportunity to provide contiguous, high-functioning wetland and stream systems. Appendices A through E provides conceptual level details for each of these areas. Table 20 provides a summary of on-site compensatory mitigation by construction stage.

Table 20 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	2	III	0.1	1.2	0.6	1.9	(C),(E)	Creation: Mitigation Areas A, B, G, H, I, J, K, L = 77.7 acres; Enhancement: Wetlands 2, 3, and 7A = 38.5 acres; Additional Compensation = 36 acre open water habitat; Total compensation area = 152.5 acres
	3	III	6.8	10.1	38.6	55.5	(C),(E)	
	4A	III	1.5	1.8	0.0	3.3	(C)	
	5A	III	2.9	2.0	2.1	7.0	(C)	
	5C	III	0.0	0.1	0.0	0.1	(C)	
	6	III	0.0	34.8	0.0	34.8	(C)	
	7A	III	0.3	1.2	0.0	1.5	(C),(E)	
	8B	III	<0.1	0.0	0.1	0.1	(C)	
	9C	IV	0.0	0.0	0.1	0.1	(C)	
	Parcel 14	N/A	0.0	5.1	0.0	5.1	(C)	
Stage 1 Construction Total Impacts =109.4 acres								
Clearing, grading, excavation, filling for West Loop	1	III	0.0	6.6	0.7	7.3	(C),(E)	Creation: Mitigation Areas C, D, E, F = 58.3 acres; Enhancement: Wetlands 1 and 9A = 10.4 acres; Total compensation area = 68.7 acres
	8A	III	7.3	4.6	3.2	15.1	(C)	
	9A	III	2.3	2.4	3.5	8.2	(C),(E)	
	10A	III	0.0	0.6	0.0	0.6	(C)	
Stage 2 Construction Total Impacts = 31.2 acres								

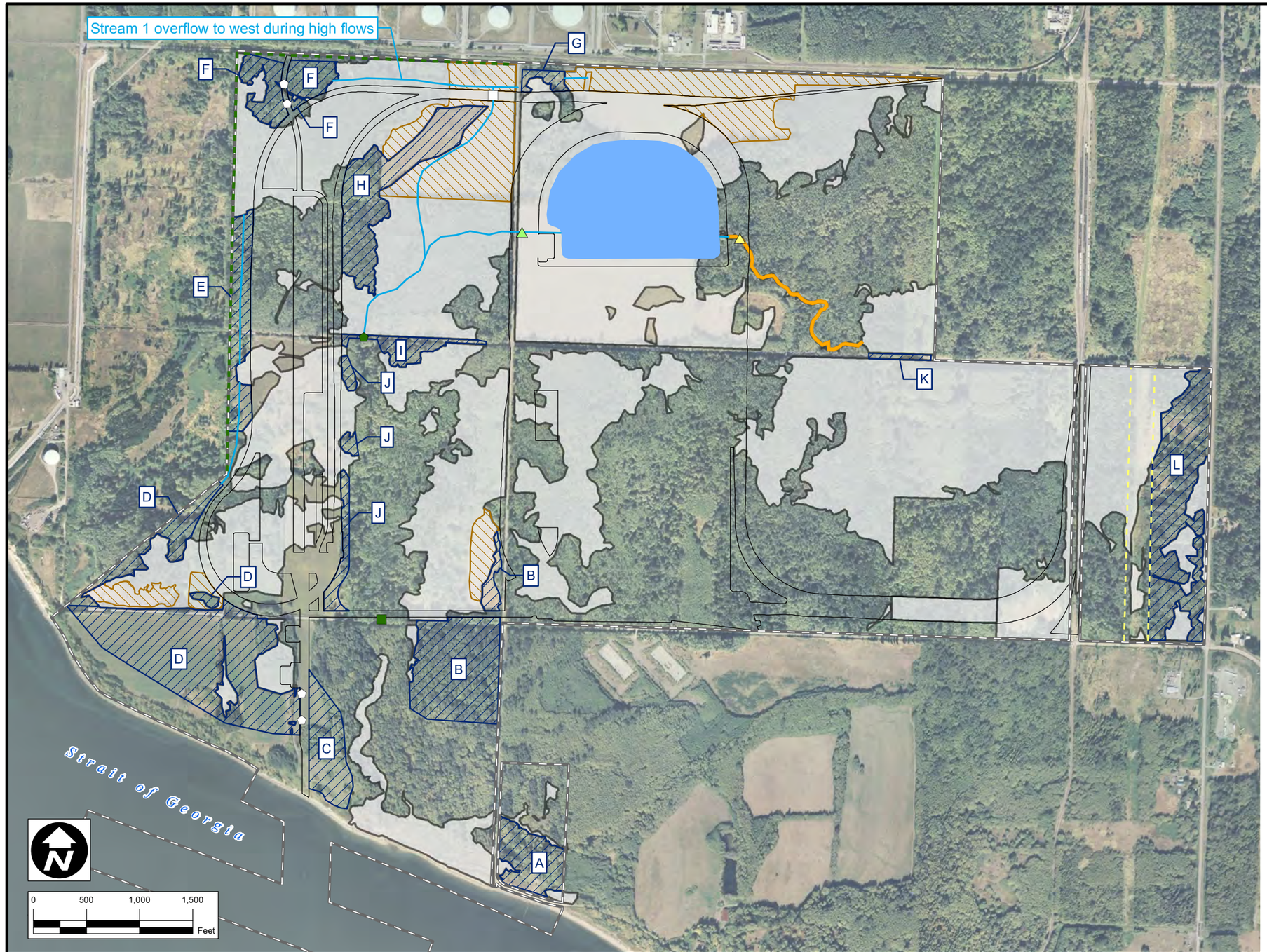
1 Creation (C), Enhancement (E)

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

8.2 GOALS OF THE PROPOSED COMPENSATION

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

1. Provide very nearly 1:1 areal compensation for direct permanent impacts to wetlands.
2. Provide approximately 2 years advance compensation for 30.1 acres of direct impacts.
3. Provide functional replacement for 12,814 linear feet (approximately 50,850 sq. ft.) of stream and drainage impacts.
4. Increase the water quality functional capacity of project area compared to current conditions, specifically with regard to stormwater treatment.
5. Increase potential fish habitat in Streams 1 and 2 by improving connectivity and fish passage, increasing riparian functions, and installing habitat features.
6. Protect and increase 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.



LEGEND

- CULVERT INFLOW TO POND
- CULVERT OUTFLOW FROM POND
- CULVERT UNDER RAIL LINES
- CULVERT UNDER ROAD
- ENHANCE CULVERT TO IMPROVE FISH PASSAGE
- REMOVE CULVERT & RESTORE STREAM
- CONIFER ENHANCEMENT (6,530 lf)
- PROPOSED STREAM/DITCH (8,793 lf)
- EXISTING STREAM ENHANCEMENT WITH 15' RIPARIAN BUFFER ENHANCEMENT ON EACH SIDE (2,300 lf, 1.6 acres of riparian planting)
- PROPOSED WETLAND ENHANCEMENT AREA (49 acres)
- PROPOSED WETLAND CREATION AREA (136 acres)
- WATER QUALITY POND WITH 100' BUFFER (36 acres)
- EXISTING WETLAND AREA
- APPROXIMATE UTILITY RIGHT-OF-WAY (location is approximate and will need to be field verified)
- DEVELOPMENT FOOTPRINT
- PROJECT AREA BOUNDARY

Source:
Ausenco Sandwell, 154199-A100-42S01.dwg (Rev. I), 12/09/2010.

Pacific International Terminals
A Cairnix Enterprise

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

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

amec

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

PROJECT:
PROPOSED GATEWAY PACIFIC TERMINAL

TITLE:
PROPOSED MITIGATION AREAS

DATE:	FEBRUARY 2011
PROJECT NO.:	091515338C-01-03
REV. NO.:	1
FIGURE NO.:	FIGURE 7

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure 7 - Proposed Mitigation Areas.mxd

7. Provide flood attenuation by diverting Stream 1 to an area containing created and enhanced wetlands during periods of high flow, and installing depressions within created riparian wetlands that would function to capture and retain water during periods of high flow.
8. Use native vegetation to effectively buffer the facility from adjacent habitats and to provide habitat functions.

8.3 OBJECTIVES

To accomplish the goals of the compensatory mitigation, the following objectives have been identified (Figure 7):

9. Construct an approximately 36-acre open water habitat to provide habitat diversity, water quality, and would function to protect hydrologic processes.
10. 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.
11. 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).
12. Create 136 acres of forested and shrub wetlands.
13. Enhance 49 acres of existing emergent and shrub wetlands to native forest vegetation, including the control of invasive species.
14. Create 8,793 linear feet of new watercourses to convey current roadside streams and drainages, including a diversion for Stream 1 during high flows that will direct water to existing and created wetlands.
15. 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.
16. Install native a conifer buffer along the northern and western property boundary to visually and audibly screen the Terminal from adjacent wetlands and streams and riparian habitats.

17. Remove other impervious surfaces that are in various locations throughout the project area, including unused roadways and remnant concrete foundations (approximately 6 acres this location).
18. Preserve 305 acres of wetlands, including forested vegetation that will remain after Terminal development (other wetland areas are largely pasture or hayfields and would be enhanced).

8.4 PROPOSED WETLAND CREATION

Compensation for unavoidable, minimized impacts to wetlands at the Terminal will consists of creation of 136 acres of Category II wetlands (See Appendices A through E). 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 even improve hydrologic functions.

The proposed mitigation would:

19. Create high-quality wetlands to compensate for low-quality wetland loss;
20. Enhance existing low-quality wetlands to compensate for low-quality wetland loss;
21. Increase water quality function by installing dense persistent vegetation and locating adjacent to the Terminal;
22. Provide a high-quality, high-functioning wildlife habitat, especially for fish, birds, and amphibians;
23. Maintain hydrologic functions, especially floodwater attenuation in Stream 1; and
24. Remove remnant concrete foundations from the former sand and gravel operation at the southern portion of the site, which would decrease on-site impervious surface and make way for wetland creation.

8.5 STREAM RELOCATION

Compensation for unavoidable, minimized impacts to streams and drainages consists of the creation of 8,793 linear feet of streams and drainages, fish passage improvements along Stream 1, and fish habitat improvements in Stream 1 and Stream 2. Stream 4 and Drainage 1 would be redirected into Wetland 3 and ultimately the proposed open water habitat in the North Hoop. The sum of stream and drainage impacts includes drainages and stream which occur on both sides of linear road corridors. In compensating for these 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 exception to this is where drainages are replaced by piping such as for Drainage 3 at Henry Road.

The proposed mitigating actions would:

25. Create streams through existing uplands, wetlands, and proposed wetland creation areas to compensate for stream/drainage loss;
26. Increase sinuosity of Stream 1 as it flows through Wetland 2;
27. 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;
28. Remove the culvert containing Stream 1 under Lonseth Road and install fish passage-friendly log weirs to improve fish passage; and
29. Install large woody debris and fish gravels within Stream 1 and Stream 2 at strategic locations to improve fish habitat.
30. Create a new stream corridor on the western project area.

8.6 RIPARIAN ENHANCEMENT

Streams and ditches are regulated by WDFW and Whatcom County, and as waters of the US by the USACE. Riparian functions play an important role in maintaining a stream's properly functioning condition. Riparian area enhancement is provided to maintain functional capabilities in the watershed.

The proposed enhancement would include:

- 1.6 acres of riparian area along new channel of Stream 4 with native coniferous forested vegetation to increase water quality, hydrologic, and habitat functions; and
- Provide 6,530 linear feet of enhanced riparian enhancement by planting conifers along the northern and western site boundaries that are adjacent to stream corridors. This would provide for visual and noise shading of the Terminal for wildlife and stream habitats and would provide potential perching sites for birds.

8.7 WETLAND PRESERVATION

Category I and II wetlands would be preserved in perpetuity. The 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 new or enhanced watercourses. An estimated total of 305 acres of wetland would be preserved in perpetuity.

9.0 ADEQUACY OF THE PROPOSED ON-SITE COMPENSATORY MITIGATION

The adequacy of proposed mitigation for wetlands and stream impacts can be evaluated in several ways and two common approaches are provided: meeting the minimum standards for area replacement and 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 replace lost functions. This method was first announced in October 2010, and on February 11, 2011, a year-long trial was implemented methodology (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 methodology was new at the time of this report and was not used, but might be included in future analysis. The credit/debit method has not been adopted by Whatcom County at this time.

9.1 MINIMUM REPLACEMENT STANDARDS

According to Whatcom County requirements, it appears the total available acre-credits would be approximately 93.9 equivalent acres, which leaves a shortfall of approximately 46.7 equivalent acre-credits for the project to provide in some form other than on-site compensation (Table 21). This does not factor in any credits for stream realignments or creation of natural water courses, opening up 4,000 feet of stream habitat to fish, or providing other riparian functional improvements. Credits for these would be negotiated with agencies.

Table 21 Approximate Credits Available

Mitigation Type	Estimated Area Available (acres)	Ratio	Potentially Available Credits (in "equivalent" acres)
Creation	136.0	2:1	68.0
Enhancement[1]	85.0	8:1	10.6
Preservation[2]	305	20:1	15.3
Total Estimated Available Credits			**93.9**

1 Enhancement includes areas enhanced to forested wetland (49 acres) and area enhanced to open water (36.0 acres).

2 Assumes that forested Category III wetlands would be allowed for preservation; otherwise approximately 15 acres of preservation of Category 1 wetlands only would be included.

Direct mitigation 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. 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—136 acres of created wetland, 85 acres of enhanced mitigation and 305 acres of preserved wetland—the equivalent of 93.9 acres of mitigation credit is available from on-site mitigation towards the total 140.6 acres required.

As the compensation for minimized unavoidable impacts is currently proposed, there remain uncompensated impacts to wetlands and streams, specifically in regards to habitat functions, and most specifically to providing appropriate bird habitat.

The Gateway Pacific Terminal watershed would lose 140.6 acres of wetland, while 136 acres would be created, meaning that there is less than 1:1 replacement area. This would is in conflict with state and federal policy for no-net-loss of wetland acreage and function. The project will continue to look for opportunities to increase mitigation, including avoidance and minimization through engineering and design features. While additional acreage would be enhanced (85 acres), this area would not provide the needed safety net (approximately 1–1.5 times the area) 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.

9.2 ECOLOGICAL LIFT ANALYSIS

Regulation and guidelines require that compensatory wetland mitigation provide equal or greater function than that lost through project impacts. These functions are measured in terms of water quality and hydraulic and habitat functions of wetlands. Table 22 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 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, 5, 6, 8, and 9. The compensatory mitigation plan provides for wetland creation and enhancement to compensate for wetland impacts from the Terminal development. 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.

Table 22 Increase in Water Quality, Hydrologic, and Habitat Functions to Be Provided by the Mitigation

Ecological Function	Summary Of Impacted Wetland Functions		Summary of Compensatory Wetland Function	
	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. • 11 of 12 proposed wetland creation areas would score 18 or higher for water quality functions, 4 of which would score 20 or higher. • 36-acre open water habitat to provide water quality enhancement and habitat diversity. • Created and enhanced riparian areas would detain and filter significantly more water than current conditions.
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	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.

Table 22 Increase in Water Quality, Hydrologic, and Habitat Functions to Be Provided by the Mitigation

Ecological Function	Summary Of Impacted Wetland Functions		Summary of Compensatory Wetland Function	
	Score[1]	Characteristics	Score[2]	Characteristics
Hydrologic	10	• Highest-scoring wetlands are some of the smallest on site, limiting their opportunity to slow and detain water.	14	• Mitigation Areas G 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 except Mitigation Area L 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 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.

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 limited ecologic function. While the proposed mitigation would fall short by 4 acres of the total area of wetland loss, creating high-functioning Category II wetlands shows a significant lift when calculated over the watershed area (Table 20).

Proposed mitigation for impacts to existing streams and drainages would include the creation of 8,793 linear feet of streams and drainages, fish passage improvements at two locations along Stream 1, 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 would improve chances of fish once again inhabiting this stream in the future.

As noted in Section 1 above, Pacific International Terminals, Inc., is continuing land acquisition, planning and design, and implementation of alternative mitigation options to obtain the additional wetlands mitigation credits required for full mitigation of wetland impacts.

10.0 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.

11.0 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.

11.1 FINANCIAL ASSURANCES AND PERMANENT CRITICAL AREAS PROTECTION

In accordance with Whatcom County requirements for on-site permittee-led compensation the applicant, Pacific International Terminals, Inc., 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 is anticipated to be $500 million, while 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, Inc., would record a notice with the county auditor real estate records 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 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.

11.2 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.

11.3 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 to for each location would be provided as this plan is further developed.

11.3.1 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.

11.3.2 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. 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 23.

11.4 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, Inc., will be responsible for the first 10 years for maintenance of the site as described in Table 24.

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, Inc., will be responsible for implementing contingencies over the first 10 years after construction has been completed.

Table 23 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.

Table 24 Proposed Maintenance Schedule for the First 10 Years Following Installation

Year	Approximate Date	Action
Start Maintenance	September 2013	Prepare site and install
Year 1	November 2013 through March 2014	Monthly site checks to check site stability
	April 2014	6-month site check
	May through October 2014	Irrigate and control weedy species
Year 2	October 2014	12-month site check
	April 2015	18-month site check
	May through October 2015	Irrigate and control weedy species
Year 3	April 2015	30-month site check
	May through October 2015	Irrigate and control weedy species
Years 4 through 10	May through October	Control weedy species and other maintenance as needed

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APPENDIX A

Mitigation Area A

APPENDIX A
MITIGATION AREA A
Gateway Pacific Terminal
Whatcom County, Washington

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 (Figure A-1). This area currently consists of predominantly upland forested areas interspersed with small pocket wetlands and narrow linear riparian wetlands along Stream 2 (Figure A-2). Priority habitats currently present at Mitigation Area A include riparian zones along Stream 2 and urban natural open space along the Strait of Georgia that provides habitat for bald eagles and peregrine falcons (WDFW 2006; Whatcom County 2005b). Whatcom County maps Stream 2 as also having potential/historical distribution of fish (Whatcom County 2005a), although fish presence has not been documented. Mitigation Area A provides the opportunity to expand upon the existing wetlands and priority habitat associated with Stream 2 to improve water quality, hydrologic, and habitat functions in the following ways:

1. Create approximately 7.1 acres of Category II emergent, scrub-shrub, and forested wetland from existing upland areas.
2. Install fish gravels and large woody debris (LWD) in strategic locations in Stream 2.
3. Leave existing large upland coniferous trees to become standing snags.
4. Remove approximately 5,390 sq. ft. of concrete foundations and a derelict scaffold gravel loader remaining from the former sand and gravel operation at the site.

The proposed mitigation 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 from Mitigation Area A to Wetland 12 and the Strait of Georgia. Additional wetlands will also maintain water quality and provide flood attenuation that will 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. 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, and the Strait of Georgia is to the south beyond Gulf Road. The Terminal site boundaries define 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-2 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 and ultimately the Strait of Georgia. An unnamed tributary to Stream 2 flows southwest through the northern portion of the site, and through Wetland 13A before intersecting Stream 2 on the western portion of the site. Wetlands 13C and 13D are isolated but hydrologically connected to Stream 2 via groundwater.

All wetlands except 13F and 13G at Mitigation Area A are hydrologically connected to Stream 2 by either surface water or groundwater. Wetland 13F, located on the southeast corner of Mitigation Area A, flows south directly to the Strait of Georgia via a culvert under Gulf Road. Wetland 13G, located on the southwest corner of Mitigation Area A infiltrates to groundwater and ultimately the Strait of Georgia.

A former gravel export operation and single-family residence were historically present along the north side of Gulf Road (Figure A-1). Three concrete pad foundations totaling approximately 5,390 sq. ft. remain from the residence and gravel operation that are no longer in service, along with a scaffold gravel loader that extends from over Gulf Road to the Strait of Georgia. A small well shed is also present on the southwestern portion of Mitigation Area A near Gulf Road. 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. All delineated wetlands at Coastal Lagoon (13A, 13C, 13D, 13E, 13F, and 13G) are palustrine forested (PFO) wetlands. Wetland characteristics are summarized in Table A-1. Detailed descriptions are provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

Source:
David Evans & Associates, 2010-04-14-svTPXpiti0006-DEGROSS.dwg, 07/20/2010.

0 150 300 600
Feet

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

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREA A EXISTING CONDITIONS	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=300 feet	FIGURE No.: FIGURE A-1

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure A-1 - Mitigation Area A - Existing Conditions.mxd

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

CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREA A EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=300 feet	FIGURE No.: FIGURE A-2

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure A-2 - Mitigation Area A - Existing Stream Network.mxd

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; nearly contiguous with Wetland 13E on central portion	Drains to Stream 2 and Wetland 12A, 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 12A, 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 12A, 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-2

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 wetlands include skunk cabbage (*Lysichiton americanus*), slough sedge (*Carex obnupta*), reed canarygrass (*Phalaris arundinacea*),

reed mannagrass (*Glyceria maxima*), and slender boykinia (*Boykinia elata*). Obligate wetland species are typical along Stream 2 as it flows through Wetlands 13E and 13A.

2.1.2 Hydrology

Wetland 13F has a direct connection with the Strait of Georgia via a culvert under Gulf Road. All other wetlands drain via surface or groundwater flow to Stream 2, and ultimately Wetland 12 and the Strait of Georgia. All of 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, and 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 (Figure A-3). 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 (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 to the north (Whitehorn series) to somewhat excessively drained with a water table at about 80 inches, very low available water capacity, and no ponding to the south (Neptune series). The Birch Bay series is between these areas geographically and with respect to hydrology. Although the Neptune series is characterized as having a depth to water table of 80

Source:
Soil Classification data from U.S. Department of Agriculture:
http://SoilDataMart.nrcs.usda.gov

0 150 300 600
Feet

N

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PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREA A NATIONAL RESOURCES CONSERVATION SERVICE SOILS	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=300 feet	FIGURE No.: FIGURE A-3

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure A-3 - Mitigation Area A - NRCS Soils.mxd

inches, the presence of Wetlands 13F and 13G within this mapped soil type indicates the water table may be at or near the surface, at least in localized areas, within this soil unit.

Table A-2 Mitigation Area A 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)
Neptune very gravelly sandy loam	Somewhat Excessively Drained	80	None	None	Very Low (about 2.3 inches)

Source: NRCS (2007)

See the *Wetland Determination and Delineation Report* (AMEC 2008) for a full description of these soil types.

2.2 OTHER WATERS AT THE COASTAL LAGOON

2.2.1 Stream 2

Stream 2 is approximately 1.25 miles long, draining the area to the east and generally flowing northwest through the central portion of Wetland Mitigation Area A. Approximately 400 feet east of Gulf Road, a tributary flowing from the northeast converges with the primary channel of Stream 2 and continues to flow west through a culvert under Gulf Road to Wetland 12, a coastal lagoon, and ultimately the Strait of Georgia, a traditionally navigable water (TNW) of the United States. 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 to a TNW (see Figure A-2 for locations).

The habitat value of Stream 2 and its tributary is relatively low. It is an intermittent stream, with an inconsistent and relatively sparse forest canopy of alder. The stream bank is lined with Category I wetland areas that include several obligate species. According to the Whatcom County Critical Areas ordinance (Whatcom County 2005a), this stream is categorized as HCA-1b. 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).

2.3 UPLANDS

Uplands within Mitigation Area A 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 A—usually only one or two trees per acre, some of which appear to be much older than the surrounding red alder forest. Soil types within the uplands are generally the same as previously described in Section 2.1.3.

2.4 WILDLIFE

2.4.1 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, although fish distribution has not been documented. 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.

2.4.2 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 with some forested crest 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).

No nests of bald eagles or peregrine falcons were identified at the Terminal site during natural resource baseline studies conducted in 1994 by Shapiro and Associates, and none have since been identified by WDFW or Whatcom County. Although there were 80 separate bald eagle sightings during the study, the number of individuals was much lower. Only one peregrine falcon was observed during the study, and no cliffs suitable for peregrine falcon nesting were identified. The Terminal site was identified as having perching habitat for eagles and falcons migrating through the area (Shapiro and Associates 1994).

AMEC conducted bird surveys from 2008 to 2009 in representative areas at the Terminal site to determine bird presence and use of the site. Area Count Station 3 was located adjacent to the southwest of Mitigation Area A at the southeast edge of the adjacent coastal lagoon (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 study area contains no breeding habitat for these species.

2.4.3 Amphibians

According to Shapiro and Associates (1994), 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. Two species of frogs, red-legged frog (*Rana aurora*) and Pacific tree frog (*Pseudacris regilla*), and two species of salamander, northwestern salamander (*Ambystoma gracile*) and long-toed salamander (*Ambystoma macrodactylum*), were observed during amphibian surveys at the Terminal site in 1994. None of the species identified are listed as sensitive, threatened, or endangered by WDFW or the U.S. Fish and Wildlife Service. *Ranis* and *Psuedacris* tadpoles were identified in the coastal lagoon adjacent to the west of Mitigation Area A beyond Gulf Road, and the high number of tree-frog vocalizations heard on several occasions indicates a relatively large adult population exists at the site.

Although the amphibian survey was time-constrained and the overall number of amphibians identified at the Terminal site was low, it is expected that additional species could occur in the area. Additional amphibian species that could potentially be present at Mitigation Area A include bullfrog (*Rana catesbeiana*), western toad (*Bufo boreas*), rough-skinned newt (*Taricha granulosa*), and to a lesser extent, the ensatina (*Ensatina eschscholtzii*). The low number of salamanders observed may indicate poor-quality habitat even though large wetland areas are present. The lack of downed LWD was identified as a potential limiting factor for amphibians (particularly salamanders), as it typically provides refugia for amphibians during warm and cold weather.

According to information provided by the Shapiro and Associates, amphibian study, red-legged frog, Pacific tree frog, northwestern salamander, long-toed salamander, bullfrog, western toad, rough-skinned newt, and possibly ensatina potentially use Mitigation Area A during at least a portion of their life cycles, especially within the existing wetlands and riparian area along Stream 2.

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, Category I wetlands along Stream 2, multiple other wetlands, and priority habitats (riparian areas, urban natural open space) within and adjacent to Mitigation Area A provides the opportunity to increase habitat and hydrologic connectivity and improve water quality for on-site and downstream aquatic resources (Figure A-4).

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 such as bald eagle and peregrine falcon. This is especially true at the southern portion of Mitigation Area A where there is documented presence of these species. Removing the remnant structures and concrete foundations on the southern portion of Mitigation Area A will decrease impervious surface and make way for wetland creation. The range of topography, soil types, and existing hydrology at Mitigation Area A will allow for aquatic bed, emergent, scrub-shrub, and forested wetlands to be created between wetlands along Stream 2 (Wetlands 13A and 13E) and the wetlands to the south (Wetlands 13F and 13G), increasing habitat and hydrologic connectivity while providing water-quality improvements.

3.2 FUNCTIONAL ASSESSMENT

The proposed actions at Mitigation Area A would create approximately 7 acres of Category II depressional and riverine 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, 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 flood water; however, the overall hydrologic functions of Mitigation Area A are anticipated to be low because of low opportunity to provide those functions.

AMEC Earth & Environmental 11810 North Creek Parkway N Bothell, WA 98011			CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.
PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL		DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREA A PROPOSED MITIGATION		CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
		PROJECTION: WA SP North, Ft.	SCALE: 1 inch=300 feet	FIGURE No.: FIGURE A-4

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

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	• Increased riparian wetland area and storage volume will attenuate potential flooding from Stream 2 and its tributary
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 m (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.

The highest function that Mitigation Area A will provide is with respect to fish and wildlife habitat. Expanded wetlands along Stream 2 will provide additional amphibian habitat while improving water quality in Stream 2 for downstream aquatic species. Improving current conditions in Stream 2 would provide much more suitable in-stream habitat for fish species should they ever gain access and inhabit Stream 2. 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 A. Therefore, Mitigation Area A has high potential for habitat mitigation opportunities.

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 in this strategic location just upland of the beach that will provide the type of biological, chemical and physical conditions typical of a freshwater coastal lagoon. The compensation area will be adjacent to but separate from Wetland 12, an estuarine coastal lagoon to the west beyond Gulf Road, and adjacent to the north of the Strait of Georgia. 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 A provides a unique opportunity to expand the functions unique to wetlands that exist at the confluence of marine and freshwater systems. While fresh- and saltwater systems are categorized as “estuarine,” coastal lagoons have characteristics that distinguish them from most estuarine systems. Their location in the landscape adjacent to estuarine wetlands and bodies of saltwater increases local biodiversity by providing habitat niches for freshwater species in the vicinity of estuarine or saltwater species. More importantly, they provide habitat for species that inhabit both freshwater and brackish/saltwater environments such as certain shorebirds. In addition, coastal lagoons and their associated wetlands are proving to be very important habitats for salmonids; unpublished reports of ongoing research in Puget Sound (Hirschi et al. 2003; Beamer et al. 2003) suggest coastal lagoons are heavily used by juvenile salmonids.

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

- Increase the extent of high-functioning freshwater coastal lagoon wetlands.
- Increase connectivity between Stream 2, on-site wetlands, Wetland 12, and the Strait of Georgia.
- Expand upon existing priority habitats at Mitigation Area A.

4.2 OBJECTIVES OF THE PROPOSED MITIGATION

The specific objectives of the proposed compensation are as follows:

- Create approximately 7.1 acres of Category II freshwater coastal lagoon wetlands.
- Improve water quality and hydrologic functions for downstream resources.
- Improve habitat functions for known and presumed on-site wildlife.

Mitigation objectives would be attained through the following actions:

- Excavate the existing topographic contours to create wetland hydrologic conditions between Wetlands 13A and 13E to Wetlands 13G, 13F, and the Strait of Georgia.
- Replant the regraded area with native emergent, scrub-shrub, and forest wetland vegetation.
- Install habitat features, including fish gravels in Stream 2 and LWD in strategic locations.

4.3 PLANTING PALETTE AND COMMUNITY COMPOSITION

The proposed mitigation includes planting a varied plant species with the goal of establishing a diverse emergent community and accelerating scrub-shrub and forest succession. Plant communities will transition from emergent on the southern portion to scrub-shrub 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. Existing large coniferous trees will be left to become standing snags in the created wetlands.

5.0 REFERENCES

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APPENDIX B

Mitigation Areas B through F

APPENDIX B
MITIGATION AREAS B THROUGH F
Gateway Pacific Terminal
Whatcom County, Washington

1.0 INTRODUCTION

Mitigation Areas B through F are 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 B-1). With the exception of Mitigation Area C, all proposed wetland creation areas will expand upon existing wetlands (Figure B-2). Priority habitats adjacent to the proposed mitigation areas include riparian zones along Stream 1 and Urban Natural Open Space along the Strait of Georgia that provides habitat for bald eagles and peregrine falcons (WDFW 2006; Whatcom County 2005b). Whatcom County also maps Stream 1 as having presumed distribution of fish (Whatcom County 2005a). Mitigation Areas B through E provide the opportunity to expand upon the existing wetlands and priority habitat associated with Stream 1, bald eagles, and peregrine falcons, and to improve water quality, hydrologic, and habitat functions in the following ways:

1. Create approximately 31.9 acres of Category II scrub-shrub and forested wetland from existing upland areas.
2. Create approximately 46.6 acres of Category III scrub-shrub and forested wetland from existing upland areas.
3. Install large woody debris (LWD) in strategic locations and leave existing large upland coniferous trees to become standing snags.

The proposed mitigation will provide significant habitat functions for priority species and other wildlife by expanding and creating wetlands adjacent to Stream 1 and the Strait of Georgia, specifically Mitigation Areas B, C, and D. Significant water quality and hydrologic functions will be provided by Mitigation Areas D, E, and F, as these wetlands will receive water from Stream 1 during high flow events, and stormwater from the project area, which will protect water quality and downstream aquatic resources and infrastructure.

2.0 EXISTING CONDITIONS

2.1 MITIGATION AREA B

Mitigation Area B consists of two adjacent areas on either side of Henry Road and west of Gulf Road, totaling 19.1 acres. The larger portion of Area B is an approximately 17.6-acre area located south of

Henry Road; this portion consists almost entirely of forested areas adjacent to the east of Wetland 14, a 0.7-acre Category III forested depressional wetland (Table B-1). Drainage 3 currently flows west along the south side of Henry Road at the north boundary of Mitigation Area B and Wetland 14. A high berm exists between Wetland 14 and Drainage 3, and therefore, no surface water connection exists between these features. As such, Wetland 14 has no outlet and ponds water to approximately 2 feet. Topography at this portion of Mitigation Area B slopes gently down to the southwest.

The portion of Mitigation Area B north of Henry Road is an approximately 1.5-acre area and consists of maintained pasture adjacent to the east of Wetland 7A, an approximately 40-acre Category III slope wetland that is predominantly forested but also contains an area of maintained pasture at its southeastern extent (Table B-1). Near the northern portion of Mitigation Area B, 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 at this portion of Mitigation Area B slopes gently down to the southwest.

2.2 MITIGATION AREA C

Mitigation Area C is an approximately 8.2-acre area located south of Henry Road to the west of a ravine where Wetlands 11A and 12 and Stream 1 are located. Mitigation Area C consists of a mix of emergent, scrub-shrub, and forested uplands above the ravine. The western boundary of Mitigation Area C is defined by the east side of the proposed wharf trestle. Topography at Mitigation Area C generally slopes down to the south-southeast.

2.3 MITIGATION AREA D

Mitigation Area D consists of three adjacent areas on the southwest portion of site, totaling 38.4 acres. The larger portion of Mitigation Area D is an approximately 32.2-acre area located south of Henry Road and consists almost entirely of maintained pasture with a few fringe scrub-shrub and forested areas. Mitigation Area D will envelop Wetland 10B, a 0.1-acre Category III scrub-shrub depressional wetland, and will border Wetland 10A to the east, a 3.7-acre Category III forested slope wetland (Table B-1). Wetlands 10A and 10B have no surface outlet and drain to groundwater before flowing south to the Strait of Georgia. Wetland 10A may receive flow from Drainage 4. This portion of Mitigation Area D will encompass the area where Henry Road will be removed west of the West Loop, allowing this portion of Mitigation Area D to be connected to Wetland 9A to the north, a 25.7-acre Category III slope wetland that includes a mix of forested, scrub-shrub, and emergent areas (Table B-1).

Source:
David Evans & Associates, 2010-04-14-svTPXpiti0006-DEGROSS.dwg, 07/20/2010.

0 500 1,000 2,000 Feet

N

AMEC Earth & Environmental 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: FEBRUARY 2011
TITLE: MITIGATION AREAS B-F EXISTING CONDITIONS	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=1,000 feet	FIGURE No.: FIGURE B-1

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

AMEC Earth & Environmental 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: FEBRUARY 2011
TITLE: MITIGATION AREAS B-F EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW		CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
		PROJECTION: WA SP North, Ft.	SCALE: 1 inch=1,000 feet	FIGURE No.: FIGURE B-2

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure B-2 - Mitigation Areas B-F - Existing Stream Network.mxd

Table B-1 Mitigation Areas B Through F Existing Wetland Characteristics

Wetland Name	Hydro-geomorphic Class[1]	Rating[2]	Total Area (acres)	Location[3]	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
7A	Slope	III	40.0	South of Henry Road between Gulf Road and Stream 1	Abuts Stream 5, Drainages 5 and 8, 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
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
9B	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
14	Depressional	III	0.7	Southwest quadrant of Gulf Road and Henry Road intersection	Isolated – No apparent outlet; likely drains to groundwater flowing downslope to Stream 1, then the Strait of Georgia

[1] Brinson (1993)

[2] Hruby (2004)

[3] Refer to Figure B-2.

Drainage 4 flows east along the south side of Henry Road, and Drainage 7 flows east along the north side of Henry Road. A small portion of Wetland D is located within the southern portion of Wetland 9A, in an isolated 0.5-acre emergent upland area surrounded by emergent wetlands. Topography generally slopes down to the south.

The portion of Mitigation Area D north of Henry Road along the southwestern site boundary consists of a 5.7-acre area adjacent to the west of Wetlands 9A and 9B, and will connect to and be contiguous with the area of Mitigation D south of Henry Road. Wetland 9B is a 0.2-acre Category III forested depressional wetland located to the west of and contiguous with Wetland 9A (Table B-1). This portion of Mitigation Area D is predominantly forested, and topography generally slopes to the southeast.

2.4 MITIGATION AREA E

Mitigation Area E is an approximately 8.5-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. Wetland 8A, a 24.7-acre Category III slope wetland is adjacent to the east; Wetland 1, a 44.3-acre Category III depressional wetland is adjacent to the north (Table B-1). Wetlands 1 and 8A both consist of forested, scrub-shrub, and emergent areas. South of Lonseth Road, Mitigation Area E consists of emergent and scrub-shrub uplands, and north of Lonseth Road, forested uplands. Topography generally slopes to the southeast.

2.5 MITIGATION AREA F

Mitigation Area F is located on the northwest site boundary and consists of two areas that will be hydrologically connected via culverts under a proposed road that will bisect Mitigation Area F. Mitigation Area F is a 3.5-acre scrub-shrub and forested upland area enveloped by Wetland 1 except along its northern boundary where Aldergrove Road is present. Topography is generally flat in this area.

2.6 WETLANDS

Figure B-2 shows the existing stream network, wetlands, and hydrologic flow at Mitigation Areas B through F. All wetlands are hydrologically connected to Stream 1 and the Strait of Georgia via surface water or groundwater.

Currently, wetlands at or adjacent to Mitigation Areas B through F comprise approximately 99.4 acres. Wetlands were classified as slope and depressional HGM; wetland vegetation is classified as forested (PFO), scrub-shrub (PSS), and emergent (PEM). Wetland characteristics are summarized in Table B-1. Detailed descriptions are provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

2.6.1 Vegetation

Forested wetlands at or adjacent to Mitigation Areas B through F include Wetlands 1, 7A, 8A, 9A, 9B, 10A, and 14. Vegetation consists 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 8A, 9A, and 10B also contain scrub-shrub and emergent vegetation communities, and vegetation for most of Wetland 8A is succeeding from old field to scrub-shrub and forest communities. In general, scrub-shrub communities consist of shrubs—including Douglas spirea (*Spiraea douglasii*) and Himalayan blackberry (*Rubus armeniacus*)—with emergent vegetation—including bentgrass (*Agrostis* spp.), red clover (*Trifolium pratense*), and common rush. Emergent communities include vegetation such as reed canarygrass (*Phalaris arundinacea*), Himalayan blackberry, and weedy annuals.

2.6.2 Hydrology

Wetland 7A abuts and flows to Drainages 5 and 8 and Stream 5. Drainage 8 was also observed to overflow into Wetland 7A. Wetland 8A abuts and drains southeast to Stream 1 via constructed drainages. Wetlands 9A and 9B flow directly to Drainage 7, which flows east along the north side of Gulf Road to Stream 1. All identified wetlands ultimately drain 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.

Wetlands 10A, 10B, and 14 are considered isolated, as they have no defined surface water outlet and, therefore, no surface water connection to jurisdictional waters. However, water within these wetlands likely infiltrates to groundwater flowing downslope to the Strait of Georgia. All these wetlands have areas of seasonal ponding and multiple hydroperiods.

2.6.3 Soils

Soils mapped within the wetlands identified above and Mitigation Areas B through F include the Whitehorn silt loam 0–2 percent slopes, the Birch Bay silt loam 0–3 and 3–8 percent slope soil units, and the Kickerville silt loam 3–8 percent slope soil unit (Figure B-3).

Wetlands 7A, 9A, 9B, 10A, 10B, and 14 are mapped as the Whitehorn series. Wetland 1 is predominantly mapped as the Whitehorn series with an area of the Birch Bay 0–3 percent slopes soil unit at its northwest extent. Wetland 8A is a mix of the Whitehorn series and the Birch Bay 3–8 percent slope soil units.

Mitigation Areas B through D are mapped as the Whitehorn series, while Mitigation Area E is a mix of the Whitehorn series and Birch Bay silt loam 0–3 percent slopes soil units, with a small area of the Kickerville series soil unit. Mitigation Area F is mapped as the Birch Bay silt loam 0–3 percent soil unit.

As evidenced by the characteristics in Table B-2, a majority of the soils at Wetland Mitigation Areas B through F (Whitehorn series) are poorly drained, with water at or near the surface, high frequency of ponding, and high 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. The Birch Bay silt loam soil units have a depth to water table of 24–48 inches, which will also be conducive to wetland hydrology once excavated in the mitigation areas.

Table B-2 Mitigation Areas B Through 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)
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)

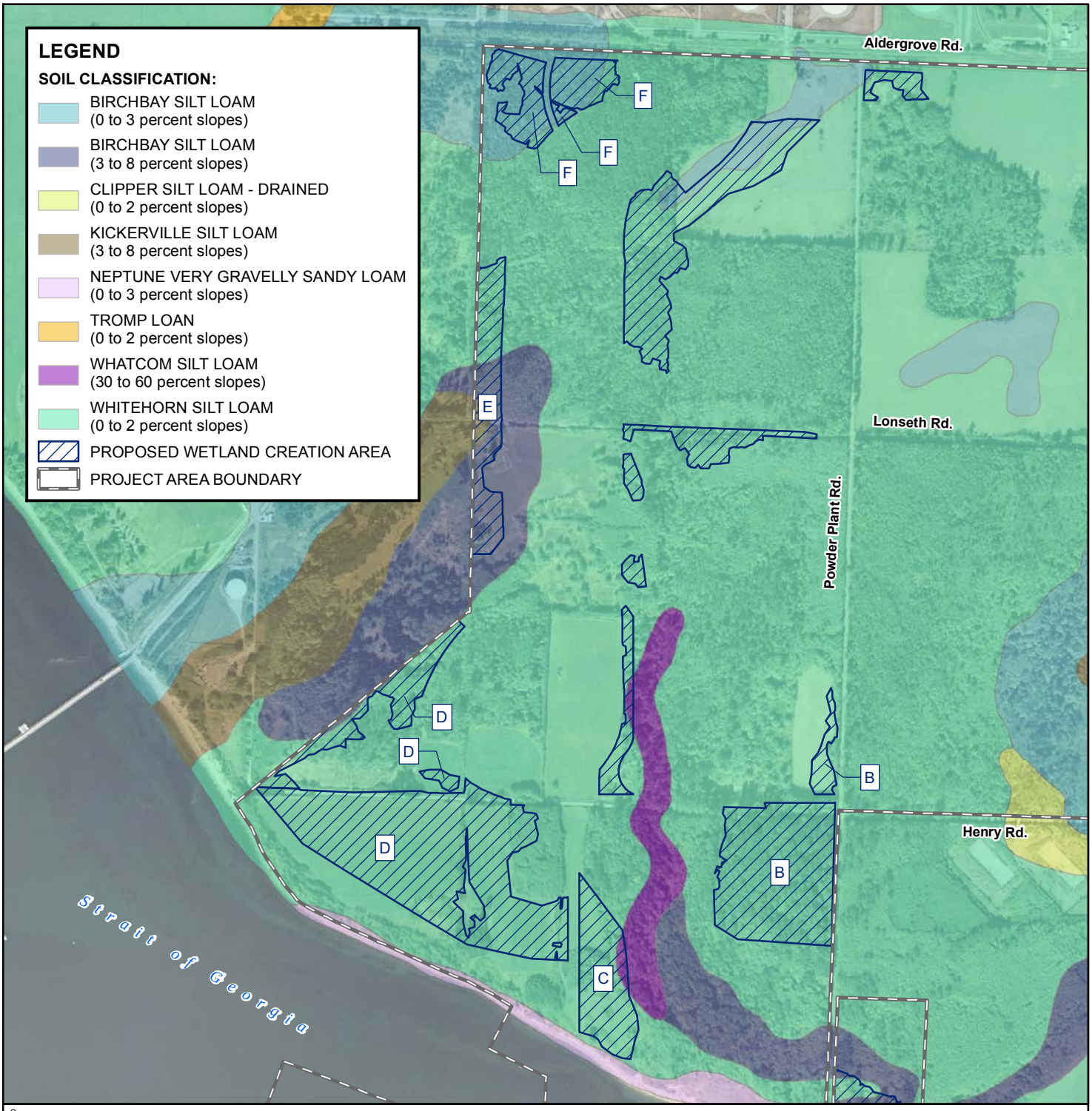
See the *Wetland Determination and Delineation Report* (AMEC 2008) for a full description of these soil types.

2.7 OTHER WATERS

2.7.1 Streams 3 and 5

Streams 3 and 5 are relatively permanent waters (RPWs) that flow west along Aldergrove Road and Henry Road, respectively, in excavated and maintained roadside ditches that flow seasonally for at least three months yearly. Stream 3 is located on the south side of Aldergrove Road, adjacent to the north of Wetland 1 and Mitigation Area F. Stream 5 is located on the north side of Henry Road adjacent to the south of Wetland 7A and between the two portions of Mitigation Area B.

Streams 3 and 5 are partially or wholly vegetated with primarily hydrophytic species, including lady fern, common cattail, reed canarygrass, salmonberry, Cooley's hedge nettle, field horsetail, birds-foot trefoil, and small-fruited bulrush. Deposits of gravel and cobble are generally present. Ditches are mowed annually and excavated approximately once every three years, according to a utility worker



Source:
Soil Classification data from U.S. Department of Agriculture:
http://SoilDataMart.nrcs.usda.gov

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AMEC Earth & Environmental 11810 North Creek Parkway N Bothell, WA 98011			CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.
PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL		DWN BY: SD	DATUM: NAD83 / DATE: FEBRUARY 2011
TITLE: MITIGATION AREAS B-F NATIONAL RESOURCES CONSERVATION SERVICE SOILS		CHK'D BY: KD	REV. NO.: 1 / PROJECT NO.: 091515338C-01-03
		PROJECTION: WA SP North, Ft.	SCALE: 1 inch=1,000 feet / FIGURE No.: FIGURE B-3

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure B-3 - Mitigation Areas B-F - NRCS Soils.mxd

maintaining the ditches during a follow-up field visit (pers. comm. July 16, 2007). Streams 3 and 5 provide little habitat for aquatic or terrestrial species. They have little to no overstory cover, are of relatively constant width (3–5 feet), and have a steep, compacted stream bank. Unidentified aquatic insects and tadpoles were observed during field visits.

2.7.2 Drainages 3, 4, 5, 7, and 8

Five roadside drainages (Drainages 3, 4, 5, 7, and 8) are located at or adjacent to Mitigation Areas B through F. Drainages 3, 4, 7, and 8 flow directly to Stream 1 along Henry Road and Lonseth Road. Drainage 5 flows south along Gulf Road and intersects Stream 5 northwest of the Gulf Road and Henry Road intersection. All drainages ultimately flow to Stream 1 and the Strait of Georgia. All drainages except for Drainage 5 are considered RPWs.

As these drainages are essentially roadside ditches, habitat value is considered very low.

2.8 UPLANDS

Uplands at and in the vicinity of Mitigation Areas B through F 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. Soil types within the uplands are generally the same as previously described in Section 2.6.3.

2.9 WILDLIFE

2.9.1 Fish

None of the streams or drainages adjacent to Mitigation Areas B through F have been identified as potential or documented fish-bearing waters. As such, fish habitat is not present at or adjacent to Mitigation Areas B through F.

2.9.2 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 Areas C and D are 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).

No nests of bald eagles or peregrine falcons were identified at the Terminal site during natural resource baseline studies conducted in 1994 by Shapiro and Associates, and none have since been identified by WDFW or Whatcom County. Although there were 80 separate bald eagle sightings during the study, the number of individuals was much lower. Only one peregrine falcon was observed during the study and no cliffs suitable for peregrine falcon nesting were identified. The Terminal site was identified as having perching habitat for eagles and falcons migrating through the area (Shapiro and Associates 1994).

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 southwest of Wetland 14 and between Mitigation Areas B and C. 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 in the location of Mitigation Area D. 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, chestnut-backed chickadee (*Poecile rufescens*), orange-crowned warbler (*Vermivora celata*), savannah sparrow (*Passerculus sandwichensis*), yellow-rumped warbler (*Dendroica coronata*), western grebe and unidentified gulls (AMEC 2009).

Point Count Station 6 was located in the scrub-shrub and emergent portions of Wetland 8A to the east of Mitigation Area E and south of Mitigation Area F. 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 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.

2.9.3 Amphibians

According to Shapiro and Associates (1994), 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. Two species of frogs, red-legged frog (*Rana aurora*) and Pacific tree-frog (*Pseudacris regilla*), and two species of salamander, northwestern salamander (*Ambystoma gracile*) and long-toed salamander (*Ambystoma macrodactylum*) were observed during amphibian surveys at the Terminal site in 1994. None of the species identified are listed as sensitive, threatened, or endangered by WDFW or the U.S. Fish and Wildlife Service. The high number of tree-frog vocalizations heard on several occasions indicates that a relatively large adult population exists at the site.

Although the amphibian survey was time-constrained and the overall number of amphibians identified at the Terminal site was low, it is expected that additional species could occur in the area. Additional amphibian species that could potentially be present at Mitigation Area B through F include bullfrog (*Rana catesbeiana*), western toad (*Bufo boreas*), rough-skinned newt (*Taricha granulosa*), and—to a lesser extent—the ensatina (*Ensatina eschscholtzii*). The low number of salamanders observed may indicate poor-quality habitat even though large wetland areas are present. The lack of downed LWD was identified as a potential limiting factor for amphibians (particularly salamanders), as it typically provides refugia for amphibians during warm and cold weather.

According to the information provided by the Shapiro and Associates amphibian study, red-legged frog, Pacific treefrog, northwestern salamander, long-toed salamander, bullfrog, western toad, rough-skinned newt, and possibly ensatina potentially use the areas in and near Mitigation Areas B through F for at least a portion of their life cycle.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREAS B THROUGH F

3.1 SITE SELECTION RATIONALE

Mitigation Areas B through F have been located directly adjacent to the Terminal facility to intercept stormwater and expand upon existing wetlands that will remain. Stream 1 will be diverted west to Mitigation Areas D through F during periods of high flow, which will improve water quality and downstream hydrologic conditions for Stream 1—while maintaining habitat and hydrologic connectivity between wetlands on the northern and southern portions of the Terminal site. 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 such as bald eagle and peregrine falcon, especially in Mitigation Areas C and D close to the shoreline (Figure B-4).

3.2 FUNCTIONAL ASSESSMENT

The proposed actions would create approximately 31.9 acres of Category II scrub-shrub and forested wetlands, and approximately 46.6 acres of Category III scrub-shrub and forested wetlands. Table B-3 identifies the average scores of Mitigation Areas B through F 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, except for Mitigation Area E, which was classified as riverine.

Stormwater inputs from adjacent development will provide the opportunity for Mitigation Areas B through F to have high opportunity to filter out and retain sediment and pollutants, increasing water quality for downstream aquatic resources. Although Mitigation Areas B through F scored low overall for hydrologic functions, diverting Stream 1 to the mitigation areas during high flows will lessen the erosive severity of floodwaters downstream and protect fish habitat. As diverted Stream 1 provides hydrology to these areas, water will slow as it flows through the dense persistent vegetation and settle in depressional areas, particularly in Mitigation Areas E and F. Fish and wildlife habitat functions will be high in the mitigation areas because of numerous habitat niches and proximity to other wetlands, and will primarily serve to maintain connectivity between habitats on the northern and southern portions of the Terminal site.

4.0 COMPENSATORY MITIGATION GOALS AND OBJECTIVES

4.1 GOALS OF THE PROPOSED MITIGATION

The goal of the action at Mitigation Areas B through F 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. The compensation areas will expand upon the existing portions of Wetlands 1, 7A, 9A, 9B, 10A, 10B, and 14 that will remain after construction of Terminal.

The overall goals of the compensatory mitigation at Areas B through F are as follows:

- Increase the extent of high functioning freshwater scrub-shrub and forested wetlands.
- Maintain connectivity between habitats on the northern and southern portions of the Terminal site.
- Intercept and filter stormwater from the Terminal site.

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AMEC Earth & Environmental 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: FEBRUARY 2011
TITLE: MITIGATION AREAS B-F PROPOSED MITIGATION	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=1,000 feet	FIGURE No.: FIGURE B-4

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Table B-3 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 ft • Mitigation Area E: 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 • Mitigation Area E: 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 high flows are diverted to Mitigation Areas D through F
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 Areas B and C, 5–19 species; Mitigation Areas D through F, >19 species • Interspersion of Cowardin classes: Mitigation Areas B through E, moderate; Mitigation Area F, 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: Mitigation Areas B through E, 330 ft relatively undisturbed vegetated areas >25% or >50% circumference; Mitigation Area F does not meet buffer criteria • 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 (Areas B through E); connections relatively disturbed (Area F)	• 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	

4.2 OBJECTIVES OF THE PROPOSED MITIGATION

The specific objectives of the proposed compensation are as follows:

1. Create approximately 31.9 acres of Category II scrub-shrub and forested wetlands.
2. Create approximately 46.6 acres of 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 to create wetland hydrologic conditions in specified areas.
2. Replant the regraded areas with native scrub-shrub and forest wetland vegetation.
3. Install habitat features including LWD in strategic locations.
4. Divert Stream 1 to Mitigation Areas D through F during high flows.

5.0 REFERENCES

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APPENDIX C

Mitigation Areas G through J

APPENDIX C
MITIGATION AREAS B THROUGH F
Gateway Pacific Terminal
Whatcom County, Washington

1.0 INTRODUCTION

Mitigation Areas G through J are generally located along Stream 1 on the north-central portion of the Gateway Pacific Terminal ("Terminal") site, which currently consists of a mix of forested areas, paved roads, and maintained pastures (Figure C-1). All proposed wetland creation areas will expand upon the portions of existing wetlands to remain (Figure C-2). Priority habitat riparian zones are located along Stream 1 in the vicinity of Mitigation Areas H through J (WDFW 2006; Whatcom County 2005b). Whatcom County maps Stream 1 as having presumed distribution of fish (Whatcom County 2005a). Mitigation Areas G through J provide the opportunity to expand upon the portions of existing wetlands to remain priority habitat associated with Stream 1, and to improve water quality, hydrologic, and habitat functions in the following ways:

1. Create approximately 24.8 acres of Category II scrub-shrub and forested wetland from existing upland areas.
2. Remove Lonseth Road and the associated culvert for Stream 1 in Mitigation Area I.
3. Install fish passage–friendly log weirs where Stream 1 will flow through Mitigation Area I.
4. Install large woody debris (LWD) in strategic locations and leave existing large upland coniferous trees to become standing snags

The proposed mitigation will provide significant habitat functions for priority species and other wildlife by creating wetlands along and adjacent to Stream 1 in areas identified by the Washington Department of Fish and Wildlife (WDFW) as riparian priority habitats (WDFW 2006). Significant water quality functions will be provided by Mitigation Areas G through J, as these wetlands will intercept stormwater from the adjacent Terminal to protect downstream water quality. Dense persistent vegetation and depressions in Mitigation Areas G, H, and I will slow and filter water from Stream 1, and will allow sediment and pollutants to settle in wetland depressions and become assimilated into the soil column.

2.0 EXISTING CONDITIONS

2.1 MITIGATION AREA G

Mitigation Area G is an approximately 1.3-acre area located in the southeast quadrant of the Aldergrove Road and Gulf Road intersection. Mitigation Area G consists of a small area of emergent, scrub-shrub, and forested uplands adjacent to Wetland 3, an approximately 143.4-acre Category III slope wetland that is a mix of emergent pastures and forested areas, with some scrub-shrub areas located along the fringes of these boundaries (Table C-1). Stream 1 flows west along the south side of Aldergrove Road before flowing south, then west within Wetland 3 around the east and south sides of Mitigation Area G. Stream 6 flows south along the east side of Gulf Road, adjacent to the west of Mitigation Area G. Topography is generally flat at Mitigation Area G.

2.2 MITIGATION AREA H

Mitigation Area H is an approximately 15.8-acre area located between Wetlands 1 and 2 southwest of the Aldergrove Road and Gulf Road intersection. The southern portion of Mitigation Area H is forested, and the northern portion of Mitigation Area H is located in a large cattle pasture southwest of the Aldergrove Road and Gulf Road intersection. Wetland 1 is a 44.3-acre Category III depressional wetland to the northwest of Mitigation Area H, and Wetland 2 is a 49.0-acre Category III slope wetland to the east of Mitigation Area H (Table C-1). Wetlands 1 and 2 are predominantly forested except for the large cattle pasture. Topography is generally flat but slopes very gently to the south.

2.3 MITIGATION AREA I

Mitigation Area I is an approximately 3.4-acre area located along the portion of Lonseth Road that will be removed between the West Loop and Gulf Road. Mitigation Area I is forested except for the portion where Lonseth Road currently exists. This area will connect the remaining portions of Wetlands 2, 7A, and 8A after construction of the Terminal. The southern edge of Wetland 2 is adjacent to nearly the entire north edge of Mitigation Area I. Wetland 7A is a 40.1-acre Category III slope wetland to the southeast of Mitigation Area I and Wetland 8A is a 24.7-acre Category III slope wetland to the southwest of Mitigation Area I, on opposite sides of the ravine that contains Stream 1 (Table C-1). Wetland 7A is predominantly forested but also contains an area of maintained pasture at its southeastern extent, and Wetland 8A consists of a mix of emergent, scrub-shrub, and forested areas. Topography at Mitigation Area I slopes down to Stream 1 from the east and west.

2.4 MITIGATION AREA J

Mitigation Area J consists of three areas totaling 4.3 acres located along the east side of the proposed West Loop. Mitigation Area J consists of forested and scrub-shrub areas at the top of the west side of the ravine that contains Stream 1. The three areas of Mitigation Area J will fill in upland gaps to

Source:
David Evans & Associates, 2010-04-14-svTPXpiti0006-DEGROSS.dwg, 07/20/2010.

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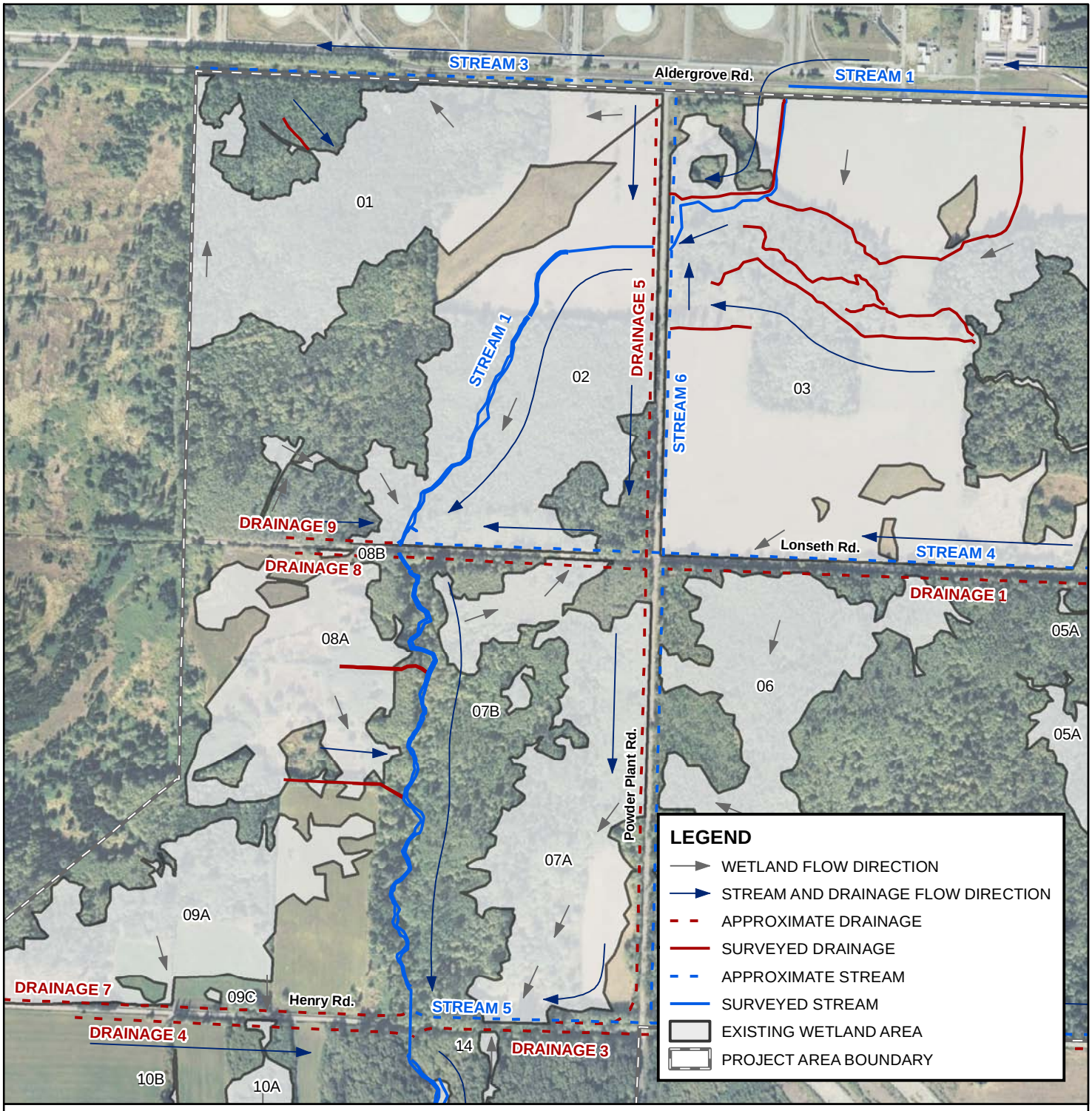
AMEC Earth & Environmental
11810 North Creek Parkway N
Bothell, WA 98011

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREAS G-J EXISTING CONDITIONS	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=800 feet	FIGURE No.: FIGURE C-1

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



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Bothell, WA 98011

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREAS G-J EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=800 feet	FIGURE No.: FIGURE C-2

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure C-2 - Mitigation Areas G-J - Existing Stream Network.mxd

connect the remaining portions of Wetland 8A and a small portion of Wetland 9A east of the West Loop after construction of the Terminal, and extend the wetlands to the south along the top of the ravine. Topography generally slopes down to the south within Mitigation Area J and slopes sharply down to the east in the ravine east of Mitigation Area J.

2.5 WETLANDS

Figure C-2 shows the existing stream network, wetlands, and hydrologic flow at Mitigation Areas G through J. All wetlands are hydrologically connected to Stream 1 or the Strait of Georgia via surface water or groundwater connection.

Currently, wetlands at or adjacent to Mitigation Areas G through J comprise approximately 327.1 acres (Table C-1). Wetlands were classified as slope and depressional HGM; wetland vegetation is classified as forested (PFO), scrub-shrub (PSS), and emergent (PEM). Wetland characteristics are summarized in Table C-1. Detailed descriptions are provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

Table C-1 Characteristics of Existing Wetlands at and Adjacent to Mitigation Areas G Through J

Wetland Name	Hydro-geomorphic Class[1]	Rating[2]	Total Area (acres)	Location[3]	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
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, then flows to Strait of Georgia
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, then flows to Strait of Georgia
7A	Slope	III	40.0	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
8A	Slope	III	24.7	South of Lonseth Road east of western site boundary	Abuts Stream 1, then flows to Strait of Georgia
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

[1] Brinson (1993)

[2] Hruby (2004)

[3] Refer to Figure C-2.

2.6 VEGETATION

All of the wetlands at or adjacent to Mitigation Areas G through J 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 3, 7A, 8A, and 9A also contain scrub-shrub and emergent areas. In general, scrub-shrub communities consist of shrubs—including Douglas spirea (*Spiraea douglasii*) and Himalayan blackberry (*Rubus armeniacus*)—with emergent vegetation—including bentgrass (*Agrostis sp*.), red clover (*Trifolium pratense*), and common rush.

Wetlands 1 and 2 share borders within the wet meadow southwest of the Gulf Road and Aldergrove Road intersection, and are vegetated with a typical pasture mixture. Small thickets of rose, snowberry, and Himalayan blackberry are common along the transition from forest to pasture and along the roadway in Wetland 2. Reed canarygrass dominates the area surrounding Stream 1 in the pasture. The western half of Wetland 3 consists of a wet meadow vegetated with a typical pasture mixture. 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.

2.7 HYDROLOGY

All identified wetlands ultimately drain 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.

Wetland 2 abuts Streams 1 and 4, and a culvert beneath Gulf Road connects Wetland 2 with Wetland 3 via Stream 1.

Stream 1 originates in Wetland 3 through the confluence of many small, undefined drainages into one constructed, well-defined stream just before flowing out of the wetland on the east side of Gulf Road. A constructed roadside ditch drains the northwestern part of the wetland on the south side of Aldergrove Road.

Wetland 7A abuts and flows to Drainages 5 and 8 and Stream 5. Drainage 8 was observed to overflow into Wetland 7A. Wetland 8A abuts and drains southeast to Stream 1 via constructed drainages. Wetland 9A flows directly to Drainage 7, which flows east along the north side of Gulf Road to Stream 1.

2.8 SOILS

Soils mapped within Mitigation Areas G through J 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 (Figure C-3). Table C-2 identifies characteristics of these soil units.

Table C-2 Mitigation Areas G Through J Existing Soils Characteristics[1]

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)

[1] NRCS (2007)

Other than the northern portion of Mitigation Area H and the northeastern portions of Wetlands 1 and 2, which are mapped as the Birch Bay series, Mitigation Areas G through J and adjacent wetlands are mapped as the Whitehorn series. 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. Although the area where the Birch Bay series is present may require some excavation to promote wetland hydrology, the presence of Stream 1 and adjacent wetlands in this area is evidence of consistent hydrology and a high water table in the area.

See the *Wetland Determination and Delineation Report* (AMEC 2008) for a full description of these soil types.

2.9 OTHER WATERS

2.9.1 Streams 1, 4, and 6

Stream 1 provides moderate habitat for terrestrial and aquatic species. The stream has its headwaters in the northeastern portion of the study area, where flow is loosely channelized. The stream becomes more channelized as it approaches Gulf Road, then passes under Gulf Road through a culvert. The stream emerges from the culvert in the open field, where it continues south through surface flow into a ravine lined by an alder forest. In this area, the stream is again culverted at Lonseth Road. This segment of the stream provides little habitat quality. The vegetation composition is predominantly alder, with little variation in the canopy. The channel is generally narrow with an unvegetated bed, and no wetlands are associated with it; it is separated from the lower reach of the stream by a third culvert at Henry Road.

The lower portion of Stream 1 from Henry Road to the stream mouth has a canopy layer limited to alder forest, with areas characterized by an understory including willows and a lower shrub layer of twinberry. Portions of the stream contain wetlands banks, with obligate species of skunk cabbage and water parsley. Along with the vegetation, the lower section of the stream contains a large amount of trash and man-made debris that have been dumped into it and surrounding ditches. The stream winds through the ravine and is braided in segments. The stream exits the forest canopy to the coastal lagoon through a thicket of Nootka rose. In the lagoon, the stream meanders to its outlet in the Strait of Georgia.

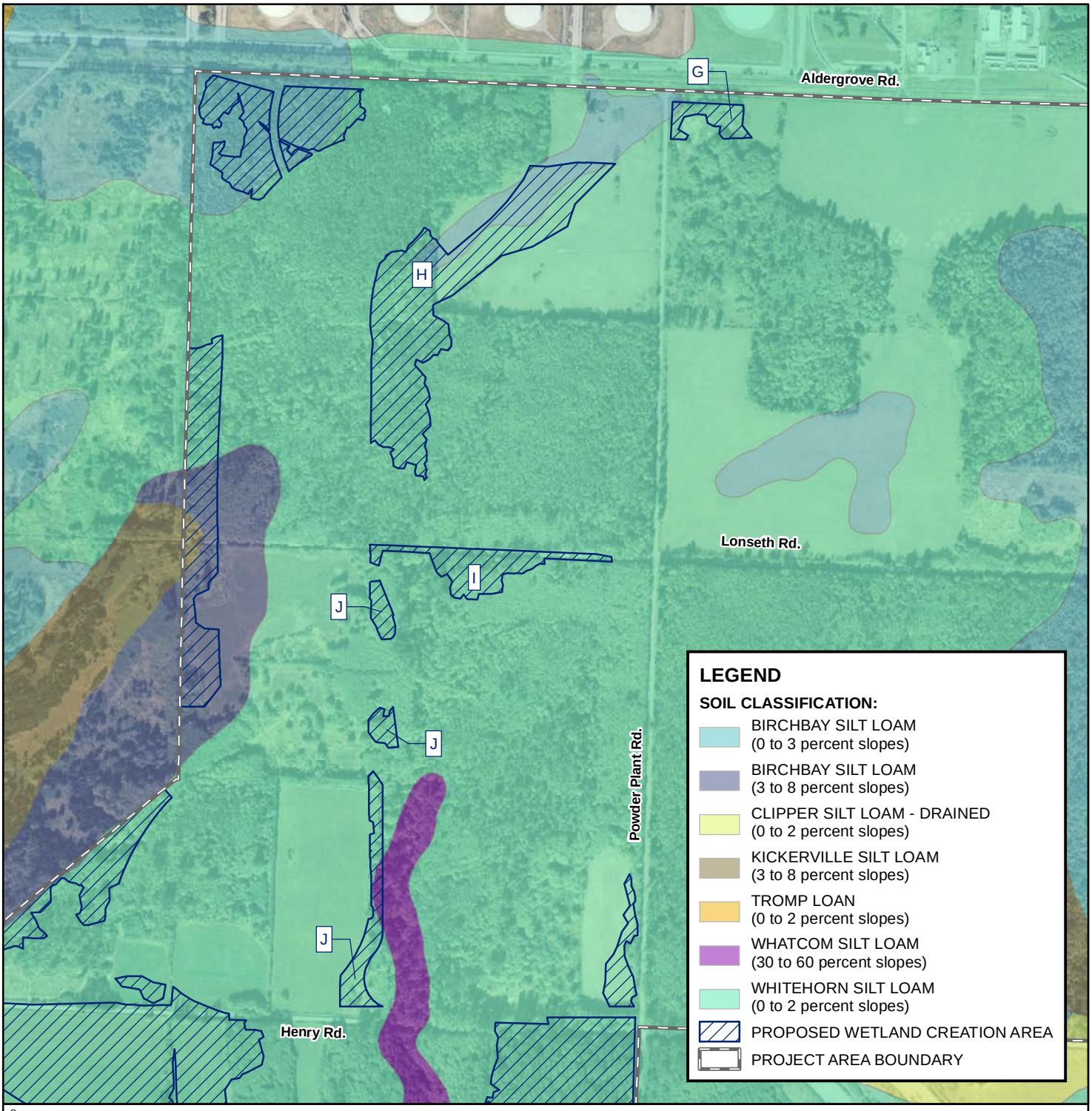
Streams 4 and 6 are relatively permanent waters (RPWs) that are essentially excavated and maintained roadside ditches that flow seasonally for at least three months of the year. Stream 4 flows west along the north side of Lonseth Road until it empties into Stream 1 west of Gulf Road. Stream 6 is located 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 are partially or wholly vegetated with primarily hydrophytic species including lady fern, common cattail, reed canarygrass, salmonberry, Cooley's hedge nettle, field horsetail, birds-foot trefoil, and small-fruited bulrush. Deposits of gravel and cobble are generally present. Ditches are mowed annually and excavated approximately once every three years, according to a utility worker maintaining the ditches during a follow-up field visit (pers. comm. July 16, 2007). Streams 4 and 6 provide little habitat for aquatic or terrestrial species. They have little to no overstory cover, are of relatively constant width (3–5 feet), and have a steep, compacted stream bank. Unidentified aquatic insects and tadpoles were observed during field visits.

2.9.2 Drainages 1, 5, 8, and 9

Four roadside drainages (Drainages 1, 5, 8, and 9) are located at or adjacent to Mitigation Areas G through J and adjacent wetlands. Drainage 1 flows west along the south side of Lonseth Road until it empties into Stream 1 west of Gulf Road. Drainage 5 is located along the west side of Gulf Road and has the same hydrologic divide as Stream 6 between Aldergrove Road and Lonseth Road. South of Lonseth Road, Drainage 5 continues to flow south to Stream 5. Drainages 8 and 9 flow east to Stream 1 along the south and north sides of Lonseth Road, respectively, to the west of Stream 1. All drainages ultimately flow to Stream 1 and the Strait of Georgia. All drainages except for Drainage 5 are considered RPWs.

As these drainages are essentially roadside ditches, habitat value is considered very low.



Source:
Soil Classification data from U.S. Department of Agriculture:
http://SoilDataMart.nrcs.usda.gov

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PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREAS G-J NATIONAL RESOURCES CONSERVATION SERVICE SOILS	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=800 feet	FIGURE No.: FIGURE C-3

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2.10 UPLANDS

Uplands at and in the vicinity of Mitigation Areas G through J 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. Soil types within the uplands are generally the same as previously described in Section 2.8.

2.11 WILDLIFE

2.11.1 Fish

Stream 1 is the only on-site stream identified as having current fish distribution (Shapiro and Associates 1994; Whatcom County 2005a). Shapiro and Associates (1994) found very limited fish habitat in Stream 1 because of intermittent flow, few high-quality pools, lack of LWD and spawning gravels, and poor water quality attributed to sediment load, garbage in the stream, and high temperatures. The only fish species identified within the stream channel was the three-spine stickleback (*Gasterosteus aculeatus*). WDFW indicated that the stream is unlikely to be used by salmon, but could be potential habitat for cutthroat and other salmonids. Very few aquatic invertebrates were captured by a dip net, and only one caddis fly larva was observed (Shapiro and Associates 1994). As such, existing wildlife habitat within Stream 1 is considered low quality, but there is considerable potential to improve conditions for fish species.

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.

2.11.2 Birds

No nests of bald eagles or peregrine falcons were identified at the Terminal site during natural resource baseline studies conducted in 1994 by Shapiro and Associates, and none have since been identified by WDFW or Whatcom County. Although there were 80 separate bald eagle sightings during the study, the number of individuals was much lower. Only one peregrine falcon was observed during the study and no cliffs suitable for peregrine falcon nesting were identified. The Terminal site was identified as having perching habitat for eagles and falcons migrating through the area (Shapiro and Associates 1994).

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 5 was located in a scrub-shrub area of Wetland 3 south of Mitigation Area G and east of Mitigation Area H beyond Gulf Road. 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 2009).

Point Count Station 3 was located in a forested portion of Wetland 7A to the east of Mitigation Areas I and J. Birds observed from this location during the winter and breeding seasons include American robin, American goldfinch, Bewick's wren, black-capped chickadee, brown creeper (*Certhia americana*), golden-crowned kinglet (*Regulus satrapa*), pine siskin, rufous hummingbird (*Selasphorus rufus*), song sparrow, spotted towhee (*Pipilo maculatus*), Wilson's warbler (*Wilsonia pusilla*), winter wren (*Troglodytes troglodytes*), and yellow-rumped warbler (*Dendroica coronata*) (AMEC 2009).

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 state of Washington. Although these species were observed during surveys, the study area contains no breeding habitat for these species.

2.11.3 Amphibians

According to Shapiro and Associates (1994), 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. 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 at the Terminal site in 1994. None of the species identified are listed as sensitive, threatened, or endangered by WDFW or the U.S. Fish and Wildlife Service. The high number of tree-frog vocalizations heard on several occasions indicates a relatively large adult population exists at the site.

Although the amphibian survey was time-constrained and the overall number of amphibians identified at the Terminal site was low, it is expected that additional species could occur in the area. Additional amphibian species that could potentially be present at Mitigation Area G through J include bullfrog

(*Rana catesbeiana*), western toad (*Bufo boreas*), rough-skinned newt (*Taricha granulosa*), and—to a lesser extent—the ensatina (*Ensatina eschscholtzii*). The low number of salamanders observed may indicate poor-quality habitat even though large wetland areas are present. The lack of downed LWD was identified as a potential limiting factor for amphibians (particularly salamanders), as it typically provides refugia for amphibians during warm and cold weather.

Based on the information provided by the Shapiro and Associates amphibian study, red-legged frog, Pacific tree frog, northwestern salamander, long-toed salamander, bullfrog, western toad, rough-skinned newt, and possibly ensatina potentially use the areas in and near Mitigation Areas G through J for at least a portion of their life cycle.

3.0 PROPOSED COMPENSATORY MITIGATION AT AREAS G THROUGH J

3.1 SITE SELECTION RATIONALE

Mitigation Areas G through J have been located directly adjacent to the Terminal site to intercept stormwater and expand upon the portions of existing wetlands that will remain (Figure C-4). Stream 1 will flow through Mitigation Areas G and I and directly adjacent to Mitigation Area H. As such, these wetlands have significant opportunity to improve downstream water quality and hydrologic conditions for Stream 1, as water is slowed and filtered by the dense persistent vegetation and allowed to settle into the soil column within wetland depressions. The removal of Lonseth Road within Mitigation Area I will provide the opportunity to remove the existing culvert that restricts fish passage and install fish passage–friendly log weirs. In addition, the presence of WDFW and Whatcom County riparian priority habitat along Stream 1 presents a unique opportunity to improve and expand upon these areas and increase habitat functions. Mitigation Area J will intercept and filter stormwater from the east side of the proposed East Loop, allowing stormwater to infiltrate to groundwater instead of flowing down the steep ravine and potentially causing erosion into Stream 1. 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 such as bald eagle and peregrine falcon.

3.2 FUNCTIONAL ASSESSMENT

The proposed actions would create approximately 24.8 acres of Category II scrub-shrub and forested wetlands. Table C-3 identifies the average scores of Mitigation Areas G through J 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). Mitigation Area G was classified as riverine, Mitigation Areas H and J were classified as depressional, and Mitigation Area I was classified as slope.

Stormwater inputs from adjacent development will provide the opportunity for Mitigation Areas G through J to have high opportunity to filter out and retain sediment and pollutants, increasing water quality for downstream aquatic resources. Mitigation Areas G through J have much higher potential and opportunity to provide hydrologic functions than the other Mitigation Areas due to their location along and adjacent to Stream 1, which will lessen the erosive severity of floodwaters downstream and protect fish habitat. As previously stated, the location of WDFW and Whatcom County riparian priority habitats along Stream 1, including through Mitigation Area I, presents the opportunity to improve upon this habitat for fish, birds, and amphibians. Based on the location of Mitigation Areas G through J adjacent to developed areas, Stream 1, and WDFW priority habitats, these areas have the highest potential and opportunity to provide water quality, hydrologic, and habitat functions of the Mitigation Areas on site.

4.0 COMPENSATORY MITIGATION GOALS AND OBJECTIVES

4.1 GOALS OF THE PROPOSED MITIGATION

The goal of the action at Mitigation Areas G through J is to create wetlands from upland areas 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 upon the existing portions of Wetlands 1, 2, 3, 7A, 8A, and 9A that will remain after construction of the Terminal.

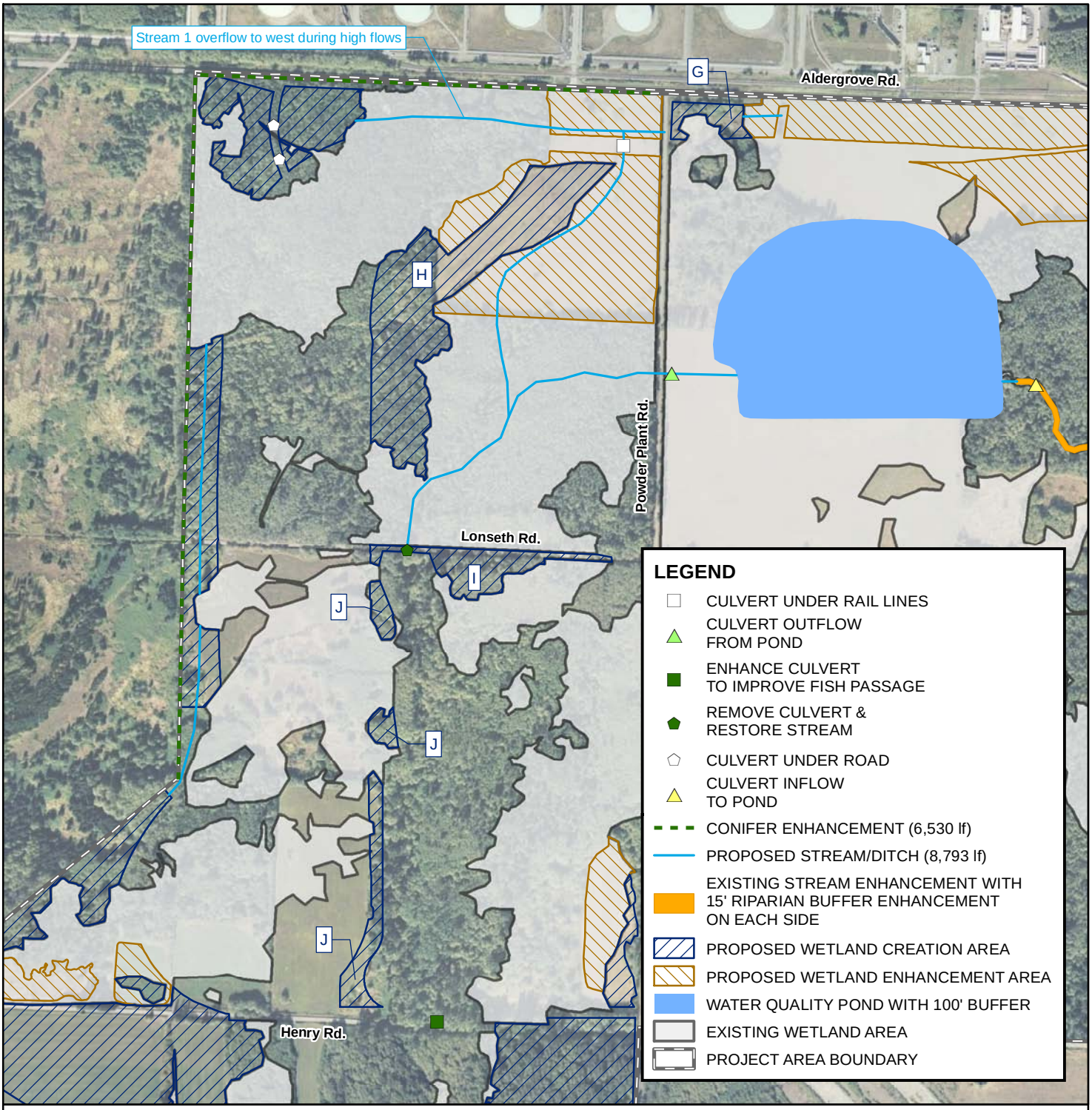
The overall goals of the compensatory mitigation at Areas G through J are as follows:

- Increase the extent of high-functioning freshwater scrub-shrub and forested wetlands.
- Expand and improve upon the existing WDFW and Whatcom County riparian priority habitat along Stream 1.
- Intercept and filter stormwater from the Terminal site.

4.2 OBJECTIVES OF THE PROPOSED MITIGATION

The specific objectives of the proposed compensation are as follows:

- Create approximately 24.8 acres of Category II scrub-shrub and forested wetlands.
- Improve water quality functions for downstream resources.
- Improve hydrologic functions for downstream resources.
- Improve habitat functions for known and presumed on-site wildlife.



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CLIENT: PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREAS G-J PROPOSED MITIGATION	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=800 feet	FIGURE No.: FIGURE C-4

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure C-4 - Mitigation Areas G-J - Proposed Mitigation.mxd

Table C-3 Hydrologic, Water Quality, and Biological Characteristics and Functions to Be Provided by Mitigation Areas G Through J

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 ft • Mitigation Area G: depressions that cover <1/2 wetland area and trees or shrubs >2/3 wetland area • Mitigation Area I: 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 • Mitigation Area G: Ratio of wetland unit to stream is between 5 and <10 and forested or shrub > 1/3 area • Mitigation Area I: dense, uncut, rigid vegetation >90% wetland area; small surface depressions that retain water over >10% of wetland area	• Improved downstream hydrologic conditions for Stream 1 • Reduced potential for stormwater erosion down steep ravine that contains Stream 1 from the East Loop
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: Areas G and J, 5–19 species; Areas H and I, >19 species • Interspersion of Cowardin classes:	• 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

Table C-3 Hydrologic, Water Quality, and Biological Characteristics and Functions to Be Provided by Mitigation Areas G Through J

Ecological Function[1]	Summary of Compensatory Function		
	Score[2]	Wetland Characteristics	Wetland Functions
		Areas G, H, J, moderate; Area I, 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: Area G does not meet buffer criteria; Area H, 170 ft of undisturbed vegetated areas >50% circumference; Areas I and J, 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 between them are relatively undisturbed (Areas G and H); connections relatively disturbed (Areas I and J)	
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.

Mitigation objectives would be attained through the following actions:

- Excavate the existing topographic contours to create wetland hydrologic conditions in specified areas.
- Replant the regraded areas with native scrub-shrub and forest wetland vegetation.
- Install habitat features including LWD in strategic locations.
- Remove the portion of Lonseth Road and the associated culvert at Mitigation Area I and install fish passage–friendly log weirs.

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APPENDIX D

Mitigation Areas K through L

APPENDIX D
MITIGATION AREAS K AND L
Gateway Pacific Terminal
Whatcom County, Washington

1.0 INTRODUCTION

Mitigation Areas K and L are located on the eastern portion of the Gateway Pacific Terminal ("Terminal") site (Figure D-1). Mitigation Area K currently consists of the portion of Lonseth Road to be removed between Wetlands 3 and 5A (Figure D-2). Mitigation Area L currently consists of a mix of emergent, scrub-shrub, and forested wetland and upland areas. These proposed wetland creation areas will expand upon and connect existing wetlands to improve water quality, hydrologic, and habitat functions through the following actions:

1. Removal of Lonseth Road at Mitigation Area K;
2. The creation of approximately 27 acres of Category II scrub/shrub and forested wetland from existing upland areas;
3. Installation of large woody debris (LWD) in strategic locations and leaving existing large upland coniferous trees to become standing snags.

The proposed mitigation would connect existing wetlands adjacent to Mitigation Areas K and L to primarily provide habitat functions, specifically for birds and amphibians. As Stream 4 would be rerouted through Mitigation Area K to Wetland 3, the stormwater pond, and eventually Stream 1, Mitigation Area K would also provide water quality and hydrologic functions to protect downstream aquatic resources and infrastructure. Mitigation Area K would establish undisturbed surface connectivity between Stream 4 and adjacent Wetlands 3 and 5A where there is currently none, despite their proximity to each other. Mitigation Area L would also provide water quality and hydrologic functions by intercepting, storing, and filtering water flowing on site from streams and drainages that begin off site.

2.0 EXISTING CONDITIONS

2.1 MITIGATION AREA K

Mitigation Area K is an approximately 0.7-acre area located along the portion of Lonseth Road to be removed between Wetlands 3 and 5A, and as such is predominantly paved road between Stream 4 and Drainage 1, which flow west to Stream 1. A portion of Wetland 3, a 143.4-acre Category III slope wetland, is located adjacent to the north of Mitigation Area K (Table D-1). This portion of Wetland 3 is

forested and connected to the main portion of Wetland 3 to the northwest by a long, narrow, meandering swale. Wetland 5A, a 95.3-acre Category III primarily forested slope wetland, is located adjacent to the south of Mitigation Area K (Table D-1). Topography at Mitigation Area K is generally defined by the Lonseth Road prism, which is flat on the paved road and slopes down sharply to Stream 4 and Drainage 1.

2.2 MITIGATION AREA L

Mitigation Area L is an approximately 26.3-acre area bounded by Henry Road to the south, Kickerville Road to the east, Lonseth Road to the north, and a utility easement to the west. Vegetation consists of a mix of emergent, scrub-shrub, and forested uplands between Wetlands 4A, 4B, 4C, and 4D. Wetlands 4A and 4D are Category III slope wetlands, and Wetlands 4B and 4C are Category III depressional wetlands (Table D-1).

Wetland 4A is a 26.6-acre forested and emergent wetland on the north end of Mitigation Area L. Wetland 4D is a 1.3-acre wetland on the south end of Mitigation Area L that consists of emergent, scrub-shrub, and forested areas (Table D-1). Wetland 4B is a 4.36-acre wetland located on the east side of Mitigation Area L that is predominantly forested except for the mowed vegetation where it crosses the utility easement along Kickerville Road. Wetland 4C is a 0.2-acre predominantly emergent wetland where it crosses the utility easement along Kickerville Road, with a small area of scrub-shrub vegetation on its western extent.

2.3 WETLANDS

Figure D-2 shows the existing stream network, wetlands, and hydrologic flow at Mitigation Areas K and L. All wetlands are hydrologically connected to Stream 1 and, ultimately, the Strait of Georgia via surface water or groundwater connection.

Currently, wetlands adjacent to Mitigation Area K comprise 245.9 acres, and wetlands adjacent to Mitigation Area L comprise 32.4 acres. Wetlands were classified as slope and depressional HGM, and wetland vegetation was classified as forested (PFO), scrub-shrub (PSS), and emergent (PEM). Wetland characteristics are summarized in Table D-1. Detailed descriptions are provided in the *Wetland Determination and Delineation Report* (AMEC 2008).

Source:
David Evans & Associates, 2010-04-14-svTPXpiti0006-DEGROSS.dwg, 07/20/2010.

0 250 500 1,000
Feet

N

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11810 North Creek Parkway N
Bothell, WA 98011

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL

TITLE: MITIGATION AREAS K-L
EXISTING CONDITIONS

DWN BY:	DATUM:	DATE:
SD	NAD83	FEBRUARY 2011
CHK'D BY:	REV. NO.:	PROJECT NO.:
KD	1	091515338C-01-03
PROJECTION:	SCALE:	FIGURE No.:
WA SP North, Ft.	1 inch=500 feet	FIGURE D-1

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

0 250 500 1,000 Feet

N

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CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL		DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREAS K-L EXISTING CONDITIONS - STREAM NETWORK, WETLANDS, AND HYDROLOGIC FLOW		CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
		PROJECTION: WA SP North, Ft.	SCALE: 1 inch=500 feet	FIGURE No.: FIGURE D-2

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure D-2 - Mitigation Areas K-L - Existing Stream Network.mxd

Table D-1 Characteristics of Existing Wetlands Adjacent to Mitigation Areas K and L

Wetland Name	Hydro-geomorphic Class[1]	Rating[2]	Total Area (acres)	Location[3]	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, then flows to Strait of Georgia
4A	Slope	III	26.6	South of Lonseth Road, east of railroad	Abuts and drains to Drainage 6, then to Drainage 1 and Stream 1, then flows to Strait of Georgia
4B	Depressional	III	4.4	West of Kickerville Road	Abuts and drains to Drainage 6, then to Drainage 1 and Stream 1, then flows to Strait of Georgia
4C	Depressional	III	0.2	West of Kickerville Road	Abuts and drains to Drainage 6, then to Drainage 1 and Stream 1, then flows to Strait of Georgia
4D	Slope	III	1.3	Northwest of the Kickerville Road and Henry Road intersection	Isolated – No apparent outlet; likely drains to groundwater flowing downslope to Drainage 6, then to Drainage 1 and Stream 1, then flows to Strait of Georgia
5A	Slope	III	95.2	South of Lonseth Road, west of railroad	Northern portion abuts and drains to Drainage 1 and Stream 1, then flows to Strait of Georgia; southern portion drains to groundwater, then to Stream 5 and Stream 1, then flows to Strait of Georgia

[1] Brinson (1993)

[2] Hruby (2004)

[3] Refer to Figure D-2.

2.4 VEGETATION

As discussed, Mitigation Area K currently consists of the portion of Lonseth Road to be removed between Wetlands 3 and 5A; therefore, the only vegetation present is occasionally mowed roadside weedy species along the banks of the road prism, including reed canarygrass (*Phalaris arundinacea*).

The portions of Wetlands 3 and 5A adjacent to Mitigation Area K include 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*). Wetland 3 also has heavily grazed pasture and scrub-shrub areas in its main portion to the west beyond the wetland swale.

Mitigation Area L currently consists of upland areas between Wetlands 4A, 4B, 4C, and 4D consisting of a mix of forested, scrub-shrub, and emergent upland vegetation typical of the area. Wetland 4A consists of mowed emergent vegetation along the utility easement and forested vegetation outside of the easement. Dominant species in Wetland 4A include red alder trees in the overstory, with a shrub community composed of Himalayan blackberry (*Rubus armeniacus*), trailing blackberry (*Rubus ursinus*), salmonberry, and red alder saplings. The herbaceous community is dominated by reed canarygrass. Dominant vegetation in Wetland 4B includes an overstory of red alder and an understory of Douglas spirea (*Spiraea douglasii*), reed canarygrass, and slough sedge. Wetland 4C consists of a monotypic stand of reed canarygrass with shrubs including Douglas spirea near its western boundary. Wetland 4D consists of emergent, scrub-shrub, and forested wetland vegetation typical of the area.

Uplands in the vicinity of Mitigation Areas K and L consist predominantly of red alder forest typical of the area. 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. On-site uplands beyond Mitigation Areas K and L, and adjacent wetlands that are not forested consist of fringe scrub-shrub areas and emergent areas along paved roads and utility easements. Emergent vegetation along utility easements and road prisms is mowed regularly.

2.5 HYDROLOGY

Stream 4 and Drainage 1 are relatively permanent waters (RPWs) that flow west along the north and south sides of Lonseth Road, respectively, on either side of Mitigation Area K. The portion of Wetland 3 adjacent to the north of Mitigation Area K drains to the swale that connects it with the main area of Wetland 3 to the northwest, which then flows to Stream 1. Wetland 5A drains north to Drainage 1 adjacent to the south of Mitigation Area K. Wetlands 4A, 4B, 4C, and 4D all flow north via surface or groundwater to Drainage 6, a non-RPW, which then flows west to Drainage 1. Drainage 1 flows west along Lonseth Road and empties into Stream 1 west of Gulf Road, which then flows to the Strait of Georgia.

See the *Wetland Determination and Delineation Report* (AMEC 2008) for a full description of site hydrology.

2.6 SOILS

Two soil types are mapped at and in the vicinity of Mitigation Areas K and L: the Whitehorn silt loam 0 to 2 percent slopes and the Birch Bay silt loam 0 to 3 percent soil units (Figure D-3). Table D-2 identifies characteristics of these soil units.

Table D-2 Mitigation Areas K and L Existing Soils Characteristics[1]

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)

[1] NRCS (2007)

Soils at Mitigation Area K likely consist of fill associated with the road prism of Lonseth Road. However, this area of Lonseth Road is predominantly mapped as the Whitehorn silt loam soil unit with a small area of the Birch Bay silt loam soil unit on its western edge. Lonseth Road and its road prism would be removed from Mitigation Area K and the area would be excavated to match the existing grades of adjacent Wetlands 3 and 5A. Wetlands 3 and 5A are also mapped as the Whitehorn silt loam soil unit adjacent to Mitigation Area K. As the Whitehorn series soils are poorly drained with water at or near the surface, have a high frequency of ponding and high available water capacity, these soils are very conducive to wetland hydrology.

Wetland soils at Mitigation Area L appear to correlate generally to the Whitehorn silt loam soil unit, and uplands to the Birch Bay silt loam soil unit, although some areas of wetland are also present in the Birch Bay silt loam soil unit. Although the area where the Birch Bay silt loam soil unit is present may require some excavation to promote wetland hydrology, the presence of several wetlands in and adjacent to this soil type at Mitigation Area L is evidence of consistent hydrology and a high water table in the area.

See the *Wetland Determination and Delineation Report* (AMEC 2008) for a full description of these soil types.

2.7 OTHER WATERS

2.7.1 Stream 4

Stream 4 is an RPW that is essentially an excavated and maintained roadside ditch that flows seasonally for at least three months of the year. Stream 4 flows west along the north side of Lonseth Road until it empties into Stream 1 west of Gulf Road. Stream 4 is partially or wholly vegetated along its length, with primarily hydrophytic species, including lady fern, common cattail, reed canarygrass, salmonberry, Cooley's hedge nettle, field horsetail, birds-foot trefoil, and small-fruited bulrush. Deposits of gravel and cobble are generally present. Stream 4 is mowed annually and excavated approximately once every three years, according to a utility worker maintaining the ditches during a follow-up field visit (pers. comm. July 16, 2007). Stream 4 provides little habitat for aquatic or terrestrial species as it has little to no overstory cover, relatively constant width (3–5 feet), and a steep, compacted stream bank. Unidentified aquatic insects and tadpoles were observed during field visits.

2.7.2 Drainages 1 and 6

Drainages 1 and 6 drain Wetlands 4A, 4B, 4C, 4D, and 5A in the vicinity of Mitigation Areas K and L. 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 beyond Gulf Road and, ultimately, the Strait of Georgia. Drainage 1 is an RPW, and Drainage 6 is a non-RPW.

As these drainages are essentially roadside ditches, habitat value is considered very low.

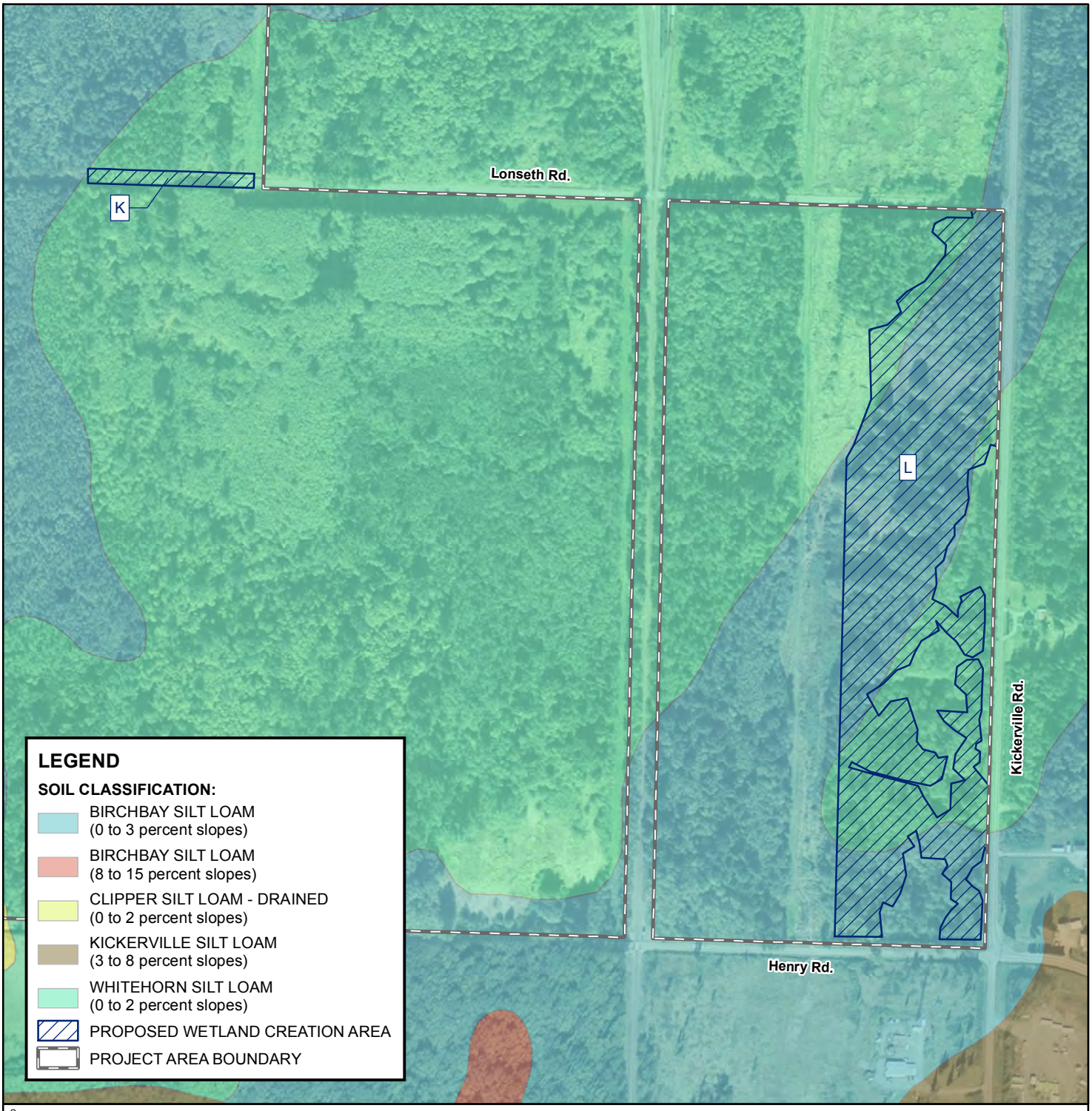
2.8 WILDLIFE

2.8.1 Fish

None of the streams or drainages have been identified as potential or documented fish-bearing waters. As such, fish habitat is not currently present in Stream 4 or Drainages 1 and 6.

2.8.2 Birds

No nests of bald eagles or peregrine falcons were identified at the Terminal site during natural resource baseline studies conducted in 1994 by Shapiro and Associates, and none have since been identified by the Washington Department of Fish and Wildlife (WDFW) or Whatcom County. Although there were 80 separate bald eagle sightings during the study, the number of individuals was much lower. Only one peregrine falcon was observed during the study, and no cliffs suitable for peregrine falcon nesting were identified. The Terminal site was identified as having perching habitat for eagles and falcons migrating through the area (Shapiro and Associates 1994).



Source:
Soil Classification data from U.S. Department of Agriculture:
http://SoilDataMart.nrcs.usda.gov

0 250 500 1,000 Feet

N

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Bothell, WA 98011

CLIENT:
PACIFIC INTERNATIONAL TERMINALS, INC.

PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL	DWN BY: SD	DATUM: NAD83	DATE: FEBRUARY 2011
TITLE: MITIGATION AREAS K-L NATIONAL RESOURCES CONSERVATION SERVICE SOILS	CHK'D BY: KD	REV. NO.: 1	PROJECT NO.: 091515338C-01-03
	PROJECTION: WA SP North, Ft.	SCALE: 1 inch=500 feet	FIGURE No.: FIGURE D-3

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure D-3 - Mitigation Areas K-L - NRCS Soils.mxd

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

Point Count Station 8 was located in a forested area of Wetland 5A between Mitigation Areas K and L. Birds observed from this location during the winter and breeding seasons include American robin (*Turdus migratorius*), American goldfinch (*Carduelis tristis*), Anna's hummingbird (*Calypte anna*), Bewick's wren (*Thyrothorus ludovicianus*), black-capped chickadee (*Poecile rufescens*), brown-headed cowbird (*Molothrus ater*), common yellowthroat (*Geothlypis trichas*), dark-eyed junco (*Junco hyemalis*), marsh wren (*Cistothorus palustris*), northern flicker (*Colaptes auratus*), pine siskin (*Carduelis pinus*), song sparrow (*Melospiza melodia*), ruby-crowned kinglet (*Regulus calendula*), rufous hummingbird (*Selasphorus rufus*), spotted towhee (*Pipilo maculatus*), and yellow-rumped warbler (*Dendroica coronata*) (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.

2.8.3 Amphibians

According to Shapiro and Associates (1994), 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. Two species of frogs, red-legged frog (*Rana aurora*) and Pacific tree frog (*Pseudacris regilla*), and two species of salamander, northwestern salamander (*Ambystoma gracile*) and long-toed salamander (*Ambystoma macrodactylum*), were observed during amphibian surveys at the Terminal site in 1994. None of the species identified are listed as sensitive, threatened, or endangered by WDFW or the U.S. Fish and Wildlife Service. The high number of tree-frog vocalizations heard on several occasions indicates that a relatively large adult population exists at the site.

Although the amphibian survey was time-constrained and the overall number of amphibians identified at the Terminal site was low, it is expected that additional species could occur in the area. Additional amphibian species that could potentially be present at Mitigation Areas K and L include bullfrog (*Rana catesbeiana*), western toad (*Bufo boreas*), rough-skinned newt (*Taricha granulosa*), and—to a lesser extent—the ensatina (*Ensatina eschscholtzii*). The low number of salamanders observed may indicate poor-quality habitat even though large wetland areas are present. The lack of downed LWD was identified as a potential limiting factor for amphibians (particularly salamanders), as it typically provides refugia for amphibians during warm and cold weather.

Based on the information provided by the Shapiro and Associates amphibian study, red-legged frog, Pacific tree frog, northwestern salamander, long-toed salamander, bullfrog, western toad, rough-skinned newt, and possibly ensatina potentially use the areas in and near Mitigation Areas K and L for at least a portion of their life cycle.

3.0 SITE SELECTION RATIONALE

With the removal of Lonseth Road, Mitigation Area K would provide the opportunity to connect Wetlands 3 and 5A to increase hydrologic and habitat connectivity between these two large wetland areas. A locally high water table evidenced by the presence of these wetlands, Stream 4, and Drainage 1 would provide sufficient hydrology to create wetland conditions. As such, Mitigation Area K is in a unique location to provide significant water quality functions, as water from Stream 4 is slowed and filtered by the dense persistent vegetation and allowed to settle into the soil column within the wetland depressions. Undisturbed habitat connectivity between Wetlands 3 and 5A would allow species of birds and amphibians to migrate freely between these areas (Figure D-4).

Mitigation Area L would connect Wetlands 4A, 4B, 4C, and 4D to provide significant wetland habitat connectivity in an area surrounded by paved roads and a mowed utility easement. As such, Mitigation Area L also has the opportunity to intercept stormwater from adjacent development and improve water quality for downstream aquatic resources. Areas of red alder forest with occasional large coniferous tree species adjacent to wetlands provide the opportunity to convert these upland forested areas to wetlands while leaving the coniferous trees to become standing snags essential for perching bird species such as bald eagle and peregrine falcon.

3.1 FUNCTIONAL ASSESSMENT

The proposed actions would create approximately 27 acres of Category II scrub-shrub and forested wetlands. Tables D-3 and D-4 identify the average scores of Mitigation Areas K and L, 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). Mitigation Area K was classified as riverine, and Mitigation Area L was classified as depressional.

As discussed previously, Wetlands K and L would provide primarily water quality and habitat functions, with a significant increase in wetland habitat connectivity. The small size of Mitigation Area K would seem to limit its ability to perform wetland functions, but the connectivity between Wetlands 3 and 5A that it would provide, as well as Stream 4 flowing through it, provides the opportunity for Mitigation Area K to improve overall downstream water quality and hydrologic conditions and act as a wildlife corridor between large wetland areas. Conversely, Mitigation Area L would provide moderate

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PROJECT: PROPOSED GATEWAY PACIFIC TERMINAL

TITLE: MITIGATION AREAS K-L
PROPOSED MITIGATION

DWN BY:	DATUM:	DATE:
SD	NAD83	FEBRUARY 2011
CHK'D BY:	REV. NO.:	PROJECT NO.:
KD	1	091515338C-01-03
PROJECTION:	SCALE:	FIGURE No.:
WA SP North, Ft.	1 inch=500 feet	FIGURE D-4

K:\AMEC US OFFICES\KIRKLAND\15338-0\15338C\T-01-03 - Preliminary Conceptual Mitigation Plan\dwg\Figure D-4 - Mitigation Areas K-L - Proposed Mitigation.mxd

wetland functions but over a much larger area. The lack of an RPW adjacent to Mitigation Area L would limit its ability to provide hydrologic functions, but it would intercept and filter stormwater from adjacent paved roads. Mitigation Area L would provide significant wetland habitat connectivity between Wetlands 4A, 4B, 4C, and 4D to create a much larger, higher-functioning wetland with respect to wildlife habitat.

4.0 COMPENSATORY MITIGATION GOALS AND OBJECTIVES

4.1 GOALS OF THE PROPOSED MITIGATION

The goal of the action at Mitigation Areas K and L is to increase hydrologic and habitat connectivity between adjacent wetlands to provide increased water quality, hydrologic, and habitat functions in these areas.

The overall goals of the compensatory mitigation at Areas K and L are as follows:

- Increase the extent of high-functioning freshwater scrub-shrub and forested wetlands.
- Where feasible, connect wetlands that are close to each other to improve hydrologic and habitat connectivity between them.
- Provide wetland area for Stream 4 to flow through before flowing to Wetland 3.

4.2 OBJECTIVES OF THE PROPOSED MITIGATION

The specific objectives of the proposed compensation are as follows:

- Create approximately 27 acres of Category II scrub-shrub and forested wetlands.
- Improve water quality functions for downstream resources.
- Improve hydrologic functions for downstream resources.
- Improve habitat functions for known and presumed on-site wildlife.

Mitigation objectives would be attained through the following actions:

- Excavate the existing topographic contours to create wetland hydrologic conditions in specified areas.
- Replant the regraded areas with native scrub-shrub and forest wetland vegetation.
- Install habitat features including LWD in strategic locations.
- Remove the portion of Lonseth Road between Wetlands 3 and 5A to make way for Mitigation Area K.

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

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 out 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: o Multiple Cowardin classes o Multiple hydroperiods o Moderate plant richness and interspersion of Cowardin classes o Multiple special habitat features o Relatively undisturbed buffers o Multiple priority habitats within 330 ft o 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 postconstruction.

Table D-4 Hydrologic, Water Quality, and Biological Characteristics and Functions to Be Provided by Mitigation Area L

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 areas • Area seasonally ponded is >1/4 total area but <1/2 total area • Untreated stormwater discharges to wetlands; stream discharges into wetlands that drains farmed field and roads; developed areas within 150 ft	• Filter out and retain sediment and pollutants • Increased water quality for on-site and downstream aquatic resources
Hydrologic	16	• Intermittently flowing outlet • Marks of ponding at least 0.5 to <2 feet from surface or bottom of outlets • Area of watershed basin is 10 to 100 times the area of the wetland unit • Opportunity to reduce flooding and erosion due to the presence of downstream aquatic resources and infrastructure	• Reduced potential for downstream flooding and erosion
Habitat	18	• Cowardin classes present: scrub-shrub, forested, forested class has three out of five strata • Hydroperiods: occasionally flooded, saturated only • Plant richness: >19 species • Moderate interspersion of Cowardin classes • LWD, standing snags, invasive plants cover less than 25% of wetland in each stratum • Buffers: 330 ft of relatively undisturbed vegetated areas or open water for >25% circumference • Within 5 miles of a brackish or salt water estuary • Priority habitats within 330 ft: 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: o Multiple Cowardin classes o Multiple hydroperiods o Moderate plant richness and interspersion of Cowardin classes o Multiple special habitat features o Relatively undisturbed buffers o Priority habitat present o Relatively undisturbed connections to other wetlands within 1/2 mile
Total	52 (Cat. II)	Moderate Water Quality Functions Moderate Hydrologic Functions Moderate Habitat Functions	

1 = Hruby 2004

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

5.0 REFERENCES

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APPENDIX E

Stream Restoration and Enhancement

APPENDIX E
STREAM RESTORATION AND ENHANCEMENT
Gateway Pacific Terminal
Whatcom County, Washington

1.0 INTRODUCTION

The site layout of the Gateway Pacific Terminal ("Terminal") provides significant stream restoration and enhancement opportunities, particularly for Stream 1, which is the only on-site stream identified as having current fish distribution (Shapiro and Associates 1994; Whatcom County 2005a). As discussed previously, development of the Terminal will impact approximately 12,815.8 linear feet of streams and drainages. Stream creation and restoration at the Terminal site will maintain water quality and improve hydrologic and habitat functions in the following ways:

1. Creating approximately 8,793 linear feet of streams and water conveyance features that include:
    a. Rerouting Stream 1 to flow west through Mitigation Area G before flowing to the remaining portions of existing Wetlands 1, 2, and Mitigation Area I.
    b. Increasing the meander (sinuosity) of Stream 1 through the remaining portion of Wetland 2.
    c. Constructing an overflow conveyance that will convey water west from Stream 1 to Mitigation Areas F, E, and D during periods of high flow.
    d. Constructing an overflow conveyance from the proposed water quality pond that flows west to Stream 1.
2. Removing the culvert where Stream 1 flows under Lonseth Road and installing fish passage–friendly log weirs to improve fish passage.
3. Removing the culvert where Stream 1 flows under Henry Road and replacing it with a fish passage–friendly bottomless box culvert.
4. Rerouting Stream 4 to flow northeast to the water quality pond through the narrow, linear portion of Wetland 3 that connects the southeast lobe to its main portion to the northwest.
5. Enhancing approximately 1.6 acres of riparian buffer along rerouted Stream 4 for approximately 2,300 linear feet (15 feet along either side).
6. Installing in-stream and riparian habitat features such as spawning gravel and large woody debris (LWD) in strategic locations.

Mitigation actions to Streams 1 and 2 will improve fish passage and habitat and increase channel complexity while maintaining hydrology to existing wetlands and providing hydrology to created wetlands. As Stream 4 essentially functions as a roadside ditch, the mitigation actions to Stream 4 will dramatically increase channel complexity and its ability to provide significant water quality, hydrologic, and habitat functions. Riparian enhancements along rerouted Stream 4 will further increase the functions that Stream 4 is able to provide, especially habitat for amphibians and birds.

Implementation of these stream restoration and enhancement measures, along with the proposed water quality pond, will function to maintain water quality for on-site and downstream aquatic resources while attenuating high flows and providing habitat for a variety of species.

2.0 EXISTING CONDITIONS

2.1 STREAM 1

Stream 1, which provides moderate habitat for terrestrial and aquatic species, is fed by surface flow through excavated roadside ditches, isolated channels within wetlands, groundwater that seeps, and in some places, surface sheet flow. Whatcom County categorizes Stream 1 as a HCA-1b stream.

The on-site portion of Stream 1 begins at the northeast corner and flows west along the north side of Aldergrove Road, then south through a culvert under Aldergrove Road into the northwestern portion of Wetland 3. Stream 1 exits Wetland 3 through a culvert under Gulf Road and emerges into an open wetland pasture (Wetland 2), where it continues southwest through surface flow into a ravine lined by an alder forest. The stream then flows south through a culvert under Lonseth Road and continues south through the ravine. The sides of the ravine are very steep in this area, and the stream channel is generally narrow with an unvegetated bed and no riparian wetlands. As such, this segment of the stream provides little habitat quality. Stream 1 then flows south under Henry Road through a culvert.

The lower portion of Stream 1 from Henry Road to its mouth has a canopy layer limited to alder forest, with areas characterized by an understory that includes willows and a lower shrub layer of twinberry. Portions of the stream contain wetland banks, with obligate species of skunk cabbage and water parsley. Along with the vegetation, the lower section of the stream contains a large amount of trash and man-made debris dumped into it and the surrounding ditches. The stream winds through the ravine and is braided in segments. The stream exits the forest canopy to the coastal lagoon through a thicket of Nootka rose. In the lagoon, the stream meanders to its outlet in the Strait of Georgia.

Shapiro and Associates (1994) conducted a surface water hydrology analysis for Stream 1 from December 1992 through May 1993. The stream was found to be 1.25 miles long and drains 800 acres, 90 percent of which is on site. Observed flows in Stream 1 ranged from 0.76 cubic feet per

second (cfs) to 14.02 cfs, with a median flow of 2.62 cfs. Half of the precipitation that falls on steep slopes, such as the stream ravine and coastal bluffs, immediately becomes runoff. About one-third of the precipitation becomes runoff in more level upland areas in the form of base flow into the stream after absorption capacity of the soil has been reached.

Stream 1 is proposed to be rerouted through Wetlands 1 and 2, which are contiguous and predominantly forested with a large pasture located in the southwest quadrant of the Aldergrove Road and Gulf Road intersection. Remaining areas where Stream 1 is proposed to be rerouted include forested uplands in the northwestern portion of the site (proposed Mitigation Areas G and I) and forested, scrub-shrub, and emergent uplands along the western site boundary.

2.2 STREAM 2

Stream 2, which is approximately 1.25 miles long, drains the area to the east and generally flows northwest through the central portion of Wetland Mitigation Area A. Approximately 400 feet east of Gulf Road, a tributary flowing from the northeast converges with the primary channel of Stream 2 and continues to flow west through a culvert under Gulf Road to Wetland 12, a coastal lagoon, and ultimately, the Strait of Georgia, a traditional navigable water (TNW) of the United States. Stream 2 and its tributary have continuous flow for at least three months of the year, and are therefore considered to be relatively permanent (RPW) tributaries to a TNW. According to the Whatcom County Critical Areas Ordinance (CAO), this stream is categorized as HCA-1b (Whatcom County 2005a).

2.3 STREAM 4

Stream 4 is a roadside ditch that currently flows west along the north side of Lonseth Road from the east site boundary and empties to Stream 1. Deposits of gravel and cobble are generally present, and substrate particle sizes increase as Stream 4 approaches Stream 1. Ditches are mowed annually and excavated approximately once every three years, according to a utility worker maintaining the ditches during a follow-up field visit (pers. comm. July 16, 2007). Stream 4 has little to no overstory cover, relatively constant width (3–5 feet), and a steep, compacted stream bank. The portion of Wetland 3 that Stream 4 will be rerouted through is currently forested and consists of a long, narrow, linear drainage that flows northwest. Forested uplands are along either side of the drainage for its entire length. According to the Whatcom County CAO, this stream is categorized as HCA-1c (Whatcom County 2005a).

2.4 WILDLIFE

As discussed previously, Stream 1 is the only on-site stream identified as having current fish distribution (Shapiro and Associates 1994; Whatcom County 2005a). Shapiro and Associates (1994) found very limited fish habitat in Stream 1 because of intermittent flow, few high-quality pools, lack of

LWD and spawning gravels, and poor water quality attributed to sediment load, garbage in the stream, and high temperatures. The only fish species identified within the stream channel was three-spine stickleback (*Gasterosteus aculeatus*). The Washington Department of Fish and Wildlife (WDFW) indicated that the stream is unlikely to be used by salmon, but could be potential habitat for cutthroat and other salmonids. Very few aquatic invertebrates were captured by a dip net, and only one caddis fly larva was observed (Shapiro and Associates 1994). As such, existing wildlife habitat within Stream 1 is considered low quality, but there is considerable potential to improve conditions for fish species.

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

The habitat value of Stream 2 and its tributary is relatively low. It is an intermittent stream, with an inconsistent and relatively sparse forest canopy of alder. The stream bank is lined with Category I wetland areas that include several obligate species. 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).

As Stream 4 is a roadside ditch that is periodically maintained and excavated, it provides little to no habitat for aquatic or terrestrial species.

3.0 PROPOSED COMPENSATORY STREAM MITIGATION

3.1 SITE SELECTION RATIONALE

The proposed stream restoration and enhancement measures were identified based on the Terminal site layout, which was designed to minimize or avoid impacts to critical areas. The actions will help to maintain on-site water quality, and improve on-site water quality and habitat conditions within proposed and existing streams.

Restoring Stream 1 to a more properly functioning condition is a priority of the mitigation actions at the Terminal site, as this is currently the only on-site fish-bearing stream. Design of the Terminal layout allows for removing the culvert under Lonseth Road and improving the culvert under Henry Road, making fish passage possible where it is currently non-existent. The general degraded nature of Stream 1 has the potential for significant enhancement, including installation of in-stream habitat features such as fish gravels and LWD, removal of garbage, and increased channel sinuosity through the remaining portion of Wetland 2. Redirecting Stream 1 to wetland creation areas during high flows

will help to attenuate flood waters and protect downstream property and aquatic resources while providing hydrology to these wetlands.

Stream 2 is identified as having potential/historical fish distribution, and the riparian areas of Stream 2 are priority habitats. As Stream 2 currently has no fish distribution, there is opportunity to improve conditions within the stream should fish species gain access and inhabit Stream 2 in the future. Improvements to Stream 2 will primarily provide habitat functions, but will also provide some water quality improvements.

The narrow linear area within Wetland 3 and its hydrologic flow to the northwest provides a unique position in the landscape to reroute Stream 4 toward the proposed water quality pond. Enhancing riparian areas along rerouted Stream 4 will provide primarily water quality and habitat improvements.

3.2 FUNCTIONAL ASSESSMENT

Stream restoration and enhancement at the Terminal site will provide significant habitat functions for fish, amphibians, and birds, while providing water quality and hydrologic functions to protect downstream structures and aquatic resources. Table E-1 summarizes the functions to be provided by the stream restoration and enhancement actions.

4.0 COMPENSATORY MITIGATION GOALS AND OBJECTIVES

4.1 GOALS OF THE PROPOSED MITIGATION

In riparian systems, the vegetation, water tables, soils, microclimate, and wildlife inhabitants of terrestrial ecosystems are often influenced by perennial or intermittent water. Simultaneously, adjacent vegetation, nutrient and sediment loading, terrestrial wildlife, as well as organic and inorganic debris influence the biological and physical properties of the aquatic system (WDFW 2008). The overall goal of stream restoration and enhancement at the Terminal site is to improve upon the existing aquatic systems and create additional high-functioning aquatic systems that will facilitate the interactions between terrestrial and aquatic areas to provide significant functions with respect to on-site wildlife habitat, water quality, and hydrology.

The goals of the stream restoration and enhancement compensatory mitigation are as follows:

- Improve Stream 1 fish passage, habitat conditions, and stream flow.
- Provide hydrology to Mitigation Areas D, E, and F from Stream 1 during high flows.
- Increase Stream 4 channel complexity.
- Improve amphibian and bird habitat along the riparian areas of Stream 4.
- Maintain/improve water quality and hydrologic functions provided by on-site waters.

Table E-1 Functions to Be Provided by Stream Restoration and Enhancement

Restoration/Enhancement Action	Functions to Be Provided
• Reroute Stream 1 to flow west through Mitigation Area G before flowing to the remaining portions of existing Wetlands 1 and 2 and Mitigation Area I.	• Hydrology to Mitigation Areas G and I
• Increase the meander (sinuosity) of Stream 1 through the remaining portion of Wetland 2.	• More natural conditions that allow in-stream habitat such as pool and riffle complexes to form • Increased riparian area and complexity • Increased water quality as more natural conditions allow pollutants and sediments to settle • Flood water attenuation from increased in-stream volume and overflow riparian areas • Hydrology to Mitigation Area I
• Construct an overflow conveyance that will convey water west from Stream 1 to Mitigation Areas D, E, and F during periods of high flow.	• Flood water attenuation as high flows from Stream 1 are redirected to remaining and created wetlands • Increased riparian area along conveyance through remaining and created wetlands • Increased water quality as flood water from Stream 1 is diverted to wetlands where pollutants and sediment can settle • Habitat for amphibians and birds, especially as the conveyance flows through wetland areas • Hydrology to Mitigation Areas D, E, and F
• Construct an overflow conveyance from the proposed water quality pond that flows west to Stream 1.	• Increased riparian area along conveyance through remaining wetlands • Habitat for amphibians and birds, and potentially fish, especially as the conveyance flows through wetlands • Clean water to Stream 1 to maintain base flow • An outlet for the water quality pond
• Remove the culvert where Stream 1 flows under Lonseth Road and install fish passage–friendly log weirs.	• Fish passage where none currently exists • More natural stream conditions as flow will not be channeled through the culvert
• Remove the culvert where Stream 1 flows under Henry Road and replace it with a fish passage–friendly bottomless box culvert.	• Fish passage where none currently exists • More natural stream conditions as flow will not be channeled through the culvert

Table E-1 Functions to Be Provided by Stream Restoration and Enhancement

Restoration/Enhancement Action	Functions to Be Provided
• Reroute Stream 4 to flow northeast to the water quality pond through the narrow linear wetland that connects the southeast lobe of Wetland 3 to its main portion to the northwest.	• More natural conditions and increased sinuosity (currently a roadside ditch) that allow in-stream habitat such as pool and riffle complexes to form • Improved hydrology to this portion of Wetland 3 • Increased riparian area and complexity • Habitat for amphibians and birds, especially as the conveyance flows through wetlands • Increased water quality as more natural conditions allow pollutants and sediments to settle • Flood water attenuation from increased in-stream volume and overflow riparian areas
• Enhance approximately 1.6 acres of riparian buffer along rerouted Stream 4 for approximately 2,300 linear ft (15 ft along either side).	• Significant habitat for amphibians and birds • Increased water quality as overflow from Stream 4 floods riparian areas and allows pollutants and sediments to settle
• Install in-stream and riparian habitat features such as spawning gravel and LWD	• Improved in-stream fish habitat, especially for spawning and juvenile wintering areas • More natural conditions as LWD creates pool and riffle complexes

4.2 OBJECTIVES OF THE PROPOSED MITIGATION

The specific mitigation objectives identified in Table E-1 would be attained through the following actions:

- Excavate conveyances for the rerouted portion of Stream 1 to and through Mitigation Areas G and I and remaining areas of Wetlands 1 and 2, and install a culvert under Gulf Road.
- Excavate the Stream 1 overflow conveyance west through Wetland 1 to Mitigation Areas D and E and south to Mitigation Area F.
- Excavate the overflow conveyance from the water quality pond west to Stream 1, and install a culvert under Gulf Road;
- Excavate the portion of Lonseth Road and its road prism over Stream 1.
- Remove the culvert under Lonseth Road and install fish passage–friendly weirs to control flow.
- Excavate/remove the Stream 1 culvert under Henry Road and install a fish passage–friendly box culvert.
- Add LWD and fish gravels in strategic locations.
- Divert Stream 4 into the narrow, linear portion of Wetland 3.

- Install riparian vegetation along a 15-foot buffer on either side of Stream 4 once diverted into Wetland 3.

4.3 RIPARIAN PLANTING PALETTE AND COMMUNITY COMPOSITION

The proposed mitigation includes enhancing the 15-foot riparian buffer along both sides of Stream 4 with persistent native riparian wetland vegetation. The goal is to establish a high-functioning riparian system along Stream 4 that will provide habitat for a variety of wildlife species, especially amphibians and birds, while maintaining water quality and hydrologic functions of Stream 4. Selected plant species are typical of high-functioning western Washington scrub-shrub and forested riparian areas and include snowberry (*Symphoricarpos albus*), Indian plum (*Oemlaria cerasiformis*), oceanspray (*Holodiscus discolor*), vine maple (*Acer circinatum*), bigleaf maple (*Acer macrophyllum*), and Douglas fir (*Pseudotsuga menziesii*). See Appendix F for typical planting plans for the Stream 4 riparian enhancement.

5.0 REFERENCES

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