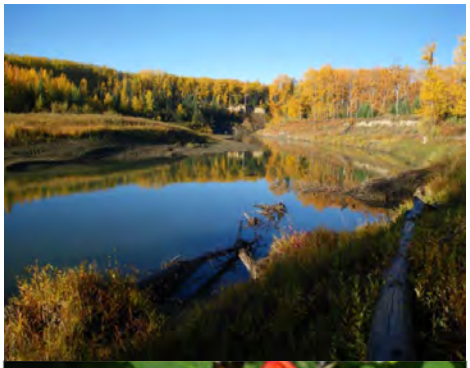

WETLAND EVALUATION TECHNICAL REPORT FOR THE TRANS MOUNTAIN PIPELINE ULC TRANS MOUNTAIN EXPANSION PROJECT

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Prepared for:

TRANSMOUNTAIN

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- Saddle Lake Cree Nation;
- Enoch Cree Nation;
- Alexander First Nation;
- Samson Cree Nation;
- Ermineskin Cree Nation;
- Montana First Nation;
- Louis Bull Tribe;
- Alexis Nakota Sioux First Nation;
- Sunchild First Nation;
- Lheidli T'enneh;
- Aseniwuche Winewak Nation;
- Simpcw First Nation; and
- Canim Lake Band.

All of their time, effort, commitment and participation is much appreciated and was fundamental to the success of the wetland evaluation for the proposed Trans Mountain Expansion Project.

EXECUTIVE SUMMARY

Trans Mountain Pipeline ULC (Trans Mountain) is a Canadian corporation with its head office located in Calgary, Alberta. Trans Mountain is a general partner of Trans Mountain Pipeline L.P., which is operated by Kinder Morgan Canada Inc. (KMC), and is fully owned by Kinder Morgan Energy Partners, L.P. Trans Mountain is the holder of the National Energy Board (NEB) certificates for the Trans Mountain pipeline system (TMPL system).

The TMPL system has an operating capacity of approximately 47,690 m^3/d (300,000 bbl/d) using 23 active pump stations and 40 petroleum storage tanks. The expansion will increase the capacity to 141,500 m^3/d (890,000 bbl/d).

The proposed expansion will comprise the following:

- pipeline segments that complete a twinning (or "looping") of the pipeline in Alberta and BC with about 987 km of new buried pipeline;
- new and modified facilities, including pump stations and tanks; and
- three new berths at the Westridge Marine Terminal in Burnaby, BC, each capable of handling Aframax class vessels.

The expansion has been developed in response to requests for service from Western Canadian oil producers and West Coast refiners for increased pipeline capacity in support of growing oil production and access to growing West Coast and offshore markets. NEB decision RH-001-2012 reinforces market support for the expansion and provides Trans Mountain the necessary economic conditions to proceed with design, consultation and regulatory applications.

Application is being made pursuant to Section 52 of the *National Energy Board Act* (*NEB Act*) for the proposed Trans Mountain Expansion Project (referred to as "TMEP" or "the Project").

TERA Environmental Consultants (TERA) was commissioned to prepare the following Wetland Evaluation Technical Report. Provided in this report are the results of the desktop and literature review and the field programs conducted for the Project in 2012 and 2013. The report also provides the results of Aboriginal participation during the wetland field surveys.

A desktop review and analysis of overflight photographs and satellite imagery was conducted for the entire proposed pipeline corridor. Wetland data collection for the Project during the 2012 and 2013 field programs utilized both helicopter reconnaissance and ground-based wetland surveys where ground access was available. The helicopter reconnaissance was used to gather high-level delineation and classification information for wetlands. Wetlands identified during the helicopter reconnaissance were ground-truthed where land access was available.

The ground-based surveys allowed wetland ecologists to collect site-specific wetland function information (*e.g.,* habitat, hydrological and biogeochemical) and confirm wetland classification and delineation. The field program focused on the 150 m wide proposed pipeline corridor. During the ground-based wetland field surveys, wetlands were classified to class and form hierarchical levels according to the Canadian Wetland Classification System (NWWG 1997) in Alberta and BC and to the Mackenzie and Moran (2004) Wetlands of British Columbia: A Guide to Identification in BC.

Review of overflight photographs and satellite imagery identified a total of 638 wetlands (339 in Alberta and 299 in BC) (94.4 km), comprising approximately 9.6% of the proposed pipeline corridor, as being crossed by the 150 m wide proposed pipeline corridor (percentage will change once the route has been refined). Wetlands crossed by the proposed pipeline corridor include 141 basin marshes, 67 riparian marshes, 4 lacustrine marshes, 7 slope marshes, 2 hummock marshes, 104 flat swamps, 78 riparian swamps, 2 discharge swamps, 6 slope swamps, 45 basin water, 19 riparian water, 13 basin fens, 26 horizontal fens, 13 riparian fens, 2 channel fens, 1 feather fens, 1 slope fen and 1 basin bog.

During the 2012 and 2013 ground-based wetland field surveys, conducted on lands where access was granted, 377 out of the 638 wetlands (261 in Alberta and 116 in BC) (66.5 km) were visited. Wetlands

visited during the 2012 and 2013 wetland field surveys that are infringed upon by the 150 m wide proposed pipeline corridor include 140 basin marshes, 38 riparian marshes, 2 hummock marshes, 1 slope marsh, 68 flat swamps, 57 riparian swamps, 2 discharge swamps, 4 slope swamps, 12 basin water, 10 riparian water, 11 basin fens, 24 horizontal fens, 7 riparian fens and 1 feather fen.

It is important to note that not all of these wetlands will be affected during pipeline construction since the pipeline construction right-of-way (approximately 45 m wide) will be placed within the proposed pipeline corridor in a manner that avoids wetlands to the extent practical. Characterization of the wetlands within the proposed pipeline corridor is needed for establishing baseline setting information.

Wetlands located along the proposed Kingsvale power line were identified through review of satellite imagery. This review identified the potential for 23 wetlands to be crossed by this power line. These wetlands include 7 basin marshes, 7 riparian marshes, 3 flat swamps, 3 riparian swamps, 1 basin water and 2 riparian water wetlands. No wetlands were identified along the proposed Black Pines power line.

There will be no wetlands directly affected by the construction of the proposed pump station facilities and terminals.

Through a review of the stormwater requirements for the Sumas Terminal, it was determined that there will likely be an incremental increase in volume of stormwater discharge. Stormwater at the Sumas Terminal is discharged into a wet area to be a potential shrubby swamp associated with an ephemeral drainage. This area will be further evaluated in 2014.

Where feasible, the pipeline construction right-of-way will be routed to reduce potential effects on wetlands. A routing decision framework which meets the intentions of the FPWC will take into consideration factors such as minimising length traversing environmentally significant areas and implementing construction and reclamation mitigation measures that have been shown to reduce disturbance to wetlands and ensure wetland function is not lost. To avoid permanent loss of wetland function, Trans Mountain has developed measures to avoid or reduce the adverse effects of construction on wetland habitat, hydrological and biogeochemical functions. Project mitigation has been developed to allow affected wetlands to return to the same level of functionality as documented during pre-construction surveys following the temporary construction disturbances.

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

DEFINITIONS AND ACRONYM LIST

Definition/Acronym	Full Name
AB	Alberta
ACIMS	Alberta Conservation and Information Management System
AENV	Alberta Environment (this is the old name – see AESRD)
AESRD	Alberta Environment and Sustainable Resource Development
ASRD	Alberta Sustainable Resource Development (currently restructured to AESRD)
ATK	Aboriginal Traditional Knowledge
ATPR	Alberta Tourism, Parks and Recreation
Avoidance	a means to prevent a potential adverse effect through routing/siting of the project, changes to project design or construction timing
BC	British Columbia
BC CDC	British Columbia Conservation Data Centre
BC MEP	British Columbia Ministry of Environment and Parks
BC MOE	British Columbia Ministry of Environment
BC OGC	British Columbia Oil and Gas Commission
BC MFLNRO	British Columbia Ministry of Forests, Land and Natural Resource Operation
BC MOF	British Columbia Ministry of Forestry
BEC	Biogeoclimatic Ecosystem Classification
BGC	Biogeoclimatic
CEA	Canadian Environmental Assessment
CEA Act	*Canadian Environmental Assessment Act*
CEA Agency	Canadian Environmental Assessment Agency
Compensation	a means intended to compensate unavoidable and potentially significant or unacceptable effects any may consist of offsets (no net loss), research, education programs, and financial compensation (considered only when all other options have been exhausted)
COP	Code of Practice
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPCN	Certificate of Public Convenience and Necessity
CWCS	Canada Wetland Classification System
CWH	Coastal Western Hemlock Biogeoclimatic Zone
DFO	Fisheries and Oceans Canada
DUC	Ducks Unlimited Canada
Environmentally Significant Areas	• "*Hazard lands which are unsafe in their natural state or pose severe constraints for development*; • *Perform a vital environmental function*; • *Contain rare or unique features, plants or animals*; • *Unique habitats or small remnants of once large habitats which have virtually disappeared*; • *Large and relatively undisturbed habitats that provide shelter for species which are intolerant of human disturbance; and provide an important linking function or permit the movement of wildlife over considerable distance*" (City of Spruce Grove 2010).
Environmental Reserve	'*land designated as environmental reserve by a subdivision authority or a municipality*"
EPP	Environmental Protection Plan
ERCB	Alberta Energy Resources Conservation Board
ESA	Environmental and Socio-economic Assessment
ESSF	Engelmann Spruce-Subalpine Fir Biogeoclimatic Zone
facultative hydrophytes	plant species found in wetland but may also be found in some upland areas (Mackenzie and Moran 2004).
Footprint	footprint study area
FPWC	Federal Policy on Wetland Conservation
FVRD	Fraser Valley Regional District
FWMIS	Fish and Wildlife Management Information System

Definition/Acronym	Full Name
GIS	Geographic Information System
Indicator	a biophysical, social, or economic property or variable that society considers to be important and is assessed to predict Project-related changes and focus the effects assessment on key issues. One or more indicators are selected to describe the present and predicted future condition of an element. Societal views are understood by the assessment team through published information such as management plans and engagement with regulators, public, Aboriginal, and other interested groups.
IBA	Important Bird Area
ICH	Interior Cedar-Hemlock Biogeoclimatic Zone
IDF	Interior Douglas-fir Biogeoclimatic Zone
LSA	local study area
MDP	Municipal Development Plan
MH	Mountain Hemlock Biogeoclimatic Zone
Mitigation measures	mean measures for the elimination, reduction or control of a project's adverse environmental effects, including restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.
MS	Montane Spruce Biogeoclimatic Zone
Muskeg	peatland wetlands such as bogs and fens.
NEB	National Energy Board
NWPA	*Navigable Waters Protection Act*
obligate hydrophytes	plant species restricted to wetlands and semi-aquatic locations (Mackenzie and Moran 2004).
OMNR	Ontario Ministry of Natural Resources
Post-construction monitoring	a type of monitoring program that may be used to verify that mitigation measures effectively mitigated the predicted adverse environmental effects.
PP	Ponderosa Pine Biogeoclimatic Zone
QEP	Qualified Environmental Professional
RAR	Riparian Area Regulations
RK	reference kilometres
RSA	regional study area
SARA	*Species at Risk Act*
SBS	Sub-Boreal Spruce Biogeoclimatic Zone
Special Management Area	areas that require specific development and servicing policies to aid in coordinating development in relation to existing and future plans
Streamside Protection and Enhancement Area (SPEA)	development setback for the prevention of degradation to fish habitat
supplemental studies	studies to be conducted post submission of the Application to provide supplemental information in support of the Application.
TEK	Traditional Ecological Knowledge
TLU	Traditional Land Use
TNRD	Thompson-Nicola Regional District
Trans Mountain Pipeline ULC	Trans Mountain
the Project	Trans Mountain Expansion Project
TWS	temporary workspace
US	United States
Wetland	*"land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment."* (National Wetland Working Group [NWWG] 1997).
ZOI	zone of influence

1.0 INTRODUCTION

1.1 Project Overview

Trans Mountain Pipeline ULC (Trans Mountain) is a Canadian corporation with its head office located in Calgary, Alberta. Trans Mountain is a general partner of Trans Mountain Pipeline L.P., which is operated by Kinder Morgan Canada Inc. (KMC), and is fully owned by Kinder Morgan Energy Partners, L.P. Trans Mountain is the holder of the National Energy Board (NEB) certificates for the Trans Mountain pipeline system (TMPL system).

The TMPL system commenced operations 60 years ago and now transports a range of crude oil and petroleum products from Western Canada to locations in central and southwestern British Columbia (BC), Washington State and offshore. The TMPL system currently supplies much of the crude oil and refined products used in BC. The TMPL system is operated and maintained by staff located at Trans Mountain's regional and local offices in Alberta (Edmonton, Edson, and Jasper) and BC (Clearwater, Kamloops, Hope, Abbotsford, and Burnaby).

The TMPL system has an operating capacity of approximately 47,690 m^3/d (300,000 bbl/d) using 23 active pump stations and 40 petroleum storage tanks. The expansion will increase the capacity to 141,500 m^3/d (890,000 bbl/d).

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- Pipeline segments that complete a twinning (or "looping") of the pipeline in Alberta and BC with about 987 km of new buried pipeline.
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The expansion has been developed in response to requests for service from Western Canadian oil producers and West Coast refiners for increased pipeline capacity in support of growing oil production and access to growing West Coast and offshore markets. NEB decision RH-001-2012 reinforces market support for the expansion and provides Trans Mountain the necessary economic conditions to proceed with design, consultation, and regulatory applications.

Application is being made pursuant to Section 52 of the *National Energy Board Act* (*NEB Act*) for the proposed Trans Mountain Expansion Project (referred to as "TMEP" or "the Project"). The NEB will undertake a detailed review and hold a Public Hearing to determine if it is in the public interest to recommend a Certificate of Public Convenience and Necessity (CPCN) for construction and operation of the Project. Subject to the outcome of the NEB Hearing process, Trans Mountain plans to begin construction in 2016 and go into service in 2017.

Trans Mountain has embarked on an extensive program to engage Aboriginal communities and to consult with landowners, government agencies (*e.g.*, regulators and municipalities), stakeholders, and the general public. Information on the Project is also available at www.transmountain.com.

The scope of the Project will involve:

- using existing active 610 mm (NPS 24) and 762 mm (NPS 30) OD buried pipeline segments;
- constructing three new 914 mm (NPS 36) OD buried pipeline segments totalling approximately 987 km:
  - Edmonton to Hinton – 339.4 km
  - Hargreaves to Darfield – 279.4 km
  - Black Pines to Burnaby – 367.9 km;

- reactivating two 610 mm (NPS 24) OD buried pipeline segments that have been maintained in a deactivated state:
  - Hinton to Hargreaves – 150 km
  - Darfield to Black Pines – 43 km;
- constructing two, 3.6 km long 762 mm (NPS 30) OD buried delivery lines from Burnaby Terminal to Westridge Marine Terminal (the Westridge delivery lines);
- installing 23 new sending or receiving traps (16 on the Edmonton-Burnaby mainlines), for in-line inspection tools, at nine existing sites and one new site;
- adding 35 new pumping units at 12 locations (*i.e.*, 11 existing and one new pump station site);
- reactivating the existing Niton Pump Station that has been maintained in a deactivated state;
- four existing pump stations at Albreda, Stump, Hope, and Wahleach, may be deactivated if further studies indicate that these stations are not required;
- constructing 20 new tanks located at the Edmonton (5), Sumas (1) and Burnaby (14) Terminals, preceded by demolition of 2 existing tanks at Edmonton (1) and Burnaby (1), for a net total of 18 tanks to be added to the system; and
- constructing one new dock complex, with a total of three Aframax-capable berths, as well as a utility dock (for tugs, boom deployment vessels, and emergency response vessels and equipment) at Westridge Marine Terminal, followed by the deactivation and demolition of the existing berth.

Figure 1.1 provides the location of the proposed Project.

TRANS MOUNTAIN

FIGURE 1.1

PROJECT OVERVIEW
ALBERTA AND BRITISH COLUMBIA

TRANS MOUNTAIN
EXPANSION PROJECT

- Kilometre Post (KP)
- Reference Kilometre Post (RK)
- Trans Mountain Pipeline (TMPL)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Terminal
- Pump Station (Pump Additions, Station Modifications and/or Scraper Facilities)
- New Pump Station (Proposed)
- Pump Station (Reactivated)
- Existing Pump Station
- Highway
- Railway
- City / Town / District Municipality
- Indian Reserve / Métis Settlement
- National Park
- Provincial Park
- Protected Area / Natural Area / Provincial Recreation Area / Wilderness Provincial Park / Conservancy Area
- Provincial Boundary
- International Boundary

Projection: LCC Modified. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: IHS Inc., 2013, BC Forests, Lands and Natural Resource Operations, 2012 & Natural Resources Canada, 2012; Geopolitical Boundaries: Natural Resources Canada, 2003, AltaLIS, 2013, IHS Inc., 2011, BC FLNRO, 2007 & ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010 & IHS Inc., 2011; Hydrology: Natural Resources Canada, 2007 & BC Crown Registry and Geographic Base Branch, 2008; Parks and Protected Areas: Natural Resources Canada, 2012, AltaLIS, 2012 & BC FLNRO, 2008; ATS Grid: AltaLIS, 2009; Edmonton TUC: Alberta Infrastructure, 2011; Canadian Hillshade: TERA Environmental Consultants, 2008; US Hillshade: Copyright:© 2009 ESRI.

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Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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ALL LOCATIONS APPROXIMATE

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1.2 Traditional Ecological Knowledge

Trans Mountain has engaged with Aboriginal communities and organizations that may be affected by the Project or that may have an interest in the Project based on the proximity of their community and their assertion of traditional and cultural use of the land along the proposed pipeline corridor to maintain a traditional lifestyle.

TERA Environmental Consultants (TERA) was commissioned to facilitate the participation of potentially affected Aboriginal communities during the wetlands field surveys conducted for the Project. The purpose is to incorporate Aboriginal views and the experiential knowledge of the land that has accumulated over generations and passed down from the Elders into the consideration of potential Project-related environmental effects. The collection of Traditional Ecological Knowledge (TEK) focused on Aboriginal experiential knowledge of the land and field reconnaissance was conducted along Crown lands potentially disturbed by Project construction, including associated physical works and activities. This report includes the results of the Aboriginal participation during the wetlands field surveys. Approval to treat collected TEK within this report as public knowledge was received by the participating Aboriginal communities listed herein.

1.3 Objectives

The objectives of the wetland evaluation are as follows.

- Identify potential interactions between Project activities and wetlands as well as the resulting direct or indirect effects to wetlands.
- Identify key wetland issues and the relevant wetland indicators that will be used to assess each issue.
- Delineate and classify wetlands encountered by the Project.
- Determine pre-construction existing conditions by:
  - Documenting the characteristics for wetlands encountered by the Project.
  - Documenting the function of wetlands encountered by the Project.
- Meet the NEB Filing Manual requirements (NEB 2013).
- Collect sufficient information for Code of Practice (COP) Notification to and/or for *Water Act* Approval from Alberta Environment and Sustainable Resource Development (AESRD) for wetlands crossed by the proposed pipeline corridor in Alberta.
- Collect sufficient information for wetland crossings in BC that require either approval from or notification to the BC Oil and Gas Commission (BC OGC) under Section 9 of the Water Act.
- Collect sufficient information to satisfy Environment Canada regulatory requirements for wetlands.
- Identify potential wetland-related construction issues and recommend technically and economically feasible mitigation measures in the event that wetland disturbance cannot be avoided.

The objectives of Aboriginal participation during the wetlands field surveys are to:

- document the TEK of Aboriginal communities;
- augment the design and execution of the field surveys;
- inform existing (baseline) environmental conditions;
- identify potential effects of the Project on environmental resources;
- integrate TEK into the consideration and mitigation of environmental effects; and

- contribute to final Project design.

This report describes the methods of the wetland survey, the approach to and results of the field work as well as provides general and site-specific wetland mitigation recommendations and regulatory requirements for the construction phase, including reclamation, of the Project. The results of this wetland evaluation do not provide conclusions regarding significance. Volume 5A Biophysical Assessment provides the potential residual and cumulative effects of the pipeline and facilities component of the Project, including an evaluation of significance.

1.4 Regulatory Guidance

Regulatory guidance for wetland description and measures for the protection or assessment of wetlands is provided by several documents listed in the subsections below. Aboriginal Traditional Knowledge (ATK) is considered within the wetland evaluation as per guidance from the NEB *Filing Manual* (2013) and Section 19(3) of the *Canadian Environmental Assessment* (*CEA*) *Act, 2012*.

1.4.1 Federal Legislation and Standards

Federal legislation involving wetlands that may apply to the Project include:

- *Fisheries Act*;
- *Navigable Waters Protection Act* (*NWPA*);
- *Migratory Birds Convention Act*; and
- *Species at Risk Act* (*SARA*).

Guidance for wetland description and information gathering on a federal level is provided by several documents listed below:

- Federal Policy on Wetland Conservation (FPWC) (Environment Canada 1991);
- FPWC: Implementation Guide for Federal Land Managers (Lynch-Stewart *et al*. 1996);
- Wetlands Environmental Assessment Guidelines (Milko 1998);
- Wetland Ecological Functions Assessment: An Overview of Approaches (Hanson *et al.* 2008); and
- NEB *Filing Manual* (NEB 2013).

1.4.2 Provincial Legislation and Standards in Alberta

Alberta legislation involving wetlands that may apply to the Project include:

- *Water Act*;
- *Public Lands Act*; and
- *Wildlife Act*.

Regulatory guidance on a provincial level in Alberta for wetland description and information gathering is provided by the following documents:

- Stepping Back from the Water – A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta's Settled Region (Alberta Environment and Sustainable Resource Development [AESRD] 2012a);
- Wetland Management in the Settled Area of Alberta – An Interim Policy (Alberta Water Resource Commission 1993);

- New Alberta Policy (Alberta Government 2013a);
- Provincial Wetland Restoration/Compensation Guide (Alberta Environment [AENV] 2007).
- Strathcona County Wetland Conservation Policy (Strathcona County 2009);
- Strathcona County Municipal Development Plan Bylaw 1-2007 (Strathcona County 2007);
- Edmonton Municipal Development Plan (City of Edmonton 2010);
- Edmonton Wetland Strategy (City of Edmonton 2012);Spruce Grove Municipal Development Plan (City of Spruce Grove 2010);
- Parkland County Environmental Reserve Bylaw 26-98 (Parkland County 1998);
- Parkland County Municipal Development Plan Bylaw 37-2007 (Parkland County 2007); and
- Yellowhead Land Use Bylaws No. 2.06 (Yellowhead County 2006).

1.4.3 Provincial Legislation and Standards in British Columbia

Legislation in British Columbia (BC) involving wetlands that may apply to the Project include:

- *Water Act*;
- *Oil and Gas Activities Act*;
- *Fish Protection Act*;
- *Wildlife Act*; and
- *Environmental Assessment Act*.

Guidance for collecting information and describing wetlands in BC is provided by the following documents:

- *Approvals and Notifications for "Changes In and About a Stream – Section 9 BC Water Act* from Water Stewardship Division, BC Ministry of Forests, Lands and Natural Resource Operations (BC Ministry of Forests, Lands and Natural Resource Operations [MFLNRO] 2013a);
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia from Environment Stewardship Division (Wetland Stewardship Partnership 2009);
- Fraser-Fort George Regional District Zoning Bylaw No. 833 (Regional District of Fraser-Fort George 1986);
- Fraser-Fort George Regional District Official Community Plan Electoral Area H (Regional District of Fraser-Fort George 2002);
- Thompson-Nicola Regional District Zoning Bylaw 2400 (Thompson-Nicola Regional District 2012);
- Hope Official Community Plan (District of Hope 2004);
- Fraser Valley Regional District Community Plan Electoral Area B (Fraser Valley Regional District 1998); and
- Fraser Valley Regional District Community Plan Electoral Area D (Fraser Valley Regional District 1997).

Further guidance regarding wetland definition and classification is discussed in Section 3.5.1.

1.5 Federal Legislation and Standards

1.5.1 Comment on the Federal Policy on Wetland Conservation

Wetlands are complex ecological systems and, consequently, evaluation of wetlands for the purposes of environmental impact assessments tend to focus on wetland function. The FPWC commits all federal departments to the goal of "no net loss" of wetland function on federal lands and waters (Environment Canada 1991, Lynch-Stewart 1992, Lynch-Stewart *et al.* 1996).

The objective of the FPWC is to promote conservation of Canada's wetlands to sustain their ecological and socio-economic functions. To support this objective, several goals have been established by the FPWC, including:

- "no net loss" of wetland function on federal lands or projects;
- enhancement and rehabilitation of wetlands in areas where the continuing loss or degradation of wetlands or their functions have reached a critical level; and
- recognition of wetland functions in resource planning, management and economic decision-making with regard to all federal programs, policies and activity.

Trans Mountain acknowledges the intent of the objective of the FPWC.

1.5.2 Fish and Wildlife Regulations

Fish habitat is primarily regulated at the federal level by the *Fisheries Act* and the *NWPA*. Legislation pertaining to wildlife in wetlands includes the federal *Migratory Birds Convention Act* and *SARA*.

Fish and Fish Habitat

Oil and gas industrial activities in Alberta and BC that have the potential to affect fish or fish habitat that may be associated with wetlands must be constructed and operated in compliance with the federal *Fisheries Act*, which is administered by Fisheries and Oceans Canada (DFO). Without authorization from DFO, the *Fisheries Act* prohibits the destruction of fish and the harmful alteration, disruption or destruction of fish habitat. The *Fisheries Act* also has provisions that: prohibit the deposition of deleterious substances into waters used by fish; ensure the safe passage of fish; require flow of water and passage of fish; require water intakes and diversions to have a fish guard or fish screen; and require proponents to submit plans of specification of their works to DFO for review.

Navigable Wetlands

Prior to changes made under *Jobs, Growth and Long-Term Prosperity Ac*t (Bill C-38) in June 2012, Section 108 of the *NEB Act* previously required the proponent to obtain approval from Transport Canada for works crossing navigable waters in all instances. A determination of navigability was first typically required for all of the proposed watercourse and navigable wetland crossings. Following the results of the determination, relevant information related to all navigable watercourses and wetlands crossed by a Project were to be submitted to Transport Canada as part of an application for approval under the *NWPA* (now the *Navigation Protection Act*). Following changes to the *NEB Act*, a MOU was established between the NEB and Transport Canada outlining the responsibility of the NEB with respect to the review of navigability for watercourses and wetlands to be crossed by NEB regulated projects (NEB 2013b). As part of this MOU:

"...the responsibilities for approving pipelines and power lines subject to the NEB Act that pass in, on, over, under, through or across navigable waters was transferred to the NEB..." (NEB 2013b).

New NEB policy/processes related to review of projects, with specific relevance to the crossing of potentially navigable waters, are currently being developed, but are not yet publicly available.

Wildlife and Wildlife Habitat

The *Migratory Birds Convention Act* protects migratory birds and their habitat in Canada. Environment Canada administers the *Act* through the Canadian Wildlife Service. The *Migratory Birds Convention Act* allows for regulations to be made by the Governor in Council that prohibit "...*the killing, capturing, injuring, taking or disturbing of migratory birds or the damaging, destroying, removing or disturbing of nests*." The *Migratory Birds Convention Act* also protects migratory bird habitat and prescribes for the control and management of the habitat. Under the *Migratory Birds Convention Act*, no person shall "...*disturb, destroy, or take a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird*" except when authorized with a permit.

SARA protects listed species identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). *SARA* applies to federal lands, however, it may also apply to other lands when provincial protection is deemed inadequate by the federal Minister of the Environment.

All species that are classified as being at risk by COSEWIC are addressed under *SARA*. This includes species that are Extirpated, Endangered, Threatened and of Special Concern. However, only species that are Endangered, Threatened or Extirpated (and their residences) listed on Schedule 1 of *SARA* are protected.

1.5.3 NEB Filing Requirements

The NEB requires a detailed description of the Project's local, regional and provincial effects to wetland function, the identification of wetland class, ecological community and conservation status, a discussion on wetland function, as well as the provision of rationale and details of proposed wetland mitigation, monitoring and potential compensation, if warranted. Table 1.5-1 outlines the NEB filing requirements for wetlands and relevant sections in the ESA - Biophysical Assessment (Volume 5A) and this Wetland Evaluation Technical Report (Volume 5C).

TABLE 1.5-1

WETLAND NEB FILING REQUIREMENTS

Filing Requirements[1]	Reference
1. Quantify, delineate and describe wetlands in the study area in the context of:	
• wetland class, ecological community type and conservation status;	Addressed in Section 5.0 and Appendix B of the Wetland Evaluation Technical Report (Volume 5C).
• abundance at local, regional and provincial scales;	Addressed in Section 5.0 of the Wetland Evaluation Technical Report (Volume 5C) and Sections 7.0 and 8.0 of the ESA.
• distribution; and	Addressed in Section 5.0 and Appendix A of the Wetland Evaluation Technical Report (Volume 5C).
• current level of disturbance.	Addressed in Section 5.0 and Appendix B of the Wetland Evaluation Technical Report (Volume 5C).
2. Identify and describe wetland capacities to perform hydrological, water quality, habitat or other ecological functions.	Addressed in Section 5.0 and Appendix B of the Wetland Evaluation Technical Report (Volume 5C) and Sections 7.0 and 8.0 of the ESA (Volume 5A).
3. Identify a regional study area of sufficient size to capture effects on wetlands within the larger drainage area. Include wetlands located outside of the local study area that may be affected by hydrological changes as a result of cumulative effects.	Addressed in Section 3.3 of the Wetland Evaluation Technical Report (Volume 5C) and Sections 7.0 and 8.0 of the ESA (Volume 5A).
4. Detail the efforts to be taken to avoid impacting wetlands, mitigation, monitoring and any potential compensation measures, if warranted, for potentially affected wetlands.	Addressed in Section 6.0 of the Wetland Evaluation Technical Report (Volume 5C)
Where residual effects have been predicted, identify whether those residual effects would be likely to act in combination with the effects of other physical facilities or activities and expand on the matters described above as appropriate.	Addressed in Section 8.0 of the ESA (Volume 5A).

Note: 1 As outlined for the wetland component of Table A-2: Filing Requirements for Biophysical Elements (NEB 2013).

1.6 Provincial Legislation and Standards in Alberta

This subsection outlines the regulatory guidelines in Alberta for the *Water Act*, the *Public Lands Act* and the *Wildlife Act*.

1.6.1 Water Act

Provincial regulations for developments through wetlands on privately-owned lands in the White Area of Alberta are addressed by the *Water Act*. The *Water Act* governs activities affecting waterbodies (*e.g.*, wetlands) in Alberta including construction, water diversions and infilling of wetlands. The purpose of the *Water Act* is to conserve and protect Alberta's water resources. The *Water Act* governs the alteration of flow or level of water; changes to the location of water; changes to the direction of flow of water; causes of the siltation of water; causes of the erosion of any bed or shore of a waterbody/wetland; or causes of an effect on an aquatic environment.

AESRD is responsible for administering the Alberta *Water Act* and has implemented the following two COPs to regulate wetland crossing activities associated with pipelines: *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (Alberta Government 2013b); and *Code of Practice for Watercourse Crossings* (*i.e.,* for vehicle and equipment crossings) (Alberta Government 2013c). A COP Notification under the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (Alberta Government 2013b) will be required for all wetlands crossed by the proposed pipeline corridor in the White Area of Alberta, with the exclusion of "*...bogs, fens and muskegs*" as per the AESRD COP Notification form Version 1.2 December 2012 (Alberta Government 2013b). Notification must be submitted to AESRD at least 14 days prior to construction. Permanent disturbances (*i.e.*, infilling, altering or physically draining a wetland [Alberta Environment 2007]) include facility sitings (*e.g.*, pipeline riser sites, tank terminals, pump stations) or permanent all-weather access roads; permanent disturbances are potentially subject to compensation and *Water Act* approval. Trans Mountain will make applications for the COPs as required.

1.6.2 Public Lands Act

The *Public Lands Act* requires that surface dispositions be issued for the use of all public lands in Alberta. The dispositions are requirements for entering, occupying or using public land. Under Section 3 of the *Public Lands Act,* these public lands include the "*...bed and shore*" of all "*...permanent and naturally occurring water bodies*" (*i.e.,* wetlands), unless the title had been granted to a private landowner. A permanent waterbody is one that exhibits persistent evidence of a bank, bed and shore and a propensity to return to normal levels under ordinary circumstances after periods of drought or flood. AESRD administers dispositions on Crown lands through the *Public Lands Act*. AESRD has outlined Core Operating Conditions, Objectives, Standards and Guidelines following the *Public Lands Act* (Alberta Sustainable Resource Development 2004, 2008).

1.6.3 Wildlife Act

The Alberta *Wildlife Act* also applies to wildlife and wildlife habitat that may be present in wetlands. The *Wildlife Act* protects certain species in Alberta stating that no person shall "*...wilfully molest, disturb or destroy a house, nest or den of prescribed wildlife.*" Under the *Wildlife Act*, an assessment must be made prior to construction to identify any provincially-listed species that would be potentially influenced by the Project.

1.6.4 Wetland Management in the Settled Area of Alberta: An Interim Policy

The Wetland Management in the Settled Area of Alberta: An Interim Policy was initially developed to provide provincial government departments, proponents and Albertans with direction for how to manage wetlands within the White Area of the Province. The main goal outlined in the interim policy is to "*...sustain the social, economic and environmental benefits that functioning wetlands provide, now and in the future"* (Alberta Water Resources Commission 1993).

When dealing with marsh type wetlands within the White Area of Alberta, the intent of the policy, in order of preference, is as follows.

a) "To conserve slough/marsh wetlands in a natural state.

b) To mitigate degradation or loss of slough/marsh wetland benefits as near to the site of disturbance as possible.

c) *To enhance, restore or create slough/marsh wetlands in areas where wetlands have been depleted or degraded*" (Alberta Water Resources Commission 1993).

The policy identifies that conflicts may arise between wetland conservation and other natural resources and development projects. As a result, management guidelines were developed which involve mitigating, where necessary, the effects to wetlands in order to achieve regional wetland management objectives and that those land use activities that are able to integrate or coexist with wetlands will be permitted and encouraged.

Although the intention of the policy was to include peatlands within the policy goals, due to the lack of information at the time the policy was developed, no exact policy intents were ever created specific to peatlands. As a precautionary measure, the interim policy does state that "...*a cautious approach to the use and development of peat resources will be adopted until a policy for peatlands is developed*" (Alberta Water Resources Commission 1993).

The objective of regional awareness of wetlands is outlined in the interim policy. Regional wetland management objectives were developed for the White Area based on the known wetland values, type and distribution (Alberta Water Resources Commission 1993).

1.6.5 New Alberta Wetland Policy

Wetlands in Alberta account for approximately 20% of the land surface of the province, where 90% of these consist of peatlands (*i.e.*, bogs and fens). They are diverse and productive natural systems that provide a variety of ecological services and are an important part of the Alberta landscape in maintaining healthy watersheds. The new Alberta Wetland Policy "...*facilitates an informed and considered approach to wetland management across all areas of the province, it provides the required tools and knowledge systems to support the province's wetland management needs into the future*" (Alberta Government 2013a).

The goal of the new Alberta Wetland Policy (Alberta Government 2013a) is to conserve, restore, protect and manage Alberta's wetlands. To support this goal, several objectives have been established which are listed below:

- wetlands of the highest value are to be protected for the long-term benefit of all Albertans;
- wetlands and their benefits are to be conserved and restored in areas where losses have been high;
- wetlands are to be managed by avoiding, minimizing and if necessary, replacing lost wetland value; and
- wetland management will be considered in a regional context.

Trans Mountain acknowledges the policy's goal and objectives.

1.6.6 Provincial Wetland Restoration/Compensation Guide

In 2007, the province of Alberta developed a guideline that compliments the goals outlined in the interim policy. The purpose of the guide is to advise "...*government regulators, land developers, the public, wetland restoration agencies, and government departments*" whose ultimate activities may impact wetland function. The guide also outlines the application process, under the *Water Act*, for any permanent loss of wetland within the White Area, including an explanation of wetland compensation (the least preferred option), or mitigation measures that can be implemented to reduce the loss of wetland area (*i.e.*, restoring drained or permanently alter naturally occurring wetlands) (AENV 2007).

1.6.7 Stepping Back from the Water – A Beneficial Management Practices Guide for New Development Near Water Bodies in Alberta

The Stepping Back from the Water Guide was development by AESRD to provide a framework for minimizing effects and the risks associated with development near waterbodies. The emphasis of this framework is on the conservation of riparian areas and strips of land found alongside lakes, rivers, streams and wetlands. Specific setbacks for the protection of aquatic ecosystems are outlined in this document along with regulation pertaining to riparian areas (including wetland riparian areas). This guide also provides municipalities with guidelines for minimum widths of environmental reserve/easements and is to supplement other AESRD guidelines. Additional information and considerations for buffer widths are recommended for protecting aquatic and terrestrial habitat (including wetlands), wildlife travel corridors and rare species.

Suggested setback distances are determined from the legal bank of a waterbody (*i.e.*, wetland) as defined in the *Surveys Act*, except in the case of ephemeral or intermittent streams where the middle of the channel is used as a starting point. Examples of suggested setback distances are outlined below (AESRD 2012a).

- Flood Water Conveyance and Storage Lakes, and seasonal to permanent wetlands, including fens:
  - setback distance should include the 100-year water level, with an allowance for wave action and other water-related hazards (*e.g.*, ice piling) (AESRD 2012a).
- Water Quality Function of permanent waterbodies (*i.e.*, lakes, rivers, streams, seeps, springs and seasonal to permanent wetlands, including fens):
  - setback distance initially of 50 m for areas located on coarse textured sands and gravels or alluvial sediments; and
  - setback distance initially of 20 m for areas located on glacial till with the following modifier:
    - when slope is greater than 5% the setback width is increased by 1.5 m for every 1% of slope over 5%.

1.7 Municipal Legislation and Standards in Alberta

Some municipalities along the proposed pipeline corridor in Alberta have bylaws and municipal development plans with respect to wetlands including Strathcona County (2007, 2009), the City of Edmonton 2010, 2012) City of Spruce Grove (2010), Parkland County (1998, 2007) and Yellowhead County (2006). Trans Mountain will continue to have ongoing discussions with municipal authorities.

1.8 Provincial Legislation and Standards in British Columbia

This subsection outlines the regulatory guidelines and regulations in BC for the *Water Act*, the *Oil and Gas Activity Act*, the *Fish Protection Act*, the *Wildlife Act* and the *Park Act*.

1.8.1 Water Act

The *Water Act* regulates all water resources in the province of BC and provides requirements for construction activities that require working in and around water, specifically streams and associated stream habitats. In the *Water Act,* a stream is defined as "...*a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp and gulch*". Approval under the *Water Act* is required for any activities that will result in changes in or around stream systems. These changes are defined as "...*any modification to the nature of the stream including the land, vegetation, natural environment or flow of water within a stream, or any activity or construction within the stream channel that has or may have an impact on a stream*".

In BC, the *Water Act* provides standards and mitigation measures for construction activities that require working in and around water (including wetlands) (BC Ministry of Environment [MOE] 2008) in order to reduce disturbances to aquatic habitat and fauna that may result from instream activities associated with

roads, power lines and other pipeline-related operations (BC MFLNRO *et al.* 2012). Approval or notification to the BC OGC under Section 9 of the *Water Act* are typically required for wetland crossings Through consultation with a representative of BC Ministry of Forests, Land and Natural Resource Operation (BC MFLNRO) it was determined that under the *Water Act* all wetlands in BC need to be notified for (Reudink pers. comm.).Work should be conducted during periods of time that minimize harm to aquatic species and habitats. Periods of restricted access as well as terms and conditions for avoiding impact to aquatic habitats are region-specific. If work needs to be performed in-stream within a restricted period, a Habitat Officer from the respective management regions where the activity is to occur (*i.e.*, Omineca, Thompson and Lower Mainland) or a DFO biologist must prescribe specific precautions to be followed (BC MFLNRO 2013a).

1.8.2 Oil and Gas Activities Act

The *Oil and Gas Activities Act* provides the legal base for the BC Oil and Gas Commission (OGC) to administer the *Water Act* in order to regulate oil and gas activities. This allows the OGC to issue permits and notifications under the *Water Act* for oil and gas activities, including the construction or operation of a pipeline that cross waterbodies (*i.e.*, wetlands).

Under Part 7(44c) of the *Water Regulation*, the construction or maintenance of a pipeline crossing may be made without obtaining an approval or license provided that:

- "*(i) the pipeline and associated works are installed in a dry stream channel at a depth so that the top of the pipe is at least 1 metre below the lowest elevation of the bed of the stream*; and

- *(ii) in the case of an aerial crossing, the crossing is constructed in accordance with the requirements prescribed in paragraph (b) for clear span bridges*".

Most of the stream systems associated with wetlands crossed by the proposed pipeline corridor in BC typically have flow year-round.

There are no specific regulated setback distance (*i.e.,* buffer) applied to all wetlands in BC, instead wetland buffers rely on the site-specific biophysical findings (*e.g.*, species at risk presence or habitat). BC has recommendations for management buffers surrounding wetlands outlined in the *Environmental Protection and Management Guide* (EPMG) which are referred to as Riparian Management Areas (RMA) (BC Oil and Gas Commission [BC OGC] 2013). RMAs represent the lands found adjacent to wetlands that require special management for the conservation of fish and/or wildlife habitat, biodiversity and water values. The objectives of these management areas are to:

- "*minimize or prevent impacts of oil and gas activities on stream channel dynamics, aquatic ecosystems and water quality of all streams, lakes and wetlands*;

- *minimize or prevent impacts of oil and gas activities on the diversity, productivity and sustainability of wildlife habitat and vegetation adjacent to streams, lakes and wetlands or where high wildlife values are present*; and

- *allow for oil and gas development activities that are consistent with the above objectives*" (BC OGC 2013).

The wetland Riparian Management Areas (RMA) range from 0 m to 50 m from the high water mark depending on the wetland size (*e.g.*, greater or less than 5 ha), wetland type (*i.e.*, peatland) and which biogeoclimatic zone the wetland is located in (BC OGC 2013). These are not regulatory setbacks but are recommended RMAs that should be considered during a wetland assessment (BC OGC 2013).

1.8.3 Fish Protection Act

The BC *Fish Protection Act* was developed "*...to establish directives to protect riparian areas from developments so that the areas can provide natural features, functions and conditions that support fish life and processes*" and to promote intergovernmental co-operation. Under the *Fish Protection Act,* a stream "*...includes any of the following that provides fish habitat: a watercourse, whether it contains water or not, a pond, lake, river, creek or brook, a ditch, spring or wetland that is connected by surface flow*".

A wetland is defined under the BC *Fish Protection Act* as "*...land that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, vegetation typically adapted for life in saturate soil conditions, including swamps, marshes, bogs, fens, estuaries and similar areas that are not part of the active floodplain of a stream*".

The BC *Fish Protection Act* Riparian Areas Regulation (RAR) was developed under the *Fish Protection Act* to "*...protect the features, functions and conditions that are vital in the natural maintenance of stream health and productivity*." The RAR is intended for fish-bearing streams or wetlands connected to fish-bearing streams, where a permanent development is to occur and does not apply to pipeline construction. Some streams have been designated as Sensitive under the *Fish Protection Act* and the stream, all of its tributaries and associated wetlands will warrant particular attention. Any assessments need to be reported to BC MOE Ecosystems Branch.

The BC *Fish Protection Act* ultimately can limit any *Water Act* approvals or licenses that are associated with sensitive stream systems according to the Sensitive Streams Designation and Licensing Regulation. A *Water Act* approval can only be issued if the following terms have been satisfied:

- "*...there are no significant adverse impacts on the protected fish population*;
- *that mitigation measures included in the approval or license will avoid any significant impacts*; or
- *if mitigation cannot fully address the problem, compensation measures elsewhere will fully compensate for adverse impacts*" (West Coast Environmental Law 2011a).

Through this process, the proponent will often be required to provide a list of proposed mitigation measures that will be implemented with an application.

1.8.4 Wildlife Act

The BC *Wildlife Act* applies to wildlife and wildlife habitat including what may be present in wetlands. The BC *Wildlife Act* oversees many forms of wildlife found within BC and outlines that a person is considered to be committing an offence if the person alters, destroys or damages wildlife habitat or if they disturb, molest, injure, possess, take or destroy the following.

1. "*34(a) a bird or its egg*;
2. *(b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl*;
3. *(c) the nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.*";
4. "*9(1)(a) a muskrat house or den, except on diked land*; or
5. *(b) a beaver house or den or beaver dam.*"

As a result, under the BC *Wildlife Act* a permit may be required should a proposed activity require the removal of beaver dams or muskrat dens or the destruction of certain bird nests and/or eggs that could be associated with wetlands (BC MFLNRO 2013b).

1.8.5 Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia

The Wetland Ways: Interim Guidelines for Wetland Protection and Conservation was developed by the Wetland Stewardship Partnership (2009) to provide guidance to government and proponents proposing an activity or development near wetlands or those who want suggestions as to how to maintain the ecological values of wetlands.

The driving force behind the creation of these guidelines is the objectives associated with the protection and management of wetlands. These include:

- protect and maintain water quantity;

- protect and maintain water quality; and
- protect and maintain wetland habitat and species.

This document provides a general breakdown of the different BC legislation that relates to wetlands as well as identifies best management practices and suggested mitigation measures for the protection and management of wetland ecosystems based on different activities (*i.e.*, road and utility corridors including pipelines) (Wetland Stewardship Partnership 2009).

1.9 Municipal Legislation and Standards in BC

Some municipalities along the proposed pipeline corridor in BC have bylaws and municipal development plans with respect to wetlands including. Regional District of Fraser-Fort George (1986, 2002), Thompson-Nicola Regional District (2012), District of Hope (2004), Fraser Valley Regional District (1997, 1998). Trans Mountain will continue to have discussions with municipal authorities.

2.0 CONSULTATION AND ENGAGEMENT

Trans Mountain and its consultants have conducted a number of consultative activities to inform Aboriginal communities, stakeholders, the public and regulatory authorities about the approach to assessing potential environmental and socio-economic effects of the Project, and to seek input throughout the Project planning process.

2.1 Public Consultation, Aboriginal Engagement and Landowner Relations

Trans Mountain has implemented and continues to conduct open, extensive and thorough public consultation, Aboriginal engagement and landowner relations programs. These programs were designed to reflect the unique nature of the Project as well as the diverse and varied communities along the proposed pipeline and marine corridors. These programs were based on Aboriginal communities, landowner and stakeholder groups' interests and inputs, knowledge levels, time and preferred methods of engagement. In order to build relationships for the long-term, these programs were based on the principles of accountability, communication, local focus, mutual benefit, relationship building, respect, responsiveness, shared process, sustainability, timeliness, and transparency.

Feedback related to the Project that was raised through various Aboriginal engagement and public consultation activities including public open houses, ESA Workshops, Community Workshops and one-on-one meetings, is summarized below and was considered in the development of this technical report, and the assessment of wetland loss or alteration in Volume 5A:

- wetland restoration concerns;
- spatial boundaries of the wetland assessment;
- concerns about Wagner Bog and the Wagner Natural Area were brought as the pipeline may potentially cut across areas feeding these natural areas and may impact the water supply;
- wetland classification system should be of high standards;
- wetland areas identified west of Edson, near Hinton, southwest of Valemount (including Cranberry Marsh), south of Blue River, near Blackpool and near Nicola River;
- peaty areas near Fraser River to the Blue Mountain area;
- concerns about the Cheam wetlands;
- cumulative effects on wetlands; and
- protection of waterfowl habitat at wetlands.

In addition, concerns related to the potential effects of spills on wetlands were also raised and detailed information on pipeline spills is provided in Volume 7.

The full description of the public consultation, Aboriginal engagement and landowner relations programs are located in Volumes 3A, 3B and 3C, respectively. Section 3.0 of Volume 5A summarizes the consultation and engagement activities that have focused on identifying and assessing potential issues and concerns related to wetlands which may be affected by the construction and operation of the Project. Information collected through public consultation, Aboriginal engagement and landowner relations programs for the Project was considered in the development of this technical report, and the assessment of wetland loss or alteration in Volume 5A.

2.2 Regulatory Consultation

Consultation and engagement with key stakeholders is an important part of the wetland evaluation process. Stakeholders consulted included potentially affected Aboriginal communities, the public, municipal, provincial and federal officials.

While discussing components about the Project, assessment procedure and methods, discussions with identified stakeholders allowed for:

- seeking input and feedback on the scope of the wetland evaluation, including key issues, approach and methods, effects assessment indicators and study area parameters;
- seeking feedback and input on mitigation and monitoring measures; and
- confirmation of the limitations of provincial databases.

A summary of regulatory consultation conducted during the wetland evaluation is provided in Table 2.1-1.

TABLE 2.1-1

SUMMARY OF REGULATORY ACTIVITIES RELATED TO WETLANDS

Stakeholder Group/Agency Name	Name and Title of Contact	Method of Contact	Date of Consultation Activity	Reason For Engagement	Issues/Concerns	Commitments/ Follow-up Actions/ Comments
FEDERAL CONSULTATION						
Environment Canada	Andrew Robinson, Wildlife Biologist, BC	Meeting	December 6, 2011	Wetland evaluation methods were presented for discussion.	No concerns with methods were brought forward.	Resolved
Environment Canada	Harp Gill Andrew Robinson Paul Gregoire	Meeting	April 17, 2013	Wetland evaluation methods, study areas and indicators were presented for discussion.	Address alteration of wetland habitat function related to wildlife quantitatively.	Resolved
PROVINCIAL CONSULTATION - ALBERTA						
AESRD	Muhammad Aziz, Team Lead, Water Team, Spruce Grove Central Region – Environmental Operations Rick Nutbrown, Water Administration Engineer, Spruce Grove Central Region – Environmental Operations	Meeting	June 21, 2013	Provide a project overview and discussion of: Local Study Area (LSA) and Regional Study Area (RSA) boundaries, cumulative effects approach, survey methodologies and mitigation recommendations.	No concerns were brought forward.	Resolved
MUNICIPAL CONSULTATION - ALBERTA						
Strathcona County	Jocelyn Thrasher-Haug, Manager, Environmental and Open Space Planning	Email	July 29, 2013 August 6, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	Continued follow up with Strathcona County in progress.	Further consultation will continue as required.
City of Edmonton	Agnieska Kotowska, Biodiversity Department	Email Phone	July 29, 2013 August 7, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	Representative would like to see a more detailed map zoomed in to the Edmonton area showing the proposed corridor and possible alternatives. Would also like to review proposed mitigation specific to the different environmentally sensitive wetlands found in the City.	Further consultation will continue as required.

TABLE 2.1-1 Cont'd

Stakeholder Group/Agency Name	Name and Title of Contact	Method of Contact	Date of Consultation Activity	Reason For Engagement	Issues/Concerns	Commitments/ Follow-up Actions/ Comments
City of Edmonton (cont'd)	See above	See above	See above	See above	Should the pipeline cross City lands then permitting may be required. If the pipeline and construction areas are only in the TUC, then the City will only review the application. If a new right-of-way is needed for the pipeline then there may be some permits that will be required. If traveling along an existing right-of-way or the TUC then most likely will not require anything additional to the standard applications (*Water Act* and *Public Lands Act*). Would like to see a separate report that focuses on the wetlands within the Edmonton area. Typically, the City would like to see Class III and up wetlands avoided if at all possible. If not, then provincial regulations apply for wetland disturbance.	See above
	Kuni Niina, Oil and Gas Liaison Officer	Email	August 8 and 9, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	Previously, discussions focused on pipeline alignment and have not covered temporary disturbance to wetlands. Directional drilling has been identified as the preferring crossing method for ravines and the river within the TUC. Requested aerial overview that shows the wetland locations within the city boundary.	Further consultation will continue as required.
City of Spruce Grove	Debra Irving, Director of Planning and Development	Email	July 29, 2013 July 31, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	If the Project crosses any natural areas identified in the MDP then a natural areas assessment will need to be conducted. This assessment would be required any time that the City would be asked for comments as part of a referral. Comment on an assessment cannot be undertaken until the effects of a project are known with respect to natural areas/ wetlands/drainage channels.	Resolved

TABLE 2.1-1 Cont'd

Stakeholder Group/Agency Name	Name and Title of Contact	Method of Contact	Date of Consultation Activity	Reason For Engagement	Issues/Concerns	Commitments/ Follow-up Actions/ Comments
City of Spruce Grove (cont'd)	See above	See above	See above	See above	The City would defer to the Province with respect to permanent wetland loss. The City's policy relates more to the formation of mitigation measures as part of development permit approval or when providing comments on plans that are referred to the City from another agency during the processing of a pipeline application.	See above
Parkland County	Bruno St-Amand, Manager, Engineering Services	Email	July 29, 2013 July 30, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	There are no municipal regulatory prerequisites for temporary and potentially permanent disturbance to wetlands in Parkland County. The County defers to provincial and federal regulations.	Resolved
Yellowhead County	Jack Ramme, Chief Administrative Officer	Email	July 29, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	Yellowhead County defers to federal and provincial regulations with respect to wetland disturbance.	Resolved
PROVINCIAL CONSULTATION – BRITISH COLUMBIA						
BC MFLNRO	Robyn Reudink, Licensed Resource Specialist	Email	March 24, 2013	Provide a project overview and discussion of: Local Study Area (LSA) and Regional Study Area (RSA) boundaries, cumulative effects approach, survey methodologies and mitigation recommendations.	Request for information on the proposed watercourse crossing and crossing techniques. Mitigation measures should include measures to reduce predator efficiency for caribou.	Information regarding watercourse crossings with techniques and detailed map showing corridor provided in April 2013.
		Meeting	June 19, 2013	Provide a project overview and discussion of survey methodologies and mitigation recommendations. Discussion regarding regulatory process for disturbances (*i.e.*, permanent, temporary) to wetlands.	With NEB projects, BC MFLNRO typically defers to that regulatory body and to Environment Canada for wetland disturbance, however, ongoing consultation and involvement would be appreciated. BC OGC will be the decision maker on permitting for projects in BC. It is unclear at this time whether BC MFLNRO will also be allowed to review the permit application or not. It is still a new process. All wetlands should be notified for this Project.	Resolved

TABLE 2.1-1 Cont'd

Stakeholder Group/Agency Name	Name and Title of Contact	Method of Contact	Date of Consultation Activity	Reason For Engagement	Issues/Concerns	Commitments/ Follow-up Actions/ Comments
BC MFLNRO (cont'd)	See above	See above	See above	See above	Ms. Reudink expressed concerns about how mitigation will be separated out to reflect the different wetland types. TERA responded that mitigation will be site-specific where required as wetlands are to be visited in the field and general pipeline mitigation will be tailored to the different areas.	See above
BC MOE	Katrina Stipex, BC CDC	Email	February 13, 2013	Determine limitations of the database.	Limitations were provided and incorporated into reporting.	Resolved
BC OGC	Viva Wolf, Operations Manager	Email Meeting	July 29, 2013 October 23, 2013	Clarifying what regulatory requirements need to be met in regards to temporary and permanent disturbance to wetlands as a result of pipeline crossings and new pump station development. In addition, asked for clarification on the differences between Section 7 and Section 9 of the BC *Water Act*.	Discussed Sections 7, 8 and 9 of the *Water Act.* Also discussed Section 5 of the Environmental Protection and Management Regulation of the *Oil and Gas Activities Act*, regarding permanent structures within a wetland (*i.e.*, resulting in permanent disturbance to wetlands) and BC OGC's discretion in this matter. For permanent disturbances to wetlands the BC OGC defers to Environment Canada.	Resolved
MUNICIPAL CONSULTATION – BRITISH COLUMBIA						
Regional District of Fraser-Fort George	Marija Soklic	Email Phone	July 29, 2013 July 30, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	Wetland disturbance located outside of a development permit area, the Regional District works closely with the BC MOE to make sure that not only are the province's requirements met but that the Regional District's requirements are met.	Resolved though further consultation will continue as warranted once a final pipeline route has been determined.
Thompson-Nicola Regional District	Adam Fitch, Planning Technician	Email	July 29, 2013 Sept. 13, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	An assessment would only be triggered if building permits and potentially rezoning and development permits are needed as a result of Project facilities.	Resolved although further consultation will continue as warranted once a final pipeline route has been determined.
District of Hope	Scott Nesumy	Email Phone	July 29, 2013 July 30, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	A development permit may be required but the District requires more information before this decision can be made.	Resolved though further consultation will continue as required once a final pipeline route has been determined.

TABLE 2.1-1 Cont'd

Stakeholder Group/Agency Name	Name and Title of Contact	Method of Contact	Date of Consultation Activity	Reason For Engagement	Issues/Concerns	Commitments/ Follow-up Actions/ Comments
Fraser Valley Regional District	Suzanne Gresham, General Manager Electoral Area Services	Email	July 29, 2013 Sept. 5, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	In response to the question about what the requirements are for disturbances to wetlands a comprehensive response has not been put together yet.	Resolved though further consultation will continue as required once a final pipeline route has been determined.
City of Surrey	Jason Daviduk, Engineering Department	Email from third person (Roger Tonge at Universal Pegasus International)	September 27, 2013	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	Would like 3 weeks notice prior to the start of field work on City lands.	Resolved though further consultation will continue as warranted.
	Stephen Godwin, Environmental Department	Conference Call	October 25, 2013		Defers to the BC *Water Act,* DFO and Environment Canada with respect to disturbances to wetlands.	
City of Burnaby	--	--	--	Clarifying what regulatory requirements need to be met in regards to wetland disturbance as a result of Project construction.	Continued follow up with the City of Burnaby in progress	Further consultation will continue as warranted.

3.0 METHODS

During the assessment of the wetland biophysical element it was determined that the potential effect of Project construction is to wetland function (*i.e.,* habitat, hydrological and biogeochemical) (Section 3.1). In order to assess wetland function the indicator of wetland loss or alteration was considered and confirmed through consultation with stakeholders and professional judgement. The quantitative and/or qualitative measurement of the potential Project effects and cumulative effects on wetlands was determined to be the area of wetlands disturbed or contaminated of various functional conditions (Section 3.2) as determined during the ground-based field surveys. Detailed information on Project interactions and effects and the assessment indicator and measurement endpoint can be found in Section 7.2.8.1 and 8.7 of Volume 5A.

3.1 Project Interactions and Identification of Potential Effects

Pipeline and associated facility construction and maintenance activities have the potential to directly and indirectly affect wetland habitat, hydrological and biogeochemcial functions through altering vegetation composition and habitat availability, disrupting wetland hydrology inputs and outputs, drainage characteristics, and evapotranspiration rates, and increase the risk of contamination through accidental spills from equipment during construction.

Alterations to wetland habitat availability through changes to vegetation composition as a result of right-of-way and facility clearing and construction activities can directly as well as indirectly impact those wildlife species that depend on wetlands for part or all of their life cycle.

Pipeline and associated facility construction and maintenance activities may also result in alterations to wetland hydrological functions by impeding wetland connectivity and drainage characteristics, therefore, causing ponding or drying within wetlands.

Accidental spills from equipment during construction could result in direct and indirect effects to wetland biogeochemical function by causing changes to water quality, soil adsorption and nutrient/contaminant uptake.

3.2 Assessment Indicators and Measurement Endpoints

The selection of indicators for wetland loss or alteration included: consideration of the filing requirements outlined for the wetland biophysical element in the NEB *Filing Manual* (2013), experience gained during previous projects with similar conditions and potential issues, feedback from regulators, Aboriginal communities and stakeholders, available research literature, and professional judgement of the assessment team. Initially, the proposed indicators of wetland loss or alteration included wetland function (expressed as functional condition) and wetlands of special concern (expressed as functional condition) were considered. These were discussed during the ESA Workshops. Participants of the workshops did not express any concerns about the proposed indicators of wetland loss or alteration and whether they were appropriate for evaluating the effects of the Project on wetlands. Although some workshop participants did express the wish to see wetlands restored to a functional condition that was better than the current functional condition, and to emphasise the importance of ephemeral wetlands. No additional wetland indicators were suggested by workshop participants.

Input on the proposed wetland indicators was also sought from AESRD, BC MOE, (BC MFLNRO) and Environment Canada (Section 2.0). All four agencies were in agreement that the proposed wetland indicators were appropriate and suggested no additional indicators for consideration. Through discussions with the Project team, it was determined that wetlands of special concern will be addressed under the vegetation indicators (*i.e.*, vegetation communities of concern). To reduce assessment duplication of the same indicator it was decided that wetlands of special concern will be presented in the Wetland Evaluation Technical Report (Volume 5C) but will be addressed within the scope of the vegetation study as an indicator (*i.e.*, vegetation communities of concern). The wetland-specific results are presented in the Wetland Evaluation Technical Report (Volume 5C). Therefore, only one indicator of wetland loss or alteration will be assessed in the wetland component of the ESA. These changes were discussed during consultation with Environment Canada and were deemed appropriate with no additional suggestions being made.

Measurable endpoints are used to conduct quantitative and/or qualitative measurement of the potential Project effects and cumulative effects. The degree of change in these measureable endpoints is used to characterize Project-related and cumulative effects, and evaluate the significance of the potential environmental effects. The measureable endpoints of the indicator of wetland loss or alteration were derived based on processes, functions and services associated with wetlands. These include the following (Table 3.2-1):

- area of wetlands disturbed or contaminated that are of High Functional Condition, High-Moderate Functional Condition, Low-Moderate Functional Condition and Low Functional Condition.

These measurable endpoints were selected based on the feasibility and rapid assessment process that can be achieved to monitor them to collect existing data and observations during ground-based field work and the ability to assess and compare those wetland function results quantitatively and qualitatively during post-construction monitoring.

TABLE 3.2-1

ASSESSMENT INDICATORS AND MEASUREMENT ENDPOINTS FOR WETLAND LOSS OR ALTERATION

Wetland Indicator	Measurement Endpoint	Rationale for Indicator Selection
Wetland Function	Area (ha) of wetland (*i.e.*, habitat, hydrology, biogeochemistry) disturbed/contaminated that are of High Functional Condition, High-Moderate Functional Condition, Low-Moderate Functional Condition and Low Functional Condition.	The selection of the indicator and measurement endpoints considered NEB *Filing Manual* requirements, experience gained during previous projects with similar conditions and potential issues, feedback from regulators, Aboriginal communities and stakeholders, available research literature, and professional judgement of the assessment team. These selections also addressed concerns from participants of the ESA Workshops and were informed by regulators (*i.e.*, AESRD, BC MOE, BC MFLNRO and Environment Canada). The indicator (*i.e.*, wetland function) complies with the "no net loss" of wetland function goal of the Federal Policy on Wetland Conservation (Environment Canada 1991).

3.3 Study Area Boundaries

The Project was considered in relation to the Footprint Study Area (Footprint) (*i.e.*, construction right-of-way and temporary workspace), a LSA (Wetland LSA) and a RSA (Wetland RSA). See Figure 5.8-1 in Volume 5A for a visual representation of the study area boundaries.

The Footprint is comprised of the area directly disturbed by surveying, construction and clean-up of the pipeline and associated physical works and activities (including, where appropriate, the permanent right-of-way, pump stations, tanks, temporary construction workspace, temporary stockpile sites, temporary staging sites, construction camps, access routes, power lines, etc.). The proposed pipeline will likely be installed within a 45 m wide construction right-of-way, which includes the permanent right-of-way and temporary workspace. Additional temporary workspace will be required at select locations to accommodate construction activities (*e.g.*, road and watercourse crossings, sharp sidebends and buried utility lines).

A Wetland LSA was established to reflect the area in which Project construction and operation activities would most likely affect wetlands. The zone of influence (ZOI) likely to be affected by direct disturbance during construction and operations aligning with the Vegetation LSA, where vegetation (*i.e.*, species composition, health and vigour) is one of the primary indicators of wetland function. The spatial boundaries of the Wetland LSA for the Project is a 300 m wide band generally from the centre of the proposed pipeline corridor (*i.e.,* 150 m on both sides of centre of the proposed pipeline corridor) with site-specific tailoring to extend around larger wetland complexes that are encountered by the proposed pipeline corridor. The 300 m wide band is considered to be of a sufficient size along the entire pipeline corridor, since the wetlands encountered in Alberta are commonly isolated basins or smaller wetland complexes located within agricultural lands with some forested areas, and those in BC are located within steep mountain valleys or exist as isolated basins or smaller wetland complexes within agricultural lands.

The spatial boundaries of the Wetland RSA are defined as the area where the direct and indirect influence of other land uses and activities could overlap with proposed Project-specific effects and cause cumulative effects on wetlands, waterbodies and drainages directly affected by the Project. The Wetland RSA aligns in general with the Aquatic RSA where regional hydrology is the overall driver for wetland occurrence and includes all watersheds affected by the Project.

The spatial boundaries of the Wetland LSA and Wetland RSA relied on the professional judgement of the assessment team and were formulated in conjunction with other supporting studies conducted for the Project that provide useful information on biophysical environment encountered by the proposed pipeline corridor (*i.e.*, the Fisheries (Alberta) Technical Report, Fisheries (British Columbia) Technical Report, the Vegetation Technical Report and the Wildlife Technical Report of the Volume 5C). The spatial boundaries of the Wetland LSA and Wetland RSA were discussed during the open houses, Community Workshops, ESA Workshops, regulator consultation, and Aboriginal engagement to obtain feedback and identify any changes to or concerns with these boundaries. Participants of the Edmonton ESA workshop commented on wetlands of special concern and suggested that the LSA be extended to capture these larger complexes. As stated previously, the spatial boundary of the Wetland LSA will be tailored at site-specific locations to extend around larger wetland complexes. Participants at the Kamloops ESA workshop commented that the LSA surrounding the pump stations should be extended to include the area that the groundwater could travel to ensure that “wet ground” is not missed and this was taken into consideration during tailoring of the Wetland LSA. No other issues, concerns or suggested changes were raised about these boundaries during the consultation process.

3.4 Existing Conditions

Existing conditions represent the functional state of a wetland within the landscape prior to construction activities associated with the Project and provide a reference point against which future conditions are compared to assess Project-specific and cumulative effects. For wetlands, existing (*i.e.*, baseline conditions represent the current state of the environment. Existing conditions of wetlands encountered by the Project were determined via aerial imagery interpretation and field surveys. Existing disturbances (*i.e.*, disturbances present prior to the Project construction) were noted since they are relevant to post-construction monitoring outcomes. The methods used to collect existing conditions of wetlands were discussed with members of Environment Canada, AESRD, BC OGC, BC MFLNRO, BC MOE and municipalities (*e.g.,* City of Kamloops, City of Surrey) (see Section 2.0), and are detailed in Section 3.6.3.

3.5 Literature/Desktop Review

This wetland evaluation relies on the definitions, classes and parameters outlined in the Canadian Wetland Classification System (CWCS) (National Wetland Working Group 1997), *Wetlands of BC: A Guide to Identification* (Mackenzie and Moran 2004), as well as the FPWC (Environment Canada 1991). In addition to literature regarding the regulatory standards for wetlands, a review of existing literature for Wetland Regions of Canada, Natural Subregions of Alberta, Biogeoclimatic Zones of BC, government databases (*i.e.*, BC Conservation Data Centre [BC CDC], etc.) and consultation was completed. A desktop review of overflight photographs and existing satellite imagery (1:10 000 scale) was used to identify potential wetlands located within the 150 m wide proposed pipeline corridor. In order to identify potential wetland locations to visit in the field, wetlands were identified on the satellite imagery using key indicators such as geomorphology, surficial hydrology and vegetation type and cover.

3.5.1 Aboriginal Traditional Knowledge

ATK is typically documented as a means to preserve historical and familial connections, territorial occupation, land and resource use, and temporal execution strategies. ATK includes, however, is not limited to, the collection of TEK during biophysical field survey participation for the Project and Traditional Land Use (TLU) study information from potentially affected Aboriginal communities. Prior to TEK field data collection, preliminary background ATK data was compiled. The following sources were used:

- publicly available ATK, TEK and TLU reports;
- open houses and community gatherings;
- meetings and conversations with Aboriginal community representatives;

- public record of comparable past projects or previous environmental assessment;
- published reports from regulatory authorities involved in administering or regulating a specified area or resource (*e.g.*, integrated resource plans, land and resource management plans, etc); and
- Geographical Information System (GIS) tools to determine spatial relationships of source data to the Project.

The preliminary background ATK data was verified and augmented as a result of the TEK field data collection.

3.5.2 Database Limitations

Searches of government databases was conducted to collect previously documented information pertaining to different components of wetland habitat (*i.e.*, vegetation, wildlife species and listed wetlands) in order to compile a list of potential species and habitats that may be encountered by the Project. There are limitations when employing the information provided by databases.

The Fish and Wildlife Management Information System (FWMIS) and the Alberta Conservation Information Management System (ACIMS) databases rely on individuals and organizations to contribute their data in order to keep their databases current and to expand on the information that can be provided to other practitioners. Data searches of these two systems is not intended to be used as a final statement on the presence, absence or the status of species within an area nor can this information be used as a substitute for conducting site-specific surveys. There are also many areas within Alberta that have not been surveyed extensively where information is limited (AESRD 2009, Alberta Tourism, Parks and Recreation [ATPR] 2012).

The information provided by the BC CDC is dynamic and based on best known observations. Additions and maintenance of the database is ongoing with edits being conducted on a daily basis. The absence of any occurrences in an area does not necessarily mean that those species or ecosystems at risk are not present, only that there is no documentation for a particular area. This information should not be used as a replacement of detailed assessments during the appropriate season which is the only way to confirm the presence or absence of any species or ecosystems at risk (Stipec pers. comm.).

3.5.3 Satellite Imagery Limitations

The satellite imagery interpretation was conducted to provide an understanding of overall wetland distribution and to provide a high level summary of wetland distribution along the proposed pipeline corridor and potential wetland locations to visit during wetland fieldwork. The inconspicuous physical characteristics of some wetlands may have potentially hindered their identification during photograph interpretation due to their small size or often ephemeral and temporary occurrence on agricultural lands or within forested areas, therefore, satellite imagery interpretation was supplemented and improved through helicopter reconnaissance.

3.6 Field Data Collection

TERA has implemented proper record keeping practices for information obtained in the field to ensure that survey results are accessible for future reference.

It should be noted that the number of wetlands presented in this report have been updated following a late season wetland survey conducted in October 2013. This information was not included on the Environmental Alignment Sheets of Volume 6E nor was it available when cross referencing with other discipline results (*e.g.,* wildlife, vegetation and fish) was conducted. Therefore, some discrepancies maybe noted between the ESA (Volume 5A), Wetland Evaluation Technical Report (Volume 5C), the Environmental Alignment Sheets (Volume 6E) and other discipline technical reports (Volume 5C). This discrepancy along with the number and classification of wetlands crossed by the 150 m wide proposed pipeline corridor will be updated following supplemental wetland surveys planned for 2014 targeting locations where access was not available and once the 150 m wide corridor is refined at a 45 m construction right-of-way.

3.6.1 Wetland Classification

The CWCS (National Wetland Working Group [NWWG] 1988, 1997) serves as a practical guide for the classification of wetlands encountered in Canada. Mackenzie and Moran (2004) use a similar classification base in *Wetlands of BC: A Guide to Identification*.

In many classifications (Halsey and Vitt 1996, Mackenzie and Moran 2004, NWWG 1997), wetlands are further divided based on soil properties into mineral (non-peat) wetlands and organic (or peatland) wetlands. Mineral wetlands typically include shallow open water (less than 2 m deep), marshes and swamps. Peat forming wetlands, referred to as peatlands, typically include bogs and fens (Smith *et al.* 2007).

Wetland classifications are often distinguished based on a moisture gradient and often occur in transition between one wetland class and another, or have smaller inclusions of wetlands of different classes located within larger areas. For this reason, wetland classification is a best attempt to describe and delineate wetland type within the Footprint, but cannot accurately detail all that occurs at a site.

Figure 3.6-1 is a modified flow chart outlining the dominant wetland groups, classes and forms commonly found on mineral/peat soils along the proposed pipeline corridor.

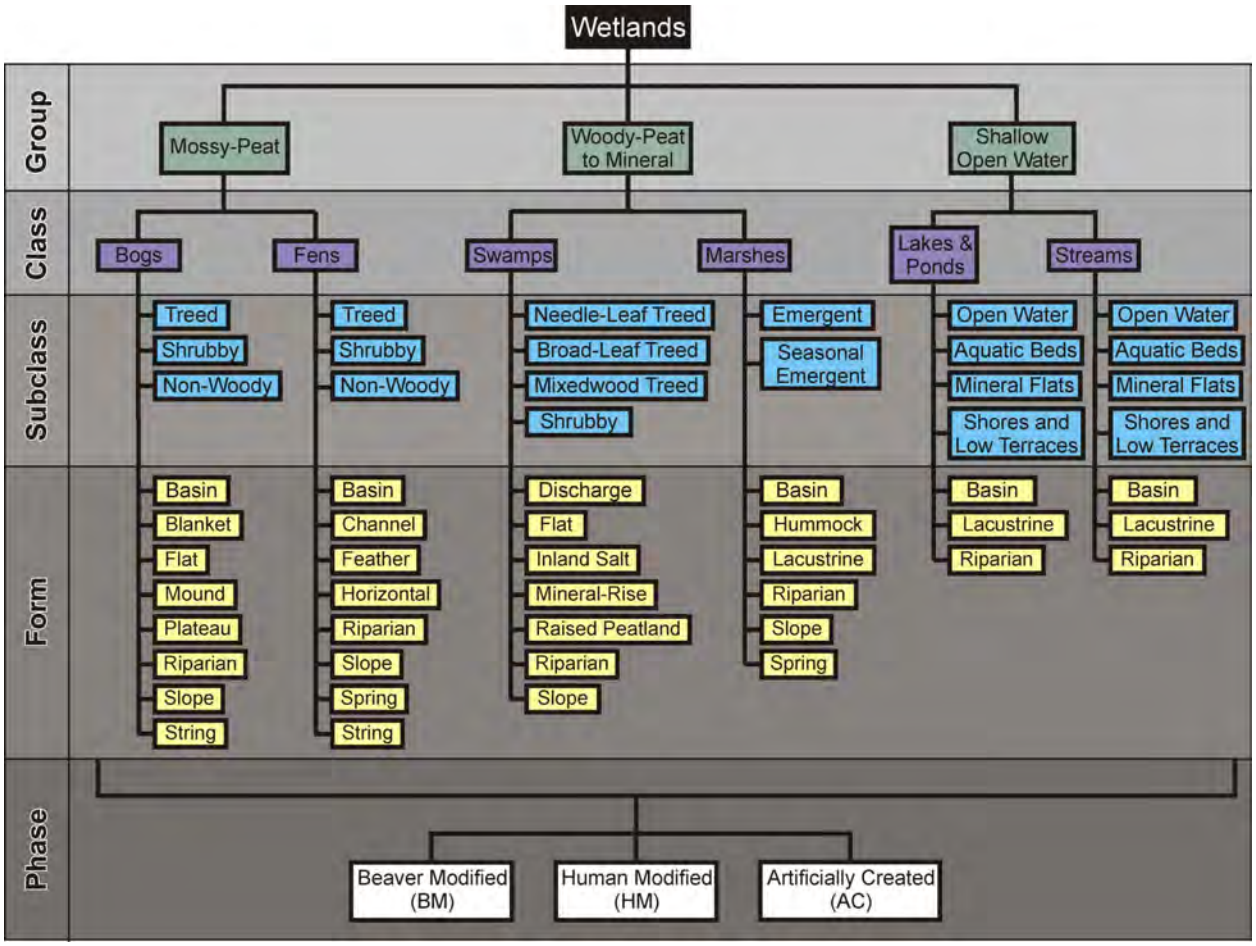

Figure 3.6-1 Wetland Classification Organization Chart

Source: modified from NWWG 1997

Wetlands identified through satellite interpretation, helicopter reconnaissance along the entire proposed pipeline corridor, and ground surveyed in Alberta are classified using the CWCS wetland class and associated wetland form which is based on "...*surface morphology, surface pattern, water type and morphology characteristics of underlying mineral soil*" (NWWG 1997).

Table 3.6-1 provides additional detail for each of the CWCS wetland classes.

TABLE 3.6-1

WETLAND CLASSES ESTABLISHED BY THE CANADIAN WETLAND CLASSIFICATION SYSTEM

Dominant Wetland Class	Wetland Class Characteristics	Forms[1]	Location
Bog	• An accumulation of peat. • Surface raised or level with surrounding terrain. • Water table at or slightly below the surface and raised above the surrounding terrain. • Ombrogenous (nourished by precipitation). • Moderately decomposed *Sphagnum* peat with remains of shrubs. • Most frequently dominated by *Sphagnum* mosses with tree, shrub or treeless vegetation cover.	Basin	• Basins.
		Blanket	• Valleys and hillsides.
		Flat	• Broad, poorly defined low land areas.
		Mound	• Discrete mounds of peat situated in or surrounded by fen.
		Plateau	• Northern Plateau Bog – Boreal Wetland Region.
		Riparian	• Floating bog – on/adjacent to open water bodies. • Shore bog – adjacent to open waterbodies.
		Slope	• Sloping terrain.
		String	• Low areas, near other ombrotrophic peatlands.
Fen	• An accumulation of peat. • Surface is level with the water table, with water flow on the surface and through the subsurface. • Fluctuating water table which may be at, or a few centimetres above or below, the surface. • Minerogenous (nourished by groundwater). • Decomposed sedge or brown moss peat. • Graminoids and shrubs characterize the vegetation cover.	Basin	• Basins.
		Channel	• Well defined channels without an actively flowing stream or with a smaller remnant stream.
		Feather	• Narrow drainage ways downslope from bogs.
		Horizontal	• Broad poorly defined low land areas.
		Riparian	• Floating fen – adjacent to ponds or lakes. • Shore fen – along the shore of a lake or edge of a pond.
		Slope	• Slopes, in areas of high rainfall.
		Spring	• Where groundwater interaction or discharge occurs.
		String	• Ladder fen – between domed bogs and upland. • Net fen – wet hollows or shallow pools. • Northern ribbed fen – Boreal Wetland Region.
Swamp	• Peatland and mineral wetland. • Water table at or below the surface. • Minerogenous (nourished by groundwater). • Highly decomposed woody peat and organic material. • Coniferous or deciduous trees or tall shrub vegetation cover.	Discharge	• Seepage swamp – along outflow of groundwater seepage. • Spring swamp – close to lakes or open water bodies.
		Flat	• Basin swamp – in glacial features on ablation till plains. • Swale swamp – close to lakes or open water bodies. • Unconfined flat swamp – glacial lakebeds or areas of glacial outwash.
		Inland Salt	• Near inland, saline lakes and marshes.
		Mineral-Rise	• Beach Ridge Swamp – beach ridges. • Island swamp – island, bar or point in a riparian condition. • Levee swamp – levees. • Mound swamp – mineral sediments/bedrock surrounded by peatland.
		Raised Peatland	• Raised plateaus.

TABLE 3.6-1 Cont'd

Dominant Wetland Class	Wetland Class Characteristics	Forms[1]	Location
Swamp (cont'd)	• See above	Riparian	• Channel swamp – abandoned river or stream channels, oxbows, etc. • Floodplain swamp – floodplain valley of rivers, streams or behind levees. • Lacustrine swamp – shores of permanent ponds or lakes. • Riverine swamp – along banks of rivers/permanent and intermittent streams.
		Slope	• Drainage way swamp – confined drainages or water track. • Lagg swamp –zone between upland mineral terrain and peatland. • Peat margin swamp – between peatland and upland mineral terrain. • Unconfined slope swamp – glacial lake beds and outwash areas in peatland, may occur at margins of extensive flat swamps.
Marsh	• Mineral wetland or peatland that is periodically inundated by standing or slow moving waters. • Minerogenous (nourished by groundwater). • Substratum usually consists of mineral material, although occasionally it consists of peat deposits. • Emergent aquatic macrophytes largely rushes, reeds, grasses, and sedges and some floating aquatic macrophytes.	Basin	• Discharge basin – flat areas, depressions, basins, kettles, sinkholes below groundwater table. • Isolated basin – basins formed by glacial erosional and depressional processes. • Linked basin – well defined shallow basins with inlets and outlets.
		Hummock	• Heights of land in zones of groundwater upwelling – sometimes slopes or depressions.
		Lacustrine	• Lacustrine bay – gently sloping offshore zones, recession flats or shoals of shallow bays (lakes). • Lacustrine lagoon – semi-closed basins behind barrier beaches/adjacent to lakes. • Lacustrine shore – recent lacustrine sediments, along shoreline and between high and low water.
		Riparian	• Riparian delta – active or abandoned glacial deltas with a stream or river running over them. • Riparian floodplain – swales, oxbows and meander scars. • Riparian meltwater channel – broad spillway valleys and alluvial/outwash plains. • Riparian stream – embankments, channels, islands and riparian zones of streams or rivers.
		Slope	• Lower elevation slopes.
		Spring	• Seasonal to semi-permanent flowing springs or upwelling groundwater.
Shallow Open Water	• Distinct wetlands transitional between those wetlands that are saturated or seasonally wet (bog, fen, marsh or swamp) and permanent, deep water bodies. • Standing water less than 2 m deep in mid-summer. • Natural impoundments such as beaver ponds or other open water wetland systems are included where water levels are not regulated. • Usually associated with lacustrine (lake) or fluvial (stream) systems.	Basin	• Discharge – flat or concave basins in topographic low areas. • Isolated – shallow depressions in high/intermediate topographic positions. • Linked – shallow depressions with inlet and outlet flow. • Polygon – peatland depressions. • Thermokarst – permafrost terrain. • Tundra – permafrost terrain.
		Lacustrine	• Bay. • Lagoon; shore – zone of wave action in beach or strand areas. • High and low shore and littoral zones.
		Riparian	• Delta – alluvial plains/sediment deposits where rivers/streams enter lakes. • Floodplain – abandoned channels, oxbows or river meanders on river floodplains. • Meltwater channel – meltwater channels and spillways and "U" shaped valleys. • Stream – well defined channels with eroded banks.

Sources: Government of Canada 1986, NWWG 1997

Note: 1. The Forms identified do not represent all of the Forms found within the CWCS. Only Forms that are anticipated to be found along the proposed pipeline corridor were mentioned.

Wetlands where ground-based surveys were conducted in BC are classified using Mackenzie and Moran (2004). Table 3.6-2 provides additional detail for each of the wetland classes identified by Mackenzie and Moran. Discrepancies exist between CWCS (NWWG 1997) and Mackenzie and Moran (2004) due to differences in classification methods between the two systems, not a difference in field classification techniques or methods. Geographical and climatic characteristics also play a role in the differences between the two classification systems. For example, the CWCS describes bogs as being ombrogenous (*i.e.*, requiring precipitation for its formation) and are isolated from the groundwater table (NWWG 1997). However, according to Mackenzie and Moran (2004), bogs in BC do exhibit typical vegetation associated with bogs as well as abundant levels of *Sphagnum* species but they do experience some interaction with the groundwater table, especially in hollows or low topographic areas within these wetland ecosystems.

As mentioned previously in Section 1.8.2, the BC OGC recommends management buffers for wetlands, as outlined in the EPMG, which relate to RMAs for these wetlands. Although not regulatory setbacks the BC OGC does require these to be assigned to wetlands for the purposes of notifications under Section 9.0 of the *Water Act.* Classification of a wetland to determine these recommended setback distances follows a series of questions related to a wetlands size and location (BC OGC 2013). The breakdown of these classes is as follows:

- Wetlands >5 ha:
  - not found within BWBSmw1 or BWBSmw2 or are <1,000 ha (W1 wetland classification); and
  - found within BWBSmw1 or BWBSmw2 and are >1,000 ha (W3 wetland classification).
- Wetlands <5 ha:
  - wetlands between 0.25-5 ha (W2 wetland classification); and
  - wetlands <0.25 ha (wetland unclassified).

The recommended RMA setback distances include 50 m for wetlands classed as W1, 30 m for wetlands classed as W2 and 0 m for wetlands classified as W3 (BC OGC 2013).

TABLE 3.6-2

WETLAND CLASSES ESTABLISHED BY THE WETLANDS OF BRITISH COLUMBIA

Group	Site Class	Site Characteristics	Cover Type	Species Group
Wetland	Bog (Wb)	• Nutrient-poor peatlands (> 40 cm peat) with ericaceous shrubs and hummock-forming *Sphagnum* species • Highly acidic and oxygen poor soil (pH < 5.5) • Surface raised above groundwater flow	Conifer treed or low shrub	*Sphagnum* mosses, ericaeous shrubs, and conifers
	Fen (Wf)	• Peat accumulation (> 40 cm peat) • High mineral content at rooting zone due to groundwater inflow • pH >5.0 • Develop in basins, lake margins, river floodplains and seepages	Graminoid or low shrub	Deciduous shrubs, sedges and brown mosses
	Marsh (Wm)	• Mineral soils or well-humified peat • Shallow (0.1 – 2 m; • Fluctuating water table with early-season high water levels • Exposure of substrate in late season or during drought • High nutrient availability	Graminoid or forb	Large emergent sedge, grass, forb or horse-tail species
	Swamp (Ws)	• Mineral soils or well-humified peat • Temporary shallow flooding (0.1 – 1 m) • Water flow from a near-surface water table • High nutrient availability	Tall shrub or forested	Conifers, willows, alders, forbs, grasses, leafy mosses
	Shallow water (Ww)	• Permanent water (0.5 – 2 m) • Dominated by rooted, submerged and floating aquatic plants • Still or slow-moving permanent waterbodies • Mineral soils or well-humified peat	Aquatic	Aquatic species, emergent vegetation, <10% cover
Estuarine	Estuarine meadow (Ed)	• High intertidal and supertidal zones • Semi-diurnal tidal flooding by brackish water	Graminoid	Grasses, sedges and forbs tolerant of diurnal flooding and brackish water
	Estuarine marsh (Em)	• Intertidal • Diurnal tidal flooding by salt water	Graminoid or forb	Salt-tolerant emergent graminoids and succulents
Flood	High bench	• Above normal water flow • Brief flooding	Coniferous forested	Upland species of seepage sites
	Mid bench	• Elevated • Floods most year for 10 - 21 days • Areas of sedimentation	Deciduous treed or forested	Flood-tolerant trees and shrubs
	Low bench	• Directly adjacent to watercourse • Annual flooding for greater than 21 days • Annual erosion and deposition	Tall deciduous shrubs	Flood-tolerant shrubs

TABLE 3.6-2 Cont'd

Group	Site Class	Site Characteristics	Cover Type	Species Group
Transition[1] (non-wetland)	Shrub-carr	• Frost-prone depressions • Fine to medium-textured moist soils • Shrub dominated • Seasonally saturated • Sometimes border wetlands	Low shrub	Deciduous low shrubs, grasses and forbs
	Saline meadow (Gs)	• Semi-arid climate • Slightly to highly saline soils • Periods of brief inundation • Dry most of the growing season	Graminoid	Flood and salt tolerant graminoids and forbs

Source: Mackenzie and Moran 2004

Note: 1. The transition group are often found in association with other wetland types but are not considered to be wetlands.

3.6.2 Collection of Traditional Ecological Knowledge

TERA, on behalf of Trans Mountain, facilitated the participation of potentially affected Aboriginal communities during the wetlands field surveys conducted for the Project. Opportunities for Project participation were made available to potentially affected Aboriginal communities that have an interest in the Project, based on their proximity to the Project and/or their assertion of traditional and cultural rights of the land. All Aboriginal communities potentially affected by the Project were invited to participate in the wetlands field surveys conducted for the Project to allow for the collection of TEK.

Engagement for the Project was initiated in spring 2012 and continued throughout 2013. The methods used to determine how participants were to be involved in Project field surveys were the same for all Aboriginal communities. Each field survey was discussed with the individual community, usually with staff from the community lands department. This discussion included details regarding the type, timing and locations of work to be conducted and, based on this information, each community chose which of their members would participate in each field survey. The participating Aboriginal communities are listed in Table 3.6-3 from east to west in relation to the Project.

TABLE 3.6-3

ABORIGINAL WETLAND FIELD SURVEY PARTICIPATION FOR THE PROJECT

Aboriginal Community	Wetlands	Results Review
Edmonton to Hinton Segment		
Saddle Lake Cree Nation	August 15-21, 2012 May 27-June 1, 2013	November 28, 2013
Enoch Cree Nation	June 3-5, 2013	November 28, 2013
Alexander First Nation	May 27-June 1, 2013	November 28, 2013
Samson Cree Nation	May 27-June 1, 2013 July 25-30, 2013	November 28, 2013
Ermineskin Cree Nation	August 15-21, 2012 May 27-June 1, 2013 July 25-30, 2013	October 31, 2013
Montana First Nation	August 15-21, 2012 May 27-June 1, 2013	November 28, 2013
Louis Bull Tribe	August 15-21, 2012 May 1-2, 2013 May 29-31, 2013 July 25-30, 2013	November 28, 2013
Alexis Nakota Sioux First Nation	August 15-21, 2012 May 27-June 1, 2013	November 28, 2013
Sunchild First Nation	August 15-21, 2012 May 27-June 1, 2013	November 28, 2013
Hargreaves to Darfield Segment		
Lheidli T'enneh	June 11-18, 2013 July 11-15, 2013	November 28, 2013
Aseniwuche Winewak Nation	June 11-18, 2013	November 28, 2013
Simpcw First Nation	June 11-18, 2013 July 11-15, 2013	N/A
Canim Lake Band	July 11-15, 2013 July 12-13, 2013	November 5, 2013

Simpcw First Nation field participants did not to share TEK with TERA for the purpose of the Project, however, all field participants contributed to the discussion of potential Project-related effects on resources and participated in the discussion of potential mitigation measures to reduce potential Project-related effects.

3.6.2.1 Field Reconnaissance

In 2012 and 2013, TEK was gathered and recorded during the wetlands field surveys (Table 3.6-3). The dates provided in Table 3.6-3 may not correspond to the dates noted elsewhere in this report since additional time was spent in the field with the Aboriginal participants for mobilization and demobilization to the field, pre-field work meetings and wrap-up meetings. The field crew consisted of wetlands specialists, Aboriginal participants and a TERA facilitator. Translators were available in the field upon the request of a community. TERA facilitators accompanied participants during the field surveys to identify potential effects of the Project on environmental resources, to explain potential construction techniques, to describe Project specifications, to document TEK and to ensure that proprietary information was kept in confidence.

During the field surveys, traditional methods of resource procurement were discussed, as well as modern methods currently employed. Seasonality of resource harvesting, species of traditional importance; classification of wetland areas; and descriptions of traditional resources contained within the different wetland areas was also important information shared by the Aboriginal participants. Geographical locations were identified, as were areas that are not used and the reasons why. Potential mitigation measures to reduce any Project-related effects on a resource were also discussed during the wetland field surveys. Open discussions occurred regularly between participants and wetlands specialists regarding the resources present and available to Aboriginal communities. These discussions were important to help build relationships among the field crews. Aboriginal participants spoke about aspects of the environment that were important to them and the importance of the resource from a western science perspective was also discussed. The wetlands TEK collected during the biophysical field surveys has added results that western science may not have gathered or considered, confirmed results that had been collected through the field surveys, as well as has identified and confirmed issues of concern to be addressed in Volume 5A. The TEK collected is also used to assist in the review of potential Project-related effects on wetlands.

3.6.2.2 Results Review/Reporting

Review of collected TEK and discussions of potential Project-related effects and mitigation strategies described in this report were conducted directly with participating community members during the field surveys. Confirmation of the accuracy of the information incorporated and approval of the inclusion of the confidential and proprietary information in Project planning occurred during community results review follow-up (Table 3.6-3). Information collected during the field surveys that relates primarily to traditional land and resource use or to other elements has been incorporated into the following reports with permission of the participating communities:

- Traditional Land and Resource Use Technical Report (Volume 5D);
- Socio-Economic Technical Report (Volume 5D);
- Community Health Technical Report (Volume 5D); and
- Screening Level Human Health Risk Assessment of Pipeline and Facilities (Volume 5D).

A detailed summary of Trans Mountain's engagement activities with each potentially affected Aboriginal community is provided in Volume 3B of the application.

3.6.3 Reconnaissance and Ground-based Wetland Field Survey

Table 3.6-4 summarizes the wetland field work conducted in 2012 and 2013.

TABLE 3.6-4

WETLAND FIELD WORK CONDUCTED IN 2012 and 2013

Field Work Type	Location and Pipeline Segment	Date
Helicopter reconnaissance	Alberta (Edmonton to Edson)	August 16 and 17, 2012
Helicopter reconnaissance	BC (Hargreaves to Darfield Station)	August 19 and 20, 2012
Helicopter reconnaissance	BC (Black Pines to Westridge)	September 22 and 23, 2012
Helicopter reconnaissance	Alberta (Edson to Hinton)	May 10, 2013
Helicopter reconnaissance	BC (Hargreaves to Darfield and Black Pines to Westridge)	May 8, 2013
Ground-based field work at all wetlands with available land access	Alberta (Edmonton to Hinton)	August 13 to 23, 2012 May 27 to June 5, 2013 June 26 to 30, 2013 July 1 to 5, 2013 October 10 to 22, 2013
Ground-based field work at all wetlands with available land access	BC (Hargreaves to Darfield Station)	September 27 to October 3, 2012 June 11 to 19, 2013 June 20 to 28, 2013 July 5 to 10, 2013
Ground-based field work at all wetlands with available land access	BC (Black Pines to Hope)	June 10 to 19, 2013
Ground-based field work at all wetlands with available land access	BC (Hope to Burnaby)	April 28 to 30, 2013 May 1 to 7, 2013 June 10 to 12, 2013
Ground-based field work at all wetlands with available land access	BC (Burnaby to Westridge)	April 28 to 30, 2013 May 1 to 7, 2013

Note: Ground-based wetland surveys were conducted for all wetlands where access was available in spring/summer 2012 and 2013.

The purpose of the ground-based wetland surveys was to obtain detailed information on the various wetland types crossed by the proposed pipeline corridor and associated power lines. Wetlands were classified according to the CWCS (NWWG 1997) in Alberta, and the CWCS (NWWG 1997) and Mackenzie and Moran (2004) in BC.

At all wetlands observed during the 2012 and 2013 helicopter overflights, the following information was collected for wetlands within the 150 m wide corridor along each proposed pipeline segment and associated power lines, where possible.

General Information and Classification

- Wetlands were geo-referenced using GPS (UTM), legal location, where possible, was documented and a site sketch was prepared.
- Wetlands were photo documented and any existing alterations either on or adjacent to the site were noted.
- Wetlands were classified depending on vegetation, hydrology and soils present, and signs of modification (*e.g.*, beaver and/or human) were documented.

At all wetlands where access was available during the 2012 and 2013 ground-based wetland surveys, the following information was collected within the 150 m wide corridor: habitat, hydrological and biogeochemical function. Information collected on these components was used to confirm wetland classifications, especially for those wetlands where it was possible to determine site association using the Mackenzie and Moran (2004) classification system.

Hydrological Function

The hydrological function of wetlands is dependent on several factors. The source and movement of water can indicate the type of wetland as well as its importance to surrounding waterbodies and wetlands. For the purpose of this wetland evaluation during the collection of existing data, comments were made regarding surface water presence, movement and depth. The following parameters were collected (Table 3.6-5).

- Hydrogeomorphic Setting and Basin Topography: geomorphology and wetland connectivity describes the topographic position and hydrology (*e.g.,* inflow and outflow) of a wetland. Together they illustrate how the wetland interacts with the surrounding landscape. Geomorphology and wetland connectivity can include fluvial, lacustrine, palustrine and estuarine systems (MacKenzie and Moran 2004). Wetland connectivity can also be used to predict the resiliency of a wetland to disturbance (*e.g.,* pipeline construction) (Hill and Devito 1997 in Graf 2009, Trettin *et al.* 1997 in Graf 2009).

- Hydrodynamic Index: a wetland hydrodynamic index describes the magnitude of vertical and lateral water movement and can vary from stagnant in peatlands (*e.g.,* fens and bogs) to dynamic in mineral wetlands (*e.g.,* marshes) (MacKenzie and Moran 2004). This influences wetland biogeochemistry and vegetation composition.

- Surface Flow: surface water presence and depth can support wetland classification justification, biogeochemical and vegetation function, as well as provide habitat features.

TABLE 3.6-5

HYDROLOGICAL FUNCTION PARAMETERS

Parameter	Description
Hydrogeomorphic Setting and Basin Topography	The hydrogeomorphic setting of a wetland describes its topographic position as well as the hydrology of the site (Mackenzie and Moran 2004). There are six hydrogeomorphic settings identified including: • Estuarine System: sites located at the convergence of river and marine environments that are affected by tides. • Fluvial System: locations associated with flowing water and are subject to flooding, erosion and depositional processes. • Lacustrine System: lakeside sites that are influenced by lake hydrological processes including wave action, flooding and sedimentation. • Palustrine System, Basins and Hollows: depressions and other low areas where the water table is found near or at the ground surface and where the source of water typically is groundwater and precipitation. • Palustrine System, Ponds and Potholes: small waterbodies. • Palustrine System, Seepage Slopes: sites located on slopes where groundwater is near the ground surface resulting in seepage. The topography within and surrounding a wetland can determine the type of wetland that is created and its defining features.
Hydrodynamic Index (HI)	The hydrodynamic index consists of five categories which outline the magnitude of vertical and horizontal flow conditions through soil on wet and very wet sites (Mackenzie and Moran 2004). These include the following. • Stagnant: soil water is stagnant or moves very gradually. Fluctuations vertically are minimal. Surface saturation does occur but surface flooding does not. There is an abundance of in the accumulation of organic matter and high bryophyte cover. • Sluggish: groundwater moves gradually through peat or mineral soils along a hydrological gradient. Vertical fluctuations are minor. Soil saturation is semi-permanent. There is an abundance in peat accumulation and bryophyte cover. • Mobile: distinguishable flooding and drawdown and/or pronounced water movement laterally. Associated with many types of waterbodies (*i.e.,* peripheral peatlands, open water tracks, ponds, potholes, back marshes in estuaries). Consist of deep but well-decomposed accumulations of peat with patchy bryophyte cover. • Dynamic: lateral flow and/or vertical fluctuations of the water table through mineral soil. Associated with potholes in arid climates. There is little accumulation of organics and few byrophytes. • Very Dynamic: highly dynamic surface water associated with tidal sites, potholes and river systems. No organic matter accumulation and no byrophytes present.
Surface Flow	Wetlands are influenced by the presence or absence of water. Part of the field program focussed on the type of inlet or outlet present, its permanency and whether the inlet or outlet had been modified by external factors (*i.e.*, beaver activity). The source of the wetland's water was also documented (*e.g.*, groundwater, precipitation/run-off, watercourse).

Habitat Function

The habitat function of wetlands can be determined based on several factors that can be documented in the field. For this wetland evaluation, the existing data for the following parameters was collected:

- presence of vegetation indicator species and/or communities;
- wildlife observations; and
- habitat suitability.

Vegetation

Native vegetation is important due to its relationship with other ecosystem components. Preservation of native vegetation is key to the protection of gene pools for future use, protecting wildlife species and their habitats, preserving climax ecosystems and native biodiversity, conservation of representative samples of different habitats characteristic of a region, prevention of erosion, and preserving water quality and quantity.

During the wetland field program, the presence of plant species adapted to growing within saturated soils and their cover and density were documented. Of particular importance was the presence of woody vegetation, obligate hydrophytes and facultative hydrophytes since these groups can be used to identify the specific type of wetland observed. Woody vegetation species tend to be associated with more riparian areas in marsh type wetlands and can be dominant cover in treed or shrubby wetlands. Obligate hydrophytes tend to be more restricted to wetlands and semi-aquatic locations (*i.e.*, great bulrush). Facultative hydrophytes are common to wetlands but can also be found in more upland areas (*i.e.*, Labrador tea) (Mackenzie and Moran 2004).

The type of vegetation observed, its distribution and condition were recorded as an indication of overall wetland function.

Dominant vegetation was recorded (*e.g.*, tree, shrub, herbaceous, moss and/or weed species).

- Vegetation community composition often control site hydrology (e.g., peatland microtopography [Belyea 1996, Kellner and Halldin 2002]) and biogeochemistry (e.g., litter quality) as well as influence wetland habitat function.
- When present, weeds will be recorded into density distribution classes 1 through 9 according to Luttmerding et al. (1990). Weed presences can provide information about overall wetland function. Unknown species that make up a large component of the percent ground cover will be collected (where permissible) and preserved for proper identification.
- Within BC, ecological communities with an assigned a conservation ranking will be assessed. This ranking includes Extinct, Red, Blue, Yellow and No status.

Wildlife Observations and Habitat Suitability

Wetlands provide a variety of habitats for several wildlife species throughout all or a portion of their life cycle. During the field program the presence of wildlife species or wildlife sign (*i.e.*, tracks, scat, etc.) was documented.

Any identifiable habitat features (*e.g.*, snags present, browsing evident, sufficient cover and access to open water, etc.) were also recorded as they provide a proxy for the type of wildlife that benefit from wetland habitat as well as information on components of the wetland that are most important to wildlife, which will be considered when suggesting mitigation. The presence or absence of these habitat services can be used to determine whether the overall wetland function is being influenced by external factors.

Biogeochemical Function

Biogeochemical cycling includes the transport and transformation of chemicals through physical, chemical and biological processes. Wetland biogeochemical function can be defined as material inflows (sink),

outflows (source) and intrasystem cycling. Nutrient inputs and outputs can occur through geologic, biologic and hydrologic pathways. For wetlands, hydrologic pathways of inflow and outflow include precipitation, evaporation, surface and groundwater, as well as tidal exchange. Intrasystem cycling of chemical elements (*e.g.*, carbon, nitrogen, sulphur, phosphorus, etc.) are driven by biological activity.

The dynamic hydrologic conditions in wetlands strongly influences biogeochemical processes, primarily through the availability of oxygen for the biological processes involved in wetland nutrient cycling. Water table position directly affects microbial respiration rates and, consequently, decomposition rates by altering the availability of oxygen and other terminal electron acceptors in the soil column.

The quality of litter can be more important in controlling intersystem cycling, such as decomposition rates, than abiotic factors such as water table position and temperature (Moore and Dalva 1997, Szumigalski and Bayley 1996, Updegraff *et al.* 1996, Yavitt *et al.* 1997).

It may not always be possible to determine an ecosystem mass balance (*i.e.*, quantitative description of inputs, outputs and intrasystem cycling), since it could require several years of study. However, by measuring selected physical and chemical parameters that influence intrasystem nutrient cycling an estimate of wetland biogeochemical function can be determined (*e.g.*, Government of BC 2010, MacKenzie and Moran 2004, US Environmental Protection Agency 2008).

Biogeochemical characteristics, Table 3.6-6, such as litter quality, soil moisture regime, as well as standing or open water turbidity, colour and pH, were be identified.

- Litter quality can constrain biogeochemical cycling (e.g., rate of decomposition and nutrient turnover rates) (Straková et al. 2011, Szumigalski and Bayley 1996, Updegraff et al. 1996). Generally, litter quality can be grouped as poor (woody biomass and mosses), moderate (tree and shrub leaves and needles) and high (graminoid and herbaceous plants).

- Soil moisture regime is the amount of soil water available for evapotranspiration (MacKenzie and Moran 2004), which can alter soil reduction-oxidation potential and, therefore, plant nutrient availability and plant community composition.

- Water pH can influence nutrient availability as well as plant community structure (McLatchey and Reddy 1998, Vitt et al. 1995). Water colour and turbidity is an estimate of suspended and dissolved solids, which influence biogeochemical cycling. Water pH, colour and turbidity were measured in standing or open water.

TABLE 3.6-6

BIOGEOCHEMICAL FUNCTION PARAMETERS

Parameter	Description
Decomposition Rates	Degree of decomposition can be correlated to: • nutrient availability; • litter quality; and • rate of decomposition/mineralization. Decomposition rates can be determined using the Von Post Scale which ranges from material that is completely undecomposed and plant material is still identifiable (H1) to material that is completely decomposed and plant structures are not discernible (H10) (Ekono 1981).
Soil Moisture	Soil moisture is defined as the "*...average amount of soil water annually available for evapotranspiration by vascular plants over several years*" (Mackenzie and Moran 2004). Nine soil moisture categories have been identified ranging from Very Dry to Very Wet. However, wetlands and their associated ecosystems typically are found within the Moist to Very Wet categories. • Moist (M): water deficiencies do not occur and the need for water does not exceed supply. Can support forests. • Very Moist (VM): groundwater table often found within the rooting zone during the growing season and can be found more than 30 cm below the surface. Can support forests. • Wet (W): groundwater table often found within the rooting-zone during the growing season and can be found at or up to 30 cm below the surface. Can support trees and tall shrubs. • Very Wet (VW): groundwater table located at or above the surface mostly during the growing season. Can support low shrubs.

TABLE 3.6-6 Cont'd

Parameter	Description
Wetland pH	Wetland pH is a measure of the availability of base cations which are of importance more so in peatlands than hydrologically dynamic systems. This parameter can also affect the rate and type of biological and chemical processes within a wetland. There are five categories ranging from Very Acid to Akaline (Mackenzie and Moran 2004). Generally, an increase in the availability of base cations results in the reduction in site productivity. This occurs as acidity increased. • Very Acid (VA): <4.5 pH, true bogs with cover of *Sphagnum* Group I or III mosses but no minerotrophic indicators. • Moderately Acid (MA): 4.5 to 5.5 pH, high *Sphagnum* cover with minerotrophic indicators. • Slightly Acid (SA): 5.5 to 6.5 pH, fens or swamps with *Tomenthpnum*, *Warnstorfii* and *Drepanocladus* brown mosses present with a stagnant to sluggish hydrodynamic index. • Neutral (N): 6.5 to 7.4 pH, fens, swamps or marshes with a combination of species found on slightly acid and alkali sites. • Alkaline (A): >7.4 pH, wetlands dominated by minerophic bryophytes on peatlands (*e.g.,* Scorpidium or Campylium mosses) and alkali-tolerant species in marshes.

Data collection methods are based on the Wisconsin Rapid Assessment Methodology (Wisconsin Department of Natural Resources 2001), Manual for the Wetland Ecosystem Services Protocol for the United States (WESPUS) (Adamus 2011), Riparian Health Assessment for Lakes, Sloughs and Wetlands (Ambrose *et al.* 2009), Riparian Health Assessment for Streams and Small Rivers (Fitch *et al.* 2001), Ontario Wetland Evaluation System (Ontario Ministry of Natural Resources [OMNR] 1993) and Wetland Ecological Functions Assessment: An Overview of Approaches (Hanson *et al.* 2008).

This methodology captures information to determine existing (*i.e.*, pre-construction) conditions of wetlands and wetland function. Once collected, this data provides sufficient detail on wetlands to support, where warranted: *NWPA* applications; COP notifications; application for *Water Act* and *Public Lands* approvals from AESRD in Alberta; approval from or notification to the BC OGC under Section 9 of the *Water Act* in BC; and for any development permits for different municipalities (*i.e.*, RD of Fraser–Fort George). The existing data collection approach was discussed with Environment Canada, AESRD, BC OGC, BC MOE and BC MFLNRO. It was felt to be an appropriate approach (Section 2.0).

3.6.3.1 Sampling Frequency

All wetlands where access was available were ground-truthed in the 2012 and 2013 field programs. The goal is to obtain site-specific existing information for all wetlands encountered by the proposed pipeline corridor and associated power lines prior to construction.

3.6.4 Wetland Function

Wetland function was evaluated at each wetland encountered during the ground-based field work. The functions for wetlands crossed by the proposed pipeline corridor and associated power lines are reported on the premise that disturbed wetlands would be revisited in the years following construction to document the progress of functionality returning to the wetland system after pipeline construction. Wetland functions documented during the existing condition (*i.e.*, pre-construction) evaluation will be compared to wetland functions observed along the reclaimed (*i.e.*, post-construction) construction right-of-way. The results of this comparison will be used to measure the effectiveness and efficiency of mitigation and reclamation measures, and provide support to the determination of loss or “no net loss” of wetland function.

Details on each of the wetland functional categories are as follows.

- **High Functional Conditions:** wetlands that demonstrate many wetland functions expected for their type and class are high functioning wetlands. These wetlands are performing all expected wetland functions for their type and class (*e.g.,* vegetation and wildlife habitat function, hydrological function as well as water quality and substrate functions). Following construction, these wetlands are anticipated to recover high functioning wetland habitat (*i.e.,* hydrophytic vegetation will re-establish, hydric substrate will be maintained and hydrology will be restored), although there is a potential for an alteration of vegetation (*i.e.,* graminoid or shrubby species dominant within previously treed wetlands), an overall loss of wetland habitat is not anticipated.

- **High-Moderate Functional Conditions:** wetlands that demonstrate many wetland functions expected for their type and class are high-moderate functioning wetlands. These wetlands are mildly disturbed, which reduces the efficacy of the wetland to perform all wetland functions expected for the wetland type and class (*e.g.,* vegetation and wildlife habitat function, hydrologic function as well as water quality and substrate functions). Following construction, these wetlands are anticipated to recover to continue to function as wetland habitat (*i.e.,* hydrophytic vegetation will re-establish, hydric substrate will be maintained and hydrology will be restored), although there is a potential for an alteration of vegetation (*i.e.,* graminoid or shrubby species dominant within previously treed wetlands), an overall loss of wetland habitat is not anticipated.

- **Low-Moderate Functional Conditions:** wetlands that demonstrate some of the wetland functions expected for their type and class, with moderate anthropogenic disturbance, are low-moderate functioning wetlands. They are moderately disturbed throughout (*e.g.,* existing right-of-way or access road through portion of a wetland of local extent). The disturbance reduces the efficacy of the wetland to perform wetland functions expected for the wetland type and class (*e.g.,* vegetation and wildlife habitat function, hydrologic function as well as water quality and substrate function). Following construction, these wetlands may recover to their wetland type and class. However, the potential for wetland communities to revert to an earlier successional stage following construction may alter the wetland's ability to recover its wetland function qualities, which may impact the recovery trajectory.

- **Low Functional Conditions:** wetlands that demonstrate limited wetland functions expected for their type and class due to severe anthropogenic disturbance (*e.g.,* permanent access road through wetland of local extent). These wetlands are severely disturbed, which effects the efficacy of the wetland to perform wetland functions expected for the wetland type and class (*e.g.,* vegetation and wildlife habitat function, hydrologic function as well as substrate function). Following construction, these wetlands are likely to remain as low functioning.

If a wetland is determined to not exhibit High Functional Conditions during the pre-construction evaluation (*i.e.*, the wetland function is categorized as High-Moderate Functional Condition**,** Low-Moderate Functional Condition or Low Functional Condition), it should be noted that the proponent is not responsible for returning the wetland to High Functional Conditions, however, will aim to return the wetland to same functional condition as documented pre-construction (*e.g.*, a High-Moderate Functional Condition wetland should be reclaimed to a High-Moderate Functional Condition subsequent to pipeline construction).

Table 3.6-7 provides a breakdown in the assessment scoring assigned to these functional conditions as well as some of criteria used to determine these scores.

TABLE 3.6-7

WETLAND LANDSCAPE FUNCTIONAL CONDITION BREAKDOWN

Functional Condition	Score Range	Criteria[1]
High Functional Condition	75-100%	• Riparian Habitat: full riparian zone (no disturbance) with diverse plant composition (woody and herbaceous). • Surrounding Land Use: undisturbed. • Hydrologic Flow: flow (slope, wetland complex, existing channel, inlet and outlet, etc). • Wetland Surface Connectivity: wetland complex. • Vegetation Cover/Density: heavily vegetated with less than 5% open water or bare soil. • Biodiversity and Habitat Availability: wildlife trees and/or snags in or adjacent to wetland, tame pasture species absent, suitable nesting cover present for waterfowl/shorebirds in wetland (vegetation greater than 50 cm in height). • Water Impedance/Improper Contouring: no artificial impedance (berm, trench crown, roadway) or no unnatural contouring. • Water Storage: *Sphagnum spp.* dominated peat wetland. • Hydrologic Connectivity: palustrine (isolated) wetland. • Hydraulic Conductivity: permeable substrate (temporary or ephemeral wetland).

TABLE 3.6-7 Cont'd

Functional Condition	Score	Criteria[1]
High-Moderate Functional Condition	50-74%	• Riparian Habitat: narrowed full riparian zone (*disturbance*) with diverse plant composition (woody and herbaceous). • Surrounding Land Use: seismic exploration. • Hydrologic Flow: flow (slope, wetland complex, existing channel, inlet and outlet, etc). • Wetland Surface Connectivity: wetland complex, isolated wetland. • Vegetation Cover/Density: vegetation on wetland margins and vegetated islands present therefore creating longer water flow path. • Biodiversity and Habitat Availability: wildlife trees and/or snags in or adjacent to wetland, tame pasture species rare to single patches or sporadic to few patches, suitable nesting cover present for waterfowl/shorebirds in wetland (vegetation greater than 50 cm in height). • Water Impedance/Improper Contouring: no artificial impedance (berm, trench crown, roadway) or no unnatural contouring. • Water Storage: large (greater than or equal to 500 m^2) mineral wetland. • Hydrologic Connectivity: fluvial wetland associated with lower order stream/river or partial disconnect from wetland complex due to artificial disturbance. • Hydraulic Conductivity: semi-permeable substrate (seasonal or semi-permanent wetland).
Low-Moderate Functional Condition	25-49%	• Riparian Habitat: partial riparian (half margin or clusters). • Surrounding Land Use: cutblock or hayed (or wetland has been hayed). • Hydrologic Flow: no flow (including ephemeral flow). • Wetland Surface Connectivity: isolated wetland or impeded connectivity (*e.g.*, berm or blockage). • Vegetation Cover/Density: vegetation on margins only or vegetation located in centre of wetland only. • Biodiversity and Habitat Availability: tame pasture sporadic to few patches to several patches or more, suitable nesting cover present for waterfowl/shorebirds in wetland (vegetation greater than 50 cm in height) absent. • Water Impedance/Improper Contouring: artificial impedance (ponding) or unnatural contouring. • Water Storage: mineral (less than approximately 500 m^2) wetland associated with complex or graminoid/herbaceous dominated peat wetland. • Hydrologic Connectivity: fluvial wetland associated with higher order stream/river. • Hydraulic Conductivity: semi-permeable substrate (seasonal or semi-permanent wetland).
Low Functional Condition	0-24%	• Riparian Habitat: no riparian (less than 50 cm). • Surrounding Land Use: pasture, cultivated or hydrologic impediment (*e.g.,* road). • Hydrologic Flow: no flow (including ephemeral flow). • Wetland Surface Connectivity: impeded connectivity (*e.g.,* berm or blockage). • Vegetation Cover/Density: vegetation on wetland margins and vegetated islands present therefore creating longer water flow path. • Biodiversity and Habitat Availability: wildlife trees and/or snags in or adjacent to wetland absent, tame pasture several patches to more, suitable nesting cover present for waterfowl/shorebirds in wetland (vegetation greater than 50 cm in height) absent. • Water Impedance/Improper Contouring: artificial impedance (ponding) or unnatural contouring. • Water Storage: no peat or small isolated wetland or peat has been removed. • Hydrologic Connectivity: fluvial wetland associated with higher order stream/river or lacustrine wetland. • Hydraulic Conductivity: impermeable substrate (permanent wetlands mineral or peat) or unnatural permeable substrate (wetland drying after disturbance).

Note: 1. Criteria presented here are examples of the criteria used to evaluate these functional conditions.

3.7 Wetland Extrapolation

Wetlands identified through ground-based surveys within the proposed pipeline corridor and their functional conditions were be extrapolated out to the Wetland LSA and Wetland RSA based on their frequency of occurrence and percentage of land cover. Data sources, such as CanVec in Alberta and the Fresh Water Atlas in BC, were used to supplement the ground-based data. Areas within the Wetland LSA and Wetland RSA which are not conducive to having wetlands (*i.e.*, mountainous areas or steep slopes) were subtracted from this exercise.

This analysis achieves an overview of potential wetland type, functional condition and distribution throughout the Wetland LSA and Wetland RSA, which in turn provides for a quantitative evaluation of Project-specific and cumulative effects.

3.8 Navigable Wetlands

According to the NEB *Filing Manual* (2013) navigable water is defined as "... *any body of water capable, in its natural state, of being navigated by floating vessels of any description for the purpose of transportation, recreation or commerce, and may also be a human-made feature such as a canal or reservoir."*

Wetlands in some circumstances fall within this definition as they have characteristics that allow for floating vessels to traverse across them (*i.e.,* deeper, more permanent water, channels through the wetland). Specific types of wetlands that would fall under this designation include deep emergent marshes, open water ponds and non-woody fens which have open water channels throughout or any wetlands associated with a classified watercourse.

Wetlands encountered along the proposed pipeline corridor were assessed as to whether or not they would fall under this designation. Criteria were developed to help with identifying any potentially navigable wetlands. Criterion used included:

- classification of wetland (*i.e.,* deep marsh, open water pond, non-woody fen or any wetland associated with classified watercourses);
- permanency of water (*i.e.,* semi-permanent or permanent); and
- presence of semi-permanent or permanent open water channels within the wetland (*e.g.,* within non-woody fens).

4.0 RESULTS OF LITERATURE/DESKTOP REVIEW

4.1 General Information

4.1.1 Wetland Definition

Wetlands are defined as follows:

> *"…land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment."* (NWWG1997).

This wetland definition encompasses a wide range of ecosystems, from semi-terrestrial peatlands (*i.e.*, fens and bogs commonly referred to as muskeg) and swamps to semi-aquatic marshes and shallow open water complexes. Wetlands include a broad range of ecosystem types, from those permanently flooded by shallow water and dominated by aquatic organisms to forested sites with merely moist soils.

4.1.2 Aboriginal Traditional Knowledge

Wetlands provide a nutrient-rich habitat for a variety of plants and animals that are important to Aboriginal communities for subsistence harvesting and sustaining traditional practices. Large mammals found in and around these areas, such as caribou and moose, as well as small fur-bearers make these ecosystems important for Aboriginal trapping and hunting activities. Medicinal and other culturally important plants, such as the diamond willow, are also frequently found in wetland regions. Concerns related to wetlands identified during engagement on other development projects in the region include the disruption of wetlands and muskeg (*i.e.,* peatland*)* areas, contamination due to pollution related to pipeline construction and the displacement or destruction of medicinal and otherwise important plants (Lifeways of Canada Ltd. [Lifeways] 2012, Northern Gateway Pipelines Limited Partnership [NGPLP] 2010).

Where available, background ATK information collected for each component of the Project is included in the corresponding subsections below.

4.1.3 Environmental Setting

Table 4.1-1 provides a summary of the environmental settings for each component of the Project. Detailed description of the different components can be found below.

TABLE 4.1-1

SUMMARY OF ENVIRONMENTAL SETTING

Pipeline Segment	Pump Station/ Terminal/Power Lines	Ecozones and Ecoregions of Canada	Wetland Region	Wetland Distribution	Natural Subregion of Alberta	Biogeoclimatic Zone of BC	Biogeoclimatic Zone of BC Variant[1]	Migratory Bird Sanctuaries	Western Hemisphere Shorebird Reserves	Important Bird Areas	Ramsar Wetlands	Ducks Unlimited Canada Priority Areas	Protected Areas Encountered
ALBERTA													
Edmonton to Hinton	Edmonton Terminal Gainford Pump Station Wolf Pump Station Edson Pump Station Hinton Pump Station	Prairie Ecozone • Aspen Parkland Ecoregion Boreal Plains Ecozone • Boreal Transition Ecoregion • Western Alberta Upland Ecoregion	Continental and Transitional Mid-Boreal	5 – 40%	Central Parkland Dry Mixedwood Central Mixedwood Lower Foothills Montane	N/A	N/A	N/A	N/A	N/A	N/A	Level 1 Priority: Prairie Pothole Region and Western Boreal Forest (crossed by the proposed pipeline corridor)	Yates Natural Area (within 0.02 km north of proposed pipeline corridor at RK 222.0) Nojack Provincial Recreation Area (within 0.07 km north of proposed pipeline corridor at RK 175.5)
N/A	Jasper Pump Station	Boreal Plains Ecozone • Western Alberta Upland Ecoregion	South Rocky Mountain	<5%	Montane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Jasper National Park (pump station is located within the park)
BRITISH COLUMBIA													
Hargreaves to Darfield	Rearguard Pump Station Blue River Pump Station Blackpool Pump Station Darfield Pump Station	Montane Cordillera Ecozone • Eastern Continental Ranges Ecoreion • Western Continental Ranges Ecoregion • Columbia Mountains and Highlands Ecoregion	Continental Mid-Boreal South Interior Mountain	<5 - 10%	N/A	Interior Cedar-Hemlock Sub-Boreal Spruce Interior Douglas-fir	ICHmm SBSdh1 ICHwk1 ICHvk1 ICHmw3 ICHdw3 IDFmw2 IDFmw2b	N/A	N/A	N/A	N/A	Level 3 Priority Areas: Eastern Boreal Forest (crossed by the proposed pipeline corridor)	Jackman Flats Provincal Park (0.04 km west of the proposed pipeline corridor at RK 506.7 to RK 511.7) Blue River Black Spruce Provincal Park (0.03 km east of the proposed pipeline corridor at RK 610.2 to RK 611.9) Finn Creek Provincal Park (crossed by the proposed pipeline corridor, RK 638.7 to RK 639.3) North Thompson River Provincal Park (crossed by the proposed pipeline corridor, RK 725.5 to RK 726.5) Eakin Creek Canyon Provincal Park (0.07 km west of the proposed pipeline corridor at RK 752.4 to RK 752.7) Chu Chua Cottonwood Provincal Park (0.03 km east of the proposed pipeline corridor at RK 765.3 to RK 766.8)
Black Pines to Hope	Black Pines Pump Station Kamloops Pump Station Kingsvale Pump Station	Montane Cordillera Ecozone • Thompson – Okanagan Plateau Ecoregion • Okanagan Range Ecoregion	Intermountain Prairie South Coastal Mountain Pacific Temperate	<5 - 10%	N/A	Ponderosa Pine Interior Douglas-fir Bunchgrass Montane Spruce Coastal Western Hemlock Englemann Spruce-Subalpine Fir Mountain Hemlock	PPxh2 IDFxh2 BGxw1 BGxh2 IDFxh2a IDFdk1 IDFxh1 IDFdk2 MSdm2 MSmw1 CWHms1 ESSFmw MHmm2 CWHds1	N/A	N/A	Douglas Lake Plateau (BC172) (crossed by the proposed pipeline corridor, RK 850.6 to 863.7)	N/A	Level 2 Priority Areas: BC Coastal Areas and Estuaries (crossed by the proposed pipeline corridor) Level 3 Priority Areas: Eastern Boreal Forest (crossed by the proposed pipeline corridor)	Lac Du Bois Grasslands Protected Area (crossed by the proposed pipeline corridor, RK 829.0 to RK 836.8 and RK 842.4 to 843.9) Coldwater River Provincial Park (within 0.01 km east of proposed pipeline corridor at RK 980.1) Coquihalla Summit Recreation Area (crossed by the proposed pipeline corridor, RK 992.4 to RK 1005.1) Coquihalla River Provincal Park (within 0.05 km west of proposed pipeline corridor at RK 1023.1)
	Black Pines power line		Intermountain Prairie	<5 - 10%		Ponderosa Pine	PPxh2			N/A		Level 3 Priority Areas: Eastern Boreal Forest (crossed by the proposed pipeline corridor)	N/A
	Kingsvale power line		Intermountain Prairie	<5		Interior Douglas-fir	IDFxh1 IDFdk1 IDFdk2 IDFxh2 IDFxh2a			N/A		N/A	N/A

TABLE 4.1-1 Cont'd

Pipeline Segment	Pump Station/ Terminal/Power Lines	Ecozones and Ecoregions of Canada	Wetland Region	Wetland Distribution	Natural Subregion of Alberta	Biogeoclimatic Zone of BC	Biogeoclimatic Zone of BC Variant[1]	Migratory Bird Sanctuaries	Western Hemisphere Shorebird Reserves	Important Bird Areas	Ramsar Wetlands	Ducks Unlimited Canada Priority Areas	Protected Areas Encountered
Hope to Burnaby	Sumas Pump Station Sumas Terminal	Pacific Maritime Ecozone • Pacific Ranges Ecoregion • Cascade Ranges Ecoregion • Lower Mainland Ecoregion	Pacific Temperate	5 – 10%	N/A	Coastal Western Hemlock	CWHds1 CWHdm CWHxm1	N/A	N/A	N/A	N/A	Level 2 Priority Areas: BC Coastal Areas and Estuaries (crossed by the proposed pipeline corridor)	Cheam Lake Wetlands Regional Park (crossed by the proposed pipeline corridor, RK 1079.9 to RK 1080.1 and RK 1080.1 to RK 1080.4) Surrey Bend Regional Park (crossed by the proposed corridor RK 1160.5 to RK 1163.7)
Burnaby to Westridge	Burnaby Terminal Westridge Marine Terminal	Pacific Maritime Ecozone • Lower Mainland Ecoregion	Pacific Temperate	5 – 10%	N/A	Coastal Western Hemlock	CWHdm	N/A	N/A	English Bay and Burrand Inlet (BC020) (crossed by the proposed pipeline corridor, RK 1183.6 to RK 1183.8)	N/A	Level 2 Priority Areas: BC Coastal Areas and Estuaries (crossed by the proposed pipeline corridor)	N/A

Sources: Agriculture and Agri-Food Canada 2013, BC Conservation Data Centre 2013, Bird Studies and Nature Canada. 2012, Bureau of the Convention on Wetlands 2013, DUC 2013, Ecological Stratification Working Group 1995, Environment Canada 1991, 1996, 2013, Lynch-Stewart 1992, Lynch-Stewart *et al.* 1996, Natural Regions Committee 2006, Natural Resources Canada 2009, Ramsar 1987 and Western Hemisphere Shorebird Reserve Network 2013

Note: 1 Biogeoclimatic Zone of BC Variant is broken up as follows:

Relative Precipitation	Code	Relative Temperature or Continentality*	Code
very dry	x	hot	h
dry	d	warm	w
moist	m	mild	m
wet	w	cool	k
very wet	v	cold	c
		very cold	v
		hypermaritime*	h
		maritime*	m
		submaritime*	s

(BC Ministry of Forests 1992)

4.1.3.1 Edmonton to Hinton Segment

The following subsections describe the environmental setting along the Edmonton to Hinton Segment, including the Edmonton Terminal, Gainford Pump Station, Wolf Pump Station, Edson Pump Station and the Hinton Pump Station.

Ecozones and Ecoregions of Canada

The Edmonton to Hinton Segment (RK 0 to RK 339.4) is located within three Ecoregions of Canada, namely the Apsen Parkland, Boreal Transition and the Western Alberta Upland Ecoregions (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Aspen Parkland Ecoregion is a component of the Prairies Ecozone. This ecoregion extends from southern Manitoba westward into central Alberta, representing a transitional zone from the boreal forest to the grasslands. The climate is characterised by summers that are short and warm, and winters that are long and cold with relatively consistent snow cover. Wetland habitat comprises approximately half of this ecoregion. Soils in this ecoregion consist of loamy black chernozemic soil, making this ecoregion incredibly viable when it comes to productive agricultural land. Poorly drained gleysolic soils are also commonly found in this ecoregion. In these poorly drained areas, sedge and willow species can be commonly found, and small lakes and ponds can be found throughout the landscape. These areas of ponding water support many species of waterfowl, and offer important resources for a variety of wildlife species (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Boreal Transition Ecoregion, a component of the Boreal Plains Ecozone, extends from southern Manitoba to central Alberta and has a subhumid low boreal ecoclimate. Warm summers and cold winters are commonplace in this ecoregion. Mean annual precipitation in this ecoregion where the Project is situated is approximately 450 mm. The dominant vegetation is deciduous boreal forest interspersed with farmland. Sedge species, willow species, black spruce and tamarack are frequently found in low, poorly drained areas. Many small lakes, ponds and marshes occupy shallow depressions in the landscape. Grey Luvisols and dark grey chernozemic soils are the dominant types in this ecoregion, however, black chernozemic, peaty gleysolic, and mesisolic soils are also present in some areas. This ecoregion provides essential habitat for waterfowl and neotropical migrant birds (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Western Alberta Upland Ecoregion is also located within the Boreal Plains Ecozone. This ecoregion is comprised of two separate areas: one small southern area extending into the foothills of Alberta; and a larger, more northern area extending into BC. The mean annual precipitation ranges from 450-600 mm across both areas. The vegetation found in this ecoregion represents a transition between mid-boreal and mid-cordilleran ecosystems. Dry areas are characterised by aspen and lodgepole pine, while wet areas are characterised by black spruce and tamarack. Peat blankets, well-developed luvisolic, gleysolic and organic soils are dominant in this ecoregion (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

Wetland Regions of Canada

Wetland regions are areas defined by characteristic and similar wetland ecosystems that develop in locations having similar topography, hydrology and nutrient regime. Subdivisions of these regions are made based on wetland distribution, the relative abundance of wetland type (bogs, fens, swamps, marshes and shallow water) or developmental trends dissimilar to those in the rest of the region (Government of Canada 1986).

The Edmonton to Hinton Segment is located within Continental and Transitional Mid-boreal Wetland Region, a subcomponent of the Mid-boreal Wetland Region (Government of Canada 1986). This area is transitional between the Prairie region to the south and the Boreal region to the north. In this transitional region, common wetlands include treed bogs and fens occurring on broad flats and in confined basins. Floating fens and shore swamps may border lakes and ponds. Marshes are present in agricultural areas and along the edges of some streams and lakes. In the western portions of the region, the climate experiences cold winters and warm summers. Peat thickness within these two regions averages approximately 4 m in the Continental Mid-boreal and 2-3 m in bogs found within the Transitional Mid-

boreal and less in fens (Government of Canada 1986). Wetland distribution along the Edmonton to Hinton Segment ranges from approximately 5% in the east to 40% in the west (Natural Resources Canada 2009).

Natural Subregions of Alberta

The Edmonton to Hinton Segment is located within five Natural Subregions of Alberta. These include the Central Parkland, Dry Mixedwood, Central Mixedwood, Lower Foothills and Montane Natural Subregions (Natural Regions Committee 2006).

The Central Parkland Subregion of the Parkland Natural Region consists of productive croplands with most of the region being cultivated. The remaining native vegetation is usually an aspen-grassland mosaic. Plains rough fescue dominates the vegetation communities in the southern and eastern areas with small aspen dominated communities occurring in moister habitats. The northern and western parts are composed of aspen forest with grasslands being restricted to the driest areas. Black Chernozem soils normally occur under grasslands while Dark Grey Chernozems and Luvisols generally occur in aspen forests. Wetlands make up approximately 5-10% of the total area of the Central Parkland Subregion (Natural Regions Committee 2006, Natural Resources Canada 2009) with many small waterbodies scattered throughout the area. The typical wetland types include marshes, willow scrublands and seasonal ponds in the southern part of the subregion. Treed fens with shallow organic soils occur in the northwest. The topography of this area is steeply undulating with wetland basins occurring within the low areas between hills (Natural Regions Committee 2006).

The Dry Mixedwood Natural Subregion is the most southern and the warmest of the Boreal Forest Subregions in Alberta (Natural Regions Committee 2006). It is dominated by level to gently undulating glacial till and lacustrine plains. Hummocky uplands are prevalent in the south with Gray Luvisols being the dominant soil type in this area. Gleysols and organic soils dominate wetland areas. Aspen forests with understories dominated by prickly rose, low-bush cranberry, beaked hazelnut and Canada buffaloberry are typical of the uplands. Treed, shrubby or sedge-dominated fens are common in wet areas. Jack pine typically dominates dry, well-drained areas (Natural Regions Committee 2006). Wetlands vary within this subregion from approximately 10-40% depending on the site location (Natural Resources Canada 2009). The proposed pipeline corridor crosses a portion of the Dry Mixedwood Natural Subregion where wetland distribution is approximately 10-25% (Natural Resources Canada 2003).

The Central Mixedwood Natural Subregion of the Boreal Forest Natural Region consists of predominately aspen, mixedwood, and white spruce forests on uplands, with jack pine stands on coarser materials to the east. This subregion is slightly cooler and moister then the Dry Mixedwood Natural Subregion, however, there is north-to-south variability. Within this subregion, wetlands are a dominant component of the landscape. Common wetland types in this subregion include treed fens on organic deposits (*i.e.*, peat) and marshes on wet mineral soils. Many small lakes occur within this subregion (Natural Regions Committee 2006). Wetland distribution within this subregion varies from 10-60% depending on the site location (Natural Resources Canada 2009). The proposed pipeline corridor crosses a portion of the Central Mixedwood Natural Subregion where wetland distribution is approximately 25-40% (Natural Resources Canada 2009).

The Lower Foothills Natural Subregion of the Foothills Natural Region is characterised by rolling, till-covered plateaus forested by mesic, closed canopy mixed stands of aspen, lodgepole pine, white spruce and balsam poplar. Common understory species on mesic sites include: green alder; low-bush cranberry; prickly rose; wild sarsaparilla; dewberry; fireweed; and bluejoint. Within the Lower Foothills Natural Subregion, wetlands often contain peat accumulations up to 4 m thick and are predominantly treed fens with some bogs and open fens. There is little standing water in this subregion (Natural Regions Committee 2006). Wetlands vary within this subregion from approximately 10-40% depending on the site location (Natural Resources Canada 2009). The proposed pipeline corridor crosses a portion of the Lower Foothills Natural Subregion where wetland distribution is approximately 25-40% (Natural Resources Canada 2009).

The Montane Natural Subregion occupies approximately 9,000 km² of land. The Montane Subregion occurs at lower elevations along the Front Ranges and along the upper elevations of the Porcupine Hills and Cypress Hills. The Subregion contains rolling and hilly foothills with five major river valleys

(Crowsnest, Bow, North Saskatchewan, Athabasca, and Smokey rivers). In the foothill areas, orthic black Chernozems are typical of grassland areas with orthic Dark Grey Chernozems found in more wooded areas. Eutric Brunisol soils dominate in the river valleys. Vegetation communities are mainly comprised of closed forest communities dominated by lodgepole pine, Douglas-fir, aspen and white spruce. Deciduous forests occur on fluvial fans, terraces and floodplains and open grasslands occur on dry and exposed sites. Wetlands are rare in the Montane Subregion, with fens and marshes occupying approximately 2% of the total subregion area (Natural Regions Committee 2006).

Important Waterbodies and Wetlands

Wetlands along and adjacent to the proposed pipeline corridor provide potential habitat for a number of species, including amphibians and several species of waterfowl and shorebirds.

In Alberta, the proposed pipeline corridor does not encounter the 200 m setback of any provincially identified piping plover waterbodies (AESRD 2010-2012). The proposed pipeline corridor does not encounter the 1,000 m setback of provincially identified colonial nesting bird waterbodies. However, the proposed pipeline corridor does encounter the 800 m setback of three provincially identified trumpeter swan waterbodies (AESRD 2010-2012). The three trumpeter swan waterbodies include:

- Unnamed Lake (SW 22-53-185 WM) approximately 400 m from the proposed pipeline corridor (RK 241.4 to RK 243.1);
- Annabel Lake (34-52-195 WM) approximately 700 m from the proposed pipeline corridor (RK 253.9 to RK 254.6); and
- Unnamed Lake (W 5-53-195 WM) approximately 200 m from the proposed pipeline corridor (RK 256.8 to RK 258.6).

In situations where activities are identified to be within close proximity of trumpeter swan waterbodies, a restricted activity period (RAP) is outlined as "...*April 1 to September 30, no activity within 800 m of the high water mark of identified lakes or waterbodies*" and "*no development (roads, structures, etc.) within 500 m of the high water mark on identified lakes or waterbodies*" (AESRD 2012b).

The Edmonton to Hinton Segment does not cross any Migratory Bird Sanctuaries (Environment Canada 2013a), Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2013), Important Bird Areas (Bird Studies Canada and Nature Canada 2012) or Ramsar wetlands (Bureau of the Convention on Wetlands 2013).

Ducks Unlimited Canada Priority Areas

Ducks Unlimited Canada (DUC) has identified three levels of priority for wetland conservation in Canada. Within Alberta, the Edmonton to Hinton Segment travels through the DUC Level 1 Priority Landscapes. This priority level includes the Prairie Pothole Region and the Western Boreal Forest Region of Canada (DUC 2013). No DUC sites are crossed by the proposed pipeline corridor (McFarlane pers. comm.).

Provincial Parks and Protected Areas

Provincial parks, recreational and protected areas were identified within the Wetland LSA for all of the proposed pipeline segments. In Alberta, two protected areas, Nojack Provincial Recreation Area and Yates Natural Area, were identified in proximity to the Edmonton to Hinton Segment. The proposed pipeline corridor at RK 175 is located 0.07 km south of the Nojack Provincial Recreation Area and at RK 222 is located 0.02 km south of the Yates Natural Area.

Aboriginal Traditional Knowledge

Available ATK related to wetlands along the proposed Edmonton to Hinton Segment is limited. However, the desktop review identified concerns regarding the disruption of wetlands and muskeg due to pipeline construction activities since these disruptions could result in lower animal populations and impact medicinal plants (NGPLP 2010).

4.1.3.2 Jasper Pump Station

The following subsections describe the environmental setting around the Jasper Pump Station.

Ecozones and Ecoregions of Canada

The Jasper Pump Station (KP 369.5 along the existing TMPL right-of-way) is located within the Western Alberta Upland Ecoregion of Canada (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Western Alberta Upland Ecoregion is also located within the Boreal Plains Ecozone. This ecoregion is comprised of two separate areas; one small southern area extending into the foothills of Alberta and a larger, more northern area extending into BC. The mean annual precipitation ranges from 450-600 mm across both areas. The vegetation found in this ecoregion represents a transition between mid-boreal and mid-cordilleran ecosystems. Dry areas are characterised by aspen and lodgepole pine, while wet areas are characterised by black spruce and tamarack. Peat blankets, well-developed Luvisolic, Gleysolic and Organic soils are dominant in this ecoregion (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

Wetland Regions of Canada

The Jasper Pump station is located within South Rocky Mountain Wetland Region, a subcomponent of the Rocky Mountain Wetland Region. Within this region wetlands typically are found within valleys and consist of flat bogs, horizontal fens, floodplain marshes and shallow basin marshes. The peat depth is can be up to 1 m (Government of Canada 1986). Wetland distribution around the Jasper Pump Station ranges from approximately less than 5% (Natural Resources Canada 2009).

Natural Subregions of Alberta

The Jasper Pump Station is located within the Montane Subregion (Natural Regions Committee 2006). The description of this subregion is provided above under the Edmonton to Hinton Segment.

Important Waterbodies and Wetlands

The Jasper Pump Station does not encounter the 200 m setback of any provincially identified piping plover waterbodies, the 1,000 m setback of provincially identified colonial nesting bird waterbodies or the 800 m setback of any provincially identified trumpeter swan waterbodies (AESRD 2010-2012).

The Jasper Pump Station also does not cross encounter any Migratory Bird Sanctuaries (Environment Canada 2013a), Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2013), Important Bird Areas (Bird Studies Canada and Nature Canada 2012) or Ramsar wetlands (Bureau of the Convention on Wetlands 2013).

Ducks Unlimited Canada Priority Areas

The Jasper Pump Station does not encounter any of the DUC Priority Landscapes (DUC 2013).

Provincial Parks and Protected Areas

The Jasper Pump Station is located within the Jasper National Park.

4.1.3.3 Hargreaves to Darfield Segment

The following subsections describe the environmental setting along the Hargreaves and Darfield Segment, including the Rearguard Pump Station, Blue River Pump Station, Blackpool Pump Station and Darfield Pump Station.

Ecozones and Ecoregions of Canada

The Hargraves to Darfield Segment (RK 489.6 to RK 769.0) is located within three Ecoregions of Canada, namely the Eastern Continental Ranges, Western Continental Ranges and the Columbia Mountains and Highlands ecoregions (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Eastern Continental Ranges Ecoregion, a component of the Montane Cordillera Ecozone, encompasses the Canadian Rocky Mountains in Alberta, including the eastern flanks of the Continental Ranges and a small area extending northwestward into BC. Temperatures are relatively cold in winter and early spring due to cold Arctic air along the eastern margin and within valleys. The mean annual precipitation ranges are 600-800 mm and increase with elevation from east to west. The dominant soil types include regosolic and eutric brunisolic soils, which have developed on steeply-sloping colluvial, morainal, and fluvioglacial deposits. Additionally, dystric Brunisols are more common in alpine and subalpine ecosystems. The ecoregion is largely comprised of subalpine and alpine ecosystems, characterised by mixed forests of alpine fir, lodgepole pine and Engelmann spruce. The alpine vegetation includes low-growing heather with sedges and mountain avens (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

Also within the Montane Cordillera Ecozone, the Project encounters the Western Continental Ranges Ecoregion which encompasses the Rocky Mountains of southeastern BC including the Continental Ranges and primarily consists of alpine and subalpine ecosystems. It also contains a few major valley systems, which receive a mean annual precipitation of 700-800 mm. The mean annual precipitation in the subalpine zone is 1,200 mm. Regosolic, Brunisolic, and occasional Podzolic soils have developed on colluvial, morainal, and fluvioglacial deposits in the ecoregion (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Columbia Mountains and Highlands Ecoregion extends from the northern end of the Cariboo Mountains south to the Washington border and is a complex of montane to alpine ecosystems. The mean annual temperature for the ecoregion varies from north to south, with a summer mean of 14°C and a winter mean of -5°C. Humo-ferric Podzols with dystric brunisolic soils developed on colluvial and morainal deposits are the dominant soils in this ecoregion. This ecoregion is home to a variety of wildlife including bears, moose, white-tailed deer and waterfowl (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

Wetland Regions of Canada

The Hargreaves to Darfield Segment is located within two Wetland Regions of Canada, the Continental Mid-boreal and the South Interior Mountain.

The Continental Mid-boreal Wetland Region's characteristic wetlands are treed bogs and fens occurring on broad flats and in confined basins. Floating fens and shore swamps may border lakes and ponds. Marshes can be found in agricultural areas and along edges of some streams and lakes. The climate varies from cold winters and warm summers in the west to mild winters and cooler summers in the east. Precipitation is high in the east and decreases gradually westward across the region. Peat thickness within the region averages about 4 m thick (Government of Canada 1986).

Wetland characteristic of the South Interior Mountain Wetland Region are flat bogs, basin bogs and shallow basin marshes. Within alpine areas, small basin fens and basin bogs can be found. Peat depth averages 1-2 m (Government of Canada 1986).

Wetland distribution along this portion of the proposed pipeline corridor varies from less than 5-10% (Natural Resources Canada 2009).

Biogeoclimatic Zones of British Columbia

In BC, regional-scale classification and mapping of ecosystems is provided according to the Biogeoclimatic Ecosystem Classification (BEC) system and is available as Biogeoclimatic (BGC) Zones, Subzones, Variants and associated Phases (BC MFLNRO 2012). The BEC system assembles ecosystems at three levels of integration: regional; local; and chronological. Regional levels are identified as geographical areas with similar climates. Local levels are units that have relatively uniform topography, vegetation and soils. Chronological levels are organised according to site-specific chronosequences according to site history and successional status. BGC Zones are typically named after the dominant climax species (*e.g.* Douglas-fir) and given a geographic (*e.g.* interior) or climatic modifier (*e.g.* boreal). Subzone names are based first on relative precipitation and then on either relative continentality for Coastal zones or relative temperature for Interior zones.

Segments of the Hargeaves to Darfield Segment cross the following BGC Zones, Subzones, associated Variants and Phases:

- the Interior Cedar-Hemlock (ICH) Zone, Moist Mild Subzone (ICHmm);
- the Sub-Boreal Spruce (SBS) Zone, Dry Hot Subzone – McLennan Variant (SBSdh1);
- the ICH Zone, Wet Cool Subzone – Wells Grey Variant (ICHwk1);
- the ICH Zone, Very Wet Cool Subzone – Mica Variant (ICHvk1);
- the ICH Zone, Moist Warm Subzone – Shuswap Variant (ICHmw3);
- the ICH Zone, Dry Warm Subzone – North Thompson Variant (ICHdw3);
- the Interior Douglas-fir (IDF) Zone, Moist Warm Subzone – Thompson Variant (IDFmw2); and
- the IDF Zone, Thompson Moist Warm Subzone – Steep South phase (IDFmw2b).

The ICH BGC Zone is located within the southeast corner of BC. A small portion of this BGC Zone is also found in the central west of the province. The ICH Zone typically experiences long, warm summers and cool, wet winters. Most of this zone's summers are relatively dry though melting snowpack does help to keep soil moisture levels high. Generally, warm moist conditions are common in the southeast parts of the zone while the northwest portion is cooler and wetter. Western red cedar and western hemlock dominate this forest community intermixed with other tree species. Wetlands make up a small portion of the ICH BGC Zone and are confined generally to valley bottoms where they are often associated with lakes and streams. Small swamp areas often consist of red cedar, hemlock, spruce and skunk cabbage. Wetlands located along streams and seepages often consist of devil's club and large ferns. Upland areas tend to have small bogs. Non-forested or sparsely forested wetland areas often contain willows, sedges and other hydrophytic vegetation (BC MOF 1996a).

The SBS BGC Zone is located in south central BC and dominates the central interior of BC. Winters in this zone are severe and snowy and summers are relatively warm and moist. However, the winters are slightly shorter and the vegetative season slightly longer. Upland coniferous forest dominate the sub-boreal region, hybrid white spruce and subalpine fir are the dominate tree species. Other species include lodgepole pine, trembling aspen, paper birch, Douglas-fir and black spruce. The common wetland community types found in this zone include sedge marshes, shrub fens, swamps, treed fens and bogs (BC MOF 1998a, Meidinger and Pojar 1991).

The IDF BGC Zone is located within southern BC and is characterised by warm and dry summers and cool winters resulting in a shortage of moisture. Vegetation characteristics found within this zone include forests dominated by all ages of Douglas-fir with a grassy understory. Hotter and drier areas tend to have more grassland and open ponderosa pine forests. Wetlands tend to be found in depressions and around open water. Wetland types include marshes dominated by cattails, sedges and bulrushes around open water zones or shrubby swamps dominated by willows and birches. Saline meadow wetlands are also found which typically are dominated by salt grasses (BC MOF 1996b).

Important Waterbodies and Wetlands

The Hargreaves to Darfield Segment does not cross any Migratory Bird Sanctuaries (Environment Canada 2013b), Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2013), Important Bird Areas (Bird Studies Canada and Nature Canada 2012) or Ramsar wetlands (Bureau of the Convention on Wetlands 2013).

Ducks Unlimited Canada Priority Areas

The Hargreaves to Darfield Segment does not encounter any of the DUC Priority Landscapes (DUC 2013). No DUC sites are crossed by the proposed pipeline corridor (Harrison pers. comm.).

Provincial Parks and Protected Areas

There were six protected areas identified within the Wetland LSA along the Hargreaves to Darfield Segment. The proposed pipeline corridor crosses two of these, Finn Creek Provincial Park (RK 638.7 to RK 639.3) and North Thompson River Provincial Park (RK 725.5 to RK 726.5). The other three protected areas are located within the Wetland LSA at the following distances from the proposed pipeline corridor:

- Jackman Flats Provincial Park located 0.04 km west of RK 506.7 to RK 511.7;
- Blue River Black Spruce Provincial Park located 0.03 km east of RK 610.2 to RK 611.9;
- Eakin Creek Canyon Provincial Park located 0.07 km west of RK 752.4 to RK 752.7; and
- Chu Chua Cottonwood Provincial Park located 0.03 km east of RK 765.3 to RK 766.8.

Aboriginal Traditional Knowledge

Available ATK related to wetlands along the proposed Hargreaves to Darfield Segment is limited. However, the desktop review identified concerns regarding muskeg (*i.e.*, peatland) areas where Labrador tea may be harvested (Lifeways 2012, NGPLP 2010).

4.1.3.4 Black Pines to Hope Segment

The following subsections describe the environmental setting along the Black Pines to Hope Segment, including the Black Pines Pump Station, Kamloops Pump Station and Kingsvale Pump Station and associated power lines.

Ecozones and Ecoregions of Canada

The Black Pines to Hope Segment (RK 811.9 to RK 1043.7) is located within two Ecoregions of Canada, the Thompson-Okanagan Plateau and Okanagan Range (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Thompson-Okanagan Plateau Ecoregion, a component of the Montane Cordillera Ecozone, is comprised of rolling plateaus and major valley systems. It is one of the warmest and driest ecoregions. Mean annual precipitation occurs on a gradient with increasing elevation. Vegetation in this ecoregion is diverse across alpine, subalpine, and grassland ecosystems. The dominant soil types in this ecoregion vary with elevation and range from humo-ferric Podzols and dystric Brunisols at the higher elevations to eutric brunisolic and dark gray chernozemic soils at lower elevations (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

Also, within the Montane Cordillera Ecozone, the Okanagan Range Ecoregion includes the southeastern portions of the Cascade Mountains and Okanagan Range. The mean annual temperature increases from 500-1000 mm moving east to west and increasing with elevation. The dominant ecosystem of this ecoregion is subalpine forest and is characterised by Engelmann spruce, subalpine fir and lodgepole pine. Dominant soil types range from humo-ferric podzols and dystric Brunisols at higher elevations to eutric Brunisols and Dark Grey Chernozems at lower elevations (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

Wetland Regions of Canada

The Black Pines to Hope Segment is located within three Wetland Regions of Canada, including the Intermountain Prairie, the South Coastal Mountain and Pacific Temperate.

Wetlands typical of the Intermountain Prairie Wetland Region include marshes bordering fresh to saline ephemeral or semi-permanent shallow waters. The region tends to be semi-arid and experience hot summers and mild winters. Peat accumulation is typically not found within this region (Government of Canada 1986).

Horizontal fens and shore marshes found in valleys and ribbed fens found at higher elevations are typical wetlands of the South Coastal Mountain Wetland Region. Within this region, the average thickness of peat is approximately 13.6-3 m or less (Government of Canada 1986).

Within the Pacific Temperate Wetland Region, typical wetlands consist of horizontal fens, basin swamps and flat band basin bogs. In some instances, floodplains and deltas contain extensive marshes. Climate for this area typically is humid with mild winters and warm summers with high annual precipitation. Peat accumulation within swamps is typically 4-5 m. Bogs are characterised by peat accumulations of approximately 2 m and fens usually have thicknesses of around 4 m (Government of Canada 1986).

Wetland distribution along this portion of the proposed pipeline corridor varies from less than 5-10% (Natural Resources Canada 2009).

Biogeoclimatic Zones of British Columbia

Segments of the Black Pines to Hope Segment cross the following BGC Zones, Subzones, Variants and associated Phases:

- the Ponderosa Pine (PP) Zone, Very Dry Hot Subzone – Thompson Variant (PPxh2);
- the IDF Zone, Very Dry Hot Subzone – Thompson Variant (IDFxh2);
- the Bunchgrass (BG) Zone, Very Dry Warm Subzone – Nicola Variant (BGxw1);
- the BG Zone, Very Dry Hot Subzone – Thompson Variant (BGxh2);
- the IDF Zone, Very Dry Hot Subzone – Thompson Variant – Grassland Phase (IDFxh2a);
- the IDF Zone, Dry Cool Subzone –Thompson Variant (IDFdk1);
- the IDF Zone, Very Dry Hot Subzone – Okanagan Variant (IDFxh1);
- the IDF Zone, Dry Cool Subzone – Cascade Variant (IDFdk2);
- the Montane Spruce (MS) Zone, Dry Mild Subzone – South Thompson Variant (MSdm2);
- the MS Zone, Moist Warm Subzone – Cascade Variant (MSmw1);
- the Coastal Western Hemlock (CWH) Zone, Moist Submaritime Subzone – Southern Variant (CWHms1);
- the Engelmann Spruce-Sub-alpine Fir (ESSF) Zone, Moist Warm Subzone (ESSFmw);
- the Mountain Hemlock (MH) Zone, Moist Maritime Subzone – Leeward Variant (MHmm2); and
- the CWH Zone, Dry Submaritime Subzone – Southern Variant (CWHds1).

The PP BGC Zone is located in the southern portion of BC and is the driest and warmest of the forest zones and winters are cool with light, intermittent snow cover. Ponderosa pine dominates forested areas with a grassy understory. Wetlands are not common within this zone, however, moisture loving plant species can be found in seepages and in riparian areas (BC MOF 1998b).

The IDF BGC Zone is described in Section 4.1.3.3.

The BG BGC Zone is located in south central BC and lies within the rainshadow of the Coast and Cascade mountains which results in the BGC Zone being one of BC's warmest and driest areas. Many drought tolerant plants and shrubs are found within the BGC Zone. The most common wetland type found within this zone are marshes dominated by cattail and bulrush species. Saline meadows are also present in shallow basins and associated with ponds and lakes (BC MOF 1998c).

The MS BGC Zone is located within southern BC and experiences a generally cool climate with cold winters and short, dry summers. This zone is a transition between high elevation subalpine forests of spruce and fir and the lower elevation forest of Douglas-fir or lodgepole pine. Vegetation found within this zone is a hybrid of these other areas though lodgepole pine is a prominent seral component. Wetlands are commonly found in the rolling plateau country of the Okanagan Highlands and the Thompson and Fraser plateaus. The common wetland types are fens with willows, sedges and glow moss. Areas that are poorly drained and poor in nutrients tend to contain sedges, Labrador tea and sphagnum (BC MOF 1999a).

The CWH BGC Zone is located along the western coast of BC. Within this zone, the Coast Mountains form a barrier essentially trapping the warm air from the Pacific. As the air masses force their way over the mountains, most of the moisture drops. Summers within this zone are cool and winters tend to be mild. The CWH Zone is, on average, the wettest BGC zone in BC. Due to the wet climate, nutrients quickly leach out of mineral soils and are held in the soil by decomposing organic matter and vegetation. Complex coniferous forests dominate the landscape and are highly productive ecosystems. Riparian areas, floodplains, lakes, streams and a variety of wetlands are common. Wetlands tend to be found in coastal lowland areas. Common wetland types include closed bog forests with shrubby and irregular tree cover and open bogs that have few trees (BC MOF 1999b, Meidinger and Pojar 1991).

The ESSF BGC Zone occupies the uppermost forested elevations in the southern three-quarters of the BC interior. The ESSF Zone is predominantly located in mountainous terrain, however, it is also found on some high plateaus. The winters in this zone are long, cold, moist and snowy, while the growing seasons are cool and short. Soils are rapidly to moderately well-drained. Wetlands and riparian areas are not as productive as equivalent areas in adjacent lower elevation BGC zones (BC Ministry of Forests 1998d, Meidinger and Pojar 1991).

The MH BGC Zone occupies subalpine elevations along the entire BC coast. The climate is characterized by short, cool summers and long, cool winters. It is one of Canada's wettest ecological zones. The low temperature and high moisture content of soils slows litter decomposition, which promotes high organic matter accumulation. Wetland ecosystems occur along streams and in parkland areas and forested bogs inhabit very wet sites at lower elevations (BC Ministry of Forests 1997, Meidinger and Pojar 1991).

Important Waterbodies and Wetlands

The Black Pines to Hope Segment does not cross any Migratory Bird Sanctuaries (Environment Canada 2013b), Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2013), or Ramsar wetlands (Bureau of the Convention on Wetlands 2013).

Important Bird Areas

There is one IBA located within the Wetland LSA along the Black Pines to Hope Segment, namely the Douglas Lake Plateau (Bird Studies Canada and Nature Canada 2012).

Douglas Lake Plateau (BC172)

The Douglas Lake Plateau IBA is located south of the City of Kamloops. The proposed pipeline corridor crosses a small portion of this IBA from RK 850.6 to RK 863.7 at its northern extent where it crosses Highway 5. This IBA consists of rolling bunchgrass grasslands, small marshy lakes, Douglas-fir/ponderosa pine forests and aspen parkland. This area is home to a small population of badger, great basin spadefoot toad and rubber boa. The Douglas Lake Plateau is an important migration breeding area for the sandhill crane (a Blue-listed, vulnerable species in BC). The number of sandhill cranes that use this area for breeding and migration staging areas represent over 1.5% of the North American population. The area is also a major migration corridor for loons, grebes, waterfowl, raptors, shorebirds, gulls and passerines. Perhaps 5-10% of the population of the flammulated owl, a nationally vulnerable species, breed within the IBA. The Lewis' woodpecker is also known to breed within the Douglas Lake Plateau IBA, though exact numbers of this nationally vulnerable species are not known. Ten burrowing owls have been released within this IBA at several locations. Swainson's hawk, ferruginous hawk and prairie falcon are also known to breed within the IBA. Birds that are not common within BC that are known to breed within the Douglas Lake Plateau are bobolink, Brewer's sparrow,

common nighthawk, American avocet, black tern and yellow-headed blackbird (Bird Studies Canada and Nature Canada 2012).

Ducks Unlimited Canada Priority Areas

The Black Pines to Hope Segment encounters the DUC Level 2 and Level 3 Priority Landscapes. The Level 2 Priority Landscapes along the Black Pines to Hope Segment consist of the BC Coastal Areas and Estuaries. The Level 3 Priority Landscapes are classified as Eastern Boreal Forest since it consists of characteristics similar to those found in the eastern reaches of this forest zone (DUC 2013). No DUC sites are crossed by the proposed pipeline corridor (Harrison pers. comm.).

Provincial Parks and Protected Areas.

The Black Pines to Hope Segment encounters four protected areas within the Wetland LSA. The proposed pipeline corridor crosses two of these, Lac Du Bois Grasslands Protected Area (RK 829.0 to RK 836.8 and RK 842.4 to RK 843.9) and Coquihalla Summit Recreational Area (RK 992.4 to RK 1005.1). The other two protected areas are located within the Wetland LSA at the following distances from the proposed pipeline corridor:

- Coldwater River Provincial Park located 0.01 km east of RK 980.1; and
- Coquihalla River Provincial Park located 0.05 km west of RK 1023.1.

Aboriginal Traditional Knowledge

Along the proposed Black Pines to Hope Segment, the desktop review identified that several Aboriginal communities harvest wapato, a nutritious tuber that is found scattered throughout marshy areas. The harvest is collected by using canoes or by wading into the shallows and treading on the plants until the roots float to the surface (Golder Associates 2008).

4.1.3.5 Hope to Burnaby Segment

The following subsections describe the environmental setting along the Hope to Burnaby Segment, including the Sumas Pump Station and Sumas Terminal.

Ecozones and Ecoregions of Canada

The Hope to Burnaby Segment (RK 1043.7 to RK 1179.8) is located within three Ecoregions of Canada, all components of the Pacific Maritime Ecozone. These include the Pacific Ranges, Cascade Ranges and Lower Mainland Ecoregions (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Pacific Ranges Ecoregion is characterized by high, steep mountains and is comprised of a coastal forest zone, an alpine zone and a subalpine zone. Mean annual precipitation ranges with elevation with lower elevations receiving 1,500 mm and higher elevations receiving 3,400 mm. Mineral environments are characterized by podzolic and dystric brunisolic soils and organic environments are characterized by Mesisols and Humisols. Typical wetland types in this ecoregion include sloping and basin bogs, stream fens and floodplain swamps (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Cascade Ranges Ecoregion is a small ecoregion which includes the Cascade Mountains and consists of subalpine and alpine tundra ecosystems. The mean annual precipitation in this ecoregion ranges from 1,200 - 1,500 mm. The dominant soil types are humo-ferric Podzols and ferro-humic Podzols (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

The Lower Mainland Ecoregion extends from the foothills of the Cascade Range to the Fraser River delta and northward including the Georgia Lowland. The mean annual precipitation increases from 850 - 2,000 mm moving west to east and increasing with elevation. Wetter areas are characterized by Douglas-fir, western hemlock and western red cedar. Dominant wetland soils in this ecoregion are Gleysols, Mesisols and Humisols. Coastal salt marshes are located on the Fraser River delta and along

Boundary Bay. Wetlands are important habitat for shorebirds and waterfowl (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995).

Wetland Region of Canada

The Hope to Burnaby Segment is situated within the Pacific Temperate Wetland Region, which is described in Section 4.1.3.4 (Government of Canada 1986).

Wetland distribution along this portion of the proposed pipeline corridor varies from less than 5-10% (Natural Resources Canada 2009).

Biogeoclimatic Zones of British Columbia

The Hope to Burnaby Segment crosses the following BGC Zone, Subzone and associated Variants:

- the CWH Zone, Dry Submaritime Subzone – Southern Variant (CWHds1);
- the CWH Zone, Dry Maritime Subzone (CWHdm); and
- the CWH Zone, Very Dry Maritime Subzone –Eastern Variant (CWHxm1).

The CWH BGC Zone is described in Section 4.1.3.4.

Important Waterbodies and Wetlands

The Hope to Burnaby Segment does not cross any Migratory Bird Sanctuaries (Environment Canada 2013b), Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2013), Important Bird Areas (Bird Studies Canada and Nature Canada 2012) or Ramsar wetlands (Bureau of the Convention on Wetlands 2013).

Ducks Unlimited Canada Priority Areas

Within BC, the Hope to Burnaby Segment encounters the DUC Level 2 Priority Landscapes. The Level 2 Priority Landscapes consist of the BC Coastal Areas and Estuaries and the BC Interior (DUC 2013). One DUC conservation site was identified as being indirectly crossed by the proposed pipeline corridor, Cheam Lake Wetlands (Harrison pers. comm.). The proposed pipeline corridor does not cross the wetland but does cross the southern portion of the regional park in which the conservation site is located.

Provincial Parks and Protected Areas

The Hope to Burnaby Segment encounters the southwestern portion of the Cheam Lake Wetlands Regional Park in two locations (RK 1079.9 to RK 1080.0 and RK 1080.1 to RK 1080.4) and Surrey Bend Regional Park (RK 1160.5 to RK 1163.7).

Aboriginal Traditional Knowledge

The desktop review did not identify available ATK related to wetlands along the proposed Hope to Burnaby Segment.

4.1.3.6 Burnaby to Westridge Segment

The following subsections describe the environmental setting along the Burnaby to Westridge Segment, including the Burnaby Terminal and the Westridge Marine Terminal.

Ecozones and Ecoregions of Canada

The Burnaby to Westridge Segment (RK 0 to RK 3.6) is located within the Lower Mainland Ecoregion (Agriculture and Agri-Food Canada 2013, Ecological Stratification Working Group 1995), which is described in Section 4.1.3.5.

Wetland Region of Canada

The Burnaby to Westridge Segment is situated within the Pacific Temperate Wetland Region, which is discussed in Section 4.1.3.4.

Wetland distribution along this segment varies from less than 5–10% (Natural Resources Canada 2009).

Biogeoclimatic Zones of BC

The Burnaby to Westridge Segment crosses the CWH Zone, Dry Maritime Subzone (CWHdm) (BC MOF 1999b, Meidinger and Pojar 1991), which is described in Section 4.1.3.4.

Important Waterbodies and Wetlands

The Burnaby to Westridge Segment does not cross any Migratory Bird Sanctuaries (Environment Canada 2013b), Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2013), or Ramsar wetlands (Bureau of the Convention on Wetlands 2013).

Important Bird Areas

The English Bay and Burrard Inlet IBA is crossed by the Burnaby to Westridge Segment from RK 1183.6 to RK 1183.8 (Bird Studies Canada and Nature Canada 2012).

English Bay and Burrard Inlet (BC020)

The proposed pipeline corridor terminates at the shores of the English Bay and Burrard Inlet IBA. This sheltered fjord of the Strait of Georgia incorporates a variety of habitats. This IBA was designated for three species of global importance including the western grebe, Barrow's goldeneye and surf scoter and one species of national importance, the great blue heron. Historically, large numbers of western grebe wintered here, however, due to population decline these numbers have decreased so that often no more than approximately 1% of the global population have been observed. Counts of Barrow's goldeneye have also declined from approximately 4% of the global population utilizing the area in 1990 to about 1.5% in 2000. This IBA also supports on a regular basis at least 1% of the global surf scoter population. A known great blue heron nesting colony is also present within this IBA in the Stanley Park area. The great blue heron population located here has increased since 2001 resulting in approximately 1% of the Canadian population breeding in this area. The English Bay and Burrad Inlet IBA also supports other valuable bird species such a purple marton, pelagic and double-crested cormorants, osprey and bald eagles.

Ducks Unlimited Canada Priority Areas

Within BC, the Burnaby to Westridge Segment encounters the DUC Level 2 Priority Landscapes. The Level 2 Priority Landscapes consist of the BC Coastal Areas and Estuaries and the BC Interior (DUC 2013). No DUC sites are crossed by the proposed pipeline corridor (Harrison pers. comm.).

Provincial Parks and Protected Areas

The Burnaby to Westridge Segment does not encounter any protected areas within the Wetland LSA.

Aboriginal Traditional Knowledge

The desktop review did not identify available ATK related to wetlands along the proposed Burnaby to Westridge Segment.

4.2 British Columbia Provincially-Listed Wetlands

Within BC, ecological communities are assessed and assigned a conservation ranking. This ranking includes Extinct, Red, Blue, Yellow and No Status. Ecological communities identified as Extinct no longer exist within the province of BC. Red-listed communities consist of those ecological communities that have been identified as being extirpated, endangered or threatened within BC. Ecological communities that have been designated as being on the Blue-list are those that are of special concern because they have characteristics that make then sensitive to human activities or natural events. Yellow-listed ecological

communities are believed to be secure and are not at any risk of extinction. Ecological communities that do not have a status are ones that have not been ranked provincially or even globally.

Within the 22 BGC Zone variants that the proposed pipeline corridor crosses, 15 Red-listed wetlands, 23 Blue-listed wetlands, 14 Yellow-listed wetlands and one wetland with no conservation status have been identified as having the potential to be encountered (BC CDC 2013). Field confirmation of potential listed wetlands was conducted as part of the vegetation assessment which looked at all vegetation communities of concern, including wetlands (Volume 5A).

Table 4.2-1 provides a list of listed wetlands that have the potential to be encountered within the proposed pipeline corridor.

TABLE 4.2-1

BRITISH COLUMBIA LISTED-WETLANDS WITH THE POTENTIAL TO BE ENCOUNTERED

Pipeline Loop	Biogeoclimatic Zone	Wetland Type	Ecological Community	BC Status[2]/ Provincial Ranking[3]/ Global Ranking[4]	Conservation Framework Priority[5]	Distribution[6]
Hargreaves to Darfield	ICHmm	Ws	western redcedar/skunk cabbage/peat-mosses (*Thuja plicata/Lysichiton americanus/Sphagnum spp*.)	Red/S2/GNR	3	--
		Wb	black spruce-lodgepole pine/kalmias/peat-mosses (*Picea mariana-Pinus contorta/Kalmia* spp./*Sphagnum* spp.)	Blue/S3/GNR	3	--
	SBSdh1	Ws05	MacCalla's willow/beaked sedge (*Salix maccalliana/Carex utriculata*)	Blue/S3/G3	3	Incidental: <5% of wetlands
		Wb05	black spruce/water sedge/peat-mosses (*Picea mariana/Carex aquatilis/Sphagnum spp.*)	Yellow/S3S4/GNR	3	Major: >25% of wetlands
	ICHwk1	Wm01	beaked sedge– water sedge (*Carex utriculata–Carex aquatilis*)	Yellow/S4/G4	4	Major: >25% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Incidental: <5% of wetlands
		Wm51	three-way sedge (*Dulichium arundinaceum* Herbaceous Vegetation)	Red/S2/GNR	2	Incidental: <5% of wetlands
		Ws02	mountain alder/hardhack/Sitka sedge (*Alnus incana/Spiraea douglasii/Carex sitchensis*)	Yellow/S3S4/GNR	3	Minor: 5-25% of wetlands
		Ws	western redcedar–hybrid white spruce/skunk cabbage (*Thuja plicata-Picea engelmannii* x *glauca/Lysichiton americanus*)	Yellow/S4/GNR	3	Incidental: <5% of wetlands
		Wf01	beaked sedge-water sedge (*Carex utriculata-Carex aquatilis*)	Yellow/S4/G4	4	Minor: 5-25% of wetlands
		Wf05	slender sedge/common hook-moss (*Carex lasiocarpa/Drepanocladus aduncus*)	Blue/S3/G3	3	Minor: 5-25% of wetlands
		Wf06	buckbean-slender sedge (*Menyanthes trifoliata-Carex lasiocarpa*)	Blue/S3/G3	2	--
	ICHvk1	Ws06	sitka willow/sitka sedge (*Salix sitchensis/Carex sitchensis*)	Yellow/S4/GNR	3	Minor: 5-25% of wetlands
		Ws	western red cedar – hybrid white spruce/skunk cabbage (*Thuja plicata-Picea engelmannii* x *glauca/Lysichiton americanus*)	Yellow/S4/GNR	3	--
		Wf05	slender sedge/common hook-moss (*Carex lasiocarpa/Drepanocladus aduncus*)	Blue/S3/G3	3	Minor: 5-25% of wetlands
		Wf11	tufted clubrush/golden star-moss (*Trichophorum cespitosum/Campylium stellatum*)	Blue/S2S3/G2G3	2	Incidental: <5% of wetlands
	ICHmw3	Wm02	swamp horsetail-beaked sedge (*Equisetum fluviatile-Carex utriculata*)	Blue/S3/G4	2	Incidental: <5% of wetlands
		Ws	western red cedar – hybrid white spruce/skunk cabbage (*Thuja plicata-Picea engelmannii* x *glauca/Lysichiton americanus*)	Yellow/S4/GNR	3	--
		Wb	sedges/peat-mosses (*Carex spp./Sphagnum spp*.)	No Status/SNR/GNR	Not Assessed	--
		Wb11	black spruce/buckbean/peat-mosses (*Picea mariana/Menyanthes trifoliata/Sphagnum spp*.)	Blue/S3/GNR	2	Incidental: <5% of wetlands
		Wf05	slender sedge/common hook-moss (*Carex lasiocarpa/Drepanocladus aduncus*)	Blue/S3/G3	3	Minor: 5-25% of wetlands
		Wf11	tufted clubrush/golden star-moss (*Trichophorum cespitosum/Campylium stellatum*)	Blue/S2S3/G2G3	2	Incidental: <5% of wetlands
	ICHdw3	No Wetlands	--	--	--	--
	ICH	Ws51	Sitka willow-Pacific willow/skunk cabbage (*Salix sitchensis-Salix lasiandra var. lasiandra/Lysichiton americanus*)	Red/S2/G2	1	Incidental: <5% of wetlands
	IDFmw2	Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Minor: 5-25% of wetlands
	IDFmw2b	No Wetlands	--	--	--	--

TABLE 4.2-1 Cont'd

Pipeline Loop	Biogeoclimatic Zone	Wetland Type	Ecological Community	BC Status[2]/ Provincial Ranking[3]/ Global Ranking[4]	Conservation Framework Priority[5]	Distribution
Black Pines to Hope	PPxh2	Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Major: >25% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Minor: 5-25% of wetlands
	IDFxh2	Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Minor: 5-25% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Minor: 5-25% of wetlands
	BGxw1	Wm03	awned sedge fen – marsh (*Carex atherodes*)	Red/S2?/G3G5	2	Incidental: <5% of wetlands
		Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Minor: 5-25% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Minor: 5-25% of wetlands
		Wm07	Baltic rush-common silverweed (*Juncus balticus-Potentilla anserina*)	Red/S2/GNR	2	Minor: 5-25% of wetlands
		Ws03	Bebb's willow/bluejoint reedgrass (*Salix bebbiana/Calamagrostis canadensis*)	Blue/S3/G5	3	Incidental: <5% of wetlands
	BGxh2	Wm	wooly sedge-arctic rush (*Carex pellita-Juncus arcticus*)	Red/S2/GNR	2	--
		Wm02	swamp horsetail-beaked sedge (*Equisetum fluviatile-Carex utriculata*)	Blue/S3/G4	2	--
		Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Minor: 5-25% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Minor: 5-25% of wetlands
	IDFxh2a	No Wetlands	--	--	--	--
	IDFdk1	Wm01	beaked sedge – water sedge (*Carex utriculata – Carex aquatilis*)	Yellow/S4/G4	4	Major: >25% of wetlands
		Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Minor: 5-25% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Minor: 5-25% of wetlands
		Gs04	tufted hairgrass Community (*Deschampsia cespitosa* Community)	Blue/S3/G4	2	Incidental: <5% of wetlands
		Ws05	MacCalla's willow/beaked sedge (*Salix maccalliana/Carex utriculata*)	Blue/S3/G3	3	Incidental: <5% of wetlands
		Wf01	beaked sedge-water sedge (*Carex utriculata-Carex aquatilis*)	Yellow/S4/G4	4	Major: >25% of wetlands
		Wf02	scrub birch/water sedge (*Betula nana/Carex aquatilis*)	Blue/S3/G4	2	Minor: 5-25% of wetlands
		Wf05	slender sedge/common hook-moss (*Carex lasiocarpa/Drepanocladus aduncus*)	Blue/S3/G3	3	Minor: 5-25% of wetlands
		Ws05	MacCalla's willow/beaked sedge (*Salix maccalliana/Carex utriculata*)	Blue/S3/G3	3	Incidental: <5% of wetlands
	IDFxh1	Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Minor: 5-25% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Minor: 5-25% of wetlands
	IDFdk2	Wm01	beaked sedge – water sedge (*Carex utriculata – Carex aquatilis*)	Yellow/S4/G4	4	Major: >25% of wetlands
		Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Minor: 5-25% of wetlands
		Gs04	tufted hairgrass Community (*Deschampsia cespitosa* Community)	Blue/S3/G4	2	Incidental: <5% of wetlands
		Wf06	buckbean – slender sedge (*Menyanthes trifoliata – Carex lasiocarpa*)	Blue/S3/G3	2	Incidental: <5% of wetlands
	MSdm2	Wm01	beaked sedge – water sedge (*Carex utriculata – Carex aquatilis*)	Yellow/S4/G4	4	Minor: 5-25% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Minor: 5-25% of wetlands
		Gs04	tufted hairgrass Community (*Deschampsia cespitosa* Community)	Blue/S3/G4	2	Minor: 5-25% of wetlands
		Wf01	beaked sedge – water sedge (*Carex utriculata – Carex aquatilis*)	Yellow/S4/G4	4	Major: >25% of wetlands
		Wf04	Barclay's willow/water sedge/glow moss (*Salix barclayi/Carex aquatilis/Aulacomnium palustre*)	Yellow/S3S4/GNR	4	Incidental: <5% of wetlands

TABLE 4.2-1 Cont'd

Pipeline Loop	Biogeoclimatic Zone	Wetland Type	Ecological Community	BC Status[2]/ Provincial Ranking[3]/ Global Ranking[4]	Conservation Framework Priority[5]	Distribution
Black Pines to Hope (cont'd)	See above	Wf05	slender sedge/common hook-moss (*Carex lasiocarpa/Drepanocladus aduncus*)	Blue/S3/G3	3	Minor: 5-25% of wetlands
		Wf09	few-flowered spike-rush/hook-mosses (*Eleocharis quinqueflora/Drepanocladus* spp.)	Red/S2/GNR	1	Incidental: <5% of wetlands
		Wf11	tufted clubrush/golden star-moss (*Trichophorum cespitosum/Campylium stellatum*)	Blue//S2S3/G2G3	2	Incidental: <5% of wetlands
	MSmw1	Ws02	mountain alder/hardhack/Sitka sedge (*Alnus incana/Spiraea douglasii/Carex sitchensis*)	Yellow/S3S4/GNR	3	Incidental: <5% of wetlands
		Wf01	beaked sedge – water sedge (*Carex utriculata – Carex aquatilis*)	Yellow/S4/G4	4	Major: >25% of wetlands
		Wf07	scrub birch/buckbean--shore sedge *Betula nana/Menyanthes trifoliata-Carex limosa*	Yellow/S3S4/GNR	2	--
		Wf08	shore sedge-buckbean/hook-mosses *Carex limosa-Menyanthes trifoliata/Drepanocladus* spp.	Blue/S3/G3	3	Incidental: <5% of wetlands
	CWHms1	Ws	western redcedar-Sitka spruce/skunk cabbage (*Thuja plicata-Picea sitchensis/Lysichiton americanus*)	Blue/S3?/G3?	3	--
		Wb	lodgepole pine/peat-mosses (*Pinus contorta/Sphagnum* spp.)	Yellow/S4S5/GNR	4	--
	ESSFmw	Wm01	beaked sedge – water sedge (*Carex utriculata -Carex aquatilis*)	Yellow/S4/G4	4	Incidental: <5% of wetlands
		Wm02	swamp horsetail-beaked sedge (*Equisetum fluviatile-Carex utriculata*)	Blue/S3/G4	2	--
		Wf01	beaked sedge – water sedge (*Carex utriculata –Carex aquatilis*)	Yellow/S4/G4	4	Incidental: <5% of wetlands
		Wf03	water sedge/peat-mosses (*Carex aquatilis/Sphagnum spp*.)	Yellow/S3S4/GNR	2	Minor: 5-25% of wetlands
		Wf04	Barclay's willow/water sedge/glow moss (*Salix barclayi/Carex aquatilis/Aulacomnium palustre*)	Yellow/S3S4/GNR	4	Major: >25% of wetlands
		Wf12	narrow-leaved cotton-grass-white mountain marsh-marigold (*Eriophorum angustifolium-Caltha leptosepala*)	Yellow/S3S4/G3G4	3	Major: >25% of wetlands
		Wf13	narrow-leaved cotton-grass-shore sedge (*Eriophorum angustifolium-Carex limosa*)	Blue/S3/G3	3	Major: >25% of wetlands
	MHmm2	Ws	yellow-cedar-mountain hemlock/skunk cabbage (*Chamaecyparis nootkatensis-Tsuga mertensiana/Lysichiton americanus*)	Yellow/S4/G4	3	--
		Wf01	beaked sedge – water sedge (*Carex utriculata – Carex aquatilis*)	Yellow/S4/G4	4	--
		Wb	mountain hemlock-yellow-cedar/common red peat-moss (*Tsuga mertensiana-Chamaecyparis nootkatensis/Sphagnum capillifolium*)	Yellow/S5/GNR	6	--
	CWHds1	Ws	western redcedar-Sitka spruce/skunk cabbage (*Thuja plicata-Picea sitchensis/Lysichiton americanus*)	Blue/S3?/G3?	3	--
		Wb	lodgepole pine/peat-mosses (*Pinus contorta/Sphagnum* spp.)	Yellow/S4S5/GNR	4	--
	CWH	Ws51	Sitka willow-Pacific willow/skunk cabbage (*Salix sitchensis-Salix lasiandra var. lasiandra/Lysichiton americanus*)	Red/S2/G2	1	Incidental: <5% of wetlands
		Wm04	common spike-rush Herbaceous Vegetation/(*Eleocharis palustris* Herbaceous Vegetation)	Blue/S3 /GNR	3	Incidental:<5% of wetlands
Hope to Burnaby	CWHds1	Ws	western redcedar-Sitka spruce/skunk cabbage (*Thuja plicata-Picea sitchensis/Lysichiton americanus*)	Blue/S3?/G3?	3	--
		Wb	lodgepole pine/peat-mosses (*Pinus contorta/Sphagnum* spp.)	Yellow/S4S5/GNR	4	--
	CWHdm	Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Incidental: <5% of wetlands
		Ws	western redcedar/slough sedge (*Thuja plicata/Carex obnupta)*	Blue/S2S3/GNR	2	--
		Ws	western redcedar-Sitka spruce/skunk cabbage (*Thuja plicata-Picea sitchensis/Lysichiton americanus*)	Blue/S3?/G3?	3	--

TABLE 4.2-1 Cont'd

Pipeline Loop	Biogeoclimatic Zone	Wetland Type	Ecological Community	BC Status[2]/ Provincial Ranking[3]/ Global Ranking[4]	Conservation Framework Priority[5]	Distribution
Hope to Burnaby (cont'd)	See above	Ww	water shield – bladderworts/ (*Brasenia schreberi-Utricularia spp.)*	No Status/SNR/GNR		--
		Wb	lodgepole pine/peat-mosses (*Pinus contorta/Sphagnum* spp.)	Yellow/S4S5/GNR	4	--
		Wb50	Labrador tea/western bog-laurel/peat-mosses (*Rhododendron groenlandicum/Kalmia microphylla/Sphagnum* spp.)	Blue/S3/G4	4	Incidental: <5% of wetlands
	CWHxm1	Em	tufted hairdgrass- Henderson's checker-mallow (*Deschampsia cespitosa-Sidalcea hendersonii*)	Red/S1S2/G2	1	--
		Em03	seashore saltgrass Herbaceous Vegetation (*Distichlis spicata var. spicata* Herbaceous Vegetation)	Red/S2S3/GNR	2	--
		Em	Henderson's checker-mallow Tidal Marsh (*Sidalcea hendersonii* Tidal Marsh)	Red/S1/G1	1	--
		Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Incidental: <5% of wetlands
		Wm06	hard-stemmed bulrush Deep Marsh (*Schoenoplectus acutus Deep Marsh*)	Blue/S3/G5	4	Incidental: <5% of wetlands
		Wm50	sitka sedge-Pacific water-parsley (*Carex sitchensis-Oenanthe sarmentosa*)	Blue/S3/G3	2	Minor: 5-25% of wetlands
		Ws	trembling aspen/Pacific crab apple/slough sedge (*Populus tremuloides/Malus fusca/Carex obnupta*)	Red/S1S2/G1G2	1	--
		Ws50	hardhack/Sitka sedge (*Spiraea douglasii/Carex sitchensis*)	Yellow/S4/G4	4	Minor: 5-25% of wetlands
		Ws53	western redcedar/sword fern-skunk cabbage(*Thuja plicata/Polystichum munitum-Lysichiton americanus*)	Blue/S3?/GNR		Incidental: <5% of wetlands
		Ws	western redcedar-Sitka spruce/skunk cabbage (*Thuja plicata-Picea sitchensis/Lysichiton americanus*)	Blue/S3?/G3?	3	--
		Ws	western redcedar/slough sedge (*Thuja plicata/Carex obnupta)*	Blue/S2S3/GNR	2	--
		Wf52	sweet gale/Sitka sedge (*Myrica gale/Carex sitchensis*)	Red/S2/G3	3	Minor: 5-25% of wetlands
		Wf53	slender sedge-white beak-rush *(Carex lasiocarpa-Rhynchospora alba*)	Red/S2/G2	1	Minor: 5-25% of wetlands
		Wb50	Labrador tea/western bog-laurel/peat-mosses (*Rhododendron groenlandicum/Kalmia microphylla/Sphagnum* spp.)	Blue/S3/G4	4	Incidental: <5% of wetlands
		Wb	lodgepole pine/peat-mosses Very Dry Maritime (*Pinus contorta/Sphagnum* spp. *Very Dry Maritime*	Blue/S3/GNR	4	--
	CWH	Em01	beaked ditch-grass Herbaceous Vegetation (*Ruppia maritima* Herbaceous Vegetation)	Red/S2/GNR	2	Minor: 5-25% of wetlands
		Em02	American glasswort-sea-milkwort (*Sarcocornia pacifica-Glaux maritima*)	Red/S2/G3G4	3	Incidental <5% of wetlands in the southern subzones only
		Em05	Lyngbye's sedge herbaceous vegetation (*Carex lyngbyei* Herbaceous Vegetation)	Blue/S3/GNR	2	Major: >25% of wetlands
		Ws51	Sitka willow-Pacific willow/skunk cabbage (*Salix sitchensis-Salix lasiandra var. lasiandra/Lysichiton americanus*)	Red/S2/G2	1	Incidental: <5% of wetlands
Burnaby to Westridge	CWHdm	Wm05	common cattail Marsh (*Typha latifolia Marsh*)	Blue/S3/G5	1	Incidental: <5% of wetlands
		Ws	western redcedar/slough sedge (*Thuja plicata/Carex obnupta)*	Blue/S2S3/GNR	2	--
		Ws	western redcedar-Sitka spruce/skunk cabbage (*Thuja plicata-Picea sitchensis/Lysichiton americanus*)	Blue/S3?/G3?	3	--
		Wb	lodgepole pine/peat-mosses (*Pinus contorta/Sphagnum* spp.)	Yellow/S4S5/GNR	4	--

TABLE 4.2-1 Cont'd

Pipeline Loop	Biogeoclimatic Zone	Wetland Type	Ecological Community	BC Status[2]/ Provincial Ranking[3]/ Global Ranking[4]	Conservation Framework Priority[5]	Distribution
Burnaby to Westridge (cont'd)	See above	Wb50	Labrador tea/western bog-laurel/peat-mosses (*Rhododendron groenlandicum/Kalmia microphylla/Sphagnum* spp.)	Blue/S3/G4	4	Incidental: <5% of wetlands
	CWH	Em01	beaked ditch-grass Herbaceous Vegetation (*Ruppia maritima* Herbaceous Vegetation)	Red/S2/GNR	2	Minor: 5-25% of wetlands
		Em02	American glasswort-sea-milkwort (*Sarcocornia pacifica-Glaux maritima*)	Red/S2/G3G4	3	Incidental <5% of wetlands in the southern subzones only
		Em05	Lyngbye's sedge herbaceous vegetation (*Carex lyngbyei* Herbaceous Vegetation)	Blue/S3/GNR	2	Major: >25% of wetlands
		Ws51	Sitka willow-Pacific willow/skunk cabbage (*Salix sitchensis-Salix lasiandra var. lasiandra/Lysichiton americanus*)	Red/S2/G2	1	Incidental: <5% of wetlands

Sources: BC. Conservation Data Centre 2013, Mackenzie and Moran 2004

Notes:
1. Wetland Classification: Wa=wetland alpine, Wm=wetland marsh, Ww=wetland shallow water, Wb=wetland bog, Wf=wetland fen, Ws=wetland swamp and Gs=transition site association.
2. BC Status: there are four provincial lists that ecological communities are assigned to depending on their conservation status. These are as follows:

   Red: ecological communities that are extirpated, endangered or threatened in BC.

   Blue: ecological communities that are considered to be of Special Concern in BC.

   Yellow: ecological communities that are secure.

   No Status: ecological communities that have not been ranked.
3. Provincial Conservation Status: species' or ecological community's conservation status in BC. The ranks are outlined as follows: X=presumed extirpated, H=historical (species)/possibly extirpated (communities), 1=critically imperiled, 2=imperiled, 3=special concern, vulnerable to extirpation or extinction, 4=apparently secure, 5=demonstrably widespread, abundant and secure, NA=not applicable, NR=unranked, U=unrankable.
4. Global Conservation Status: applies to a species or ecological community over its entire natural range. The ranks are as follows: X=presumed extinct (species)/eliminated (community), H=possibly extinct (species)/presumed eliminated (community), 1=critically imperiled, 2=imperiled, 3=vulnerable to extirpation or extinction, 4=apparently secure, 5=demonstrably widespread, abundant and secure, NA=not applicable, NR=unranked, U=unrankable.
5. Conservation Framework Priority: Each species and ecological community is assigned a conservation priority ranking (i.e., 1-highest, 6-lowest) for each of the three goals outlined in the Conservation Framework. The ranking presented in this table is the highest priority identified out of the three goals (BC Ministry of Environment 2009).
6. Wetland distribution frequency is only based on Mackenzie and Moran (2004) and is not a comprehensive list of wetland distribution across the BC landscape.

4.3 Wetland Loss or Alteration

Indicators are ecosystem components or variables that are used to measure the condition of an element (*i.e.*, wetland loss or alteration). These are also used in modelling exercises aimed at estimating changes in environmental systems (Hegmann *et al.* 1999). The indicator of wetland loss or alteration that will be focused on is wetland function. Pipeline construction and maintenance activities will potentially directly or indirectly result in alteration of wetland function (*i.e.*, habitat, hydrological and biogeochemical), loss of wetland function is not anticipated as a result of pipeline construction. Through proper placement of the power line installations associated with pump station expansion activities, there should not be any permanent disturbance to wetland function (*e.g.*, Kingsvale power line).

The components of wetland function are derived in part through consultation with regulators regarding, data collection methods (*e.g.,* Environment Canada) and through the Wetland Ecological Functions Assessment: An Overview of Approaches (Hanson *et al.* 2008) which is designed to provide sufficient information to detail existing conditions of wetlands and wetland function. Other such methodologies were also utilised (Adamus 2011, Ambrose *et al.* 2009, Fitch *et al.* 2001, Ontario Ministry of Natural Resources 1993, Wisconsin Department of Natural Resource 2001).

4.3.1 Wetland Function Indicator

Wetland function can be defined as natural processes (physical, chemical, biological) associated with wetlands that are important to the overall landscape, some of which directly impact human populations (*e.g.*, flood control), while other functions buffer anthropogenic disturbances (*e.g.*, water purification) (modified from Hanson *et al.* 2008). These functions (*i.e.*, habitat, hydrological and biogeochemical functions) include: flood control; ground water recharge; water quality functions, such as water purification as well as sediment and nutrient retention; carbon sequestration; substrate protection; and maintaining biodiversity. Wetland function can change throughout the year and from year to year (*e.g.,* from times of drought to excessive precipitation). Given changing conditions, wetland function is used as a general description of the ability of a wetland to perform a variety of functions. A literature review summary for wetland function is provided in Section 5.8 and 7.2.8.6 of Volume 5A. (Hoorens *et al.* 2010, Houlahan *et al.* 2006, Hunt *et al.* 1999, Kellner and Halldin 2002, McLatchey and Reddy 1998, Mitsch and Gosselink 2007, Price *et al.* 2005, van der Kamp and Hayashi 1998, Vitt 2000).

Habitat Function

Wetlands provide a range of habitat for many wildlife and plant species. Additionally, because wetlands often occur as transitions from terrestrial to aquatic environments, they tend to have higher biodiversity than either the terrestrial or aquatic environments.

In addition to providing habitat functions, wetland vegetation also provides substrate protection functions. Substrate protection functions include the ability of a wetland to stabilize and retain the substrate during high wind or storm events (*e.g.*, increase water inputs). The type of vegetation found within a wetland influences the ability of the wetland to prevent substrate erosion. A wetland with a diverse plant community (*i.e.*, presence of woody, graminoid and herbaceous vegetation) with minimal bare soil will more effectively provide substrate protection functions than a wetland that has a substantial quantity of bare soil or minimal plant diversity. Each plant group (*i.e.*, graminoid/herbaceous and woody vegetation) fulfills a unique role for substrate protection. The graminoid/herbaceous group often forms dense mats to protect substrate from both wind events and increased run-off, while the woody vegetation group often has deep tap roots as well as lateral roots which can protect deep and shallow substrate.

Hydrological Function

Hydrological functions of wetlands encompass both flood control and ground water recharge functions. Flood control functions include the ability and effectiveness of a wetland to retain surface water from storm events as well as spring snow melt. The ability of a wetland to adequately function for flood control depends on several factors including the substrate properties and size of the wetland. Peat substrates have a larger water storage capacity than mineral substrates. However, the source of the peat can also affect a peatland's water storage capacity. For example, peat comprised of *Sphagnum* moss is very porous and has high capillary water transport due to the hyaline cells in many *Sphagnum* species.

Additionally, the size of the wetland can impact flood control wetland functions; large wetlands and moderately sized wetlands associated with wetland complexes can store larger quantities of water. Wetlands that do not have peat or are isolated and small are the least effective at storing water following high levels of precipitation.

The groundwater recharge function of a wetland is the effectiveness of a wetland to supply the groundwater table with additional water. This function consists of two components: hydrological connectivity; and hydraulic conductivity. Hydrological connectivity refers to the connection present between surface and subsurface water systems. Palustrine (isolated) wetlands have a higher potential for groundwater recharge than those wetlands associated with stream/river systems or lacustrine wetlands. Wetlands associated with large river systems are typically located in areas where the water table is close to the surface. Groundwater discharge is more prevalent as a result in these locations though groundwater recharge may occur during very dry weather conditions. Wetlands located near to or are associated with lakes are often too small in relation to the lake to be an important source of groundwater recharge. Hydraulic conductivity focuses on the porosity of wetland substrate. Wetlands that have more permeable soils (*i.e.*, ephemeral or temporary wetlands) tend to be sites of higher groundwater recharge than those wetlands with more impermeable soils (*i.e.*, permanent wetlands or peatlands). Connections to groundwater can still be found in wetlands with impermeable soils but often to a lesser extent than those with permeable substrates.

Biogeochemical Function

Wetland biogeochemical function includes water quality (*i.e.*, water purification as well as sediment and nutrient retention) and carbon sequestration. The water purification function of a wetland is the ability of a wetland to reduce the concentration of sediments, nutrients and other contaminants in the water column before it is released downstream or into the groundwater. This function can be quantified by considering the occurrence of water entering a wetland (water flow), the length of the flow path through the wetland (retention time) as well as the composition and cover of vegetation within the wetland (vegetation cover/density). Wetlands within complexes are typically connected by drainages, which increases the length of the water flow path. Long flow paths allow for longer retention times for sediment, nutrients and other contaminants to settle out from the water column, be attenuated by vegetation or be incorporated into any biogeochemical processes. Wetlands that have been disturbed or impounded (*i.e.*, berm construction) have a reduced ability to perform water purification functions as surface connectivity may be compromised. Wetlands with dense vegetation (emergent, floating and submerged) are more effective at completing water purification functions than wetlands with bare soil or open water lacking vegetation. Dense vegetation reduces water flow rates, increasing water retention time within the wetland. This allows for increased time for suspended solids to settle from the water column and for nutrients and contaminants to be incorporated into biogeochemical processes.

Carbon storage functions focus on the effectiveness of a wetland to function as a carbon sink in the landscape. Carbon sequestration in wetlands occurs during peat development and varies depends on vegetation quality (*i.e.*, ease of decomposition), temperature, water table position, and litter input rates. Peatlands dominated by moss species and woody vegetation (*e.g.*, low litter quality) store more carbon than wetlands that are dominated by graminoid/herbaceous vegetation (*e.g.*, high litter quality) and have an organic veneer or do not accumulate peat (*i.e.*, high litter quality and low water table position). Carbon sequestration functions are also reduced where peat has been compacted due to disturbance. Non-peat accumulating wetlands can sequester carbon through high rates of plant productivity but only for very short periods of time.

Wetland function was evaluated at each wetland encountered along the proposed pipeline corridor during ground-based field work, where access was available. Since there should be no wetland function lost with development, disturbed wetlands are typically assessed in the years following construction. Wetland function documented during the existing (*i.e.*, pre-construction) survey will be compared to wetland function observed along the reclaimed (*i.e.*, post-construction) Project. The comparison of existing (baseline) to post-construction wetland function will be used to gauge the efficiency of mitigation and reclamation measures, and to determine the loss or “no net loss” of wetland function.

5.0 RESULTS OF FIELD DATA COLLECTION

5.1 Distribution of Wetlands along the Project

A desktop review of overflight photographs and satellite imagery was conducted to identify and delineate wetland areas encountered within the 150 m wide proposed pipeline corridor. The desktop review identified 638 potential wetlands (339 in Alberta and 299 in BC) (94.4 km), comprising approximately 9.6% of the proposed pipeline corridor (Tables 5.1-1, 5.1-2, 5.1-3, 5.1-4, 5.1-5). Potential wetlands identified during imagery review as being crossed by the 150 m wide proposed pipeline corridor include 141 basin marshes, 67 riparian marshes, 4 lacustrine marshes, 7 slope marshes, 2 hummock marshes, 104 flat swamps, 78 riparian swamps, 2 discharge swamps, 6 slope swamps, 45 basin shallow open water, 19 riparian shallow open water, 13 basin fens, 26 horizontal fens, 13 riparian fens, 2 channel fens, 1 feather fen, 1 slope fen and 1 basin bog. Of the 638 wetlands encountered along the proposed pipeline corridor, 148 are considered to be potentially navigable (64 in Alberta and 84 in BC).

The above numbers reflect the total number of potential wetlands that overlap with the 150 m wide proposed pipeline corridor. It is important to note that not all of these wetlands will be affected during pipeline construction since the pipeline construction right-of-way (approximately 45 m wide) will be placed within the proposed pipeline corridor in a manner that avoids wetlands to the extent practical.

During 2012 and 2013 ground-based wetland field surveys were conducted on lands where access was granted to classify, delineate and assess functional condition for 377 of the 638 potential wetlands (261 in Alberta and 116 in BC) (66.5 km) encountered within the 150 m wide proposed pipeline corridor, comprising approximately 6.7% of the length of the proposed pipeline corridor. Wetlands visited during the 2012 and 2013 wetland field surveys that are crossed include 140 basin marshes, 38 riparian marshes, 2 hummock marshes, 1 slope marsh, 68 flat swamps, 57 riparian swamps, 2 discharge swamps, 4 slope swamps, 12 basin shallow open water, 10 riparian shallow open water, 11 basin fens, 24 horizontal fens, 7 riparian fens and 1 feather fen. The characteristics of each wetland encountered along the 150 m wide proposed pipeline corridor are detailed in Tables 5.1-6 to 5.1-10 and the wetland distribution along the proposed pipeline corridor is shown on Figures A1 to A4 (Appendix A).

It should be noted that the number of wetlands presented in this report have been updated following a late season wetland survey conducted in October 2013. This information was not included on the Environmental Alignment Sheets of Volume 6E nor was it available when cross referencing with other discipline results (*e.g.,* wildlife, vegetation and fish) was conducted. Therefore, some discrepancies maybe noted between the ESA (Volume 5A), Wetland Evaluation Technical Report (Volume 5C), the Environmental Alignment Sheets (Volume 6E) and other discipline technical reports (Volume 5C). This discrepancy along with the number and classification of wetlands crossed by the 150 m wide proposed pipeline corridor will be updated following supplemental wetland surveys planned for 2014 targeting locations where access was not available and once the 150 m wide corridor is refined at a 45 m construction right-of-way.

This discrepancy along with the number and classification of wetlands encountered by the 150 m wide proposed pipeline corridor will be updated following supplemental wetland surveys planned for 2014. Table 5.1-11 identifies those wetlands that were confirmed during the October 2013 field program.

Details for representative delineated wetlands visited along the 150 m wide proposed pipeline corridor during the 2012 and 2013 ground-based wetland surveys, including wetland function rankings and photographs, are presented on site-specific Site Cards and are provided in Appendix B of this report. Photographs of commonly occurring wetlands found along the proposed pipeline corridor can be found in Appendix C of this report.

TABLE 5.1-1

SUMMARY OF WETLANDS ENCOUNTERED ALONG THE EDMONTON TO HINTON SEGMENT

Wetland Class	Number of Wetlands Encountered (Potential and Ground-truthed)	Number of Wetlands Encountered (Ground-truthed)[1]	Number of Wetlands of High Functional Condition[1]	Number of Wetlands of High-Moderate Functional Condition[1]	Number of Wetlands of Low-Moderate Functional Condition[1]	Number of Wetlands of Low Functional Condition[1]	Cumulative Length of Wetland Class Crossed by 150 m Wide Corridor (m)	Percent of Pipeline Corridor Crossed (%)
Basin Marsh	154	115	10	72	33	--[2]	13,727	1.4
Riparian Marsh	31	24	4	20	--[2]	--[2]	5,486	0.6
Flat Swamp	59	46	19	24	3	--[2]	10,433	1.1
Riparian Swamp	26	21	9	11	1	--[2]	5,045	0.5
Discharge Swamp	2	2	1	1	--[2]	--[2]	465	0.05
Slope Swamp	1	1	1	--[2]	--[2]	--[2]	82	0.01
Basin Shallow Open Water	18	9	--[2]	6	3	--[2]	2,139	0.2
Riparian Shallow Open Water	3	3	--[2]	2	1	--[2]	619	0.1
Basin Fen	11	10	8	2	--[2]	--[2]	1,983	0.2
Horizontal Fen	23	22	19	3	--[2]	--[2]	9,690	1.0
Riparian Fen	7	7	6	1	--[2]	--[2]	1,676	0.2
Channel Fen	2	0	--[2]	--[2]	--[2]	--[2]	131	0.01
Feather Fen	1	1	1	--[2]	--[2]	--[2]	125	0.01
Basin Bog	1	0	--[2]	--[2]	--[2]	--[2]	114	0.01
Total:	339	261	78	142	41	--[2]	51,714	5.4

Notes: 1 Ground-truthing and functional assessments were conducted at wetlands where land access permission was available in 2012 and 2013.

2 A double dash indicates that no information to support this finding during the 2012 and 2013 ground surveys; however, this functional condition may be present in wetlands that have not been ground-truthed.

TABLE 5.1-2

SUMMARY OF WETLANDS ENCOUNTERED ALONG THE HARGREAVES TO DARFIELD SEGMENT

Wetland Class	Number of Wetlands Encountered (Potential and Ground-truthed)	Number of Wetlands Encountered (Ground-truthed)[1]	Number of Wetlands of High Functional Condition[1]	Number of Wetlands of High-Moderate Functional Condition[1]	Number of Wetlands of Low-Moderate Functional Condition[1]	Number of Wetlands of Low Functional Condition[1]	Cumulative Length of Wetland Class Crossed by 150 m Wide Corridor (m)	Percent of Pipeline Corridor Crossed (%)
Basin Marsh	31	21	--[2]	13	8	--[2]	3,750	0.4
Riparian Marsh	17	13	--[2]	12	1	--[2]	2,954	0.3
Lacustrine Marsh	2	--[2]	--[2]	--[2]	--[2]	--[2]	244	0.02
Slope Marsh	1	1	--[2]	1	--[2]	--[2]	45	0.005
Flat Swamp	30	21	4	16	1	--[2]	6,980	0.7
Riparian Swamp	41	36	17	19	--[2]	--[2]	8,702	0.9
Slope Swamp	3	3	1	2	--[2]	--[2]	524	0.1
Basin Shallow Open Water	10	2	--[2]	2	--[2]	--[2]	931	0.1

TABLE 5.1-2 Cont'd

Wetland Class	Number of Wetlands Encountered (Potential and Ground-truthed)	Number of Wetlands Encountered (Ground-truthed)[1]	Number of Wetlands of High Functional Condition[1]	Number of Wetlands of High-Moderate Functional Condition[1]	Number of Wetlands of Low-Moderate Functional Condition[1]	Number of Wetlands of Low Functional Condition[1]	Cumulative Length of Wetland Class Crossed by 150 m Wide Corridor (m)	Percent of Pipeline Corridor Crossed (%)
Riparian Shallow Open Water	10	6	--[2]	6	--[2]	--[2]	1,501	0.2
Basin Fen	1	1	1	--[2]	--[2]	--[2]	9	0.001
Horizontal Fen	3	2	1	1	--[2]	--[2]	437	0.04
Riparian Fen	6	--[2]	--[2]	--[2]	--[2]	--[2]	1,266	0.1
Total	155	106	24	72	10	--[2]	27,343	2.8

Notes: 1 Ground-truthing and functional assessments were conducted at wetlands where land access permission was available in 2012 and 2013.

2 A double dash indicates that no information to support this finding during the 2012 and 2013 ground surveys; however, this functional condition may be present in wetlands that have not been ground-truthed.

TABLE 5.1-3

SUMMARY OF WETLANDS ENCOUNTERED ALONG THE BLACK PINES TO HOPE SEGMENT

Wetland Class	Number of Wetlands Encountered (Potential and Ground-truthed)	Number of Wetlands Encountered (Ground-truthed)[1]	Number of Wetlands of High Functional Condition[1]	Number of Wetlands of High-Moderate Functional Condition[1]	Number of Wetlands of Low-Moderate Functional Condition[1]	Number of Wetlands of Low Functional Condition[1]	Cumulative Length of Wetland Class Crossed by 150 m Wide Corridor (m)	Percent of Pipeline Corridor Crossed (%)
Basin Marsh	45	3	--[2]	1	2	--[2]	3,913	0.4
Riparian Marsh	7	--[2]	--[2]	--[2]	--[2]	--[2]	1,028	0.1
Lacustrine Marsh	2	--[2]	--[2]	--[2]	--[2]	--[2]	476	0.05
Slope Marsh	6	--[2]	--[2]	--[2]	--[2]	--[2]	599	0.06
Flat Swamp	10	1	--[2]	1	--[2]	--[2]	1,350	0.14
Riparian Swamp	4	--[2]	--[2]	--[2]	--[2]	--[2]	941	0.1
Slope Swamp	2	--[2]	--[2]	--[2]	--[2]	--[2]	412	0.04
Basin Shallow Open Water	7	--[2]	--[2]	--[2]	--[2]	--[2]	781	0.08
Riparian Shallow Open Water	3	--[2]	--[2]	--[2]	--[2]	--[2]	411	0.04
Basin Fen	1	--[2]	--[2]	--[2]	--[2]	--[2]	195	0.02
Slope Fen	1	--[2]	--[2]	--[2]	--[2]	--[2]	187	0.02
Total	88	4	--[2]	2	2	--[2]	10,292	1.04

Notes: 1 Ground-truthing and functional assessments were conducted at wetlands where land access permission was available in 2012 and 2013.

2 A double dash indicates that no information to support this finding during the 2012 and 2013 ground surveys; however, this functional condition may be present in wetlands that have not been ground-truthed.

TABLE 5.1-4

SUMMARY OF WETLANDS ENCOUNTERED ALONG THE HOPE TO BURNABY SEGMENT

Wetland Class	Number of Wetlands Encountered (Potential and Ground-truthed)	Number of Wetlands Encountered (Ground-truthed)[1]	Number of Wetlands of High Functional Condition[1]	Number of Wetlands of High-Moderate Functional Condition[1]	Number of Wetlands of Low-Moderate Functional Condition[1]	Number of Wetlands of Low Functional Condition[1]	Cumulative Length of Wetland Class Crossed by 150 m Wide Corridor (m)	Percent of Pipeline Corridor Crossed (%)
Basin Marsh	17	1	--[2]	--[2]	1	--[2]	1,166	0.1
Riparian Marsh	12	1	--[2]	--[2]	1	--[2]	1,087	0.1
Hummock Marsh	2	2	--[2]	--[2]	2	--[2]	185	0.02
Flat Swamp	5	--[2]	--[2]	--[2]	--[2]	--[2]	529	0.1
Riparian Swamp	6	--[2]	--[2]	--[2]	--[2]	--[2]	752	0.1
Basin Shallow Open Water	10	1	--[2]	--[2]	--[2]	1	653	0.1
Riparian Shallow Open Water	3	1	--[2]	--[2]	1	--[2]	453	0.05
Total	55	6	--[2]	--[2]	5	1	4,824	0.5

Notes: 1 Ground-truthing and functional assessments were conducted at wetlands where land access permission was available in 2012 and 2013.

2 A double dash indicates that no information to support this finding during the 2012 and 2013 ground surveys; however, this functional condition may be present in wetlands that have not been ground-truthed.

TABLE 5.1-5

SUMMARY OF WETLANDS ENCOUNTERED ALONG THE BURNABY TO WESTRIDGE SEGMENT

Wetland Class	Number of Wetlands Encountered (Potential and Ground-truthed)	Number of Wetlands Encountered (Ground-truthed)[1]	Number of Wetlands of High Functional Condition[1]	Number of Wetlands of High-Moderate Functional Condition[1]	Number of Wetlands of Low-Moderate Functional Condition[1]	Number of Wetlands of Low Functional Condition[1]	Cumulative Length of Wetland Crossed by 150 m Wide Corridor (m)	Percent of Pipeline Corridor Crossed (%)
Basin Marsh	1	--[2]	--[2]	--[2]	--[2]	--[2]	79	0.01
Total	1	--[2]	--[2]	--[2]	--[2]	--[2]	79	0.01

Notes: 1 Ground-truthing and functional assessments were conducted at wetlands where land access permission was available in 2012 and 2013.

2 A double dash indicates that no information to support this finding during the 2012 and 2013 ground surveys; however, this functional condition may be present in wetlands that have not been ground-truthed.

TABLE 5.1-6

WETLAND CLASS AND DISTRIBUTION ENCOUNTERED ALONG THE PROPOSED EDMONTON TO HINTON SEGMENT

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM Zone	UTM Easting	UTM Northing	Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
WT-1419	Potential Basin Marsh (seasonal emergent marsh)	0.5	0.6	12	343237	5934652	15-32-52-23 W4M	9.8	0.4	98.1	--	--	Figure A1	
WT-1428	Potential Basin Shallow Open Water (open water pond)	1.4	1.8	12	343791	5934139	7-32-52-23 W4M	5.1	2	405.2	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1071	Potential Basin Marsh (seasonal emergent marsh)	1.4	1.5	12	343810	5934275	10-32-52-23 W4M	0.3	0.2	95.5	--	--	Figure A1	
WT-1124	Potential Flat Swamp (shrubby swamp)	1.4	1.6	12	343858	5934192	7-32-52-23 W4M	1	1	145.6	--	--	Figure A1	
WT-1113	Potential Basin Marsh (seasonal emergent marsh)	1.5	1.6	12	343948	5934294	10-32-52-23 W4M	0.5	0.01	43.0	--	--	Figure A1	
WT-1421	Potential Flat Swamp (shrubby swamp)	1.9	2.1	12	344264	5934199	8-32-52-23 W4M	0.5	0.5	207.8	--	--	Figure A1	
WT-1046	Potential Basin Marsh (seasonal emergent marsh)	2.1	2.2	12	344493	5934250	9-32-52-23 W4M	0.2	0.2	63.4	--	--	Figure A1	
WT-1047	Basin Marsh (deep marsh)	2.3	2.5	12	344727	5934156	5-33-52-23 W4M	0.7	0.7	182.7	High-Moderate (51%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1112	Basin Marsh (seasonal emergent marsh)	2.7	2.8	12	345079	5934156	6-33-52-23 W4M	0.3	0.3	47.0	High-Moderate 63%)	--	Figure A1	
WT-1048	Flat Swamp (shrubby swamp with seasonal emergent marsh component)	3.9	3.9	12	345253	5933241	14-28-52-23 W4M	0.3	0.1	47.1	High-Moderate (72%)	--	Figure A1	
WT-1399	Riparian Marsh (seasonal emergent marsh)	7.0	7.1	12	345230	5930138	14-16-52-23 W4M	0.1	0.1	54.0	High-Moderate (65%)	--	Figure A1	
WT-1422	Basin Marsh (deep marsh)	7.2	7.3	12	345170	5929929	14-16-52-23 W4M	1.7	0.5	116.4	High-Moderate (52%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1041	Basin Marsh (seasonal emergent marsh)	7.7	7.7	12	345181	5929483	11-16-52-23 W4M	0.9	0.2	84.0	High-Moderate (50%)	--	Figure A1	
WT-1049	Potential Basin Marsh (seasonal emergent marsh)	7.7	7.7	12	345293	5929460	10-16-52-23 W4M	0.3	0.3	59.6	--	--	Figure A1	
WT-1050	Basin Marsh (seasonal emergent marsh) associated with a broad-leaf treed swamp	7.8	7.9	12	345264	5929337	6-16-52-23 W4M	0.6	0.6	96.0	High-Functional (75%)	--	Figure A1	
WT-1402	Flat Swamp (broad-leaf treed swamp with seasonal emergent marsh components)	7.8	7.9	12	345158	5929305	6-16-52-23 W4M	2.3	0.1	100.0	High Functional (75%)	--	Figure A1	
WT-1051	Basin Marsh (seasonal emergent marsh)	8.2	8.3	12	345216	5928991	3-16-52-23 W4M	0.5	0.5	143.3	High-Moderate (69%)	--	Figure A1	
WT-1233	Potential Basin Marsh (seasonal emergent marsh)	8.5	8.6	12	345265	5928603	2-16-52-23 W4M	0.3	0.1	42.3	--	--	Figure A1	
WT-1052	Potential Flat Swamp (mixedwood treed swamp)	8.9	9.1	12	345108	5928217	11-9-52-23 W4M	6.2	0.2	111.7	--	--	Figure A1	
WT-1429	Flat Swamp (shrubby swamp)	9.7	9.8	12	345083	5927446	6-9-52-23 W4M	0.5	0.03	36.0	High-Moderate (57%)	--	Figure A1	
WT-1042	Riparian Swamp (shrubby swamp) associated with a deep marsh	10.0	10.1	12	345128	5927170	3-9-52-23 W4M	0.4	0.3	69.2	High-Moderate (58%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with watercourse (Fulton Creek) (nonfish-bearing) (AB-5)
WT-1111	Potential Flat Swamp (shrubby swamp)	10.2	10.2	12	345067	5927009	3-9-52-23 W4M	0.3	0.1	42.8	--	--	Figure A1	
WT-1053	Potential Basin Marsh (seasonal emergent marsh)	10.4	10.4	12	345062	5926775	14-4-52-23 W4M	0.1	0.1	48.4	--	--	Figure A1	
WT-1061	Potential Basin Marsh (seasonal emergent marsh)	10.6	10.7	12	345050	5926601	14-4-52-23 W4M	1.4	0.5	125.5	--	--	Figure A1	
WT-1054	Basin Marsh (seasonal emergent marsh)	11.1	11.2	12	345146	5926086	6-4-52-23 W4M	0.9	0.9	126.7	High-Moderate (63%)	--	Figure A1	
WT-1155	Basin Marsh (deep marsh)	11.3	11.4	12	344952	5926010	6-4-52-23 W4M	0.8	0.2	118.3	High-Moderate (65%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1155.1	Basin Marsh (seasonal emergent marsh)	11.4	11,4	12	344950	5925954	6-4-52-23 W4M	0.1	0.1	0.04	High-Moderate (56%)	--	Figure A1	
WT-1055	Basin Marsh (deep marsh)	11.5	11.6	12	344743	5925870	5-4-52-23 W4M	0.9	0.4	133.7	High-Moderate 72%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1062.2	Basin Marsh (deep marsh)	12.6	12.6	12	344068	5925063	15-32-51-23 W4M	0.2	0.1	36.5	High-Moderate (72%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1062.1	Basin Marsh (deep marsh)	12.6	12.6	12	343989	5925134	15-32-51-23 W4M	0.2	0.2	50.5	High-Moderate (72%)	Yes if open water channel or pond within construction ROW	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-1062.8	Basin Marsh (seasonal emergent marsh)	12.6	12.7	12	344021	5925041	15-32-51-23 W4M	0.5	0.2	47.7	High-Moderate (72%)	--	Figure A1	
WT-1062.7	Riparian Marsh (seasonal emergent marsh)	12.7	12.7	12	343919	5925074	15-32-51-23 W4M	1.1	0.7	79.7	High-Moderate (72%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Mill Creek (AB-7)
WT-1062.4	Riparian Swamp (shrubby swamp)	12.7	12.8	12	343957	5924936	15-32-51-23 W4M	0.2	0.1	30.5	High-Moderate (72%)	--	Figure A1	
WT-1123	Basin Marsh (seasonal emergent marsh)	13.0	13.1	12	343750	5924819	10-32-51-23 W4M	0.3	0.3	133.3	High-Moderate (55%)	--	Figure A1	
WT-1063	Basin Marsh (deep marsh)	13.1	13.2	12	343710	5924674	10-32-51-23 W4M	1.0	0.2	105.6	High-Moderate (63%)	--	Figure A1	
WT-1069	Basin Marsh (seasonal emergent marsh)	13.2	13.3	12	343546	5924653	10-32-51-23 W4M	0.1	0.1	47.2	High-Moderate (66%)	--	Figure A1	
WT-1043.1	Potential Basin Marsh (seasonal emergent marsh)	13.5	12.5	12	343417	5924410	6-32-51-23 W4M	0.1	0.1	0.1	--	--	Figure A1	
WT-1043	Basin Marsh (seasonal emergent marsh)	13.3	13.4	12	343545	5924517	7-32-51-23 W4M	0.6	0.4	106.7	High-Moderate (61%)	--	Figure A1	
WT-1425	Basin Marsh (deep marsh)	13.9	14.1	12	343060	5924220	4-32-51-23 W4M	2.5	2.1	232.2	High Functional (75%)	--	Figure A1	
WT-1110	Potential Flat Swamp (shrubby swamp)	16.3	16.4	12	340809	5923588	16-25-51-24 W4M	0.4	0.4	78.8	--	--	Figure A1	
WT-1426	Flat Swamp (shrubby swamp)	18.0	18.8	12	339109	5923613	15-26-51-24 W4M	8.1	7.2	817.9	High-Moderate (60%)	--	Figure A1	
WT-1536	Potential Basin Marsh (seasonal emergent marsh)	20.8	20.9	12	336387	5924041	4-34-51-24 W4M	1.1	0.0	75.5	--	--	Figure A1	
WT-1445	Basin Marsh (seasonal emergent marsh)	21.5	21.9	12	335733	5923679	10-28-51-24 W4M	3.6	2.9	352.8	High-Moderate (60%)	--	Figure A1	
WT-1065	Basin Marsh (seasonal emergent marsh)	29.6	29.7	12	328334	5923610	12-26-51-25 W4M	0.6	0.4	64.2	High-Moderate (60%)	--	Figure A1	
WT-1450	Basin Marsh (seasonal emergent marsh)	29.8	29.8	12	328198	5923755	12-26-51-25 W4M	0.3	0.3	75.8	Low-Moderate (49%)	--	Figure A1	
WT-1410	Basin Marsh (seasonal emergent marsh)	30.4	30.5	12	327761	5924271	1-34-51-25 W4M	0.1	0.1	76.1	High-Moderate (50%)	--	Figure A1	
WT-1434	Flat Swamp (shrubby swamp)	30.7	30.8	12	327822	5924556	1-34-51-25 W4M	0.3	0.3	107.8	High-Moderate (50%)	--	Figure A1	
WT-1067	Basin Marsh (seasonal emergent marsh)	31.0	31.0	12	327871	5924805	8-34-51-25 W4M	0.2	0.2	75.4	Low-Moderate (49%)	--	Figure A1	
WT-1066	Basin Marsh (seasonal emergent marsh)	31.2	31.2	12	327928	5925040	8-34-51-25 W4M	0.1	0.1	28.5	Low-Moderate (42%)	--	Figure A1	
WT-1411	Potential Basin Marsh (seasonal emergent marsh)	34.3	34.4	12	325981	5927411	15-4-52-25 W4M	0.2	0.2	56.8	--	--	Figure A1	
WT-1413	Flat Swamp (broad-leaf treed swamp)	34.8	34.8	12	325635	5926896	10-4-52-25 W4M	0.4	0.4	0.0	High-Moderate (58%)	--	Figure A1	
WT-1092	Potential Basin Marsh (seasonal emergent marsh)	40.4	40.6	12	323449	5931083	4-20-52-25 W4M	0.9	0.8	181.1	--	Yes if open water channel or pond within construction ROW	Figure A1	Fish-bearing wetland (AB-16)
WT-1414	Basin Marsh (seasonal emergent marsh)	43.9	44.0	12	321249	5932704	2-25-52-26 W4M	0.4	0.3	91.6	High-Moderate (51%)	--	Figure A1 Appendix B	
WT-1068	Basin Marsh (seasonal emergent marsh)	44.5	44.6	12	320654	5932668	3-25-52-26 W4M	0.3	0.3	86.2	High-Moderate (58%)	--	Figure A1	
WT-1068.1	Basin Marsh (seasonal emergent marsh)	45.0	45.0	12	320141	5932767	4-25-52-26 W4M	0.1	0.0	3.6	Low-Moderate (35%)	--	Figure A1	
WT-229	Basin Marsh (seasonal emergent marsh)	46.6	46.7	12	318977	5933261	6-26-52-26 W4M	1.5	0.2	110.2	High-Moderate (55%)	--	Figure A1	
WT-230	Flat Swamp (shrubby swamp)	47.0	47.0	12	318644	5933202	5-26-52-26 W4M	0.1	0.1	36.6	Low-Moderate (44%)	--	Figure A1	
WT-231	Basin Marsh (seasonal emergent marsh)	47.4	47.5	12	318168	5933180	8-27-52-26 W4M	0.1	0.1	44.2	Low-Moderate (49%)	--	Figure A1	
WT-234	Flat Swamp (shrubby swamp)	47.8	47.9	12	317790	5933222	7-27-52-26 W4M	0.1	0.1	46.9	Low-Moderate (48%)	--	Figure A1	
WT-298	Basin Marsh (seasonal emergent marsh)	50.4	50.5	12	315370	5933905	12-28-52-26 W4M	0.3	0.3	90.2	High-Moderate (53%)	--	Figure A1	
WT-302	Basin Marsh (seasonal emergent marsh)	51.1	51.2	12	314676	5934111	15-29-52-25 W4M	0.8	0.1	54.1	Low-Moderate (35%)	--	Figure A1	
WT-303	Basin Marsh (seasonal emergent marsh)	51.9	52.0	12	313905	5934226	13-29-52-26 W4M	0.3	0.3	66.6	Low-Moderate (34%)	--	Figure A1	
WT-306	Basin Shallow Open Water (open water pond)	59.4	59.4	12	306592	5935606	7-33-52-27 W4M	0.4	0.4	76.8	High-Moderate (56%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-306.1	Riparian Swamp (shrubby swamp)	59.4	59.5	12	306546	5935553	7-33-52-27 W4M	0.5	0.4	117.7	High-Moderate (56%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Dog Creek (AB-18)

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-307	Riparian Marsh (seasonal emergent marsh)	59.5	59.7	12	306440	5935572	7-33-52-27 W4M	1.7	0.9	146.4	High-Moderate (56%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Dog Creek (AB-18)
WT-316	Basin Marsh (seasonal emergent marsh) associated with deep marsh components	61.5	61.9	12	304619	5936065	14-32-52-27 W4M	11.6	3.8	416.8	High-Moderate (67%)	--	Figure A1	
WT-311	Basin Marsh (seasonal emergent marsh)	64.8	65.4	12	302300	5938237	16-1-53-28 W4M	12.1	4.7	606.7	High-Moderate (51%)	--	Figure A1	
WT-310	Basin Marsh (seasonal emergent marsh)	65.0	65.2	12	302112	5938350	1-12-53-28 W4M	1.8	0.3	192.9	High-Moderate (51%)	--	Figure A1	
WT-317	Basin Shallow Open Water (open water pond)	65.4	65.5	12	301699	5938309	2-12-53-28 W4M	0.6	0.6	126.6	Low-Moderate (49%)	Yes if open water channel or pond within construction ROW	Figure A1	Beaver modified Associated with unnamed tributary (watercourse) to Atim Creek (AB-21)
WT-317 A	Flat Swamp (shrubby swamp)	65.5	65.8	12	301581	5938324	3-12-53-28 W4M	9.9	2.4	254.0	High-Moderate (71%)	--	Figure A1	
WT-318	Basin Marsh (seasonal emergent marsh)	66.4	66.4	11	698146	5938319	2-12-53-1 W5M	0.5	0.4	65.9	Low-Moderate (48%)	--	Figure A1	
WT-239	Basin Marsh (seasonal emergent marsh)	66.8	66.9	11	697744	5938287	3-12-53-1 W5M	0.8	0.7	191.2	High Functional (75%)	--	Figure A1	American Robin nest and Red-tailed Hawk nest
WT-238	Basin Marsh (deep marsh) associated with WT-239	66.9	66.9	11	697627	5938260	3-12-53-1 W5M	0.2	0.1	46.8	High Functional (75%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-239.2	Potential Basin Marsh (seasonal emergent marsh)	67.3	67.3	11	697236	5938170	13-1-53-1 W5M	0.1	0.0	11.5	--	--	Figure A1	
WT-240.1	Basin Marsh (seasonal emergent marsh)	68.0	68.0	11	696566	5937962	15-2-53-1 W5M	0.1	0.1	26.7	Low-Moderate (41%)	--	Figure A1	
WT-240.2	Basin Marsh (seasonal emergent marsh)	68.1	68.1	11	696481	5937898	15-2-53-1 W5M	0.1	0.1	61.5	Low-Moderate (38%)	--	Figure A1	
WT-241	Basin Marsh (seasonal emergent marsh)	68.3	68.3	11	696273	5937847	15-2-53-1 W5M	0.1	0.1	53.7	Low-Moderate (47%)	--	Figure A1	
WT-1016	Basin Marsh (seasonal emergent marsh)	69.0	69.0	11	695611	5937627	12-2-53-1 W5M	0.0	0.0	12.7	Low-Moderate (49%)	--	Figure A1	
WT-242	Potential Basin Shallow Open Water (open water pond)	69.3	69.4	11	695254	5937581	9-3-53-1 W5M	0.2	0.2	53.5	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-322	Potential Flat Swamp (shrubby swamp)	69.8	70.1	11	694797	5937583	10-3-53-1 W5M	1.8	1.4	336.7	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Atim Creek (AB-23)
WT-320	Potential Basin Marsh (seasonal emergent marsh)	69.8	69.9	11	694763	5937586	10-3-53-1 W5M	0.7	0.3	88.3	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Atim Creek (AB-23)
WT-321	Potential Basin Marsh (seasonal emergent marsh)	70.0	70.0	11	694643	5937708	10-3-53-1 W5M	0.2	0.2	40.0	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Atim Creek (AB-23)
WT-326	Basin Marsh (seasonal emergent marsh)	70.2	70.3	11	694359	5937613	11-3-53-1 W5M	0.2	0.1	42.5	Low-Moderate (46%)	--	Figure A1	
WT-325	Basin Marsh (seasonal emergent marsh)	70.4	70.4	11	694209	5937642	11-3-53-1 W5M	0.1	0.1	33.2	Low-Moderate (46%)	--	Figure A1	
WT-325.1	Basin Marsh (seasonal emergent marsh)	70.5	70.5	11	694123	5937709	13-3-53-1 W5M	0.1	0.1	28.0	Low-Moderate (46%)	--	Figure A1	
WT-325.2	Basin Marsh (seasonal emergent marsh)	70.5	70.5	11	694108	5937627	12-3-53-1 W5M	0.4	0.1	60.2	Low-Moderate (46%)	--	Figure A1	
WT-327	Basin Marsh (seasonal emergent marsh)	70.7	70.8	11	693859	5937707	13-3-53-1 W5M	0.1	0.1	37.8	Low-Moderate (40%)	--	Figure A1	
WT-327.1	Basin Marsh (seasonal emergent marsh)	70.8	70.8	11	693797	5937707	13-3-53-1 W5M	0.1	0.1	36.4	Low-Moderate (40%)	--	Figure A1	
WT-328	Basin Marsh (seasonal emergent marsh)	72.0	72.0	11	692630	5937771	14-4-53-1 W5M	0.1	0.1	23.3	High-Moderate (65%)	--	Figure A1	
WT-1022	Basin Marsh (seasonal emergent marsh)	72.0	72.1	11	692568	5937726	14-4-53-1 W5M	0.0	0.0	27.5	Low-Moderate (45%)	--	Figure A1	
WT-329	Basin Marsh (seasonal emergent marsh)	72.0	72.1	11	692563	5937773	14-4-53-1 W5M	0.1	0.1	28.3	High-Moderate (63%)	--	Figure A1	
WT-1018	Basin Marsh (seasonal emergent marsh)	72.2	72.3	11	692391	5937837	13-4-53-1 W5M	0.1	0.1	38.8	High-Moderate (63%)	--	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-1017	Basin Marsh (seasonal emergent marsh)	72.3	72.3	11	692329	5937869	13-4-53-1 W5M	0.0	0.0	22.0	High-Moderate (70%)	--	Figure A1	
WT-244	Basin Marsh (seasonal emergent marsh)	72.3	72.4	11	692275	5937880	13-4-53-1 W5M	0.1	0.1	38.1	Low-Moderate (43%)	--	Figure A1	
WT-243	Basin Marsh (seasonal emergent marsh)	72.4	72.4	11	692205	5937789	13-4-53-1 W5M	0.1	0.1	24.4	High-Moderate (56%)	--	Figure A1	
WT-1023	Basin Marsh (seasonal emergent marsh)	72.5	72.6	11	692077	5937798	16-5-53-1 W5M	0.1	0.1	36.5	High-Moderate (65%)	--	Figure A1	
WT-1020	Basin Marsh (seasonal emergent marsh)	72.6	72.6	11	692013	5937817	16-5-53-1 W5M	0.0	0.0	23.7	High-Moderate (53%)	--	Figure A1	
WT-246	Basin Marsh (seasonal emergent marsh)	74.7	74.7	11	689978	5938018	2-7-53-1 W5M	0.2	0.2	45.8	High-Moderate (72%)	--	Figure A1 Appendix B	
WT-330	Basin Marsh (seasonal emergent marsh)	74.8	75.0	11	689808	5938104	2-7-53-1 W5M	0.6	0.6	135.4	High-Moderate (59%)	--	Figure A1	
WT-1436.1	Basin Marsh (seasonal emergent marsh)	76.0	76.0	11	688692	5938101	1-12-53-2 W5M	0.2	0.2	0.05	High Moderate (57%)	--	Figure A1	
WT-1436	Basin Marsh (seasonal emergent marsh)	76.0	76.1	11	688616	5938145	1-12-53-2 W5M	0.04	0.04	21.6	High-Moderate (55%)	--	Figure A1	
WT-1286	Potential Basin Marsh (seasonal emergent marsh)	76.2	76.2	11	688466	5938184	1-12-53-2 W5M	0.3	0.0	44.9	--	--	Figure A1	
WT-331	Basin Marsh (seasonal emergent marsh)	76.8	76.9	11	687794	5938112	3-12-53-2 W5M	0.3	0.3	74.3	Low-Moderate (38%)	--	Figure A1	
WT-249	Flat Swamp (shrubby swamp)	78.3	78.4	11	686362	5938294	6-11-53-3 W5M	0.3	0.3	65.4	High Functional (75%)	--	Figure A1	
WT-252	Basin Marsh (deep marsh)	78.9	79.0	11	685782	5938199	5-11-53-2 W5M	0.5	0.2	72.3	High-Moderate (56%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-253	Basin Marsh (seasonal emergent marsh)	79.0	79.0	11	685675	5938221	5-11-53-2 W5M	0.1	0.1	50.1	High-Moderate (56%)	--	Figure A1	
WT-332.1	Basin Marsh (seasonal emergent marsh)	79.1	79.3	11	685465	5938183	8-10-53-2 W5M	0.8	0.8	0.1	High-Moderate (61%)	--	Figure A1	
WT-335	Basin Marsh (seasonal emergent marsh)	79.8	79.8	11	684893	5938123	2-10-53-2 W5M	0.9	0.0	21.4	High-Moderate (57%)	--	Figure A1	
WT-336	Potential Basin Marsh (deep marsh)	80.0	80.2	11	684663	5938140	6-10-53-2 W5M	2.8	1.7	204.8	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-338	Potential Flat Swamp (shrubby swamp)	80.3	80.4	11	684333	5938055	4-10-53-2 W5M	0.5	0.5	88.6	--	--	Figure A1	
WT-337	Potential Basin Marsh (seasonal emergent marsh)	80.4	80.4	11	684314	5938066	4-10-53-2 W5M	0.1	0.1	29.6	--	--	Figure A1	
WT-1437	Flat Swamp (shrubby swamp)	81.4	81.4	11	683273	5938017	2-9-53-2 W5M	0.2	0.0	17.4	High-Moderate (60%)	--	Figure A1	
WT-339	Potential Basin Marsh (seasonal emergent marsh)	81.5	81.6	11	683128	5938040	3-9-53-2 W5M	0.1	0.1	21.9	--	--	Figure A1	
WT-1191	Potential Basin Marsh (seasonal emergent marsh)	81.6	81.7	11	683026	5938028	3-9-53-2 W5M	0.3	0.1	44.4	--	--	Figure A1	
WT-255	Potential Riparian Swamp (shrubby swamp)	82.4	82.6	11	682305	5938129	8-8-53-2 W5M	13.0	2.1	262.8	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with watercourse (Kilini Creek and tributary to Kilini Creek) (AB-25)
WT-254	Potential Riparian Marsh (seasonal emergent marsh)	82.4	82.5	11	682236	5938219	8-8-53-2 W5M	4.6	0.0	45.4	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with watercourse (Kilini Creek and tributary to Kilini Creek) (AB-25)
WT-257	Flat Swamp (shrubby swamp)	83.5	83.5	11	681218	5938190	6-8-53-2 W5M	0.2	0.2	42.8	High-Moderate (59%)	--	Figure A1	
WT-1438	Basin Marsh (seasonal emergent marsh)	83.5	83.5	11	681190	5938233	6-8-53-2 W5M	0.1	0.1	22.2	High-Moderate (51%)	--	Figure A1	
WT-260	Riparian Shallow Open Water (open water pond)	85.0	85.1	11	679687	5938272	6-7-53-2 W5M	1.5	1.0	102.1	High-Moderate (57%)	Yes if open water channel or pond within construction ROW	Figure A1 Appendix B	Fish-bearing wetland (AB-28)
WT-1192	Potential Basin Marsh (seasonal emergent marsh)	85.4	85.4	11	679304	5938366	12-7-53-2 W5M	0.0	0.0	40.0	--	--	Figure A1	
WT-1193	Potential Basin Marsh (seasonal emergent marsh)	85.5	85.5	11	679208	5938346	12-7-53-2 W5M	0.1	0.1	35.1	--	--	Figure A1	
WT-261.1	Basin Marsh (seasonal emergent marsh)	86.4	86.5	11	678348	5938270	10-12-53-3 W5M	0.2	0.2	64.7	High-Moderate (55%)	--	Figure A1	
WT-262	Basin Marsh (seasonal emergent marsh)	86.5	87.0	11	678213	5938337	11-12-53-3 W5M	4.5	2.6	456.0	Low-Moderate (49%)	--	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM Zone	UTM Easting	UTM Northing	Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
WT-262.1	Basin Marsh (seasonal emergent marsh)	87.2	87.3	11	677513	5938281	10-12-53-3 W5M	0.1	0.1	30.5	Low-Moderate (49%)	--	Figure A1	
WT-340	Discharge Swamp (shrubby swamp)	87.5	87.6	11	677212	5938355	9-11-53-3 W5M	0.3	0.3	53.3	High-Moderate (72%)	--	Figure A1	
WT-342	Potential Basin Marsh (deep marsh)	88.4	88.8	11	676333	5938315	12-11-53-3 W5M	3.1	1.2	345.6	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-341	Potential Basin Shallow Open Water (open water pond)	88.5	88.6	11	676264	5938296	12-11-53-3 W5M	0.8	0.1	90.1	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-343	Potential Flat Swamp (shrubby swamp)	88.7	88.9	11	676025	5938348	12-11-53-3 W5M	1.8	1.3	186.0	--	--	Figure A1	
WT-1025	Basin Marsh (seasonal emergent marsh)	89.1	89.1	11	675647	5938473	9-10-53-3 W5M	0.1	0.0	27.9	Low-Moderate (42%)	--	Figure A1	
WT-1024	Basin Marsh (seasonal emergent marsh)	89.3	89.3	11	675453	5938424	9-10-53-3 W5M	0.0	0.0	26.8	High-Moderate (51%)	--	Figure A1	
WT-263	Potential Riparian Marsh (seasonal emergent marsh)	90.0	90.1	11	674733	5938408	11-10-53-3 W5M	0.5	0.5	80.3	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Kilini Creek (AB-33)
WT-265	Potential Riparian Marsh (seasonal emergent marsh)	90.1	90.2	11	674676	5938430	14-10-53-3 W5M	2.3	0.8	90.2	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Kilini Creek (AB-33)
WT-264	Potential Basin Marsh (deep marsh)	90.1	90.1	11	674671	5938439	11-10-53-3 W5M	0.0	0.0	6.4	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Kilini Creek (AB-33)
WT-266	Potential Basin Bog (treed bog)	90.2	90.3	11	674546	5938491	12-10-53-3 W5M	0.7	0.7	114.2	--	--	Figure A1	
WT-1209	Potential Basin Marsh (seasonal emergent marsh)	90.2	90.3	11	674530	5938433	12-10-53-3 W5M	0.3	0.3	94.5	--	--	Figure A1	
WT-1028	Basin Marsh (seasonal emergent marsh)	90.6	90.7	11	674138	5938453	9-9-53-3 W5M	0.1	0.1	36.6	High-Moderate (68%)	--	Figure A1	
WT-344	Riparian Marsh (seasonal emergent marsh)	91.0	91.1	11	673742	5938423	10-9-53-3 W5M	2.8	0.9	120.8	High-Moderate (53%)	Yes if open water channel or pond within construction ROW	Figure A1 Appendix B	Beaver modified Associated with Unnamed Tributary to Kilini Creek (AB-34)
WT-344.1	Horizontal Fen (treed fen)	91.3	91.5	11	673453	5938522	15-9-53-3 W5M	1.6	1.0	179.7	High-Moderate (73%)	--	Figure A1	
WT-344.2	Riparian Swamp (shrubby swamp)	91.6	91.6	11	673206	5938531	14-9-53-3 W5M	0.2	0.2	69.3	High-Moderate (73%)	--	Figure A1	
WT-344.3	Flat Swamp (shrubby swamp)	91.9	92.2	11	672826	5938566	13-9-53-3 W5M	1.9	1.6	224.6	High-Moderate (67%)	--	Figure A1	
WT-269	Potential Basin Marsh (seasonal emergent marsh)	92.7	92.8	11	672075	5938661	15-8-53-3 W5M	0.4	0.2	112.7	--	--	Figure A1	
WT-270	Potential Basin Marsh (seasonal emergent marsh)	92.9	92.9	11	671884	5938576	15-8-53-3 W5M	0.1	0.1	35.2	--	--	Figure A1	
WT-271.1	Basin Marsh (seasonal emergent marsh)	93.2	93.3	11	671559	5938538	14-8-53-3 W5M	0.4	0.3	103.9	High-Moderate (59%)	--	Figure A1	
WT-271	Basin Marsh (seasonal emergent marsh)	93.2	93.2	11	671563	5938688	14-8-53-3 W5M	1.0	0.0	32.0	High Functional (77%)	--	Figure A1	
WT-271.2	Basin Marsh (seasonal emergent marsh)	93.4	93.5	11	671399	5938630	14-8-53-3 W5M	0.5	0.5	123.0	High-Moderate (49%)	--	Figure A1	
WT-271.3	Basin Marsh (seasonal emergent marsh)	93.4	93.4	11	671319	5938613	14-8-53-3 W5M	0.1	0.1	5.9	High-Moderate (51%)	--	Figure A1	
WT-1454	Potential Basin Marsh (seasonal emergent marsh)	93.8	93.9	11	671221	5938906	4-17-53-3 W5M	0.8	0.8	143.2	--	--	Figure A1	
WT-1455	Potential Basin Marsh (seasonal emergent marsh)	94.0	94.0	11	671038	5938957	4-17-53-3 W5M	0.1	0.1	36.3	--	--	Figure A1	
WT-1456	Potential Basin Marsh (seasonal emergent marsh)	95.1	95.2	11	669984	5938866	3-18-53-3 W5M	0.3	0.3	78.9	--	--	Figure A1	
WT-1034	Potential Basin Shallow Open Water (open water pond)	95.3	95.4	11	669785	5938963	3-18-53-3 W5M	1.1	0.3	90.9	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1035	Potential Basin Marsh (seasonal emergent marsh)	95.7	95.8	11	669414	5938829	4-18-53-3 W5M	0.4	0.4	128.9	--	--	Figure A1	
WT-1458	Potential Basin Marsh (seasonal emergent marsh)	96.2	96.2	11	668900	5938826	1-13-53-4 W5M	0.1	0.1	30.2	--	--	Figure A1	
WT-1036	Potential Basin Shallow Open Water (open water pond)	96.6	96.7	11	668497	5938788	2-13-53-4 W5M	0.2	0.2	67.7	--	Yes if open water channel or pond within construction ROW	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-1037	Potential Basin Shallow Open Water (open water pond)	98.4	98.5	11	666720	5938916	3-13-53-4 W5M	0.3	0.2	119.9	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1038	Potential Basin Marsh (seasonal emergent marsh)	98.6	98.6	11	666521	5938909	3-13-53-4 W5M	0.0	0.0	53.1	--	--	Figure A1	
WT-1073	Potential Basin Marsh (seasonal emergent marsh)	98.7	98.7	11	666403	5938941	4-14-53-4 W5M	0.0	0.0	3.4	--	--	Figure A1	
WT-1537	Potential Basin Marsh (seasonal emergent marsh)	98.8	98.8	11	666276	5938832	4-14-53-4 W5M	0.0	0.0	13.4	--	--	Figure A1	
WT-275	Basin Marsh (seasonal emergent marsh)	100.5	101.2	11	665443	5938076	11-10-53-4 W5M	5.1	5.1	714.3	High-Moderate (62%)	--	Figure A1	Beaver activity
WT-277	Flat Swamp (shrubby swamp)	100.7	101.3	11	665227	5938135	11-10-53-4 W5M	7.3	4.7	562.4	High-Moderate (66%)	--	Figure A1	Rare ecological community observation, Beaked willow/red-osier dogwood community (S3?)
WT-354	Basin Marsh (seasonal emergent marsh)	101.9	101.9	11	664100	5937924	9-9-53-4 W5M	1.4	0.1	44.6	High-Moderate (69%)	--	Figure A1	Beaver activity
WT-356	Flat Swamp (shrubby swamp)	101.9	102.3	11	664055	5937922	10-9-53-4 W5M	6.9	3.4	416.9	High-Moderate (69%)	--	Figure A1	Beaver activity
WT-278	Basin Marsh (deep marsh)	104.3	104.3	11	662459	5939211	8-17-53-4 W5M	0.2	0.0	18.6	High-Moderate (50%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-358	Basin Marsh (seasonal emergent marsh)	105.4	105.5	11	661493	5939630	12-17-53-4 W5M	0.3	0.1	66.3	Low-Moderate (44%)	--	Figure A1	
WT-362	Basin Marsh (seasonal emergent marsh)	107.0	107.0	11	659920	5939620	14-18-53-4 W5M	0.2	0.2	56.9	Low-Moderate (40%)	--	Figure A1	
WT-363	Potential Flat Swamp (shrubby swamp)	110.7	110.8	11	656190	5939784	16-15-53-5 W5M	0.8	0.7	102.1	--	--	Figure A1	
WT-365	Potential Flat Swamp (shrubby swamp)	115.5	115.6	11	651383	5939645	13-17-53-5 W5M	0.1	0.1	39.1	--	--	Figure A1	
WT-279	Horizontal Fen (treed fen)	118.4	118.9	11	648495	5939342	4-13-53-6 W5M	83.6	6.1	417.2	High Functional (89%)	--	Figure A1	
WT-280.1	Flat Swamp (shrubby swamp)	120.9	121.2	11	646097	5939167	10-15-53-06 W5M	0.8	0.8	265.6	High Functional (76%)	--	Figure A1	
WT-368	Potential Basin Marsh (seasonal emergent marsh)	124.2	124.2	11	642896	5939171	16-17-53-6 W5M	0.4	0.4	93.8	--	--	Figure A1	
WT-1210	Potential Basin Marsh (seasonal emergent marsh)	124.5	124.5	11	642566	5939098	15-17-53-6 W5M	0.4	0.4	54.7	--	--	Figure A1	
WT-1351	Potential Basin Marsh (seasonal emergent marsh)	124.7	124.8	11	642303	5939167	14-17-53-6 W5M	0.0	0.0	18.8	--	--	Figure A1	
WT-369	Basin Marsh (seasonal emergent marsh)	124.8	124.9	11	642234	5939194	14-17-53-6 W5M	0.4	0.1	49.3	High-Moderate (59%)	--	Figure A1	
WT-1029	Basin Marsh (seasonal emergent marsh)	124.8	124.9	11	642224	5939086	14-17-53-6 W5M	0.5	0.5	116.1	High-Moderate (51%)	--	Figure A1	
WT-1030	Basin Marsh (seasonal emergent marsh)	125.0	125.1	11	642043	5939132	14-17-53-6 W5M	0.2	0.2	72.5	Low-Moderate (49%)	--	Figure A1	
WT-1026	Basin Marsh (seasonal emergent marsh)	125.1	125.1	11	641960	5939075	12-17-53-6 W5M	0.0	0.0	13.2	Low-Moderate (49%)	--	Figure A1	
WT-370	Flat Swamp (shrubby swamp)	125.6	125.9	11	641422	5939050	16-18-53-6 W5M	1.3	1.3	237.4	High Functional (76%)	--	Figure A1	
WT-375	Riparian Marsh (seasonal emergent marsh)	125.9	126.2	11	641142	5939121	14-18-53-6 W5M	13.6	0.7	253.7	High-Moderate (57%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Isle Lake (AB-60)
WT-372	Riparian Marsh (seasonal emergent marsh)	126.0	126.2	11	641060	5939125	10-18-53-6 W5M	1.3	0.9	169.6	High-Moderate (60%)[1]	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Sturgeon River (AB-59)
WT-373	Potential Riparian Marsh (seasonal emergent marsh)	126.1	126.2	11	640945	5938953	10-18-53-6 W5M	2.0	0.2	74.5	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Sturgeon River (AB-59)
WT-376	Basin Marsh (seasonal emergent marsh)	127.4	127.5	11	639703	5939149	16-13-53-7 W5M	0.4	0.4	89.2	Low-Moderate (45%)	--	Figure A1	
WT-453	Flat Swamp (shrubby swamp)	128.1	128.2	11	638945	5939077	14-13-53-7 W5M	0.7	0.1	60.3	High-Moderate (57%)	--	Figure A1	
WT-453.1	Basin Marsh (seasonal emergent marsh)	128.2	128.2	11	638867	5939169	14-13-53-7 W5M	0.0	0.0	28.2	High-Moderate (60%)	--	Figure A1	
WT-454	Basin Marsh (seasonal emergent marsh)	128.4	128.4	11	638730	5939216	13-13-53-7 W5M	0.2	0.1	65.5	High Functional (66%)	--	Figure A1	
WT-377	Flat Swamp (shrubby swamp)	128.9	129.1	11	638173	5939272	16-14-53-7 W5M	12.4	2.3	207.0	High Functional (76%)	--	Figure A1	
WT-1199	Potential Basin Shallow Open Water (open water pond)	129.8	129.9	11	637273	5939245	14-14-53-7 W5M	0.8	0.4	75.3	--	Yes if open water channel or pond within construction ROW	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-378	Basin Marsh (seasonal emergent marsh)	129.9	130.0	11	637180	5939280	14-14-53-7 W5M	0.3	0.3	64.5	High-Moderate (53%)	--	Figure A1	
WT-379	Flat Swamp (shrubby swamp)	130.0	130.2	11	637073	5939243	13-14-53-7 W5M	0.5	0.5	168.4	High-Moderate (72%)	--	Figure A1	
WT-379.2	Basin Marsh (seasonal emergent marsh)	130.3	130.4	11	636773	5939288	13-14-53-7 W5M	1.5	0.6	66.6	Low-Moderate (47%)	--	Figure A1	
WT-379.3	Flat Swamp (shrubby swamp)	130.6	130.7	11	636472	5939284	16-15-53-7 W5M	0.2	0.2	0.1	High-Moderate (69%)	--	Figure A1	
WT-379.4	Basin Marsh (seasonal emergent marsh)	130.8	130.9	11	636328	5939230	16-15-53-7 W5M	0.5	0.5	0.1	High-Moderate (61%)	--	Figure A1	
WT-380	Flat Swamp (shrubby swamp with a seasonal emergent marsh component)	130.9	131.0	11	636208	5939253	15-15-53-7 W5M	0.6	0.6	122.5	High-Moderate (64%)	--	Figure A1	
WT-380.1	Flat Swamp (shrubby swamp)	130.9	131.0	11	636119	5939273	15-15-53-7 W5M	0.2	0.2	0.1	High-Moderate (67%)	--	Figure A1	
WT-381	Basin Marsh (seasonal emergent marsh)	131.4	131.6	11	635683	5939201	14-15-53-7 W5M	1.1	0.7	168.4	High Functional (80%)	--	Figure A1	
WT-381.1	Basin Marsh (seasonal emergent marsh)	131.8	132.0	11	635289	5939182	13-15-53-7 W5M	0.4	0.4	171.8	High-Moderate (56%)	--	Figure A1	
WT-382	Flat Swamp (shrubby swamp)	132.2	132.3	11	634963	5939230	16-16-53-7 W5M	2.6	0.5	108.3	High Functional (80%)	--	Figure A1	
WT-1033	Horizontal Fen (shrubby fen)	132.4	132.5	11	634694	5939265	16-16-53-7 W5M	2.0	0.9	115.9	High Functional (77%)	--	Figure A1	
WT-1033.1	Riparian Marsh (seasonal emergent marsh)	132.5	132.8	11	634570	5939168	15-16-53-7 W5M	4.4	2.9	249.4	High-Moderate (72%)	--	Figure A1	
WT-456	Riparian Shallow Open Water (open water pond)	132.7	133.1	11	634440	5939297	11-16-53-7 W5M	27.5	3.1	372.8	Low-Moderate (48%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-458	Riparian Shallow Open Water (open water pond)	133.1	133.2	11	634055	5939325	3-21-53-7 W5M	2.8	0.3	144.2	High-Moderate (56%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-457	Basin Shallow Open Water (open water pond) associated with WT-458	133.4	133.5	11	633709	5939363	4-21-53-7 W5M	0.2	0.1	34.4	High-Moderate (56%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1044.1	Potential Flat Swamp (shrubby swamp)	134.5	134.8	11	632748	5939141	14-17-53-7 W5M	5.0	2.9	238.5	--	--	Figure A1	
WT-1044	Basin Marsh (deep marsh)	134.5	134.6	11	632741	5939274	14-17-53-7 W5M	0.6	0.2	80.2	High Functional (83%)[1]	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1539	Potential Horizontal Fen (treed fen)	136.4	136.5	11	630817	5939053	14-18-53-7 W5M	2.5	0.9	116.2	--	--	Figure A1	
WT-1541	Potential Basin Marsh (seasonal emergent marsh)	136.7	136.7	11	630486	5938908	13-18-53-7 W5M	0.9	0.3	86.2	--	--	Figure A1	
WT-1540	Potential Basin Shallow Open Water (open water pond)	136.7	136.7	11	630448	5938937	13-18-53-7 W5M	0.1	0.1	41.4	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1539.1	Riparian Swamp (shrubby swamp)	136.7	136.8	11	630601	5939404	4-19-53-7 W5M	0.4	0.5	82.1	High Functional (75%)	--	Figure A1	
WT-462	Flat Swamp (shrubby swamp)	137.2	137.2	11	630167	5939510	1-24-53-8 W5M	0.5	0.1	41.3	High Functional (76%)	--	Figure A1	
WT-1031	Flat Swamp (mixedwood treed swamp)	137.7	137.8	11	629631	5939706	7-24-53-8 W5M	0.3	0.3	72.0	High-Moderate (69%)	--	Figure A1 Appendix B	
WT-386	Basin Marsh (seasonal emergent marsh)	140.9	141.1	11	626458	5939820	7-22-53-8 W5M	5.1	1.7	207.9	High-Moderate (74%)	--	Figure A1	
WT-470	Horizontal Fen (treed fen)	141.4	141.4	11	626026	5939972	12-22-53-8 W5M	30.0	0.1	69.0	High-Moderate (74%)	--	Figure A1	Rare ecological community observation, white birch/stiff club-moss woodland community (S2?)
WT-470.1	Basin Marsh (seasonal emergent marsh)	141.5	141.5	11	625916	5939983	12-22-53-8 W5M	0.4	0.3	81.4	High-Moderate (72%)	--	Figure A1	
WT-387.1	Riparian Swamp (shrubby swamp)	142.1	142.6	11	625278	5939883	9-21-53-8 W5M	20.1	5.8	0.5	High-Moderate (64%)	--	Figure A1	
WT-389	Riparian Swamp (shrubby swamp)	142.6	142.7	11	624811	5939930	10-21-53-8 W5M	3.1	0.2	109.9	Low-Moderate (46%)	--	Figure A1	
WT-390	Riparian Fen (treed fen)	143.0	143.3	11	624408	5939986	11-21-53-8 W5M	7.7	4.1	320.5	High Functional (75%)	--	Figure A1	
WT-465	Basin Marsh (seasonal emergent marsh)	145.4	145.4	11	622025	5939851	9-19-53-8 W5M	0.2	0.2	31.2	Low-Moderate (47%)	--	Figure A1	
WT-469	Basin Marsh (seasonal emergent marsh)	150.0	150.0	11	617469	5939840	12-23-53-9 W5M	0.1	0.1	78.5	High-Moderate (55%)	--	Figure A1	
WT-468	Basin Marsh (seasonal emergent marsh) associated with WT-469	150.0	150.1	11	617453	5939843	12-23-53-9 W5M	0.2	0.1	85.9	High-Moderate (55%)	--	Figure A1	
WT-467	Flat Swamp (shrubby swamp) associated with WT-469	150.0	150.0	11	617445	5939866	12-23-53-9 W5M	0.2	0.2	60.2	High-Moderate (55%)	--	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-474	Riparian Swamp (shrubby swamp)	151.5	151.6	11	615897	5939772	12-22-53-9 W5M	0.6	0.1	64.2	High-Moderate (68%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Chip Lake (AB-90)
WT-393	Riparian Marsh (seasonal emergent marsh)	151.9	151.9	11	615574	5939766	12-22-53-9 W5M	0.4	0.0	23.4	High-Moderate (63%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Chip Lake (AB-90)
WT-1201	Potential Riparian Marsh (seasonal emergent marsh)	151.9	152.1	11	615508	5939788	15-21-53-9 W5M	4.1	0.9	209.8	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Chip Lake (AB-91)
WT-395	Basin Marsh (seasonal emergent marsh)	155.2	155.2	11	612343	5939628	12-20-53-9 W5M	0.1	0.1	21.2	Low-Moderate (36%)	--	Figure A1	
WT-398	Potential Riparian Marsh (seasonal emergent marsh)	157.0	157.1	11	610553	5939492	9-24-53-10 W5M	3.1	1.2	138.7	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Chip Lake (AB-93)
WT-475	Potential Riparian Swamp (mixedwood treed swamp)	157.1	157.4	11	610444	5939554	9-24-53-10 W5M	6.8	3.2	294.1	--	--	Figure A1	
WT-478	Flat swamp (shrubby swamp)	157.8	158.2	11	609685	5939545	11-24-53-10 W5M	4.8	3.7	352.3	High-Moderate (72%)	--	Figure A1	
WT-1203	Riparian Marsh (seasonal emergent marsh)	157.9	158.0	11	609596	5939458	6-24-53-10 W5M	0.7	0.3	58.3	High-Moderate (64%)	--	Figure A1	
WT-476	Flat Swamp (needle-leaf treed swamp)	158.2	158.4	11	609381	5939451	5-24-53-10 W5M	6.2	2.0	243.7	High Functional (86%)	--	Figure A1	
WT-480	Riparian Swamp (shrubby swamp)	159.6	159.8	11	607918	5939652	11-23-53-10 W5M	3.0	1.9	183.5	High Functional (76%)	--	Figure A1	
WT-479	Riparian Fen (treed fen)	159.8	159.9	11	607792	5939566	12-23-53-10 W5M	3.9	1.8	179.1	High Functional (81%)	Yes if open water channel or pond within construction ROW	Figure A1	Rare plant observations, snakeskin liverwort (S2) and saxifrage species (N/A) Associated with Unnamed Tributary to Chip Lake (AB-98)
WT-400	Basin Marsh (deep marsh)	160.8	161.0	11	606769	5939679	10-22-53-10 W5M	4.2	2.4	190.0	High-Moderate (52%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-401	Flat Swamp (shrubby swamp)	161.8	162.5	11	605759	5939829	16-21-53-10 W5M	5.7	5.0	643.5	High-Moderate (70%)	--	Figure A1	
WT-403	Riparian Marsh (deep marsh)	164.1	164.2	11	603539	5940122	2-29-53-10 W5M	2.4	1.5	160.7	High-Moderate (68%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Chip Lake (AB-101)
WT-483	Flat Swamp (shrubby swamp)	170.2	170.4	11	597497	5940561	8-27-53-11 W5M	0.4	0.4	147.0	High Functional (80%)	--	Figure A1	
WT-484	Basin Marsh (seasonal emergent marsh)	170.8	170.9	11	596896	5940576	7-27-53-11 W5M	0.8	0.8	98.9	High-Moderate (60%)	--	Figure A1	
WT-485	Riparian Swamp (shrubby swamp)	170.9	171.0	11	596842	5940535	3-27-53-11 W5M	6.7	0.6	103.5	High-Moderate (66%)	--	Figure A1	
WT-405	Basin Shallow Open Water (open water pond)	171.4	171.5	11	596354	5940508	5-27-53-11 W5M	10.2	2.5	171.3	Low-Moderate (49%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-407	Potential Basin Marsh (seasonal emergent marsh)	171.8	171.9	11	595912	5940525	8-28-53-11 W5M	3.6	1.0	119.7	--	--	Figure A1	
WT-408	Potential Flat Swamp (shrubby swamp)	172.3	172.6	11	595436	5940555	7-28-53-11 W5M	4.5	2.4	317.1	--	--	Figure A1	
WT-486	Riparian Marsh (seasonal emergent marsh)	173.6	173.7	11	594151	5940744	9-29-53-11 W5M	3.0	0.5	102.2	High-Moderate (61%)	--	Figure A1	
WT-487	Flat Swamp (shrubby swamp) associated with a shrubby fen (in LSA)	174.6	175.1	11	593201	5940923	12-29-53-11 W5M	7.8	3.2	563.6	High Functional (84%)[1]	--	Figure A1 Appendix B	Rare plant observation, goldthread (S3)
WT-488	Flat Swamp (shrubby swamp)	175.8	176.0	11	591938	5940883	7-30-53-11 W5M	7.4	1.0	143.2	High Functional (78%)	--	Figure A1	
WT-489	Flat Swamp (shrubby swamp)	176.4	176.5	11	591380	5940779	5-30-53-11 W5M	9.1	0.5	91.2	High-Moderate (73%)	--	Figure A1	
WT-411	Potential Channel Fen (treed fen)	177.5	177.6	11	590306	5940731	7-25-53-12 W5M	23.3	0.5	96.6	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-493	Potential Channel Fen (treed fen)	178.9	178.9	11	588914	5940687	7-26-53-12 W5M	10.8	0.1	34.5	--	Yes if open water channel or pond within construction ROW, if crossed by ROW	Figure A1	
WT-491	Riparian Marsh (seasonal emergent marsh)	178.9	179.0	11	588880	5940685	10-26-53-12 W5M	0.8	0.7	64.6	High-Moderate (50%)	--	Figure A1	Beaver modified
WT-413	Potential Basin Shallow Open Water (open water pond)	180.7	180.9	11	587101	5940724	11-27-53-12 W5M	1.7	1.7	194.6	--	Yes if open water channel or pond within construction ROW	Figure A1	
WT-495	Riparian Swamp (mixedwood treed swamp)	188.9	189.1	11	579138	5941537	2-35-53-13 W5M	3.7	2.1	230.8	High Functional (75%)	--	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-422	Basin Shallow Open Water (open water pond)	198.5	198.6	11	569678	5940577	9-26-53-14 W5M	0.5	0.2	50.9	High-Moderate (50%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-423	Riparian Marsh (seasonal emergent marsh)	198.6	198.8	11	569636	5940581	10-26-53-14 W5M	5.5	2.3	281.6	High-Moderate (55%)	Yes if open water channel or pond within construction ROW	Figure A1	Aquatics - associated with Unnamed Tributary to January Creek (AB-123)
WT-425	Riparian Swamp (shrubby swamp)	198.6	198.6	11	569645	5940542	10-26-53-14 W5M	5.2	0.0	10.1	High-Moderate (68%)	Yes if open water channel or pond within construction ROW	Figure A1 Appendix B	Associated with Unnamed Tributary to January Creek (AB-123)
WT-424	Riparian Marsh (seasonal emergent marsh)	198.7	198.9	11	569494	5940472	10-26-53-14 W5M	0.8	0.7	130.4	High-Moderate (55%)	--	Figure A1	
WT-421	Riparian Marsh (deep marsh)	198.8	198.8	11	569483	5940474	10-26-53-14 W5M	0.4	0.4	86.5	High-Moderate (57%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to January Creek (AB-123)
WT-428	Riparian Fen (shrubby fen)	199.7	199.9	11	568586	5940036	5-26-53-14 W5M	2.6	1.3	199.3	High Functional (83%)	Yes if open water channel or pond within construction ROW	Figure A1	Rare plant observations, meadow bitter cress (S3) and golden saxifrage (S3?) Associated with Unnamed Tributary to January Creek (AB-124)
WT-431	Riparian Marsh (seasonal emergent marsh)	202.5	202.8	11	566120	5938923	11-21-53-14 W5M	14.2	3.5	338.0	High-Moderate (55%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to January Creek (AB-126)
WT-430	Potential Riparian Marsh (seasonal emergent marsh)	202.6	202.7	11	566043	5939027	15-21-53-14 W5M	2.5	0.1	100.1	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to January Creek (AB-125)
WT-432	Potential Riparian Marsh (seasonal emergent marsh)	202.9	203.1	11	565739	5938939	11-21-53-14 W5M	1.5	1.0	206.3	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to January Creek (AB-126)
WT-497	Basin Shallow Open Water (open water pond)	202.9	203.0	11	565682	5938941	11-21-53-14 W5M	0.2	0.2	57.2	Low-Moderate (49%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-500	Potential Flat Swamp (shrubby swamp)	203.4	203.4	11	565204	5939019	13-21-53-14 W5M	0.1	0.0	1.6	--	--	Figure A1	
WT-501	Flat Swamp (needle-leaf treed swamp)	204.1	204.3	11	564493	5938913	15-20-53-14 W5M	11.9	2.7	223.1	High Functional (82%)	--	Figure A1 Appendix B	
WT-502	Riparian Marsh (deep marsh)	206.7	207.4	11	561962	5938967	16-24-53-15 W5M	8.2	3.7	776.0	High Functional (78%)	Yes if open water channel or pond within construction ROW	Figure A1	Rare plant observation, golden saxifrage (S3?) Associated with January Creek (AB-128)
WT-503	Potential Flat Swamp (shrubby swamp)	211.9	212.0	11	556943	5939556	1-28-53-15 W5M	1.4	1.3	142.6	--	--	Figure A1	
WT-505	Potential Flat Swamp (shrubby swamp)	212.7	212.8	11	556156	5939475	3-28-53-15 W5M	2.9	1.1	110.7	--	--	Figure A1	
WT-1027	Riparian Swamp (shrubby swamp)	217.1	217.1	11	551751	5939324	1-25-53-16 W5M	0.1	0.03	27.5	High Functional (80%)	--	Figure A1	
WT-508	Riparian Fen (non-woody fen)	220.4	220.8	11	548773	5938523	9-22-53-16 W5M	6.5	3.6	413.8	High-Moderate (64%)	Yes if open water channel or pond within construction ROW, if channels present	Figure A1 Appendix B	Associated with riparian area of Wolf Creek (AB-129)
WT-437	Riparian Fen (treed fen)	220.6	220.8	11	548590	5938464	8-22-53-16 W5M	3.8	0.2	167.7	High Functional (85%)	--	Figure A1	
WT-436	Riparian Fen (treed fen)	220.7	220.8	11	548539	5938507	10-22-53-16 W5M	0.7	0.7	142.0	High Functional (76%)	--	Figure A1	
WT-509	Horizontal Fen (treed fen)	221.3	222.1	11	547863	5938470	5-22-53-16 W5M	38.0	17.8	840.0	High Functional (88%)	--	Figure A1	
WT-509.1	Flat Swamp (shrubby swamp)	222.9	223.3	11	546345	5938136	6-21-53-16 W5M	13.1	6.2	361.7	High Functional (85%)	--	Figure A1	
WT-438	Riparian Swamp (shrubby swamp)	227.5	227.6	11	542022	5938864	16-24-53-17 W5M	2.9	1.0	117.3	High-Moderate (64%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Bench Creek (AB-132)
WT-441	Potential Flat Swamp (shrubby swamp)	230.3	230.5	11	539277	5938841	13-23-53-17 W5M	2.0	0.8	145.1	--	--	Figure A1	
WT-510	Horizontal Fen (treed fen)	235.1	236.1	11	534590	5938457	9-19-53-17 W5M	102.6	13.8	984.2	High Functional (78%)	--	Figure A1	
WT-442	Riparian Marsh (seasonal emergent marsh)	236.1	236.2	11	533670	5938116	2-19-53-17 W5M	24.4	0.3	90.0	High-Moderate (68%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Bench Creek (AB-136)
WT-443	Riparian Marsh (seasonal emergent marsh)	236.5	236.7	11	533308	5937951	6-19-53-17 W5M	1.6	1.1	199.3	High-Moderate (68%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Bench Creek (AB-136)
WT-445	Potential Flat Swamp (needle-leaf treed swamp)	237.5	237.7	11	532391	5937700	1-24-53-18 W5M	3.2	1.1	222.1	--	--	Figure A1	
WT-446	Horizontal Fen (treed fen)	237.9	238.1	11	532016	5937526	4-24-53-18 W5M	115.2	2.7	258.0	High Functional (76%)	--	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-513.1	Basin Fen (shrubby fen)	240.1	240.2	11	529903	5937208	14-14-53-18 W5M	0.6	0.5	86.4	High Functional (84%)	--	Figure A1	Rare plant observation, prairie wedge grass (S2)
WT-514	Flat Swamp (shrubby swamp)	240.2	240.4	11	529760	5937227	13-14-53-18 W5M	0.7	0.7	133.8	High Functional (80%)	--	Figure A1	
WT-514.1	Basin Marsh (seasonal emergent marsh)	240.4	240.7	11	529610	5937149	13-14-53-18 W5M	1.3	1.1	265.2	High-Moderate (70%)	--	Figure A1	
WT-515	Horizontal Fen (treed fen)	240.9	241.7	11	529139	5936965	15-15-53-18 W5M	11.9	4.3	835.1	High-Moderate (69%)	--	Figure A1 Appendix B	Rare plant observation, golden saxifrage (S3?)
WT-450	Basin Marsh (seasonal emergent marsh)	243.7	243.7	11	526643	5937114	14-16-53-18 W5M	0.04	0.04	25.7	High-Moderate (58%)	--	Figure A1	
WT-516	Riparian Marsh (seasonal emergent marsh)	245.1	245.3	11	525356	5936619	6-17-53-18 W5M	4.7	1.8	187.7	High-Moderate (64%)	Yes if open water channel or pond within construction ROW	Figure A1	Rare plant observation, prairie wedge grass (S2) Associated with Little Sundance Creek (AB-137)
WT-1032	Basin Fen (shrubby fen)	245.5	245.6	11	525044	5936350	6-17-53-18 W5M	1.0	0.9	119.8	High-Moderate (65%)	--	Figure A1	
WT-517	Riparian Swamp (shrubby swamp)	247.9	248.1	11	522824	5936480	8-13-53-19 W5M	21.0	3.5	249.9	High Functional (82%)	Yes if open water channel or pond within construction ROW	Figure A1	Rare plant observation, golden saxifrage (S3?) Associated with Sundance Creek (AB-138)
WT-1125	Potential Basin Fen (non-woody fen)	248.6	248.9	11	522524	5935580	16-12-53-19 W5M	28.6	4.4	266.9	--	Yes if open water channel or pond within construction ROW, if channels present	Figure A1	
WT-1542	Horizontal Fen (treed fen)	248.8	248.9	11	522275	5935418	14-12-53-19 W5M	17.2	0.004	17.5	High Functional (86%)	--	Figure A1	
WT-1543	Flat Swamp (mixedwood treed swamp)	250.7	250.7	11	520902	5934834	8-11-53-19 W5M	0.5	0.2	68.4	High Functional (76%)	--	Figure A1	
WT-785	Basin Marsh (seasonal emergent marsh)	251.2	251.3	11	520417	5934516	6-11-53-19 W5M	2.1	0.5	74.0	High-Moderate (56%)	--	Figure A1	
WT-786	Basin Marsh (seasonal emergent marsh)	251.5	251.6	11	520302	5934289	3-11-53-19 W5M	4.5	1.8	140.8	High Functional (77%)	--	Figure A1	
WT-795	Basin Fen (treed fen)	252.4	252.5	11	519756	5933613	12-2-53-19 W5M	2.6	0.8	154.4	High Functional (92%)	--	Figure A1	
WT-1544	Flat Swamp (needle-leaf treed swamp)	252.5	252.6	11	519730	5933494	12-2-53-19 W5M	2.3	0.8	142.5	High Functional (67%)	--	Figure A1	
WT-789	Riparian Swamp (needle-leaf treed swamp)	255.2	255.5	11	517478	5932758	3-4-53-19 W5M	6.1	2.4	359.8	High Functional (91%)	--	Figure A1	
WT-788	Basin Marsh (seasonal emergent marsh)	255.4	255.6	11	517213	5932786	3-4-53-19 W5M	1.8	0.7	207.7	Low-Moderate (49%)	--	Figure A1	
WT-791	Basin Marsh (deep marsh)	257.0	257.2	11	515863	5932778	2-5-53-19 W5M	2.2	1.9	203.5	High-Moderate (65%)	Yes if open water channel or pond within construction ROW	Figure A1	Rare plant observations, tufted tall manna grass (S2) and slender naiad (S2) Rare ecological community observation, beaked sedge marsh community (S2)
WT-792	Riparian Swamp (shrubby swamp)	257.7	257.8	11	515256	5932721	3-5-53-19 W5M	4.7	1.6	162.0	High-Moderate (74%)	Yes if open water channel or pond within construction ROW	Figure A1	Beaver modified Associated with Unnamed Tributary to Mcleod River (AB-140)
WT-1545	Riparian Swamp (shrubby swamp)	259.4	259.6	11	513485	5932835	4-6-53-19 W5M	15.1	2.7	194.2	High-Moderate (63%)	--	Figure A1	
WT-815	Potential Riparian Swamp (shrubby swamp)	260.0	260.2	11	513028	5932929	8-1-53-20 W5M	6.7	2.7	212.7	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Mcleod River (AB-141)
WT-1546	Horizontal Fen (treed fen)	260.6	260.9	11	512433	5932901	6-1-53-20 W5M	3.8	0.04	385.4	High Functional (83%)	--	Figure A1	
WT-1547	Horizontal Fen (treed fen)	261.0	261.7	11	512037	5932691	4-1-53-20 W5M	33.7	9.2	669.4	High Functional (86%)	--	Figure A1	Rare plant observation, golden saxifrage (S3?)
WT-832	Horizontal Fen (treed fen)	263.1	263.3	11	510012	5932371	10-3-53-20 W5M	344.0	0.6	140.9	High Functional (86%)	--	Figure A1	
WT-1075	Flat Swamp (needle-leaf treed swamp)	266.1	266.4	11	507249	5932731	3-4-53-20 W5M	6.9	2.6	335.2	High-moderate (68%)	--	Figure A1	
WT-833	Basin Shallow Open Water (open water pond)	267.0	267.3	11	506348	5932840	1-5-53-20 W5M	1.9	0.5	236.7	High-Moderate (61%)	Yes if open water channel or pond within construction ROW	Figure A1	Rare plant observation, linear-leaved pondweed (S2)
WT-1548	Riparian Fen (treed fen)	267.3	267.5	11	506135	5932843	7-5-53-20 W5M	2.6	0.4	253.7	High Functional (93%)	--	Figure A1	
WT-835	Riparian Swamp (mixedwood treed swamp)	267.8	269.5	11	505608	5932854	8-6-53-20 W5M	27.9	16.3	1659.4	High Functional (78%)	--	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-834	Riparian Marsh (seasonal emergent marsh)	269.5	269.6	11	504006	5933030	6-6-53-20 W5M	8.7	1.6	156.6	High Functional (85%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Mcleod River (AB-143)
WT-834.1	Riparian Marsh (seasonal emergent marsh)	270.0	270.1	11	503486	5933189	5-6-53-20 W5M	3.2	1.2	103.4	High Functional (75%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Mcleod River (AB-144)
WT-1549 A	Horizontal Fen (treed fen)	275.9	275.9	11	497847	5932459	14-33-52-21 W5M	8.6	0.004	2.2	High Functional (87%)	--	Figure A1	
WT-1550 A	Basin Fen (treed fen)	276.9	277.1	11	497041	5932210	13-33-52-21 W5M	4.8	2.5	193.3	High Functional (82%)	--	Figure A1	
WT-1550.1 A	Basin Fen (treed fen)	278.5	278.7	11	495605	5932066	13-32-52-21 W5M	1.5	1.5	203.3	High Functional (89%)	--	Figure A1	Rare plant observation, capitate sedge (S3)
WT-817	Basin Shallow Open Water (open water pond)	279.4	279.6	11	494711	5931919	15-31-52-21 W5M	35.5	0.4	181.0	High-Moderate (73%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-816	Basin Shallow Open Water (open water pond)	280.3	280.3	11	494115	5931513	6-31-52-21 W5M	6.8	0.01	65.2	High-Moderate (73%)	Yes if open water channel or pond within construction ROW, if crossed by ROW	Figure A1	Fish-bearing wetland (AB-146)
WT-818	Horizontal Fen (non-woody fen)	280.9	281.8	11	493500	5931524	7-36-52-22 W5M	9.4	2.8	871.0	High Functional (90%)	Yes if open water channel or pond within construction ROW, if channels present	Figure A1	
WT-1552 A	Horizontal Fen (treed fen)	281.9	283.7	11	492554	5931631	9-35-52-22 W5M	24.2	12.4	1868.0	High Functional (84%)	--	Figure A1	
WT-819	Discharge Swamp (needle-leaf treed swamp)	284.5	284.9	11	490192	5932691	1-3-53-22 W5M	18.5	1.9	411.2	High Functional (77%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed NCD (AB-147 and 148)
WT-1553 A	Horizontal Fen (treed fen)	285.6	285.7	11	489221	5933133	5-3-53-22 W5M	8.6	0.2	83.3	High Functional (78%)	--	Figure A1	
WT-820	Basin Marsh (seasonal emergent marsh)	287.5	287.7	11	487388	5933242	5-4-53-22 W5M	2.2	1.6	251.1	High-Moderate (72%)	--	Figure A1	
WT-1554 A	Riparian Swamp (shrubby swamp)	291.5	291.7	11	483553	5932239	15-36-52-23 W5M	0.8	0.8	145.8	High Functional (86%)	--	Figure A1	
WT-1555 A	Basin Marsh (seasonal emergent marsh) associated with a treed fen	295.9	296.0	11	480088	5930112	7-27-52-23 W5M	3.4	1.0	96.5	High Functional (84%)	Yes if open water channel or pond within construction ROW, if channels present	Figure A1	
WT-1556 A	Basin Fen (treed fen with a seasonal emergent marsh component)	296.0	296.3	11	480021	5930069	7-27-52-23 W5M	6.3	1.4	282.6	High Functional (84%)	Yes if open water channel or pond within construction ROW, if channels present	Figure A1	
WT-843	Riparian Marsh (seasonal emergent marsh)	299.0	299.7	11	477614	5928638	8-20-52-23 W5M	8.6	5.1	756.1	High Functional (75%)	--	Figure A1	Beaver modified
WT-849	Basin Marsh (seasonal emergent marsh)	304.8	304.9	11	472719	5925831	13-12-52-24 W5M	0.9	0.7	146.9	High-Moderate (58%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Hunt Creek (AB-163)
WT-851	Flat Swamp (needle-leaf treed swamp)	305.2	305.5	11	472338	5925689	9-11-52-24 W5M	12.6	2.6	328.1	High Functional (89%)	--	Figure A1	
WT-1558 A	Feather Fen (shrubby fen)	311.5	311.6	11	467626	5922186	8-32-51-24 W5M	4.0	1.0	124.9	High Functional (91%)	--	Figure A1	
WT-1559 A	Slope Swamp (shrubby swamp)	311.7	311.7	11	467622	5922027	5-33-51-24 W5M	1.6	0.4	82.4	High Functional (84%)	--	Figure A1	
WT-1135	Horizontal Fen (treed fen)	312.6	312.7	11	467897	5921189	3-33-51-24 W5M	15.9	0.4	96.4	High Functional (80%)	--	Figure A1	
WT-1560 A	Basin Fen (treed fen)	313.2	313.4	11	467454	5920684	12-28-51-24 W5M	3.0	1.7	148.1	High Functional (85%)	--	Figure A1	Associated with Unnamed Tributary to Athabasca River (AB-172)
WT-1561 A	Potential Riparian Swamp (mixedwood treed swamp)	315.7	315.8	11	466447	5918885	6-20-51-24 W5M	0.7	0.2	86.6	--	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Unnamed Tributary to Cache Percotte Creek (AB-176)
WT-1563 A	Horizontal Fen (treed fen)	319.4	319.6	11	463756	5916352	10-12-51-25 W5M	10.2	1.1	216.5	High Functional (80%)	--	Figure A1	
WT-1562 A	Flat Swamp (shrubby swamp)	319.6	319.7	11	463555	5916247	15-12-51-25 W5M	0.5	0.5	108.6	High-Moderate (73%)	--	Figure A1	
WT-1122	Basin Fen (non-woody fen)	325.0	325.2	11	459050	5913808	8-4-51-25 W5M	2.8	1.1	217.3	High-Moderate (74%)	Yes if open water channel or pond within construction ROW, if channels present	Figure A1	Associated with Unnamed NCD (AB-186)
WT-1564 A	Horizontal Fen (non-woody fen)	325.8	325.9	11	458328	5913404	3-4-51-25 W5M	0.5	0.01	78.5	High Functional (75%)	Yes if open water channel or pond within construction ROW, if channels present	Figure A1	Associated with Unnamed NCD (AB-186)
WT-1565 A	Horizontal Fen (treed fen)	326.0	326.9	11	458229	5913275	16-31-50-25 W5M	20.4	9.2	869.0	High Functional (86%)	--	Figure A1	
WT-867	Riparian Marsh (seasonal emergent marsh)	327.6	327.6	11	456968	5912606	10-31-50-25 W5M	0.04	0.04	27.1	High-Moderate (63%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Maskuta Creek (AB-188)
WT-869	Potential Basin Marsh (seasonal emergent marsh)	328.2	328.3	11	456605	5912133	5-31-50-25 W5M	0.3	0.3	119.6	--	--	Figure A1	
WT-881	Riparian Swamp (shrubby swamp)	332.5	332.6	11	453771	5909101	6-23-50-26 W5M	2.0	0.6	126.7	High Functional (81%)	--	Figure A1	
WT-882	Flat Swamp (needle-leaf treed swamp)	332.8	332.9	11	453498	5908899	6-23-50-26 W5M	0.7	0.3	67.4	High-Moderate (74%)	--	Figure A1	

TABLE 5.1-6 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-876	Basin Fen (treed fen)	335.6	335.8	11	452335	5906376	10-10-50-26 W5M	0.5	0.2	173.8	High Functional (83%)	--	Figure A1	
WT-1045	Horizontal Fen (treed fen)	336.1	336.6	11	452142	5905973	6-10-50-26 W5M	9.9	3.5	508.7	High Functional (82%)	--	Figure A1	
WT-878	Flat Swamp (needle-leaf treed swamp)	337.1	337.3	11	451538	5905138	13-3-50-26 W5M	3.8	2.2	199.9	High Functional (86%)	--	Figure A1	
WT-1096	Horizontal Fen (treed fen)	337.5	337.6	11	451405	5904787	9-4-50-26 W5M	1.0	0.2	67.9	High Functional (82%)	--	Figure A1	
WT-1569 A	Basin Fen (shrubby fen)	339.2	339.4	11	450368	5903453	14-33-49-26 W5M	0.9	0.6	136.6	High Functional (83%)	--	Figure A1	Rare plant observation, short-tail rush (S2) Long-toed salamanders

Note: 1 COP notifications will be obtained only for those wetlands that will be disturbed during construction. Not all of the wetlands located within the proposed pipeline corridor will be disturbed. Trans Mountain will make application for the COPs as required.

TABLE 5.1-7

WETLAND CLASS AND DISTRIBUTION ENCOUNTERED ALONG THE PROPOSED HARGREAVES TO DARFIELD SEGMENT

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-1121	Potential Flat Swamp (shrubby swamp)	503.7	503.8	11	341688	5870692	c-59-K/83-D-14	0.5	0.5	107.1	--	--	W2	Figure A2	
WT-1088	Potential Flat Swamp (shrubby swamp)	505.2	505.3	11	340408	5871040	d-51-L/83-D-14	0.4	0.4	88.4	--	--	W2	Figure A2	
WT-2	Flat Swamp (shrubby swamp) associated with WT-1 (Ws07)	510.0	510.3	11	340795	5867178	d-20-K/83-D-14	0.6	0.5	229.9	High-Moderate (60%)	--	W2	Figure A2	Associated with a watercourse (BC-22)
WT-1	Flat Swamp (shrubby swamp) (WT-2)	510.0	510.1	11	340809	5867165	d-20-K/83-D-14	0.1	0.1	36.9	High-Moderate (60%)	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-4	Riparian Marsh (deep marsh with shrubby swamp areas)(Wm01 with Ws03 components) associated with Riparian Swamp (shrubby swamp) (Ws02)	523.6	523.9	11	345669	5855617	a-94-C/83-D-14	10.0	3.3	308.6	High-Moderate (59%)	Yes if open water channel or pond within construction ROW	W1	Figure A2	Blue-listed (Ws03) Yellow-Listed (Wm01, Ws02) Associated with watercourse (BC-33)
WT-6	Potential Horizontal Fen (non-woody fen)	532.5	532.6	11	347910	5847456	d-01-C/83-D-14	0.7	0.2	76.5	--	Yes if open water channel or pond within construction ROW, if channels present	W2	Figure A2	
WT-9	Basin Fen (treed fen) (Wf02, Wb05)	532.7	532.7	11	347853	5847325	b-01-C/83-D-14	30.3	0.0	9.1	High Functional (78%)	--	W1	Figure A2 Appendix B	Blue-listed (Wf02) Yellow-listed (Wb05)
WT-8	Horizontal Fen (non-woody fen) associated with WT-9	532.7	532.9	11	347853	5847311	a-01-C/83-D-14	1.2	0.7	189.5	High Functional (78%)	Yes if open water channel or pond within construction ROW, if channels present	W2	Figure A2	Associated with watercourse (BC037)
WT-10	Horizontal Fen (non-woody fen)	533.2	533.4	11	347721	5846793	d-91-K/83-D-11	2.3	0.5	171.0	High-Moderate (65%)	Yes if open water channel or pond within construction ROW, if channels present	W2	Figure A2	
WT-200	Flat Swamp (mixedwood treed swamp)	542.1	542.3	11	349682	5838953	c-18-J/83-D-11	1.0	1.0	235.2	High-Moderate (70%)	--	W2	Figure A2	
WT-11	Riparian Swamp (shrubby swamp) (Ws04) associated with shrubby swamp [WT-12] with mixedwood treed swamp and emergent marsh component (Wm01)	545.8	545.9	11	351644	5836209	d-86-G/83-D-11	1.6	0.5	124.4	High-Moderate (66%), High Functional (79%)[1]	Yes if open water channel or pond within construction ROW	W2	Figure A2	Yellow-listed (Wm01) Associated with a watercourse (possibly fish bearing) (BC-52) - salmon observed, possibly sockeye.
WT-12	Riparian Swamp (shrubby swamp) with deep marsh (Wm01) and mixedwood treed swamp components and associated with WT-11	545.8	546.4	11	351624	5836195	a-86-G/83-D-11	18.4	3.6	512.7	High-Moderate (66%), High Functional (79%)[1]	Yes if open water channel or pond within construction ROW	W1	Figure A2	Yellow-listed (Wm01) Associated with watercourse (BC-53)
WT-13	Potential Riparian Fen (treed fen) with open water components	550.9	551.0	11	354496	5832353	c-42-G/83-D-11	23.1	0.2	122.4	--	Yes if open water channel or pond within construction ROW	W1	Figure A2	
WT-15	Riparian Swamp (shrubby swamp) (Ws02) with marsh areas	552.4	552.6	11	355643	5831432	d-31-G/83-D-11	0.9	0.3	181.9	High-Moderate (68%)	Yes if open water channel or pond within construction ROW	W2	Figure A2 Appendix B	Yellow-listed (Ws02)
WT-17	Basin Marsh (deep marsh) (Wm01/02) associated with WT-16	553.9	554.0	11	356730	5830481	d-30-H/83-D-11	0.1	0.1	62.6	High-Moderate (71%)	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	Yellow-listed (Wm01) Blue-listed (Wm02)

TABLE 5.1-7 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-16	Riparian Swamp (shrubby swamp) (Ws02) associated with Basin Marsh (deep marsh) (Wm01/02)	553.9	554.1	11	356747	5830490	d-30-H/83-D-11	1.2	1.2	160.7	High-Moderate (71%)	--	W2	Figure A2	Yellow-listed (Wm01, Ws02) Blue-listed (Wm02) Associated with watercourse (BC-67)
WT-18	Riparian Swamp (mixedwood treed swamp) (Ws02)	555.1	555.5	11	357523	5829611	d-19-H/83-D-11	4.6	2.2	358.6	High Functional (75%)	--	W2	Figure A2	Yellow-listed (Ws02)
WT-20	Riparian Marsh (seasonal emergent marsh) (Wm01)	555.8	555.9	11	357822	5829046	b-18-H/83-D-11	1.1	0.2	115.2	High-Moderate (61%)	--	W2	Figure A2	Yellow-listed (Wm01)
WT-21	Riparian Shallow Open Water (open water pond) associated with a Riparian Swamp (shrubby swamp) (Ws02)	556.4	556.8	11	358082	5828479	a-08-H/83-D-11	4.8	4.7	330.4	High-Moderate (64%)	Yes if open water channel or pond within construction ROW	W2	Figure A2	Beaver activity Yellow-listed (Ws02) Associated with watercourse (BC-73)
WT-22	Riparian Marsh (seasonal emergent marsh)	556.9	557.2	11	358109	5827982	d-98-A/83-D-11	2.2	1.4	292.3	High-Moderate (64%)	--	W2	Figure A2	
WT-902	Riparian Swamp (mixedwood treed swamp) (Ws07) associated with WT-901	559.0	559.5	11	357784	5826075	c-78-A/83-D-11	5.3	4.1	474.3	High Functional (77%)	--	W1	Figure A2	Associated with watercourse (BC-78, BC-77 and BC-76)
WT-901	Riparian Swamp (mixedwood treed swamp) (Ws02) with open water component and is associated with WT-902	559.3	559.3	11	357652	5825821	c-78-A/83-D-11	0.2	0.2	51.9	High-Moderate (67%)	--	Unclassified	Figure A2	Beaver activity Yellow-listed (Ws02)
WT-23	Riparian Swamp (shrubby swamp) (Ws04)	560.2	560.6	11	357273	5824961	d-69-A/83-D-11	4.0	2.5	355.7	High Functional (82%)	--	W2	Figure A2 Appendix B	
WT-26	Riparian Swamp (shrubby swamp) associated with WT-23	560.3	560.3	11	357463	5824936	d-69-A/83-D-11	0.5	0.1	27.5	High Functional (82%)	--	W2	Figure A2	
WT-25	Riparian Swamp (shrubby swamp) associated with WT-24	560.2	560.4	11	357461	5824917	d-69-A/83-D-11	1.0	0.6	119.2	High Functional (82%)	--	W2	Figure A2	Associated with watercourse (BC-80)
WT-24	Riparian Swamp (shrubby swamp) associated with WT-25	560.3	560.4	11	357321	5824853	d-69-A/83-D-11	2.6	0.6	95.3	High Functional (82%)	--	W2	Figure A2	
WT-27	Riparian Swamp (shrubby swamp) associated with WT-26	560.5	560.8	11	357348	5824666	a-69-A/83-D-11	2.2	2.2	258.3	High Functional (82%)	--	W2	Figure A2	
WT-29	Flat Swamp (shrubby swamp) associated with WT-28	561.2	561.3	11	357212	5823993	d-59-A/83-D-11	0.5	0.5	133.3	High-Moderate (70%)	--	W2	Figure A2	
WT-28	Flat Swamp (shrubby swamp) (Ws02)	561.2	561.5	11	357153	5823999	d-59-A/83-D-11	1.2	1.2	342.8	High-Moderate (70%)	--	W2	Figure A2	Yellow-listed (Ws02)
WT-30	Flat Swamp (shrubby swamp) associated with WT-28	561.2	561.6	11	357132	5823997	b-59-A/83-D-11	1.4	1.4	390.9	High-Moderate (70%)	--	W2	Figure A2	
WT-31	Riparian Swamp (mixedwood treed swamp) (Ws02)	563.2	563.4	11	356538	5822187	d-40-A/83-D-11	4.8	4.0	230.6	High Functional (84%)	--	W2	Figure A2 Appendix B	Yellow-listed (Ws02)
WT-32	Riparian Marsh (deep marsh) (Wm02)	565.4	565.6	11	357106	5820138	a-19-A/83-D-11	0.7	0.5	202.9	High-Moderate (65%)	Yes if open water channel or pond within construction ROW	W2	Figure A2	Beaver activity Blue-listed (Wm02)
WT-33	Riparian Marsh (deep marsh) associated with WT-32	565.5	565.5	11	357076	5820052	d-19-A/83-D-11	2.5	0.003	11.5	High-Moderate (65%)	Yes if open water channel or pond within construction ROW	W2	Figure A2	
WT-34	Riparian Swamp (shrubby swamp) (Ws01) associated with Riparian Swamp (shrubby swamp) Ws02	566.3	566.9	11	356844	5819268	b-09-A/83-D-11	9.3	0.5	556.7	High-Moderate (65%), High-Moderate (66%)[1]	--	W1	Figure A2	Yellow-listed (Ws02)
WT-35	Riparian Swamp (shrubby swamp) (Ws01) associated with a Riparian Marsh (seasonal emergent marsh) (Wm01) and associated with WT-34	566.3	566.9	11	356883	5819250	b-09-A/83-D-11	3.8	3.5	567.5	High-Moderate (67%)	--	W2	Figure A2	Yellow-listed (Wm01, Ws02) Associated with watercourse (BC-92)
WT-1087	Potential Riparian Swamp (shrubby swamp)	580.4	580.4	11	352575	5807071	a-74-G/83-D-6	0.3	0.3	59.9		--	W2	Figure A2	

TABLE 5.1-7 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-45	Basin Marsh (seasonal emergent marsh) with a sub-component Riparian Swamp (shrubby swamp)	587.4	587.5	11	351577	5800445	a-05-G/83-D-6	0.1	0.1	86.1	High-Moderate (58%)	--	Unclassified	Figure A2 Appendix B	Associated with watercourse (BC-133 and BC-134)
WT-47	Flat Swamp (shrubby swamp)	591.4	591.8	11	351200	5796609	d-55-B/83-D-6	0.6	0.6	434.8	High-Moderate (74%)	--	W2	Figure A2	
WT-50.1	Flat Swamp (mixedwood treed swamp) (Ws01)	600.3	600.7	11	348431	5788407	c-68-J/83-D-3	3.2	3.1	436.1	High Functional (80%)	--	W2	Figure A2	
WT-896	Potential Flat Swamp (mixedwood treed swamp)	601.2	601.4	11	348233	5787545	c-58-J/83-D-3	1.0	1.0	193.9	--	--	W2	Figure A2	
WT-895	Potential Basin Shallow Open Water (open water pond)	601.3	601.3	11	348204	5787495	b-68-J/83-D-3	0.1	0.1	45.2	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-54	Riparian Swamp (shrubby swamp) (Ws03)	611.0	611.2	11	343809	5778922	d-63-F/83-D-3	5.8	0.2	164.8	High-Moderate (61%)	--	W1	Figure A2	Blue-listed (Ws03)
WT-83	Riparian Shallow Open Water (open water pond) (FI05)	613.9	614.0	11	342523	5776377	c-34-F/83-D-3	1.4	0.5	128.5	High-Moderate (55%)	Yes if open water channel or pond within construction ROW	W2	Figure A2 Appendix B	
WT-58	Flat Swamp (shrubby swamp) with mixedwood treed swamp component (Ws09)	615.7	616.0	11	341878	5774794	c-15-F/83-D-3	1.9	1.5	264.5	High Functional (88%)	--	W2	Figure A2	
WT-59	Flat Swamp (mixedwood treed swamp) (Ws09)	616.1	616.8	11	341819	5774394	b-15-F/83-D-3	27.8	8.7	680.0	High Functional (80%)	--	W1	Figure A2	
WT-60	Riparian Swamp (shrubby swamp) (Ws02) with a deep marsh component	616.8	617.3	11	341868	5773743	c-05-F/83-D-3	8.2	5.3	509.8	High Functional (82%)	Yes if open water channel or pond within construction ROW	W1	Figure A2	Yellow-listed (Ws02) Associated with watercourse (BC-180)
WT-84	Riparian Marsh (seasonal emergent marsh) (Wm05)	617.1	617.5	11	341822	5773409	b-05-F/83-D-3	2.3	1.2	385.5	High-Moderate (65%)	--	W2	Figure A2 Appendix B	Blue-listed (Wm05) Beaver sign (old lodge)
WT-61	Slope Swamp (mixedwood treed swamp) (Ws10)	617.7	617.8	11	341763	5772900	b-05-F/83-D-3	0.4	0.4	128.4	High Functional (76%)	--	W2	Figure A2 Appendix B	
WT-85	Riparian Swamp (shrubby swamp) (Ws01)	618.4	618.8	11	341571	5772219	b-95-C/83-D-3	3.8	2.6	424.3	High Functional (76%)	--	W2	Figure A2	
WT-86	Riparian Swamp (shrubby swamp) associated with WT-85	618.8	618.9	11	341529	5771794	c-85-C/83-D-3	0.1	0.1	49.8	High Functional (76%)	--	Unclassified	Figure A2	
WT-87	Potential Basin Marsh (seasonal emergent marsh)	619.3	619.3	11	341264	5771350	a-86-C/83-D-3	0.2	0.01	24.0	--	--	Unclassified	Figure A2	
WT-64	Riparian Swamp (needle-leaf treed swamp) (Ws10, Ws04)	619.7	619.9	11	341150	5770937	d-76-C/83-D-3	0.5	0.5	149.2	High-Moderate (71%)	--	W2	Figure A2 Appendix B	
WT-63	Riparian Swamp (shrubby swamp) see WT-64	619.7	619.9	11	341174	5770914	d-76-C/83-D-3	0.3	0.3	130.4	High-Moderate (71%)	--	W2	Figure A2	
WT-65	Riparian Swamp (needle-leaf treed swamp) associated with WT-64	619.7	619.9	11	341185	5770910	d-76-C/83-D-3	0.4	0.4	130.6	High-Moderate (71%)	--	W2	Figure A2	
WT-88	Riparian Swamp (mixedwood treed swamp) (Ws51)	619.9	620.0	11	341043	5770708	c-76-C/83-D-3	3.6	0.3	92.2	High Functional (82%)	--	W2	Figure A2	Red-listed (Ws51)
WT-900	Riparian Swamp (mixedwood treed swamp) (Fm02) with open water component	620.1	620.3	11	341328	5770521	b-75-C/83-D-3	4.1	0.9	179.9	High-Moderate (73%)	--	W2	Figure A2	Beaver activity
WT-90	Riparian Marsh (deep marsh) (Wm05) associated with WT-91	620.7	621.1	11	341070	5769962	c-66-C/83-D-3	1.3	0.7	351.8	High-Moderate (69%)	Yes if open water channel or pond within construction ROW	W2	Figure A2	Blue-listed (Wm05) Rare plant observation, crested wood fern (S2S3, Blue-listed)[3]
WT-91	Riparian Shallow Open Water (open water pond) associated with WT-90	620.8	621.1	11	341033	5769919	c-66-C/83-D-3	8.8	0.9	285.7	High-Moderate (69%)	Yes if open water channel or pond within construction ROW	W1	Figure A2	Rare plant observation, crested wood fern (S2S3, Blue-listed)[3]

TABLE 5.1-7 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-66	Riparian Swamp (mixedwood treed swamp) (Ws04)	623.2	623.6	11	340363	5767863	a-47-C/83-D-3	1.7	1.7	430.6	High-Moderate (50%)	--	W2	Figure A2	
WT-95	Riparian Swamp (shrubby swamp) (Ws01, Ws10)	638.68	638.74	11	339939	5754404	a-07-K/82-M-14	0.3	0.3	60.8	High Functional (77%)	--	W2	Figure A2 Appendix B	
WT-96	Basin Marsh (seasonal emergent marsh) (Wm05) with shrubby swamp component (Ws02)	638.9	639.0	11	340040	5754258	c-96-F/82-M-14	0.1	0.1	98.2	Low-Moderate (45%)	--	Unclassified	Figure A2	Yellow-listed (Ws02) Blue-listed (Wm05)
WT-97	Flat swamp (shrubby swamp) (Ws04)	639.3	639.3	11	340389	5753970	c-96-F/82-M-14	0.2	0.1	41.2	High-Moderate (61%)	--	Unclassified	Figure A2	
WT-100	Basin Marsh (seasonal emergent marsh) with an open water component and associated with WT-99	641.7	641.9	11	341053	5751738	b-75-F/82-M-14	0.9	0.9	195.9	Low-Moderate (48%)	--	W2	Figure A2	
WT-99	Basin Marsh (seasonal emergent marsh)	641.7	641.9	11	341054	5751738	b-75-F/82-M-14	1.1	1.1	234.9	Low-Moderate (48%)	--	W2	Figure A2	
WT-101	Potential Flat Swamp (shrubby swamp)	642.1	642.2	11	341083	5751336	c-65-F/82-M-14	0.5	0.5	149.1	--	--	W2	Figure A2	
WT-104	Flat Swamp (mixedwood treed swamp) (Ws01)	642.7	643.0	11	341249	5750702	a-65-F/82-M-14	0.5	0.5	274.2	High-Moderate (65%)	--	W2	Figure A2	Associated with watercourse (BC-214)
WT-103	Basin Marsh (deep marsh) (Wm01) associated with WT-104	642.8	643.0	11	341250	5750611	d-55-F/82-M-14	0.3	0.3	188.9	High-Moderate (60%)	Yes if open water channel or pond within construction ROW	W2	Figure A2	Yellow-listed (Wm01)
WT-106	Potential Basin Marsh (deep marsh)	643.0	643.1	11	341204	5750430	d-55-F/82-M-14	0.2	0.2	102.1	--	Yes if open water channel or pond within construction ROW	W2	Figure A2	
WT-105	Potential Basin Shallow Open Water (open water pond)	643.1	643.5	11	341187	5750286	a-55-F/82-M-14	1.0	1.0	347.4	--	Yes if open water channel or pond within construction ROW	W2	Figure A2	
WT-109	Basin Marsh (seasonal emergent marsh) (Wm01) with shrubby swamp component See WT-108	643.7	644.1	11	341271	5749705	d-45-F/82-M-14	3.4	2.4	402.4	High-Moderate (58%), High-Moderate (56%)[1]	--	W2	Figure A2	Yellow-listed (Wm01) Associated with watercourse (BC-215)
WT-108	Basin Shallow Open Water (open water pond) associated with WT-109	643.8	644.1	11	341288	5749650	d-45-F/82-M-14	1.0	1.0	279.2	High-Moderate (58%), High-Moderate (56%)[1]	Yes if open water channel or pond within construction ROW	W2	Figure A2	Beaver activity Yellow-listed (Wm01, Ws02)
WT-891	Basin Marsh (seasonal emergent marsh) (Wm01) with swamp component (Ws02) along fringe	645.2	645.3	11	341614	5748253	b-34-F/82-M-14	0.2	0.2	115.1	High-Moderate (67%)	--	Unclassified	Figure A2	Yellow-listed (Wm01, Ws02) Associated with watercourse (BC-217)
WT-893	Basin Marsh (seasonal emergent marsh) associated with WT-891	645.3	645.3	11	341642	5748211	b-34-F/82-M-14	0.1	0.1	45.8	High-Moderate (67%)	--	Unclassified	Figure A2	Yellow-listed (Wm01)
WT-116	Riparian Swamp (mixedwood treed swamp) associated with a marsh component (Wm01)	647.0	647.1	11	342002	5746507	d-14-F/82-M-14	0.3	0.3	106.6	High-Moderate (67%)	--	W2	Figure A2	Beaver activity Yellow-listed (Wm01) Associated with watercourse (BC-222)
WT-119	Potential Riparian Fen (shrubby fen)	648.7	648.9	11	342430	5744945	d-94-C/82-M-14	14.0	0.8	197.9	--	--	W1	Figure A2	Associated with watercourse (BC-226)
WT-124	Flat Swamp (shrubby swamp) (Ws02)	648.8	648.9	11	342448	5744836	c-93-C/82-M-14	0.2	0.2	94.9	High-Moderate (63%)	--	Unclassified	Figure A2	Yellow-listed (Ws02)
WT-120	Riparian Swamp (mixedwood treed swamp) (Ws01)	649.2	649.5	11	342513	5744382	b-93-C/82-M-14	5.8	0.7	287.6	High Functional (80%)	--	W1	Figure A2	

TABLE 5.1-7 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-121	Riparian Shallow Open Water (open water pond) (Wm01 or Wm05)	649.4	649.5	11	342554	5744259	b-93-C/82-M-14	0.3	0.3	128.2	High-Moderate (62%)	Yes if open water channel or pond within construction ROW	W2	Figure A2 Appendix B	Yellow-listed (Wm01) Blue-listed (Wm05)
WT-123	Riparian Marsh (deep marsh) (Wm05)	649.5	649.8	11	342515	5744202	d-84-C/82-M-14	15.0	0.8	312.4	High-Moderate (67%)	Yes if open water channel or pond within construction ROW	W1	Figure A2	Blue-listed (Wm05) Associated with watercourse (BC-229)
WT-126	Flat Swamp (shrubby swamp) (Ws06)	650.9	651.2	11	341813	5742936	c-74-C/82-M-14	0.6	0.5	303.6	Low-Moderate (44%)	--	W2	Figure A2	Yellow-listed (Ws06)
WT-125	Riparian Marsh (seasonal emergent marsh)	651.1	651.2	11	341764	5743123	c-74-C/82-M-14	1.9	1.1	130.5	Low-Moderate (43%)	--	W2	Figure A2	Associated with watercourse (BC-235)
WT-128	Potential Flat Swamp (shrubby swamp)	652.4	652.6	11	340730	5742216	c-65-C/82-M-14	1.0	1.0	169.7	--	--	W2	Figure A2	Associated with watercourse (BC-237)
WT-132	Potential Basin Marsh (seasonal emergent marsh)	652.5	652.6	11	340621	5742192	c-65-C/82-M-14	0.7	0.3	141.6	--	--	W2	Figure A2	
WT-129	Potential Riparian Shallow Open Water (open water pond)	652.6	652.6	11	340699	5742035	c-65-C/82-M-14	0.2	0.004	16.3	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-131	Potential Basin Shallow Open Water (open water pond)	652.6	652.7	11	340599	5742051	c-65-C/82-M-14	0.1	0.1	42.6	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	Associated with watercourse (BC-238)
WT-130	Potential Basin Shallow Open Water (open water pond)	652.6	652.7	11	340630	5742032	c-65-C/82-M-14	0.1	0.1	56.4	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-133	Flat Swamp (Mixedwood treed swamp) (Ws01)	654.1	654.4	11	339803	5741049	c-56-C/82-M-14	5.5	2.4	252.9	High-Moderate (73%)	--	W1	Figure A2	Rare plant observation, silvery sedge (SU)[3]
WT-134	Potential Basin Marsh (seasonal emergent marsh)	654.7	654.8	11	339661	5740447	b-56-C/82-M-14	0.1	0.1	35.6	--	--	Unclassified	Figure A2	
WT-135	Riparian Swamp (shrubby swamp) with a marsh component	656.0	656.2	11	339662	5739227	c-36-C/82-M-14	1.1	0.8	250.8	High-Moderate (61%), High-Moderate (60%)[1]	--	W2	Figure A2	Associated with watercourse (BC-242)
WT-136	Riparian Swamp (shrubby swamp) (Ws01) associated with WT-135 via a drainage	656.3	656.4	11	339702	5738897	b-36-C/82-M-14	0.6	0.6	148.4	High-Moderate (70%)	--	W2	Figure A2	
WT-137	Riparian Swamp (shrubby swamp) (Ws01)	656.6	656.7	11	339631	5738604	b-36-C/82-M-14	0.4	0.4	85.7	High-Moderate (74%)	--	W2	Figure A2	
WT-138	Potential Basin Marsh (seasonal emergent marsh)	657.2	657.2	11	339686	5738032	b-26-C/82-M-14	0.1	0.1	62.6		--	Unclassified	Figure A2	
WT-141	Riparian Swamp (shrubby swamp) (Ws02) with mixedwood treed swamp component	657.3	657.3	11	339799	5737865	c-16-C/82-M-14	20.7	0.003	12.0	High-Moderate (74%)	--	W1	Figure A2	Yellow-listed (Ws02)
WT-140	Potential Riparian Fen (non-woody fen)	658.4	658.5	11	339427	5736905	b-16-C/82-M-14	10.4	0.3	80.0	--	Yes if open water channel or pond within construction ROW, if channels present	W1	Figure A2	
WT-139	Potential Riparian Fen (shrubby fen)	658.4	658.6	11	339343	5736906	a-17-C/82-M-14	1.3	1.2	180.1	--	--	W2	Figure A2	
WT-142	Potential Riparian Fen (non-woody fen)	659.3	659.6	11	339071	5736101	a-07-C/82-M-14	2.5	0.6	343.2	--	Yes if open water channel or pond within construction ROW, if channels present	W2	Figure A2	
WT-143	Potential Riparian Swamp (shrubby swamp)	659.8	659.9	11	338871	5735669	c-97-K/82-M-11	0.3	0.2	120.9	--	--	W2	Figure A2	

TABLE 5.1-7 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-903	Flat Swamp (shrubby swamp) (Ws01)	661.0	662.0	11	338381	5734552	b-88-K/82-M-11	16.5	14.2	1037.3	High Functional (80%)	--	W1	Figure A2	
WT-144	Basin Marsh (deep marsh) (Wm02) associated with WT-903	661.1	661.8	11	338351	5734475	b-88-K/82-M-11	14.0	6.9	755.5	Low-Moderate (44%)	Yes if open water channel or pond within construction ROW, if channels present	W1	Figure A2	Blue-listed (Wm02) Associated with watercourse (BC-246 and BC-247)
WT-524	Potential Riparian Fen (shrubby fen) with a non-woody fen component	661.4	661.8	11	338145	5734183	b-88-K/82-M-11	7.4	2.3	342.7	--	--	W1	Figure A2	
WT-145	Riparian Swamp (shrubby swamp) (Ws01 with Ws06 and Ws04)	663.3	663.6	11	336812	5732947	b-69-K/82-M-11	18.2	1.5	303.7	High-Moderate (70%), High-Moderate (66%)[1]	--	W1	Figure A2	
WT-146	Riparian Shallow Open Water (open water pond)	663.5	663.6	11	336718	5732743	d-70-K/82-M-11	0.5	0.3	71.3	High-Moderate (70%)	Yes if open water channel or pond within construction ROW	W2	Figure A2	
WT-147	Potential Riparian Shallow Open Water (open water pond)	663.6	663.7	11	336666	5732614	a-70-K/82-M-11	0.7	0.05	27.6	--	Yes if open water channel or pond within construction ROW	W2	Figure A2	
WT-149	Riparian Marsh (deep marsh) (Wm01) associated with WT-148	663.7	664.0	11	336653	5732592	a-70-K/82-M-11	19.4	1.3	298.9	High-Moderate (61%)	Yes if open water channel or pond within construction ROW	W1	Figure A2	Bald Eagle Nest Yellow-listed (Wm01)
WT-150	Potential Flat Swamp (shrubby swamp)	665.3	665.4	11	335471	5731529	a-51-L/82-M-11	0.4	0.4	147.6	--	--	W2	Figure A2	
WT-151	Potential Basin Marsh (deep marsh)	665.9	666.1	11	334903	5731154	d-42-L/82-M-11	3.9	1.4	178.1	--	Yes if open water channel or pond within construction ROW	W2	Figure A2	Associated with watercourse (BC-350) Rare plant observation, crested wood fern (S2S3, Blue-listed)[3]
WT-152	Potential Basin Shallow Open Water (open water pond)	666.3	666.4	11	334732	5730753	a-42-L/82-M-11	0.1	0.1	41.2	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-157	Slope Swamp (shrubby swamp) (Ws01) associated with WT-156	672.2	672.3	11	330222	5727985	a-17-L/82-M-11	0.1	0.1	61.1	High-Moderate (73%)	--	Unclassified	Figure A2	
WT-156	Slope Swamp (shrubby swamp) (Ws01)	672.3	672.6	11	330181	5728002	b-17-L/82-M-11	1.1	0.3	334.6	High-Moderate (73%)	--	W2	Figure A2	
WT-158	Flat Swamp (broad-leaf treed swamp)	672.86	672.92	11	329669	572917	a-18-L/82-M-11	0.1	0.1	50.6	High-Moderate (65%)	--	Unclassified	Figure A2 Appendix B	
WT-159	Basin Marsh (seasonal emergent marsh)	677.6	677.7	11	325113	5727628	d-03-I/82-M-12	0.3	0.3	91.0	Low-Moderate (48%)	--	W2	Figure A2	
WT-160	Basin Marsh (seasonal emergent marsh)	678.7	678.7	11	324140	5727962	a-14-I/82-M-12	0.05	0.05	29.5	Low-Moderate (47%)	--	Unclassified	Figure A2	
WT-161	Slope Marsh (seasonal emergent marsh)	678.8	678.9	11	323978	5727975	b-14-I/82-M-12	0.4	0.4	45.4	High-Moderate (50%)	--	W2	Figure A2	Associated with watercourse (BC-264)
WT-162	Basin Marsh (seasonal emergent marsh) (Wm01)	686.3	686.3	11	317054	5727971	c-02-J/82-M-12	0.1	0.1	50.1	High-Moderate (69%)	--	Unclassified	Figure A2	Yellow-listed (Wm01)
WT-164	Flat Swamp (shrubby swamp) (Ws02)	691.7	691.8	11	313625	5724174	d-66-G/82-M-12	0.1	0.1	35.8	High-Moderate (60%)	--	Unclassified	Figure A2	Yellow-listed (Ws02)
WT-167	Basin Marsh (seasonal emergent marsh) (Gs03 transitional, tiny pocket of Wm01)	695.0	695.1	11	313340	5720959	b-36-G/82-M-12	0.2	0.2	65.8	High-Moderate (50%)	--	Unclassified	Figure A2	Yellow-listed (Wm01)
WT-166	Potential Basin Shallow Open Water (open water pond)	695.0	695.0	11	313312	5720945	b-36-G/82-M-12	0.01	0.01	9.7	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	

TABLE 5.1-7 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-1347	Basin Marsh (seasonal emergent marsh) (Wm06)	695.287	695.288	11	313164	5720728	c-26-G/82-M-12	0.5	0.000002	0.5	Low-Moderate (48%)	--	W2	Figure A2 Appendix B	Blue-listed (Wm06)
WT-168	Basin Marsh (seasonal emergent marsh) (Wm01)	695.7	695.8	11	312991	5720320	b-26-G/82-M-12	0.1	0.1	42.4	High-Moderate (59%)	--	Unclassified	Figure A2	Yellow-listed (Wm01)
WT-169	Basin Marsh (seasonal emergent marsh) (Wm01)	696.2	696.2	11	312789	5719902	d-17-G/82-M-12	0.1	0.03	16.7	High-Moderate (59%)	--	Unclassified	Figure A2	Yellow-listed (Wm01)
WT-171	Basin Marsh (seasonal emergent marsh) (Wm05)	708.7	708.7	11	300979	5719745	b-20-F/82-M-12	0.1	0.1	31.9	Low-Moderate (38%)	--	Unclassified	Figure A2	Blue-listed (Wm05)
WT-172	Riparian Swamp (shrubby swamp) (Ws03)	715.5	715.8	11	295646	5723651	a-57-E/82-M-12	7.6	1.2	387.0	High Functional (79%)	--	W1	Figure A2	Blue-listed (Ws03)
WT-185	Basin Marsh (seasonal emergent marsh)	731.6	731.6	10	699583	5719770	b-20-H/92-P-9	1.1	0.1	33.3	High-Moderate (51%)	--	W2	Figure A2	
WT-190	Potential Flat Swamp (needle-leaf treed swamp)	732.4	732.5	10	699539	5718961	b-10-H/92-P-9	0.5	0.5	103.7	--	--	W2	Figure A2	Rare plant observation, tender sedge (S2S3, Blue-listed)[3]
WT-194	Basin Marsh (seasonal emergent marsh) with an artificial pond and complex	732.39	732.43	10	699538	5718955	b-10-H/92-P-9	1.0	0.1	35.6	High-Moderate (63%)	--	W2	Figure A2 Appendix B	Rare plant observation, tender sedge (S2S3, Blue-listed)[3]
WT-188	Potential Basin Shallow Open Water (open water pond)	732.5	732.5	10	699436	5718930	b-10-H/92-P-9	0.1	0.1	35.6	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-191	Potential Flat Swamp (needle-leaf treed swamp)	732.5	732.6	10	699405	5718955	b-10-H/92-P-9	0.6	0.6	119.8	--	--	W2	Figure A2	Rare plant observation, tender sedge (S2S3, Blue-listed)[3]
WT-189	Potential Basin Shallow Open Water (open water pond)	732.5	732.6	10	699409	5718874	b-10-H/92-P-9	0.1	0.02	28.1	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-193	Potential Basin Marsh (deep marsh)	732.6	732.7	10	699359	5718877	b-10-H/92-P-9	0.8	0.7	157.4	--	Yes if open water channel or pond within construction ROW	W2	Figure A2	
WT-192	Potential Flat Swamp (needle-leaf treed swamp)	732.6	732.6	10	699368	5718854	b-10-H/92-P-9	0.5	0.1	51.3	--	--	W2	Figure A2	Rare plant observation, tender sedge (S2S3, Blue-listed)[3]
WT-199.1	Flat Swamp (shrubby swamp)	734.3	734.4	10	699028	5717257	d-81-B/92-P-9	0.2	0.1	73.1	High-Moderate (74%)	--	Unclassified	Figure A2	
WT-521	Riparian Marsh (deep marsh)	734.5	734.5	10	698985	5717112	a-81-B/92-P-9	0.2	0.04	46.9	High-Moderate (63%)	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-203	Riparian Marsh (deep marsh) with shrubby swamp component (Ws02)	734.6	735.0	10	698846	5717010	b-81-B/92-P-9	0.7	0.5	343.6	High-Moderate (65%)	Yes if open water channel or pond within construction ROW	W2	Figure A2	Beaver activity
WT-201	Potential Riparian Shallow Open Water (open water pond)	734.7	735.1	10	698714	5717004	b-81-B/92-P-9	2.7	1.2	352.0	--	Yes if open water channel or pond within construction ROW	W2	Figure A2	Associated with watercourse (BC-315) Rare plant observation, tender sedge (S2S3, Blue-listed)[3]
WT-202	Potential Riparian Marsh (seasonal emergent marsh)	735.1	735.1	10	698453	5716823	b-81-B/92-P-9	0.1	0.1	29.5	--	--	Unclassified	Figure A2	
WT-1326	Riparian Marsh (seasonal emergent marsh), reed canary grass marsh with Cottonwood riparian	735.4	735.5	10	698104	5716716	d-72-B/92-P-9	0.4	0.1	28.8	High-Moderate (63%)	--	W2	Figure A2	
WT-1325	Potential Riparian Marsh (deep marsh)	736.2	736.2	10	697298	5716706	a/83-B/92-P-9	0.4	0.00003	1.1	--	Yes if open water channel or pond within construction ROW	W2	Figure A2	

TABLE 5.1-7 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-207	Potential Riparian Marsh (deep marsh)	736.3	736.3	10	697297	5716620	d-73-B/92-P-9	0.04	0.04	25.7	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	Associated with watercourse (BC-316)
WT-206	Potential Basin Marsh (seasonal emergent marsh)	736.3	736.5	10	697209	5716584	d-73-B/92-P-9	0.2	0.2	119.7	--	--	Unclassified	Figure A2	
WT-209	Riparian Swamp (shrubby swamp) (Ws03)	737.0	737.1	10	696554	5716588	c-73-B/92-P-9	0.4	0.1	43.9	High-Moderate (72%)	--	W2	Figure A2	Blue-listed (Ws03) Associated with watercourse (BC-317)
WT-208	Riparian Shallow Open Water (open water pond)	737.1	737.1	10	696531	5716434	d-74-B/92-P-9	0.4	0.01	11.8	High-Moderate (56%)	Yes if open water channel or pond within construction ROW	W2	Figure A2	
WT-211	Potential Basin Marsh (seasonal emergent marsh)	739.4	739.5	10	694353	5715840	b-76-B/92-P-9	0.3	0.3	101.9	--	--	W2	Figure A2	
WT-212	Potential Lacustrine Marsh (seasonal emergent marsh)	739.6	739.7	10	694243	5715662	b-76-B/92-P-9	0.9	0.1	92.7	--	--	W2	Figure A2	
WT-213	Potential Lacustrine Marsh (seasonal emergent marsh)	740.5	740.6	10	693883	5714898	a-67-B/92-P-9	0.4	0.4	151.3	--	--	W2	Figure A2	
WT-214	Potential Riparian Swamp (mixedwood treed swamp)	741.6	741.6	10	693098	5714170	a-58-B/92-P-9	0.3	0.3	96.1	--	--	W2	Figure A2	
WT-520	Potential Riparian Marsh (seasonal emergent marsh)	745.5	745.5	10	693046	5710450	a-18-B/92-P-9	0.4	0.3	68.6	--	--	W2	Figure A2	Associated with watercourse (BC-327)
WT-218	Flat Swamp (shrubby swamp) associated with WT-216	749.8	750.0	10	692871	5706307	a-68-J/92-P-8	1.8	0.7	185.3	High-Moderate (66%)	--	W2	Figure A2	
WT-217	Basin Shallow Open Water (open water pond) associated with WT-216	750.0	750.0	10	692878	5706154	c-68-J/92-P-8	0.2	0.2	45.0	High-Moderate (66%)	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	Rare plant observation, Mexican mosquito fern (S2, Red-listed)[3]
WT-216	Flat Swamp (mixedwood treed swamp) with shrubby swamp with open water component and is associated with WT-217 and WT-218	750.0	750.4	10	692844	5706109	c-68-J/92-P-8	4.5	1.3	422.7	High-Moderate (66%)	--	W2	Figure A2	
WT-283	Basin Marsh (seasonal emergent marsh)	750.4	750.6	10	692893	5705730	b-68-J/92-P-8	0.3	0.3	209.1	High-Moderate (58%)	--	W2	Figure A2	
WT-285	Riparian Swamp (shrubby swamp) Maybe Ws52 (no skunk cabbage)	751.6	751.8	10	692812	5704578	b-58-J/92-P-8	6.3	0.9	227.9	High-moderate (70%)	--	W1	Figure A2	
WT-286	Potential Riparian Shallow Open Water (open water pond)	756.8	757.0	10	693803	5699608	c-97-G/92-P-8	0.2	0.2	149.5	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A2	
WT-287	Potential Riparian Swamp (shrubby swamp)	757.1	757.1	10	693903	5699347	b-97-G/92-P-8	1.6	0.02	21.9	--	--	W2	Figure A2	
WT-221	Potential Basin Marsh (seasonal emergent marsh)	759.8	759.8	10	694752	5697024	c-66-G/92-P-8	0.1	0.1	35.6	--	--	Unclassified	Figure A2	

Notes:
1. Not all of the wetlands located within the proposed pipeline corridor will be disturbed. Trans Mountain will make application to the BC OGC as required.
2. Wetlands were also classified as per the Environmental Protection and Management Guide (EPMG) (BC OGC 2013).
3. Observations were made during the vegetation field surveys in 2013.

TABLE 5.1-8

WETLAND CLASS AND DISTRIBUTION ENCOUNTERED ALONG THE PROPOSED BLACK PINES TO HOPE SEGMENT

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-528	Potential Basin Marsh (seasonal emergent marsh)	815.4	815.8	10	692806	5644982	C-1-K/92-I-16	0.81	0.80	420.3	--	--	W2	Figure A3	Associated with watercourse (BC-358)
WT-536	Potential Riparian Swamp (shrubby swamp)	817.9	818.0	10	692089	5642641	A-82-F/92-I-16	2.88	0.24	133.4	--	--	W2	Figure A3	Associated with watercourse (BC-366)
WT-541	Potential Basin Marsh (seasonal emergent marsh)	819.5	819.5	10	691761	5641035	C-62-F/92-I-16	0.16	0.0001	3.6	--	--	W2	Figure A3	
WT-540	Potential Basin Marsh (seasonal emergent marsh)	819.6	819.6	10	691802	5640982	C-62-F/92-I-16	0.06	0.06	33.2	--	--	W2	Figure A3	
WT-1361	Potential Basin Marsh (seasonal emergent marsh)	824.6	824.7	10	689221	5637326	C-25-F/92-I-16	0.32	0.32	60.9	--	--	W2	Figure A3	Associated with watercourse (BC-375)
WT-1321	Potential Basin Shallow Open Water (open water pond)	825.0	825.1	10	689128	5636955	B-25-F/92-I-16	1.05	0.12	44.7	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-1134	Potential Basin Marsh (seasonal emergent marsh)	830.6	830.6	10	686623	5632280	B-78-C/92-I-16	0.06	0.06	36.2	--	--	Unclassified	Figure A3	
WT-1107	Potential Flat Swamp (shrubby swamp)	830.6	830.7	10	686654	5632250	B-78-C/92-I-16	0.09	0.09	66.1	--	--	Unclassified	Figure A3	
WT-1363	Potential Flat Swamp (broad-leaf treed swamp)	831.2	831.4	10	687013	5631794	C-68-C/92-I-16	1.83	1.37	209.7	--	--	W2	Figure A3	Associated with watercourse (BC-383)
WT-1106	Potential Basin Marsh (seasonal emergent marsh)	832.6	832.6	10	686753	5630419	B-58-C/92-I-16	0.09	0.02	20.0	--	--	Unclassified	Figure A3	
WT-1105	Potential Basin Marsh (alkali marsh)	833.5	833.6	10	686310	5629600	D-49-C/92-I-16	1.67	0.28	119.7	--	--	W2	Figure A3	Associated with watercourse (BC-388)
WT-1085	Potential Basin Marsh (seasonal emergent marsh)	834.0	834.1	10	686283	5629091	B-49-C/92-I-16	0.49	0.36	73.0	--	--	W2	Figure A3	Associated with watercourse (BC-389)
WT-1084	Potential Flat Swamp (broad-leaf treed swamp)	835.1	835.4	10	685878	5628081	D-30-C/92-I-16	1.09	1.08	310.9	--	--	W2	Figure A3	Associated with watercourse (BC-393)
WT-563	Potential Basin Marsh (seasonal emergent marsh)	841.1	841.2	10	684488	5622863	B-71-L/92-I-9	0.64	0.64	132.4	--	--	W2	Figure A3	
WT-566	Potential Basin Marsh (seasonal emergent marsh)	841.7	841.9	10	684011	5622644	A-72-L/92-I-9	1.04	1.02	201.0	--	--	W2	Figure A3	
WT-567	Potential Basin Marsh (seasonal emergent marsh)	843.3	843.3	10	682686	5621807	B-63-L/92-I-9	0.32	0.31	57.5	--	--	W2	Figure A3	
WT-570	Potential Slope Marsh (seasonal emergent marsh)	848.2	848.3	10	682044	5617923	B-24-L/92-I-9	0.07	0.07	40.1	--	--	Unclassified	Figure A3	Associated with watercourse (BC-471)
WT-611	Basin Marsh (alkali marsh)	853.5	853.7	10	683416	5612944	D-63-E/92-I-9	2.48	0.42	217.3	Low-Moderate (41%)	--	W2	Figure A3 Appendix B	
WT-571	Basin Marsh (alkali marsh)	854.2	854.3	10	683396	5612196	C-53-E/92-I-9	2.52	0.13	78.9	Low-Moderate (41%)	--	W2	Figure A3	
WT-1318	Potential Basin Marsh (alkali marsh)	856.2	856.2	10	682594	5610681	A-44-E/92-I-9	0.27	0.26	47.2	--	--	W2	Figure A3	

TABLE 5.1-8 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-579	Potential Slope Marsh (seasonal emergent marsh)	860.9	860.9	10	683370	5607518	C-03-E/92-I-9	3.09	0.12	39.8	--	--	W2	Figure A3	Associated with watercourse (BC-427)
WT-580	Basin Marsh (seasonal emergent marsh) (Wm05)	862.4	862.5	10	684157	5606563	C-92-D/92-I-9	1.36	0.23	69.5	High-Moderate (52%)	--	W2	Figure A3 Appendix B	Blue-listed (Wm05) Associated with watercourse (BC-430)
WT-581	Potential Basin Marsh (deep marsh)	865.1	865.3	10	684841	5603909	D-62-D/92-I-9	0.90	0.79	179.2	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	Associated with watercourse (BC-433)
WT-582	Potential Basin Marsh (seasonal emergent marsh)	865.5	865.6	10	685023	5603592	C-61-D/92-I-9	1.10	0.84	160.4	--	--	W2	Figure A3	
WT-619	Potential Slope Marsh (deep marsh)	868.0	868.3	10	686040	5601288	C-40-C/92-I-9	1.76	1.07	347.2	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-621	Potential Basin Marsh (deep marsh)	869.3	869.5	10	686642	5600091	D-30-C/92-I-9	0.42	0.10	144.0	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-583	Potential Lacustrine Marsh (deep marsh)	869.7	870.1	10	686731	5599750	A-30-C/92-I-9	6.03	1.87	424.9	--	Yes if open water channel or pond within construction ROW	W1	Figure A3	
WT-623	Potential Slope Fen (shrubby fen)	869.7	869.9	10	686596	5599667	A-30-C/92-I-9	2.42	0.46	186.6	--	--	W2	Figure A3	
WT-622	Potential Basin Fen (non-woody fen)	869.9	870.0	10	686632	5599528	A-30-C/92-I-9	3.64	1.26	195.2	--	Yes if open water channel or pond within construction ROW, if channels present	W2	Figure A3	Associated with watercourse (BC-438)
WT-584	Potential Basin Shallow Open Water (open water pond)	869.9	870.1	10	686779	5599558	B-29-C/92-I-9	11.99	0.51	227.1	--	Yes if open water channel or pond within construction ROW	W1	Figure A3	
WT-585	Potential Basin Shallow Open Water (open water pond)	871.1	871.2	10	686998	5598310	C-09-C/92-I-9	0.49	0.01	40.9	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-625	Potential Basin Marsh (seasonal emergent marsh)	871.5	871.9	10	687064	5597917	B-09-C/92-I-9	5.63	3.10	371.7	--	--	W1	Figure A3	Associated with watercourse (BC-439)
WT-587	Potential Flat Swamp (shrubby swamp)	871.6	871.7	10	687156	5597921	B-09-C/92-I-9	0.77	0.77	111.2	--	--	W2	Figure A3	
WT-627	Potential Basin Marsh (seasonal emergent marsh)	874.4	874.5	10	686243	5595177	B-80-K/92-I-8	0.18	0.18	64.5	--	--	Unclassified	Figure A3	
WT-592	Potential Riparian Marsh (seasonal emergent marsh)	876.0	876.1	10	685923	5593578	D-51-L/92-I-8	1.66	0.12	100.6	--	--	W2	Figure A3	
WT-629	Potential Basin Marsh (seasonal emergent marsh)	878.4	878.4	10	685377	5591317	A-32-L/92-I-8	0.40	0.13	40.6	--	--	W2	Figure A3	
WT-630	Potential Basin Marsh (seasonal emergent marsh)	878.6	878.7	10	685306	5591100	A-32-L/92-I-8	0.89	0.51	88.0	--	--	W2	Figure A3	
WT-631	Potential Riparian Marsh (seasonal emergent marsh)	879.5	879.6	10	685131	5590207	A-22-L/92-I-8	0.66	0.31	68.4	--	--	W2	Figure A3	

TABLE 5.1-8 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-593	Potential Riparian Marsh (seasonal emergent marsh)	879.6	879.7	10	685117	5590066	B-22-L/92-I-8	3.45	1.17	110.0	--	--	W2	Figure A3	Associated with watercourse (BC-448)
WT-634	Potential Slope Marsh (seasonal emergent marsh)	880.6	880.7	10	684977	5589147	D-02-L/92-I-8	2.36	0.21	99.8	--	--	W2	Figure A3	
WT-635	Potential Lacustrine Marsh (seasonal emergent marsh)	881.6	881.7	10	684702	5588116	C-92-E/92-I-8	0.13	0.12	50.8	--	--	Unclassified	Figure A3	Associated with watercourse (BC-450)
WT-638	Potential Basin Marsh (seasonal emergent marsh)	882.2	882.2	10	684588	5587552	A-93-E/92-I-8	0.64	0.02	31.5	--	--	W2	Figure A3	
WT-1308	Potential Basin Marsh (seasonal emergent marsh)	882.5	882.6	10	684589	5587206	D-83-E/92-I-8	0.08	0.08	51.8	--	--	Unclassified	Figure A3	
WT-596	Potential Riparian Marsh (seasonal emergent marsh)	886.6	887.0	10	683290	5583375	C-44-E/92-I-8	4.22	1.42	393.1	--	--	W2	Figure A3	Associated with watercourse (BC-454)
WT-640	Potential Riparian Marsh (seasonal emergent marsh)	887.0	887.2	10	683197	5582934	B-44-E/92-I-8	1.44	1.20	183.3	--	--	W2	Figure A3	Associated with watercourse (BC-455)
WT-641	Potential Riparian Marsh (seasonal emergent marsh)	887.3	887.4	10	683125	5582692	B-44-E/92-I-8	1.79	1.38	155.7	--	--	W2	Figure A3	
WT-649	Potential Basin Marsh (alkali marsh)	890.3	890.4	10	682119	5579812	D-06-E/92-I-8	1.40	0.03	47.8	--	--	W2	Figure A3	
WT-598	Potential Slope Swamp (needle-leaf treed swamp)	893.2	893.5	10	681260	5577242	A-87-D/92-I-8	8.11	3.19	307.0	--	--	W1	Figure A3	
WT-650	Potential Slope Swamp (needle-leaf treed swamp)	898.3	898.4	10	680915	5572228	C-27-D/92-I-8	3.52	0.68	105.3	--	--	W2	Figure A3	
WT-651	Potential Basin Marsh (seasonal emergent marsh)	904.5	904.5	10	676973	5567994	D-82-I/92-I-2	0.06	0.06	37.7	--	--	Unclassified	Figure A3	
WT-653	Potential Basin Marsh (seasonal emergent marsh)	905.3	905.3	10	676598	5567296	C-72-I/92-I-2	0.10	0.10	56.0	--	--	Unclassified	Figure A3	
WT-602	Potential Basin Marsh (seasonal emergent marsh)	906.6	906.7	10	675497	5566572	D-64-I/92-I-2	2.85	0.33	86.1	--	--	W2	Figure A3	
WT-603	Potential Riparian Shallow Open Water (open water pond)	910.1	910.2	10	671997	5566395	D-68-I/92-I-2	0.11	0.10	55.8	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-605	Potential Riparian Shallow Open Water (open water pond)	910.2	910.3	10	671900	5566436	A-78-I/92-I-2	0.13	0.13	51.9	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-655	Potential Basin Marsh (seasonal emergent marsh)	911.3	911.5	10	670815	5566619	A-79-I/92-I-2	0.53	0.52	139.6	--	--	W2	Figure A3	
WT-657	Potential Flat Swamp (shrubby swamp)	918.3	918.4	10	666110	5562198	C-24-J/92-I-2	1.92	1.10	132.5	--	--	W2	Figure A3	
WT-659	Potential Riparian Swamp (shrubby swamp)	927.8	928.1	10	661697	5554216	A-50-G/92-I-2	10.08	3.91	328.1	--	--	W1	Figure A3	Associated with watercourse (BC-504)
WT-660	Potential Basin Marsh (seasonal emergent marsh)	928.3	928.3	10	661649	5553703	D-40-G/92-I-2	0.04	0.003	22.7	--	--	Unclassified	Figure A3	

TABLE 5.1-8 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-662	Potential Basin Marsh (seasonal emergent marsh)	931.2	931.4	10	659887	5551300	A-12-F/92-I-2	0.62	0.62	121.5	--	--	W2	Figure A3	
WT-661	Potential Basin Marsh (seasonal emergent marsh)	931.4	931.5	10	659818	5551141	D-02-F/92-I-2	0.63	0.28	96.2	--	--	W2	Figure A3	Associated with watercourse (BC-513)
WT-729	Potential Basin Marsh (seasonal emergent marsh)	932.7	932.7	10	659107	5550116	C-92-C/92-I-2	0.07	0.07	35.9	--	--	Unclassified	Figure A3	
WT-727	Potential Basin Marsh (seasonal emergent marsh)	932.8	932.8	10	659150	5549919	C-92-C/92-I-2	0.22	0.04	26.6	--	--	Unclassified	Figure A3	
WT-730	Potential Basin Marsh (seasonal emergent marsh)	935.4	935.4	10	657708	5547942	C-74-C/92-I-2	0.05	0.05	33.9	--	--	Unclassified	Figure A3	
WT-731	Potential Flat Swamp (shrubby swamp)	935.9	936.0	10	657351	5547603	A-75-C/92-I-2	0.22	0.21	67.8	--	--	Unclassified	Figure A3	Associated with watercourse (BC-526)
WT-732	Potential Flat Swamp (shrubby swamp)	936.1	936.4	10	657187	5547502	D-65-C/92-I-2	1.58	1.38	305.0	--	--	W2	Figure A3	Associated with watercourse (BC-527)
WT-1531	Potential Basin Marsh (seasonal emergent marsh)	938.2	938.2	10	656648	5545664	B-55-C/92-I-2	0.08	0.05	31.5	--	--	Unclassified	Figure A3	
WT-667	Potential Basin Shallow Open Water (open water pond)	946.4	946.4	10	651194	5541142	A-02-D/92-I-2	1.09	0.00002	3.5	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-1306	Potential Basin Marsh (seasonal emergent marsh)	948.0	948.1	10	649991	5540046	B-93-L/92-H-15	1.45	0.11	35.6	--	--	W2	Figure A3	
WT-669	Potential Basin Marsh (seasonal emergent marsh)	950.7	950.8	10	648772	5537706	C-64-L/92-H-15	2.37	0.17	83.3	--	--	W2	Figure A3	
WT-1529	Potential Riparian Swamp (mixedwood treed swamp)	957.9	958.1	10	649338	5531239	D-94-E/92-H-15	3.50	3.00	266.6	--	--	W2	Figure A3	Associated with watercourse (BC-548 and BC-549)
WT-1083	Potential Flat Swamp (mixedwood treed swamp)	958.0	958.1	10	649385	5531068	D-94-E/92-H-15	0.15	0.13	62.3	--	--	Unclassified	Figure A3	
WT-1082	Potential Basin Marsh (seasonal emergent marsh)	959.6	959.7	10	648690	5529676	A-85-E/92-H-15	0.32	0.32	104.3	--	--	W2	Figure A3	
WT-1303	Potential Basin Marsh (seasonal emergent marsh)	959.7	959.8	10	648708	5529553	D-75-E/92-H-15	0.08	0.07	52.2	--	--	Unclassified	Figure A3	
WT-1304	Potential Basin Marsh (seasonal emergent marsh)	959.8	959.8	10	648677	5529553	D-75-E/92-H-15	0.05	0.05	46.2	--	--	Unclassified	Figure A3	
WT-1377	Potential Riparian Marsh (deep marsh)	962.9	962.9	10	648478	5526414	C-35-E/92-H-15	11.09	0.002	16.4	--	Yes if open water channel or pond within construction ROW	W1	Figure A3	
WT-1299	Potential Riparian Shallow Open Water (open water pond)	964.5	964.8	10	648327	5524930	C-25-E/92-H-15	2.38	1.42	303.0	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-671	Potential Riparian Swamp (broad-leaf treed swamp)	971.0	971.3	10	647826	5519401	B-76-D/92-H-15	2.56	1.40	212.5	--	--	W2	Figure A3	Associated with watercourse (BC-561)

TABLE 5.1-8 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-672	Potential Basin Shallow Open Water (open water pond)	972.0	972.1	10	647184	5518759	A-67-D/92-H-15	0.16	0.16	90.1	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	Associated with watercourse (BC-562)
WT-673	Flat Swamp (shrubby swamp) (Ws02)	974.46	974.52	10	645891	5516827	B-48-D/92-H-15	0.23	0.22	58.4	High-Moderate (52%)	--	Unclassified	Figure A3 Appendix B	
WT-1133	Potential Basin Marsh (seasonal emergent marsh)	978.9	978.9	10	643913	5513144	A-01-A/92-H-14	0.19	0.19	35.8	--	--	Unclassified	Figure A3	
WT-680	Potential Basin Marsh (seasonal emergent marsh)	980.1	980.1	10	643399	5512060	B-91-I/92-H-11	0.06	0.06	19.9	--	--	Unclassified	Figure A3	
WT-1120	Potential Basin Marsh (seasonal emergent marsh)	989.2	989.2	10	643262	5503286	D-92-H/92-H-11	0.20	0.20	52.6	--	--	Unclassified	Figure A3	Associated with watercourse (BC-581)
WT-1119	Potential Basin Shallow Open Water (open water pond)	989.7	989.9	10	643012	5502651	A-92-H/92-H-11	1.48	1.47	265.0	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-1132	Potential Basin Shallow Open Water (open water pond)	991.2	991.3	10	643966	5501528	D-71-H/92-H-11	1.07	0.47	109.4	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-1379	Potential Basin Marsh (seasonal emergent marsh)	992.0	992.1	10	643993	5500759	A-71-H/92-H-11	0.11	0.11	45.2	--	--	Unclassified	Figure A3	
WT-1374	Potential Slope Marsh (seasonal emergent marsh)	992.6	992.7	10	643847	5500214	B-61-H/92-H-11	0.13	0.13	31.6	--	--	Unclassified	Figure A3	
WT-1380	Potential Slope Marsh (seasonal emergent marsh)	992.8	992.8	10	643794	5500081	B-61-H/92-H-11	0.09	0.05	40.5	--	--	Unclassified	Figure A3	
WT-1271	Potential Riparian Flat (shrubby swamp)	1040.5	1040.6	10	617178	5470831	B-51-E/92-H-6	0.62	0.01	26.1	--	--	W2	Figure A3	
WT-712	Potential Basin Shallow Open Water (open water pond)	1045.4	1045.7	10	612739	5469841	B-46-E/92-H-6	1.31	1.29	283.7	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-1460	Basin Shallow Open Water (open water pond) / unclassified aquatic	1051.4	1051.5	10	607150	5468996	C-32-H/92-H-5	0.10	0.10	44.1	Low Functional (23%)	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	Beaver sign Associated with watercourse (BC-658)
WT-713	Potential Basin Marsh (seasonal emergent marsh)	1059.7	1059.8	10	600736	5464719	A-100-A/92-H-5	0.20	0.19	63.1	--	--	Unclassified	Figure A3	
WT-715	Potential Riparian Shallow Open Water (open water pond)	1062.8	1062.9	10	598757	5462421	D-62-B/92-H-5	0.29	0.28	138.1	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-716	Potential Riparian Marsh (seasonal emergent marsh)	1063.1	1063.3	10	598605	5462169	A-62-B/92-H-5	0.80	0.79	174.8	--	--	W2	Figure A3	
WT-717	Potential Riparian Swamp (shrubby swamp)	1063.4	1063.5	10	598428	5461942	B-62-B/92-H-5	1.67	1.24	153.8	--	--	W2	Figure A3	
WT-718	Potential Riparian Marsh (deep marsh)	1063.7	1063.8	10	598100	5461799	A-63-B/92-H-5	2.13	0.02	50.6	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	

TABLE 5.1-8 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-1183	Potential Basin Marsh (seasonal emergent marsh)	1067.3	1067.3	10	596676	5458941	B-34-B/92-H-5	0.30	0.30	68.7	--	--	W2	Figure A3	
WT-719	Potential Riparian Shallow Open Water (open water pond)	1068.3	1068.5	10	596193	5457946	D-15-B/92-H-5	1.33	0.50	201.9	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-722	Potential Basin Marsh (seasonal emergent marsh)	1071.2	1071.2	10	596274	5455261	A-95-J/92-H-4	0.06	0.06	29.3	--	--	Unclassified	Figure A3	
WT-724	Potential Basin Marsh (seasonal emergent marsh)	1078.7	1078.7	10	592017	5449471	C-29-J/92-H-4	0.39	0.25	62.0	--	--	W2	Figure A3	
WT-1103	Potential Riparian Marsh (seasonal emergent marsh)	1080.0	1080.1	10	590787	5449130	D-21-K/92-H-4	1.99	0.09	50.4	--	--	W2	Figure A3	
WT-1080	Potential Riparian Marsh (seasonal emergent marsh)	1080.1	1080.1	10	590833	5448995	A-21-K/92-H-4	0.27	0.06	44.3	--	--	W2	Figure A3	
WT-739	Potential Riparian Marsh (seasonal emergent marsh)	1097.2	1097.3	10	576014	5440974	C-37-E/92-H-4	0.43	0.16	88.8	--	--	W2	Figure A3	
WT-740	Potential Basin Marsh (seasonal emergent marsh)	1097.3	1097.4	10	575908	5440918	C-37-E/92-H-4	0.24	0.24	61.4	--	--	Unclassified	Figure A3	
WT-1431	Potential Riparian Marsh (deep marsh)	1102.1	1102.2	10	571661	5439071	A-22-H/92-G-1	0.46	0.03	58.2	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-741	Riparian Shallow Open Water (open water pond) with emergent marsh areas (associated with WT-1406 and WT-742)	1102.1	1102.2	10	571622	5439076	A-22-H/92-G-1	0.76	0.75	113.1	Low-Moderate (44%)	Yes if open water channel or pond within construction ROW	W2	Figure A3	Associated with watercourse (BC-716)
WT-742	Riparian Marsh (deep marsh) associated with WT-741	1102.2	1102.3	10	571553	5438996	C-12-H/92-G-1	1.77	0.84	87.4	Low-Moderate (44%)	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-743	Potential Riparian Marsh (seasonal emergent marsh)	1102.6	1102.8	10	571448	5438574	B-12-H/92-G-1	2.19	1.14	139.7	--	--	W2	Figure A3	Associated with watercourse (BC-719)
WT-766	Potential Basin Shallow Open Water (open water pond)	1107.5	1107.6	10	567587	5436216	B-96-A/92-G-1	0.16	0.16	46.2	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-767	Potential Flat Swamp (shrubby swamp)	1117.8	1117.9	10	557617	5436145	B-97-B/92-G-1	0.34	0.34	136.5	--	--	W2	Figure A3	
WT-745	Potential Basin Shallow Open Water (open water pond)	1121.1	1121.2	10	554572	5436226	A-91-C/92-G-1	0.35	0.19	59.5	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-747	Potential Basin Marsh (seasonal emergent marsh)	1127.1	1127.2	10	549024	5438329	D-17-F/92-G-1	0.69	0.68	87.9	--	--	W2	Figure A3	
WT-748	Potential Flat Swamp (shrubby swamp)	1129.0	1129.1	10	547222	5439058	A-29-F/92-G-1	0.60	0.19	116.6	--	--	W2	Figure A3	
WT-770	Basin Marsh (seasonal emergent marsh)	1132.5	1132.5	10	543989	5440135	C-32-E/92-G-1	0.06	0.06	40.9	Low-Moderate (25%)	--	Unclassified	Figure A3	Aquatics - associated with watercourse (BC-738)

TABLE 5.1-8 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-772	Potential Basin Shallow Open Water (open water pond)	1133.7	1133.8	10	542782	5440510	D-34-E/92-G-1	0.11	0.02	46.6	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-774	Potential Flat Swamp (shrubby swamp)	1134.5	1134.5	10	542112	5440870	B-44-E/92-G-1	0.42	0.22	60.7	--	--	W2	Figure A3	
WT-750	Potential Riparian Swamp (shrubby swamp)	1138.0	1138.1	10	538780	5441857	D-58-E/92-G-1	1.44	0.53	79.9	--	--	W2	Figure A3	Associated with watercourse (BC-747)
WT-1159	Potential Basin Marsh (seasonal emergent marsh)	1138.9	1138.9	10	537888	5442035	D-59-E/92-G-1	0.23	0.003	9.7	--	--	Unclassified	Figure A3	
WT-752	Potential Basin Shallow Open Water (open water pond)	1139.2	1139.2	10	537660	5442159	C-59-E/92-G-1	0.22	0.21	58.6	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-753	Potential Basin Shallow Open Water (open water pond)	1139.3	1139.4	10	537497	5442241	C-59-E/92-G-1	0.02	0.02	16.8	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-754	Potential Basin Shallow Open Water (open water pond)	1139.6	1139.6	10	537315	5442460	B-69-E/92-G-1	0.07	0.01	18.6	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-755	Potential Basin Shallow Open Water (open water pond)	1139.7	1139.8	10	537185	5442437	A-70-E/92-G-1	0.09	0.09	55.9	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	Associated with watercourse (BC-748)
WT-1398	Hummock Marsh (seasonal emergent marsh)	1140.1	1140.1	10	536837	5442544	B-70-E/92-G-1	0.20	0.08	67.3	Low-Moderate (20%)	--	Unclassified	Figure A3	
WT-758	Potential Basin Shallow Open Water (open water pond)	1142.2	1142.2	10	534859	5443331	B-72-H/92-G-2	0.03	0.02	23.2	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-1154	Potential Riparian Swamp (shrubby swamp)	1142.9	1143.0	10	534144	5443559	A-73-H/92-G-2	0.78	0.13	66.1	--	--	W2	Figure A3	
WT-778	Potential Basin Marsh (deep marsh)	1145.2	1145.2	10	531952	5443988	C-75-H/92-G-2	0.21	0.21	48.2	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	
WT-779	Potential Basin Marsh (seasonal emergent marsh)	1145.7	1145.7	10	531421	5444027	D-76-H/92-G-2	0.29	0.28	30.9	--	--	W2	Figure A3	
WT-780	Potential Basin Marsh (seasonal emergent marsh)	1145.7	1145.7	10	531372	5443970	D-76-H/92-G-2	0.26	0.19	23.5	--	--	W2	Figure A3	
WT-1130	Potential Basin Marsh (seasonal emergent marsh)	1146.8	1146.9	10	530247	5444113	C-77-H/92-G-2	0.11	0.11	49.2	--	--	Unclassified	Figure A3	
WT-782	Potential Riparian Marsh (deep marsh)	1147.3	1147.4	10	529890	5444369	A-88-H/92-G-2	0.33	0.33	95.7	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-783	Potential Riparian Marsh (deep marsh)	1147.3	1147.4	10	529876	5444399	A-88-H/92-G-2	0.19	0.15	89.0	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A3	Associated with watercourse (BC-753)

TABLE 5.1-8 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-1395	Hummock Marsh (seasonal emergent marsh) (Wm06)	1148.7	1148.8	10	529216	5445296	B-98-H/92-G-2	0.40	0.29	117.2	Low-Moderate (43%)	--	W2	Figure A3	
WT-1102	Potential Flat Swamp (shrubby swamp)	1148.7	1148.8	10	529173	5445326	B-98-H/92-G-2	0.35	0.34	85.9	--	--	W2	Figure A3	
WT-1232	Potential Basin Marsh (deep marsh)	1148.9	1149.0	10	529094	5445516	A-99-H/92-G-2	2.21	0.20	60.3	--	Yes if open water channel or pond within construction ROW	W2	Figure A3	
WT-1101	Potential Basin Marsh (seasonal emergent marsh)	1151.1	1151.4	10	528181	5447133	A-20-I/92-G-2	0.56	0.35	238.9	--	--	W2	Figure A3	
WT-1118	Potential Basin Marsh (seasonal emergent marsh)	1152.6	1152.8	10	526847	5447491	C-11-J/92-G-2	0.44	0.43	202.7	--	--	W2	Figure A3	
WT-1117	Potential Basin Marsh (seasonal emergent marsh)	1153.5	1153.5	10	525925	5447742	D-12-J/92-G-2	0.07	0.07	40.4	--	--	Unclassified	Figure A3	
WT-1078	Potential Riparian Marsh (seasonal emergent marsh)	1153.9	1154.0	10	525511	5447828	C-12-J/92-G-2	0.21	0.21	47.3	--	--	Unclassified	Figure A3	Associated with watercourse (BC-767)
WT-1382	Potential Riparian Swamp (shrubby swamp)	1154.0	1154.2	10	525445	5447880	A-23-J/92-G-2	1.30	1.26	182.2	--	--	W2	Figure A3	
WT-1143	Potential Riparian Swamp (shrubby swamp)	1154.7	1154.7	10	524785	5447960	B-23-J/92-G-2	0.28	0.05	32.7	--	--	W2	Figure A3	
WT-1129	Potential Basin Marsh (seasonal emergent marsh)	1159.3	1159.4	10	520283	5448032	B-28-J/92-G-2	0.09	0.08	48.7	--	--	Unclassified	Figure A3	
WT-1100	Potential Riparian Marsh (deep marsh)	1161.6	1161.8	10	518568	5449513	A-50-J/92-G-2	5.25	0.90	160.4	--	Yes if open water channel or pond within construction ROW	W1	Figure A3	Associated with watercourse (BC-773)
WT-1384	Potential Riparian Swamp (mixedwood treed swamp)	1163.1	1163.3	10	517434	5450510	C-50-J/92-G-2	37.20	1.98	236.9	--	--	W1	Figure A3	
WT-1216	Potential Flat Swamp (shrubby swamp)	1176.4	1176.6	10	506697	5455336	B-03-D/92-G-7	1.90	1.21	129.5	--	--	W2	Figure A3	Associated with watercourse (BC-784)
WT-1115	Potential Basin Marsh (seasonal emergent marsh)	1180.9	1181.0	10	504460	5458040	A-36-D/92-G-7	0.30	0.30	79.1	--	--	W2	Figure A3	

Notes: 1 Not all of the wetlands located within the proposed pipeline corridor will be disturbed. Trans Mountain will make application to the BC OGC as required.

2 Wetlands were also classified as per the Environmental Protection and Management Guide (EPMG) (BC OGC 2013).

TABLE 5.1-9

WETLAND CLASS AND DISTRIBUTION ENCOUTERED ALONG THE PROPOSED HOPE TO BURNABY SEGMENT

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-712	Potential Basin Shallow Open Water (open water pond)	1045.4	1045.7	10	612739	5469841	b-46-E/92-H-6	1.3	1.3	283.7	--	Yes if open water channel or pond within construction ROW	W2	Figure A4	
WT-1460	Basin Shallow Open Water (open water pond) / unclassified aquatic	1051.4	1051.5	10	607150	5468996	c-32-H/92-H-5	0.1	0.1	44.1	Low Functional (23%)	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4 Appendix B	Beaver sign Associated with watercourse (BC-658)
WT-713	Potential Basin Marsh (seasonal emergent marsh)	1059.7	1059.8	10	600736	5464719	a-100-A/92-H-5	0.2	0.2	63.1	--	--	Unclassified	Figure A4	
WT-715	Potential Riparian Shallow Open Water (open water pond)	1062.8	1062.9	10	598757	5462421	d-62-B/92-H-5	0.3	0.3	138.1	--	Yes if open water channel or pond within construction ROW	W2	Figure A4	
WT-716	Potential Riparian Marsh (seasonal emergent marsh)	1063.1	1063.3	10	598605	5462169	a-62-B/92-H-5	0.8	0.8	174.8	--	--	W2	Figure A4	
WT-717	Potential Riparian Swamp (shrubby swamp)	1063.4	1063.5	10	598428	5461942	b-62-B/92-H-5	1.7	1.2	153.8	--	--	W2	Figure A4	
WT-718	Potential Riparian Marsh (deep marsh)	1063.7	1063.8	10	598100	5461799	a-63-B/92-H-5	2.1	0.02	50.6	--	Yes if open water channel or pond within construction ROW	W2	Figure A4	
WT-1183	Potential Basin Marsh (seasonal emergent marsh)	1067.3	1067.3	10	596676	5458941	b-34-B/92-H-5	0.3	0.3	68.7	--	--	W2	Figure A4	
WT-719	Potential Riparian Shallow Open Water (open water pond)	1068.3	1068.5	10	596193	5457946	d-15-B/92-H-5	1.3	0.5	201.9	--	Yes if open water channel or pond within construction ROW	W2	Figure A4	
WT-722	Potential Basin Marsh (seasonal emergent marsh)	1071.2	1071.2	10	596274	5455261	a-95-J/92-H-4	0.1	0.1	29.3	--	--	Unclassified	Figure A4	
WT-724	Potential Basin Marsh (seasonal emergent marsh)	1078.7	1078.7	10	592017	5449471	c-29-J/92-H-4	0.4	0.2	62.0	--	--	W2	Figure A4	
WT-1103	Potential Riparian Marsh (seasonal emergent marsh)	1080.0	1080.1	10	590787	5449130	a-21-K/92-H-4	2.0	0.1	50.4	--	--	W2	Figure A4	Rare community observation, Wm05 (S3, Blue-listed)[3]
WT-1080	Potential Riparian Marsh (seasonal emergent marsh)	1080.1	1080.1	10	590833	5448995	a-21-K/92-H-4	0.3	0.1	44.3	--	--	W2	Figure A4	
WT-739	Potential Riparian Marsh (seasonal emergent marsh)	1097.2	1097.3	10	576014	5440974	c-37-E/92-H-4	0.4	0.2	88.8	--	--	W2	Figure A4	
WT-740	Potential Basin Marsh (seasonal emergent marsh)	1097.3	1097.4	10	575908	5440918	c-37-E/92-H-4	0.2	0.2	61.4	--	--	Unclassified	Figure A4	
WT-1431	Potential Riparian Marsh (deep marsh)	1102.1	1102.2	10	571661	5439071	a-22-H/92-G-1	0.5	0.03	58.2	--	Yes if open water channel or pond within construction ROW	W2	Figure A4	
WT-741	Riparian Shallow Open Water (open water pond) with emergent marsh areas (associated with WT-1406 and WT-742)	1102.1	1102.2	10	571622	5439076	a-22-H/92-G-1	0.8	0.7	113.1	Low-Moderate (44%)	Yes if open water channel or pond within construction ROW	W2	Figure A4 Appendix B	Associated with watercourse (BC-716)

TABLE 5.1-9 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-742	Riparian Marsh (deep marsh) associated with WT-741	1102.2	1102.3	10	571553	5438996	c-12-H/92-G-1	1.8	0.8	87.4	Low-Moderate (44%)	Yes if open water channel or pond within construction ROW	W2	Figure A4 Appendix B	
WT-743	Potential Riparian Marsh (seasonal emergent marsh)	1102.6	1102.8	10	571448	5438574	b-12-H/92-G-1	2.2	1.1	139.7	--	--	W2	Figure A4	Associated with watercourse (BC-719)
WT-766	Potential Basin Shallow Open Water (open water pond)	1107.5	1107.6	10	567587	5436216	b-96-A/92-G-1	0.2	0.2	46.2	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	
WT-767	Potential Flat Swamp (shrubby swamp)	1117.8	1117.9	10	557617	5436145	b-97-B/92-G-1	0.3	0.3	136.5	--	--	W2	Figure A4	
WT-745	Potential Basin Shallow Open Water (open water pond)	1121.1	1121.2	10	554572	5436226	a-91-C/92-G-1	0.3	0.2	59.5	--	Yes if open water channel or pond within construction ROW	W2	Figure A4	
WT-747	Potential Basin Marsh (seasonal emergent marsh)	1127.1	1127.2	10	549024	5438329	d-17-F/92-G-1	0.7	0.7	87.9	--	--	W2	Figure A4	
WT-748	Potential Flat Swamp (shrubby swamp)	1129.0	1129.1	10	547222	5439058	a-29-F/92-G-1	0.6	0.2	116.6	--	--	W2	Figure A4	
WT-770	Basin Marsh (seasonal emergent marsh)	1132.47	1132.51	10	543989	5440135	c-32-E/92-G-1	0.1	0.1	40.9	Low-Moderate (25%)	--	Unclassified	Figure A4 Appendix B	Associated with watercourse (BC-738)
WT-772	Potential Basin Shallow Open Water (open water pond)	1133.7	1133.8	10	542782	5440510	d-34-E/92-G-1	0.1	0.02	46.6	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	
WT-774	Potential Flat Swamp (shrubby swamp)	1134.5	1134.5	10	542112	5440870	b-44-E/92-G-1	0.4	0.2	60.7	--	--	W2	Figure A4	
WT-750	Potential Riparian Swamp (shrubby swamp)	1138.0	1138.1	10	538780	5441857	d-58-E/92-G-1	1.4	0.5	79.9	--	--	W2	Figure A4	Associated with watercourse (BC-747)
WT-1159	Potential Basin Marsh (seasonal emergent marsh)	1138.9	1138.9	10	537888	5442035	d-59-E/92-G-1	0.2	0.003	9.7	--	--	Unclassified	Figure A4	
WT-752	Potential Basin Shallow Open Water (open water pond)	1139.2	1139.2	10	537660	5442159	c-59-E/92-G-1	0.2	0.2	58.6	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	
WT-753	Potential Basin Shallow Open Water (open water pond)	1139.3	1139.4	10	537497	5442241	c-59-E/92-G-1	0.02	0.02	16.8	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	
WT-754	Potential Basin Shallow Open Water (open water pond)	1139.6	1139.6	10	537315	5442460	b-69-E/92-G-1	0.1	0.01	18.6	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	
WT-755	Potential Basin Shallow Open Water (open water pond)	1139.7	1139.8	10	537185	5442437	a-70-E/92-G-1	0.1	0.1	55.9	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	Associated with watercourse (BC-748)
WT-1398	Hummock Marsh (seasonal emergent marsh)	1140.07	1140.14	10	536837	5442544	b-70-E/92-G-1	0.2	0.1	67.3	Low-Moderate (20%)	--	Unclassified	Figure A4 Appendix B	
WT-758	Potential Basin Shallow Open Water (open water pond)	1142.2	1142.2	10	534859	5443331	b-72-H/92-G-2	0.03	0.02	23.2	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	
WT-1154	Potential Riparian Swamp (shrubby swamp)	1142.9	1143.0	10	534144	5443559	a-73-H/92-G-2	0.8	0.1	66.1	--	--	W2	Figure A4	
WT-778	Potential Basin Marsh (deep marsh)	1145.2	1145.2	10	531952	5443988	c-75-H/92-G-2	0.2	0.2	48.2	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	
WT-779	Potential Basin Marsh (seasonal emergent marsh)	1145.7	1145.7	10	531421	5444027	d-76-H/92-G-2	0.3	0.3	30.9	--	--	W2	Figure A4	

TABLE 5.1-9 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[2]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-780	Potential Basin Marsh (seasonal emergent marsh)	1145.7	1145.7	10	531372	5443970	d-76-H/92-G-2	0.3	0.2	23.5	--	--	W2	Figure A4	
WT-1130	Potential Basin Marsh (seasonal emergent marsh)	1146.8	1146.9	10	530247	5444113	c-77-H/92-G-2	0.1	0.1	49.2	--	--	Unclassified	Figure A4	
WT-782	Potential Riparian Marsh (deep marsh)	1147.3	1147.4	10	529890	5444369	a-88-H/92-G-2	0.3	0.3	95.7	--	Yes if open water channel or pond within construction ROW	W2	Figure A4	
WT-783	Potential Riparian Marsh (deep marsh)	1147.3	1147.4	10	529876	5444399	a-88-H/92-G-2	0.2	0.2	89.0	--	Yes if open water channel or pond within construction ROW	Unclassified	Figure A4	Associated with watercourse (BC-753)
WT-1395	Hummock Marsh (seasonal emergent marsh) (Wm06)	1148.7	1148.8	10	529216	5445296	b-98-H/92-G-2	0.4	0.3	117.2	Low-Moderate (43%)	--	W2	Figure A4 Appendix B	Blue-listed (Wm06)
WT-1102	Potential Flat Swamp (shrubby swamp)	1148.7	1148.8	10	529173	5445326	b-98-H/92-G-2	0.3	0.3	85.9	--	--	W2	Figure A4	
WT-1232	Potential Basin Marsh (deep marsh)	1148.9	1149.0	10	529094	5445516	a-99-H/92-G-2	2.2	0.2	60.3	--	Yes if open water channel or pond within construction ROW	W2	Figure A4	
WT-1101	Potential Basin Marsh (seasonal emergent marsh)	1151.1	1151.4	10	528181	5447133	a-20-I/92-G-2	0.6	0.4	238.9	--	--	W2	Figure A4	
WT-1118	Potential Basin Marsh (seasonal emergent marsh)	1152.6	1152.8	10	526847	5447491	c-11-J/92-G-2	0.4	0.4	202.7	--	--	W2	Figure A4	
WT-1117	Potential Basin Marsh (seasonal emergent marsh)	1153.5	1153.5	10	525925	5447742	d-12-J/92-G-2	0.1	0.1	40.4	--	--	Unclassified	Figure A4	
WT-1078	Potential Riparian Marsh (seasonal emergent marsh)	1153.9	1154.0	10	525511	5447828	c-12-J/92-G-2	0.2	0.2	47.3	--	--	Unclassified	Figure A4	Associated with watercourse (BC-767)
WT-1382	Potential Riparian Swamp (shrubby swamp)	1154.0	1154.2	10	525445	5447880	a-23-J/92-G-2	1.3	1.3	182.2	--	--	W2	Figure A4	
WT-1143	Potential Riparian Swamp (shrubby swamp)	1154.7	1154.7	10	524785	5447960	b-23-J/92-G-2	0.3	0.05	32.7	--	--	W2	Figure A4	
WT-1129	Potential Basin Marsh (seasonal emergent marsh)	1159.3	1159.4	10	520283	5448032	b-28-J/92-G-2	0.1	0.1	48.7	--	--	Unclassified	Figure A4	
WT-1100	Potential Riparian Marsh (deep marsh)	1161.6	1161.8	10	518568	5449513	a-50-J/92-G-2	5.2	0.9	160.4	--	Yes if open water channel or pond within construction ROW	W1	Figure A4	Associated with watercourse (BC-773)
WT-1384	Potential Riparian Swamp (mixedwood treed swamp)	1163.1	1163.3	10	517434	5450510	c-50-J/92-G-2	37.2	2.0	236.9	--	--	W1	Figure A4	
WT-1216	Potential Flat Swamp (shrubby swamp)	1176.4	1176.6	10	506697	5455336	b-03-D/92-G-7	1.9	1.2	129.5	--	--	W2	Figure A4	Associated with watercourse (BC-784)

Notes:
1. Not all of the wetlands located within the proposed pipeline corridor will be disturbed. Trans Mountain will make application to the BC OGC as required.
2. Wetlands were also classified as per the Environmental Protection and Management Guide (EPMG) (BC OGC 2013).
3. Observations were made during the vegetation field surveys in 2013.

TABLE 5.1-10

WETLAND CLASS AND DISTRIBUTION ENCOUNTERED ALONG THE PROPOSED BURNABY TO WESTRIDGE SEGMENT

Wetland ID	Wetland Class	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland Within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)[1]	Navigable Wetlands	BC Riparian Wetland Class[1]	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing									
WT-1115	Potential Basin Marsh (seasonal emergent marsh)	1180.9	1181.0	10	504460	5458040	a-36-D/92-G-7	0.3	0.3	79.1	--	--	W2	Figure A5	

Notes: 1. Trans Mountain will make application to the BC OGC as required.

2. Wetlands were also classified as per the Environmental Protection and Management Guide (EPMG) (BC OGC 2013).

TABLE 5.1-11

WETLAND CLASS AND DISTRIBUTION ENCOUNTERED ALONG THE PROPOSED EDMONTON TO HINTON SEGMENT – OCTOBER 2013 RESULTS

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-1047	Basin Marsh (deep marsh)	2.3	2.5	12	344727	5934156	5-33-52-23 W4M	0.7	0.7	182.7	High-Moderate (51%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1112	Basin Marsh (seasonal emergent marsh)	2.7	2.8	12	345079	5934156	6-33-52-23 W4M	0.3	0.3	47.0	High-Moderate 63%)	--	Figure A1	
WT-1048	Flat Swamp (shrubby swamp with seasonal emergent marsh component)	3.9	3.9	12	345253	5933241	14-28-52-23 W4M	0.3	0.1	47.1	High-Moderate (72%)	--	Figure A1	
WT-1399	Riparian Marsh (seasonal emergent marsh)	7.0	7.1	12	345230	5930138	14-16-52-23 W4M	0.1	0.1	54.0	High-Moderate (65%)	--	Figure A1	
WT-1422	Basin Marsh (deep marsh)	7.2	7.3	12	345170	5929929	14-16-52-23 W4M	1.7	0.5	116.4	High-Moderate (52%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1041	Basin Marsh (seasonal emergent marsh)	7.7	7.7	12	345181	5929483	11-16-52-23 W4M	0.9	0.2	84.0	High-Moderate (50%)	--	Figure A1	
WT-1049	Potential Basin Marsh (seasonal emergent marsh)	7.7	7.7	12	345293	5929460	10-16-52-23 W4M	0.3	0.3	59.6	--	--	Figure A1	
WT-1050	Basin Marsh (seasonal emergent marsh) associated with a broad-leaf treed swamp	7.8	7.9	12	345264	5929337	6-16-52-23 W4M	0.6	0.6	96.0	High-Functional (75%)	--	Figure A1	
WT-1402	Flat Swamp (broad-leaf treed swamp with seasonal emergent marsh components)	7.8	7.9	12	345158	5929305	6-16-52-23 W4M	2.3	0.1	100.0	High Functional (75%)	--	Figure A1	
WT-1051	Basin Marsh (seasonal emergent marsh)	8.2	8.3	12	345216	5928991	3-16-52-23 W4M	0.5	0.5	143.3	High-Moderate (69%)	--	Figure A1	
WT-1429	Flat Swamp (shrubby swamp)	9.7	9.8	12	345083	5927446	6-9-52-23 W4M	0.5	0.03	36.0	High-Moderate (57%)	--	Figure A1	
WT-1042	Riparian Swamp (shrubby swamp) associated with a deep marsh	10.0	10.1	12	345128	5927170	3-9-52-23 W4M	0.4	0.3	69.2	High-Moderate (58%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with watercourse (Fulton Creek) (non-fish bearing) (AB-5)
WT-1054	Basin Marsh (seasonal emergent marsh)	11.1	11.2	12	345146	5926086	6-4-52-23 W4M	0.9	0.9	126.7	High-Moderate (63%)	--	Figure A1	
WT-1155	Basin Marsh (deep marsh)	11.3	11.4	12	344952	5926010	6-4-52-23 W4M	0.8	0.2	118.3	High-Moderate (65%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1155.1	Basin Marsh (seasonal emergent marsh)	11.4	11,4	12	344950	5925954	6-4-52-23 W4M	0.1	0.1	0.04	High-Moderate (56%)	--	Figure A1	
WT-1055	Basin Marsh (deep marsh)	11.5	11.6	12	344743	5925870	5-4-52-23 W4M	0.9	0.4	133.7	High-Moderate 72%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1062.2	Basin Marsh (deep marsh)	12.6	12.6	12	344068	5925063	15-32-52-23 W4M	0.2	0.1	36.5	High-Moderate (72%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1062.1	Basin Marsh (deep marsh)	12.6	12.6	12	343989	5925134	15-32-52-23 W4M	0.2	0.2	50.5	High-Moderate (72%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-1062.8	Basin Marsh (seasonal emergent marsh)	12.6	12.7	12	344021	5925041	15-32-52-23 W4M	0.5	0.2	47.7	High-Moderate (72%)	--	Figure A1	
WT-1062.7	Riparian Marsh (seasonal emergent marsh)	12.7	12.7	12	343919	5925074	15-32-52-23 W4M	1.1	0.7	79.7	High-Moderate (72%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Mill Creek (AB-7)
WT-1062.4	Riparian Swamp (shrubby swamp)	12.7	12.8	12	343957	5924936	15-32-52-23 W4M	0.2	0.1	30.5	High-Moderate (72%)	--	Figure A1	
WT-1123	Basin Marsh (seasonal emergent marsh)	13.0	13.1	12	343750	5924819	10-32-52-23 W4M	0.3	0.3	133.3	High-Moderate (55%)	--	Figure A1	
WT-1063	Basin Marsh (deep marsh)	13.1	13.2	12	343710	5924674	10-32-52-23 W4M	1.0	0.2	105.6	High-Moderate (63%)	--	Figure A1	
WT-1069	Basin Marsh (seasonal emergent marsh)	13.2	13.3	12	343546	5924653	10-32-52-23 W4M	0.1	0.1	47.2	High-Moderate (66%)	--	Figure A1	

TABLE 5.1-11 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-1043.1	Potential Basin Marsh (seasonal emergent marsh)	13.5	12.5	12	343417	5924410	6-32-51-23 W4M	0.1	0.1	0.1	--	--	Figure A1	
WT-1043	Basin Marsh (seasonal emergent marsh)	13.3	13.4	12	343545	5924517	7-32-52-23 W4M	0.6	0.4	106.7	High-Moderate (61%)	--	Figure A1	
WT-1425	Basin Marsh (deep marsh)	13.9	14.1	12	343060	5924220	4-32-52-23 W4M	2.5	2.1	232.2	High Functional (75%)	--	Figure A1	
WT-1110	Potential Flat Swamp (shrubby swamp)	16.3	16.4	12	340809	5923588	16-25-52-24 W4M	0.4	0.4	78.8	--	--	Figure A1	
WT-1426	Flat Swamp (shrubby swamp)	18.0	18.8	12	339109	5923613	15-26-51-24 W4M	8.1	7.2	817.9	High-Moderate (60%)	--	Figure A1	
WT-1445	Basin Marsh (seasonal emergent marsh)	21.5	21.9	12	335733	5923679	10-28-51-24 W4M	3.6	2.9	352.8	High-Moderate (60%)	--	Figure A1	
WT-1065	Basin Marsh (seasonal emergent marsh)	29.6	29.7	12	328334	5923610	12-26-51-25 W4M	0.6	0.4	64.2	High-Moderate (60%)	--	Figure A1	
WT-1450	Basin Marsh (seasonal emergent marsh)	29.8	29.8	12	328198	5923755	12-26-51-25 W4M	0.3	0.3	75.8	Low-Moderate (49%)	--	Figure A1	
WT-1410	Basin Marsh (seasonal emergent marsh)	30.4	30.5	12	327761	5924271	1-34-51-25 W4M	0.1	0.1	76.1	High-Moderate (50%)	--	Figure A1	
WT-1434	Flat Swamp (shrubby swamp)	30.7	30.8	12	327822	5924556	1-34-51-25 W4M	0.3	0.3	107.8	High-Moderate (50%)	--	Figure A1	
WT-1067	Basin Marsh (seasonal emergent marsh)	31.0	31.0	12	327871	5924805	8-34-51-25 W4M	0.2	0.2	75.4	Low-Moderate (49%)	--	Figure A1	
WT-1066	Basin Marsh (seasonal emergent marsh)	31.2	31.2	12	327928	5925040	8-34-51-25 W4M	0.1	0.1	28.5	Low-Moderate (42%)	--	Figure A1	
WT-1413	Flat Swamp (broad-leaf treed swamp)	34.8	34.8	12	325635	5926896	10-4-52-25 W4M	0.4	0.4	0.0	High-Moderate (58%)	--	Figure A1	
WT-231	Basin Marsh (seasonal emergent marsh)	47.4	47.5	12	318168	5933180	8-27-52-26 W4M	0.1	0.1	44.2	Low-Moderate (49%)	--	Figure A1	
WT-234	Flat Swamp (shrubby swamp)	47.8	47.9	12	317790	5933222	7-27-52-26 W4M	0.1	0.1	46.9	Low-Moderate (48%)	--	Figure A1	
WT-298	Basin Marsh (seasonal emergent marsh)	50.4	50.5	12	315370	5933905	12-28-52-26 W4M	0.3	0.3	90.2	High-Moderate (53%)	--	Figure A1	
WT-302	Basin Marsh (seasonal emergent marsh)	51.1	51.2	12	314676	5934111	15-28-52-26 W4M	0.8	0.1	54.1	Low-Moderate (35%)	--	Figure A1	
WT-1436.1	Basin Marsh (seasonal emergent marsh)	76.0	76.0	11	688692	5938101	1-12-53-2 W5M	0.2	0.2	0.05	High Moderate (57%)	--	Figure A1	
WT-1436	Basin Marsh (seasonal emergent marsh)	76.0	76.1	11	688616	5938145	1-12-53-2 W5M	0.04	0.04	21.6	High-Moderate (55%)	--	Figure A1	
WT-249	Flat Swamp (shrubby swamp)	78.3	78.4	11	686362	5938294	6-11-53-3 W5M	0.3	0.3	65.4	High Functional (75%)	--	Figure A1	
WT-332.1	Basin Marsh (seasonal emergent marsh)	79.1	79.3	11	685465	5938183	8-10-53-2 W5M	0.8	0.8	0.1	High-Moderate (61%)	--	Figure A1	
WT-335	Basin Marsh (seasonal emergent marsh)	79.8	79.8	11	684893	5938123	2-10-53-2 W5M	0.9	0.04	21.4	High-Moderate (57%)	--	Figure A1	
WT-1437	Flat Swamp (shrubby swamp)	81.4	81.4	11	683273	5938017	2-9-53-2 W5M	0.2	0.01	17.4	High-Moderate (60%)	--	Figure A1	
WT-278	Basin Marsh (deep marsh)	104.3	104.3	11	662459	5939211	8-17-53-4 W5M	0.2	0.01	18.6	High-Moderate (50%)	Yes if open water channel or pond within construction ROW	Figure A1	
WT-358	Basin Marsh (seasonal emergent marsh)	105.4	105.5	11	661493	5939630	12-17-53-4 W5M	0.3	0.1	66.3	Low-Moderate (44%)	--	Figure A1	
WT-379.3	Flat Swamp (shrubby swamp)	130.6	130.7	11	636472	5939284	16-15-53-7 W5M	0.2	0.2	0.1	High-Moderate (69%)	--	Figure A1	
WT-379.4	Basin Marsh (seasonal emergent marsh)	130.8	130.9	11	636328	5939230	16-15-53-7 W5M	0.5	0.5	0.1	High-Moderate (61%)	--	Figure A1	

TABLE 5.1-11 Cont'd

Wetland ID	Wetland Class[1]	Start RK	End RK	UTM			Legal Location	Total Wetland Area (ha)	Area of Wetland within Corridor (ha)	Approximate Length of Wetland Crossed by Corridor (m)	Wetland Function (%)	Navigable Wetlands	Reference (Figure/Site Card)	Comments
				Zone	Easting	Northing								
WT-380	Flat Swamp (shrubby swamp with a seasonal emergent marsh component)	130.9	131.0	11	636208	5939253	15-15-53-7 W5M	0.6	0.6	122.5	High-Moderate (64%)	--	Figure A1	
WT-380.1	Flat Swamp (shrubby swamp)	130.9	131.0	11	636119	5939273	15-15-53-7 W5M	0.2	0.2	0.1	High-Moderate (67%)	--	Figure A1	
WT-387.1	Riparian Swamp (shrubby swamp)	142.1	142.6	11	625278	5939883	9-21-53-8 W5M	20.1	5.8	0.5	High-Moderate (64%)	--	Figure A1	
WT-389	Riparian Swamp (shrubby swamp)	142.6	142.7	11	624811	5939930	10-21-53-8 W5M	3.1	0.2	109.9	Low-Moderate (46%)	--	Figure A1	
WT-390	Riparian Fen (treed fen)	143.0	143.3	11	624408	5939986	11-21-53-8 W5M	7.7	4.1	320.5	High Functional (75%)	--	Figure A1	
WT-469	Basin Marsh (seasonal emergent marsh)	150.0	150.0	11	617469	5939840	12-23-53-9 W5M	0.1	0.1	78.5	High-Moderate (55%)	--	Figure A1	
WT-468	Basin Marsh (seasonal emergent marsh) associated with WT-469	150.0	150.1	11	617453	5939843	12-23-53-9 W5M	0.2	0.1	85.9	High-Moderate (55%)	--	Figure A1	
WT-467	Flat Swamp (shrubby swamp) associated with WT-469	150.0	150.0	11	617445	5939866	12-23-53-9 W5M	0.2	0.2	60.2	High-Moderate (55%)	--	Figure A1	
WT-395	Basin Marsh (seasonal emergent marsh)	155.2	155.2	11	612343	5939628	12-20-53-9 W5M	0.05	0.05	21.2	Low-Moderate (36%)	--	Figure A1	
WT-483	Flat Swamp (shrubby swamp)	170.2	170.4	11	597497	5940561	8-27-53-11 W5M	0.4	0.4	147.0	High Functional (80%)	--	Figure A1	
WT-437	Riparian Fen (treed fen)	220.6	220.8	11	548590	5938464	8-22-53-16 W5M	3.8	0.2	167.7	High Functional (85%)	--	Figure A1	
WT-442	Riparian Marsh (seasonal emergent marsh)	236.1	236.2	11	533670	5938116	2-19-53-17 W5M	24.4	0.3	90.0	High-Moderate (68%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Bench Creek (AB-136)
WT-443	Riparian Marsh (seasonal emergent marsh)	236.5	236.7	11	533308	5937951	6-19-53-17 W5M	1.6	1.1	199.3	High-Moderate (68%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Bench Creek (AB-136)
WT-1545	Riparian Swamp (shrubby swamp)	259.4	259.6	11	513485	5932835	4-6-53-19 W5M	15.1	2.7	194.2	High-Moderate (63%)	--	Figure A1	
WT-835	Riparian Swamp (mixedwood treed swamp)	267.8	269.5	11	505608	5932854	8-6-53-20 W5M	27.9	16.3	1659.4	High Functional (78%)	--	Figure A1	
WT-1555 A	Basin Marsh (seasonal emergent marsh) associated with a treed fen	295.9	296.0	11	480088	5930112	7-27-52-23 W5M	3.4	1.0	96.5	High Functional (84%)	Yes if open water channel or pond within construction ROW, if channels present	Figure A1	
WT-1556 A	Basin Fen (treed fen with a seasonal emergent marsh component)	296.0	296.3	11	480021	5930069	7-27-52-23 W5M	6.3	1.4	282.6	High Functional (84%)	Yes if open water channel or pond within construction ROW, if channels present	Figure A1	
WT-849	Basin Marsh (seasonal emergent marsh)	304.8	304.9	11	472719	5925831	13-12-52-24 W5M	0.9	0.7	146.9	High-Moderate (58%)	Yes if open water channel or pond within construction ROW	Figure A1	Associated with Hunt Creek (AB-163)
WT-1560 A	Basin Fen (treed fen)	313.2	313.4	11	467454	5920684	12-28-51-24 W5M	3.0	1.7	148.1	High Functional (85%)	--	Figure A1	Associated with Unnamed Tributary to Athabasca River (AB-172)

Note: 1 COP notifications will be obtained only for those wetlands that will be disturbed during construction. Not all of the wetlands located within the proposed pipeline corridor will be disturbed. Trans Mountain will make application for the COPs as required.

5.1.1 Wetlands in Temporary Workspace

Wetlands located in temporary workspace will be determined once the temporary workspace locations have been finalized for the Project.

5.1.2 Wetlands Located within the Boundary of Pump Stations and Along Power Lines

The 2012 and 2013 helicopter overflight photographs and satellite imagery interpretation identified that one riparian marsh wetland is partially located within the boundary of a proposed pump station, Blackpool, and is also found within the proposed pipeline corridor. Through review of the stormwater needs of the Sumas Terminal it was determined that water being discharged from the terminal is expected to be conveyed along an ephemeral drainage and into a potential riparian swamp.

Wetlands located along the proposed power lines were identified through review of satellite imagery. The imagery review identified that 23 potential wetlands are located along the Kingsvale power line. The potential wetlands located along the Kingsvale power line include 7 basin marshes, 7 riparian marshes, 3 flat swamps, 3 riparian swamps, 1 basin water and 2 riparian water wetlands. No wetlands were identified along the proposed Black Pines power line.

5.2 Wetland Function

Generally, the key functions of wetlands are habitat, hydrological and biogeochemical. Habitat functions are the functional capabilities of wetlands that benefit wildlife, native plants and aquatic life. Hydrological functions are those related to the quantity of water which may be associated with a watercourse, snowmelt or precipitation that enters a wetland and is stored for groundwater recharge and allows for nutrient availability to plants. Biogeochemical functions are those related to water quality, nutrient uptake and carbon sequestration.

5.2.1 Pipeline Corridor

Each wetland delineated along the proposed pipeline corridor was observed to be exhibiting a range of functional conditions (*i.e.*, High Functional Condition, High-Moderate Functional Condition, Low-Moderate Functional Condition or Low Functional Condition) at the time of survey. Although existing rights-of-way cross through many of the wetlands, they are still functioning to some extent, demonstrating key wetland processes (*i.e.*, dominant hydrophytic vegetation growth, hydric mineral or organic soils and wetland hydrology specific to type). Table 5.2-1 provides a summary of the wetland functional conditions found along the proposed pipeline corridor based on those wetlands that were ground-truthed during the 2012 and 2013 field programs.

TABLE 5.2-1

SUMMARY OF WETLAND FUNCTIONAL CONDITION ALONG THE PROPOSED PIPELINE CORRIDOR

Pipeline Segment	Functional Condition	Number of Wetlands
Edmonton to Hinton	High Functional	78
	High-Moderate	142
	Low-Moderate	41
	Low Functional	--[1]
Hargreaves to Darfield	High Functional	24
	High-Moderate	72
	Low-Moderate	10
	Low Functional	--
Black Pines to Hope	High Functional	--
	High-Moderate	2
	Low-Moderate	2
	Low Functional	--[1]
Hope to Burnaby	High Functional	--
	High-Moderate	--
	Low-Moderate	5
	Low Functional	1
Burnaby to Westridge	High Functional	--[1]
	High-Moderate	--[1]
	Low-Moderate	--[1]
	Low Functional	--[1]
TOTAL		377

Note: 1 A double dash indicates that no information to support this finding during the 2012 and 2013 ground surveys, however, this functional condition may be present in wetlands that have not been ground-truthed.

5.2.1.1 Traditional Ecological Knowledge

Results of the wetlands TEK collected during field studies for the Project are compiled below and organized according to proposed pipeline segment. Issues and concerns related to wetland resources as well as proposed mitigation measures and/or response to those issues are provided below. Each Aboriginal community participated in comprehensive reviews of mitigation measures in the context of all the issues they had raised during the field study and follow-up review.

During the field studies along the Edmonton to Hinton Segment, participants reported that wetlands are complex ecosystems used by many animals. Moose, deer, elk, beaver, muskrat, ducks, geese and other birds access wetlands for food, water and protection from predators. Wetlands are abundant in willows, muskeg moss (*i.e.*, peat moss), hard woods, berries and roots, and medicinal plants that thrive in wet soils.

Participants noted that wetlands are often used as migratory routes for moose, elk, coyotes and wolves and bears are also drawn to these nutrient-rich areas. Moose will calve in wetlands where nearby tall grasses and tree cover offer protection from predators and make ideal calving beds. “Muskeg moss” (*i.e.*, peat moss) is used for diapers whereby the moss is harvested and hung to dry before it is used.

During the field studies along the Hargreaves to Darfield Segment, participants identified wildlife typically observed in wetland habitats including moose, beavers, fish, toads, frogs, snakes, red-winged blackbirds, chicks, minnows, migratory birds, eagles, bats, deer, bears, muskrat, caribou, hare, ducks, elk and deer. Participants explained that the diversity of the vegetation supported by wetland habitats attracts a wide-range of wildlife species. Wetland vegetation identified during the field studies includes fireweed, dogbane, cottonwood, water lilies, bulrushes, thistle species, cattail, birch, bunchberry, Saskatoon berry, wild rhubarb, no-leaves plant, cedar, soapberry, mint and poplar.

The issues and concerns raised relative to wetland resources for the Project along the Edmonton to Hinton and Hargreaves to Darfield segments are provided in Table 5.2-2. Concerns related to wetland

resources were addressed by the proposed mitigation measures discussed. Participants have not recommended any mitigation strategies related to wetland resources additional to those described in the EPP to be implemented for the Project. Concerns related to potential effects of spills on the terrestrial environment (Section 3.0 of Volume 5A) are considered within the assessment of various onshore facility spill scenarios provided in Volume 7.

TABLE 5.2-2

WETLANDS TRADITIONAL ECOLOGICAL KNOWLEDGE RECORDED FOR THE PROJECT

Issue/Concern	Location(s)	Proposed Mitigation Measures/Response[1]
Request for post-construction site visits with Aboriginal communities.	Project Footprint	The EPPs (Volumes 6B, 6C and 6D) provide mitigation plans developed in response to issues identified during Project planning, stakeholder consultation, Aboriginal engagement and regulatory discussions. Aboriginal Monitors onsite through the construction of commissioning of the of the Project will work with environmental inspector to provide traditional knowledge to the construction program to ensure protection of the environment; to discuss upcoming traditional and western science elements with the environmental inspector to insure protection and monitoring; and to monitor mitigation success in protecting the environment. Trans Mountain will continue to engage Aboriginal communities through all phases of the Project.
Potential loss of wetland habitat, function and water quality also affecting wildlife and vegetation during construction of the Project.	Proposed wetland crossing locations	Pre-clear or pre-mow at wetlands with limited habitat potential outside of the migratory bird or species-specific timing window/RAP to discourage nesting on the construction right-of-way if spring/summer construction is scheduled. Schedule construction in wetlands during late fall and winter, to the extent feasible when wetlands are frozen or during periods when water levels are low. Flag or fence off any shrubs or trees to be salvaged and replaced at wetlands and other water crossings prior to construction. Narrow the proposed area of disturbance and protect the wetland by using fencing. Clearly mark the wetland boundaries using signage, flagging or fencing and limit traffic in the vicinity of the flagged/fenced off area, if feasible. Reduce the removal of vegetation in wetlands to the extent feasible. Conduct ground level cutting, mowing or mulching or walking-down of wetland vegetation instead of grubbing. Prevent ground disturbance by using a protective layer such as frost packing, snow, ice or matting between wetland vegetation mat/seedbed and construction equipment. Allow wetlands to recover naturally (*i.e.,* do not seed wetland areas). Maintain drainage across the construction right-of-way during all phases of construction. Grade away from watercourses/wetlands/lakes to reduce the risk of introduction of soil and organic debris. Do not place windrowed or fill material in watercourses/wetlands/lakes during grading. Keep wetland soils separate from upland soils. Do not dewater any wetland during isolated crossing construction. Re establish surface drainage patterns in wetlands/peatlands to as close to the pre construction contours as practical during reclamation. Leave frequent breaks in the trench crown in any areas identified as peatland to reduce the risk of ponding water and to re-establish drainage connectivity across the wetland.
Willow spruce bog. Request for limited tree clearing activity for the Project.	74.1 m northwest of RK199.8	Shrub staking potential to be determined with Footprint finalization.
Avoid wetland.	23.1 m north of RK 202.6	Recommended crossing for the Unnamed Tributary to January Creek (RK 202.6), a potential Beaver Dam, is Isolated trenched outside RAP with water quality monitoring if water is present. Open cut if dry or frozen to bottom (see Fish and Fish Habitat Technical Report – Alberta [Volume 5C]).

Note: 1 Detailed mitigation measures are outlined in the Table 6.1-2 and the Project-specific EPPs (Volumes 6B and 6C).

5.2.2 Pump Stations, Terminals and Power Lines

There are 13 pump stations (*i.e.*, Gainford, Wolf, Edson, Hinton, Jasper, Rearguard, Blue River, Blackpool, Darfield, Black Pines, Kamloops, Kingsvale and Sumas), 4 terminals (*i.e.*, Edmonton, Sumas, Burnaby), 1 marine terminal (Westridge Marine Terminal) and 2 power lines (*i.e.*, Black Pines and Kingsvale) where new construction works are being proposed. Of these, 4 pump stations (*i.e.*, Hinton,

Rearguard, Darfield and Black Pines) will require new lands and 9 pump stations will have construction works occurring on existing lands. The Rearguard and Black Pines pump stations will require new access roads to accommodate the proposed developments. At the three terminals, the proposed installation of additional tanks will occur within the existing fenced area of the terminals. Works at the Westridge Marine Terminal will also be conducted within the existing fenced area.

Wetlands located along the proposed Kingsvale power line were identified through review of satellite imagery. This review identified the potential for 23 wetlands to be crossed by this power line. These wetlands include 7 basin marshes, 7 riparian marshes, 3 flat swamps, 3 riparian swamps, 1 basin water and 2 riparian water wetlands. No wetlands were identified along the proposed Black Pines power line.

5.3 Wetland-Specific Results from Supporting Biophysical Studies

5.3.1 Wetland Fish and Fish Habitat

Aquatic surveys for the proposed pipeline corridor were conducted in 2012 and 2013 (Fisheries (Alberta) Technical Report and Fisheries (British Columbia) Technical Report of Volume 5C). Information regarding wetland fish and fish habitat is detailed in the Project-specific fisheries resources and habitat assessment (Volume 5C). Tables 5.3-1 to 5.3-4 summarize wetlands encountered by the proposed pipeline corridor that are potentially fish-bearing in Alberta and BC. This list is not to be considered as a comprehensive list of potentially fish-bearing wetlands and it will be updated following the completion of all supplemental surveys. Aquatic surveys along the proposed power lines will also be conducted during supplemental surveys in 2014.

TABLE 5.3-1

POTENTIAL FISH-BEARING WETLANDS ENCOUNTERED ALONG THE PROPOSED PIPELINE CORRIDOR FOR THE EDMONTON TO HINTON SEGMENT

Wetland ID	Start RK	End RK	Start UTM			End UTM		Legal Location	Wetland Class	Watercourse Name and Class	Restricted Activity Period
			Zone	Easting	Northing	Easting	Northing				
WT-1042	10.0	10.1	12U	345128	5927170	345070	5927103	3-9-52-23 W4M	Potential Riparian Swamp (shrubby swamp)	Fulton Creek (nonfish-bearing) (AB-5)	April 16 to June 30
WT-1062.7	12.7	12.7	12	343919	5925074	343930	5924954	15-32-51-23 W4M	Potential Riparian Marsh (seasonal emergent marsh)	Mill Creek (AB-7)	April 16 to June 30
WT-1092	40.4	40.6	12	323449	5931083	323545	5931259	4-20-52-25 W4M	Potential Basin Marsh (seasonal emergent marsh)	Fish-bearing wetland (AB-16)	None
WT-306.1	59.4	59.5	12	306546	5935553	306426	5935547	7-33-52-27 W4M	Riparian Swamp (shrubby swamp)	Dog Creek (AB-18)	April 16 to June 30
WT-307	59.5	59.7	12	306440	5935572	306291	5935571	7-33-52-27 W4M	Riparian Marsh (seasonal emergent marsh)	Dog Creek (AB-18)	April 16 to June 30
WT-317	65.4	65.5	12	301699	5938309	301568	5938243	2-13-53-28 W4M	Basin Shallow Open Water (open water pond)	Unnamed tributary (watercourse) to Atim Creek (AB-21)	April 16 to June 30
WT-322	69.8	70.1	11	694797	5937583	694471	5937750	10-3-53-1 W5M	Potential Flat Swamp (shrubby swamp)	Unnamed Tributary to Atim Creek (AB-23)	April 16 to June 30
WT-320	69.8	69.9	11	694763	5937586	694676	5937591	10-3-53-1 W5M	Potential Basin Marsh (seasonal emergent marsh)	Unnamed Tributary to Atim Creek (AB-23)	April 16 to June 30
WT-321	70.0	70.0	11	694643	5937708	694601	5937671	10-3-53-1 W5M	Potential Basin Marsh (seasonal emergent marsh)	Unnamed Tributary to Atim Creek (AB-23)	April 16 to June 30
WT-255	82.4	82.6	11	682305	5938129	682040	5938079	8-8-53-2 W5M	Potential Riparian Swamp (shrubby swamp)	Kilini Creek (AB-25)	April 16 to June 30
WT-254	82.4	82.5	11	682236	5938219	682190	5938214	8-8-53-2 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Kilini Creek (AB-25)	April 16 to June 30
WT-260	85.0	85.1	11	679687	5938272	679589	5938346	6-7-53-2 W5M	Riparian Shallow Open Water (open water pond)	Fish-bearing wetland (AB-28)	None
WT-263	90.0	90.1	11	674733	5938408	674655	5938446	11-10-53-3 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Kilini Creek (AB-33)	April 16 to June 30
WT-265	90.1	90.2	11	674676	5938430	674591	5938528	14-10-53-3 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Kilini Creek (AB-33)	April 16 to June 30
WT-264	90.1	90.1	11	674671	5938439	674665	5938443	11-10-53-3 W5M	Potential Basin Marsh (deep marsh)	Unnamed Tributary to Kilini Creek (AB-33)	April 16 to June 30
WT-344	91.0	91.1	11	673742	5938423	673625	5938504	10-9-53-3 W5M	Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Kilini Creek (AB-34)	April 16 to June 30
WT-375	125.9	126.2	11	641142	5939121	640896	5939064	14-18-53-6 W5M	Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Isle Lake (AB-60)	April 16 to June 30
WT-372	126.0	126.2	11	641060	5939125	640899	5938998	10-18-53-6 W5M	Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Sturgeon River (AB-59)	April 16 to June 30

TABLE 5.3-1 Cont'd

Wetland ID	Start RK	End RK	Start UTM			End UTM		Legal Location	Wetland Class	Watercourse Name and Class	Restricted Activity Period
			Zone	Easting	Northing	Easting	Northing				
WT-373	126.1	126.2	11	640945	5938953	640888	5938982	10-18-53-6 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Sturgeon River (AB-59)	April 16 to June 30
WT-387	142.4	142.6	11	624947	5939900	624826	5939932	8-21-53-8 W5M	Potential Riparian Shallow Open Water (open water pond)	Fish-bearing wetland (AB-79)	None
WT-474	151.5	151.6	11	615897	5939772	615832	5939770	12-22-53-9 W5M	Riparian Swamp (shrubby swamp)	Unnamed Tributary to Chip Lake (AB-90)	April 16 to June 30
WT-393	151.9	151.9	11	615574	5939766	615551	5939766	12-22-53-9 W5M	Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Chip Lake (AB-90)	April 16 to June 30
WT-1201	151.9	152.1	11	615508	5939788	615296	5939911	15-21-53-9 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Chip Lake (AB-91)	April 16 to June 30
WT-1202	156.5	156.5	11	611068	5939632	611023	5939658	12-19-53-9 W5M	Potential Riparian Swamp (shrubby swamp)	Unnamed Tributary to Chip Lake (AB-92)	April 16 to June 30
WT-398	157.0	157.1	11	610553	5939492	610412	5939568	9-24-53-10 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Chip Lake (AB-93)	April 16 to June 30
WT-479	159.8	159.9	11	607792	5939566	607631	5939710	12-23-53-10 W5M	Riparian Fen (treed fen)	Unnamed Tributary to Chip Lake (AB-98)	April 16 to June 30
WT-403	164.1	164.2	11	603539	5940122	603376	5940229	2-29-53-10 W5M	Riparian Marsh (deep marsh)	Unnamed Tributary to Chip Lake (AB-101)	April 16 to June 30
WT-423	198.6	198.8	11	569636	5940581	569339	5940522	10-26-53-14 W5M	Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to January Creek (AB-123)	September 1 to July 15
WT-425	198.6	198.6	11	569645	5940542	569636	5940536	10-26-53-14 W5M	Riparian Swamp (shrubby swamp)	Unnamed Tributary to January Creek (AB-123)	September 1 to July 15
WT-421	198.8	198.8	11	569483	5940474	569364	5940499	10-26-53-14 W5M	Riparian Marsh (deep marsh)	Unnamed Tributary to January Creek (AB-123)	September 1 to July 15
WT-428	199.7	199.9	11	568586	5940036	568502	5939801	5-26-53-14 W5M	Riparian Fen (shrubby fen)	Unnamed Tributary to January Creek (AB-124)	September 1 to July 15
WT-431	202.5	202.8	11	566120	5938923	565784	5938886	11-21-53-14 W5M	Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to January Creek (AB-126)	September 1 to July 15
WT-430	202.6	202.7	11	566043	5939027	565942	5939046	15-21-53-14 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to January Creek (AB-125)	September 1 to July 15
WT-432	202.9	203.1	11	565739	5938939	565535	5938877	11-21-53-14 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to January Creek (AB-126)	September 1 to July 15
WT-502	206.7	207.4	11	561962	5938967	561191	5938947	16-24-53-15 W5M	Riparian Marsh (deep marsh)	January Creek (AB-128)	September 1 to July 15
WT-508	220.4	220.8	11	548773	5938523	548367	5938443	9-22-53-16 W5M	Riparian Fen (non-woody fen)	Wolf Creek (AB-129)	September 1 to July 15
WT-438	227.5	227.6	11	542022	5938864	541904	5938869	16-24-53-17 W5m	Riparian Swamp (shrubby swamp)	Bench Creek (AB-132)	September 1 to July 15

TABLE 5.3-1 Cont'd

Wetland ID	Start RK	End RK	Start UTM			End UTM		Legal Location	Wetland Class	Watercourse Name and Class	Restricted Activity Period
			Zone	Easting	Northing	Easting	Northing				
WT-442	236.1	236.2	11	533670	5938116	533615	5938014	2-19-53-17 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Bench Creek (AB-136)	September 1 to July 15
WT-443	236.5	236.7	11	533308	5937951	533089	5937962	6-19-53-17 W5M	Potential Riparian Marsh (deep marsh)	Bench Creek (AB-136)	September 1 to July 15
WT-516	245.1	245.3	11	525356	5936619	525232	5936416	6-17-53-18 W5M	Riparian Marsh (seasonal emergent marsh)	Little Sundance Creek (AB-137)	September 1 to July 15
WT-517	247.9	248.1	11	522824	5936480	522829	5936195	8-13-53-19 W5M	Riparian Swamp (shrubby swamp)	Sundance Creek (AB-138)	September 1 to July 15
WT-792	257.7	257.8	11	515256	5932721	515089	5932701	3-5-53-19 W5M	Riparian Swamp (Shrubby Swamp)	Unnamed Tributary to Mcleod River (AB-140)	September 1 to July 15
WT-815	260.0	260.2	11	513028	5932929	512792	5933003	8-1-53-20 W5M	Potential Riparian Swamp (shrubby swamp)	Unnamed Tributary to Mcleod River (AB-141)	September 1 to July 15
WT-834	269.5	269.6	11	504006	5933030	503849	5933065	6-6-53-20 W5M	Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Mcleod River (AB-143)	September 1 to July 15
WT-834.1	270.0	270.1	11	503486	5933189	503384	5933206	5-6-53-20 W5M	Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Mcleod River (AB-144)	September 1 to July 15
WT-816	280.3	280.3	11	494115	5931513	494050	5931515	6-31-52-21 W5M	Basin Shallow Open Water (open water pond)	Fish-bearing wetland (AB-146)	None
WT-819	284.5	284.9	11	490192	5932691	489833	5932885	1-3-53-22 W5M	Discharge Swamp (needle-leaf treed swamp)	Unnamed NCD (AB-147 and 148)	None
WT-848	304.6	304.8	11	472817	5926005	472707	5925895	13-12-52-24 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Unnamed Tributary to Hunt Creek (AB-163)	September 1 to July 15
WT-849	304.8	304.9	11	472719	5925831	472606	5925730	13-12-52-24 W5M	Potential Riparian Marsh (seasonal emergent marsh)	Hunt Creek (AB-164)	September 1 to July 15
WT-1560 A	313.2	313.4	11	467454	5920684	467578	5920535	12-28-51-24 W5M	Potential Horizontal Fen (treed fen)	Unnamed Tributary to Athabasca River (AB-172)	September 1 to July 15
WT-1561 A	315.7	315.8	11	466447	5918885	466367	5918840	6-20-51-24 W5M	Potential Riparian Swamp (mixedwood treed swamp)	Unnamed Tributary to Cache Percotte Creek (AB-176)	September 1 to July 15
WT-867	327.6	327.6	11	456968	5912606	456947	5912587	10-31-50-25 W5M	Riparian Marsh (seasonal emergent marsh)	Maskuta Creek (AB-188)	September 1 to July 15

Note: 1 For detailed FWMIS and field results see the Fisheries (Alberta) Technical Report in Volume 5C.

TABLE 5.3-2

POTENTIAL FISH-BEARING WETLANDS ENCOUNTERED ALONG THE PROPOSED PIPELINE CORRIDOR FOR THE HARGREAVES TO DARFIELD SEGMENT

Wetland ID	Start RK	End RK	Start UTM			End UTM		Legal Location	Wetland Class	Watercourse Name and Class	Least Risk Biological Window
			Zone	Easting	Northing	Easting	Northing				
WT-2	510.0	510.2	11	340795	5867178	340976	5867026	d-20-K/83-D-14	Flat Swamp (shrubby swamp)	Watercourse (BC-22)	June 15 – August 15
WT-4	523.6	523.9	11	345669	5855617	345766	5855314	a-94-C/83-D-14	Riparian Marsh (deep marsh)	Watercourse (BC-33)	June 15 – August 15
WT-8	532.7	532.8	11	347853	5847311	347901	5847121	a-1-C/83-D-14	Horizontal Fen (non-woody fen)	Watercourse (BC-37)	Open
WT-11	545.8	545.9	11	351644	5836209	351559	5836113	d-86-G/83-D-11	Riparian Swamp (shrubby swamp)	Watercourse (possibly fish bearing) (BC-52) - salmon observed, possibly sockeye.	Open
WT-12	545.8	546.3	11	351624	5836195	351677	5835758	a-86-G/83-D-11	Riparian Swamp (shrubby swamp)	Watercourse (BC-53)	Open
WT-16	553.9	554.1	11	356747	5830490	356900	5830429	d-30-H/83-D-11	Riparian Swamp (shrubby swamp)	Watercourse (BC-67)	July 22 – August 15
WT-21	556.4	556.8	11	358082	5828479	358238	5828180	a-8-H/83-D-11	Riparian Shallow Open Water (open water pond)	Watercourse (BC-73)	Open
WT-902	559.0	559.5	11	357784	5826075	357512	5825704	c-78-A/83-D-11	Riparian Swamp (mixedwood treed swamp)	Watercourse (BC-78, BC-77 and BC-76)	July 15 – August 15, Open, July 15 – August 15
WT-25	560.2	560.4	11	357461	5824917	357442	5824801	d-69-A/83-D-11	Riparian Swamp (shrubby swamp)	Watercourse (BC-80)	Open
WT-35	566.3	566.9	11	356883	5819250	356713	5818707	b-9-A/83-D-11	Riparian Swamp (shrubby swamp)	Watercourse (BC-92)	Open
WT-45	587.4	587.5	11	351577	5800445	351570	5800358	a-5-G/83-D-6	Basin Marsh (seasonal emergent marsh)	Watercourse (BC-133 and BC-134)	Open (BC-133) August 7 – August 15 (BC-134)
WT-60	616.7	617.3	11	341868	5773743	341742	5773245	c-5-F/83-D-3	Riparian Swamp (shrubby swamp)	Watercourse (BC-180)	Open
WT-104	642.7	643.0	11	341249	5750702	341207	5750435	a-65-F/82-M-14	Flat Swamp (mixedwood treed swamp)	Watercourse (BC-214)	Open
WT-109	643.7	644.1	11	341271	5749705	341363	5749313	d-45-F/82-M-14	Basin Marsh (seasonal emergent marsh)	Watercourse (BC-215)	Open
WT-891	645.2	645.3	11	341614	5748253	341662	5748146	b-34-F/82-M-14	Basin Marsh (seasonal emergent marsh)	Watercourse (BC-217)	Open
WT-116	647.0	647.1	11	342002	5746507	342014	5746411	d-14-F/82-M-14	Riparian Swamp (mixedwood treed swamp)	Watercourse (BC-222)	Open

TABLE 5.3-2 Cont'd

Wetland ID	Start RK	End RK	Start UTM			End UTM		Legal Location	Wetland Class	Watercourse Name and Class	Least Risk Biological Window
			Zone	Easting	Northing	Easting	Northing				
WT-119	648.7	648.9	11	342430	5744945	342420	5744739	d-94-C/82-M-14	Potential Riparian Fen (shrubby fen)	Watercourse (BC-226)	Open
WT-123	649.5	649.8	11	342515	5744202	342380	5743920	d-84-C/82-M-14	Riparian Marsh (deep marsh)	Watercourse (BC-229)	Open
WT-125	651.1	651.2	11	341764	5743123	341675	5742926	c-74-C/82-M-14	Riparian Marsh (seasonal emergent marsh)	Watercourse (BC-235)	Open
WT-128	652.4	652.6	11	340730	5742216	340597	5742089	c-65-C/82-M-14	Potential Flat Swamp (shrubby swamp)	Watercourse (BC-237)	Open
WT-131	652.6	652.7	11	340599	5742051	340589	5742009	c-65-C/82-M-14	Potential Basin Shallow Open Water (open water pond)	Watercourse (BC-238)	July 22 – October 31
WT-135	656.0	656.2	11	339662	5739227	339712	5738981	c-36-C/82-M-14	Riparian Swamp (shrubby swamp) with a marsh component	Watercourse (BC-242)	Open
WT-144	661.1	661.8	11	338351	5734475	337864	5733892	b-88-K/82-M-11	Basin Marsh (deep marsh)	Watercourse (BC-246 and BC-247)	Open (BC-246) August 7 – August 15 (BC-247)
WT-151	665.9	666.1	11	334903	5731154	334874	5730960	d-42-L/82-M-11	Potential Basin Marsh (deep marsh)	Watercourse (BC-350)	Open
WT-161	678.8	678.9	11	323978	5727975	323936	5727952	b-14-I/82-M-12	Slope Marsh (seasonal emergent marsh)	Watercourse (BC-264)	None
WT-201	734.7	735.1	10	698714	5717004	698444	5716811	b-81-B/92-P-9	Potential Riparian Shallow Open Water (open water pond)	Watercourse (BC-315)	July 22 – August 20
WT-207	736.3	736.3	10	697297	5716620	697269	5716619	d-73-B/92-P-9	Potential Riparian Marsh (deep marsh)	Watercourse (BC-316)	TBD
WT-209	737.0	737.1	10	696554	5716588	696522	5716485	c-73-B/92-P-9	Riparian Swamp (shrubby swamp)	Watercourse (BC-317)	Open
WT-520	745.5	745.5	10	693046	5710450	692994	5710379	a-18-B/92-P-9	Potential Riparian Marsh (seasonal emergent marsh)	Watercourse (BC-327)	Open

Note: 1 For detailed results see the Fisheries (British Columbia) Technical Report in Volume 5C.

TABLE 5.3-3

POTENTIAL FISH-BEARING WETLANDS ENCOUNTERED ALONG THE PROPOSED PIPELINE CORRIDOR FOR THE BLACK PINES TO HOPE SEGMENT

Wetland ID	Start RK	End RK	Start UTM			End UTM		Legal Location	Wetland Class	Watercourse Name and Class	Least Risk Biological Window
			Zone	Easting	Northing	Easting	Northing				
WT-528	815.4	815.8	10	692806	5644982	692617	5644605	d-1-K/92-I-16	Potential Basin Marsh (seasonal emergent marsh)	Watercourse (BC-358)	Open
WT-536	817.9	818.0	10	692089	5642641	692032	5642494	a-82-F/92-I-16	Potential Riparian Swamp (shrubby swamp)	Watercourse (BC-366)	TBD
WT-1361	824.6	824.7	10	689221	5637326	689168	5637293	c-25-F/92-I-16	Potential Basin Marsh (seasonal emergent marsh)	Watercourse (BC-375)	TBD
WT-1363	831.2	831.4	10	687013	5631794	686994	5631548	c-68-C/92-I-16	Potential Flat Swamp (broad-leaf treed swamp)	Watercourse (BC-383)	TBD
WT-1105	833.5	833.6	10	686310	5629600	686319	5629470	d-49-C/92-I-16	Potential Basin Marsh (alkali marsh)	Watercourse (BC-388)	Open
WT-1085	834.0	834.1	10	686283	5629091	686237	5629029	a-49-C/92-I-16	Potential Basin Marsh (seasonal emergent marsh)	Watercourse (BC-389)	Open
WT-1084	835.1	835.4	10	685878	5628081	685729	5627802	c-29-C/92-I-16	Potential Flat Swamp (broad-leaf treed swamp)	Watercourse (BC-393)	Open
WT-570	848.2	848.3	10	682044	5617923	682068	5617890	b-24-L/92-I-9	Potential Slope Marsh (seasonal emergent marsh)	Watercourse (BC-471)	Open
WT-579	860.9	860.9	10	683370	5607518	683408	5607531	c-3-E/92-I-9	Potential Slope Marsh (seasonal emergent marsh)	Watercourse (BC-427)	Open
WT-581	865.1	865.3	10	684841	5603909	685033	5603781	d-62-D/92-I-9	Potential Basin Marsh (deep marsh)	Watercourse (BC-433)	Open
WT-622	869.9	870.0	10	686632	5599528	686788	5599372	a-30-C/92-I-9	Potential Basin Fen (non-woody fen)	Watercourse (BC-438)	Open
WT-625	871.5	871.9	10	687064	5597917	687033	5597567	b-9-C/92-I-9	Potential Basin Marsh (seasonal emergent marsh)	Watercourse (BC-439)	Open
WT-593	879.6	879.7	10	685117	5590066	685059	5589964	a-22-L/92-I-8	Potential Riparian Marsh (seasonal emergent marsh)	Watercourse (BC-448)	Open
WT-635	881.6	881.7	10	684702	5588116	684692	5588066	c-92-E/92-I-8	Potential Lacustrine Marsh (seasonal emergent marsh)	Watercourse (BC-450)	Open
WT-596	886.6	887.0	10	683290	5583375	683142	5583009	c-44-E/92-I-8	Potential Riparian Marsh (seasonal emergent marsh)	Watercourse (BC-454)	Open
WT-640	887.0	887.2	10	683197	5582934	683060	5582788	b-44-E/92-I-8	Potential Riparian Marsh (seasonal emergent marsh)	Watercourse (BC-455)	Open
WT-659	927.8	928.1	10	661697	5554216	661526	5553896	b-49-G/92-I-2	Potential Riparian Swamp (shrubby swamp)	Watercourse (BC-504)	Open
WT-661	931.4	931.5	10	659818	5551141	659775	5551052	d-2-F/92-I-2	Potential Basin Marsh (seasonal emergent marsh)	Watercourse (BC-513)	Open

TABLE 5.3-3 Cont'd

Wetland ID	Start RK	End RK	Start UTM			End UTM		Legal Location	Wetland Class	Watercourse Name and Class	Least Risk Biological Window
			Zone	Easting	Northing	Easting	Northing				
WT-731	935.9	936.0	10	657351	5547603	657278	5547580	a-75-C/92-I-2	Potential Flat Swamp (shrubby swamp)	Watercourse (BC-526)	Open
WT-732	936.1	936.4	10	657187	5547502	656937	5547321	a-75-C/92-I-2	Potential Flat Swamp (shrubby swamp)	Watercourse (BC-527)	Open
WT-1529	957.9	958.1	10	649338	5531239	649272	5530978	d-94-E/92-H-15	Potential Riparian Swamp (mixedwood treed swamp)	Watercourse (BC-548 and BC-549)	August 7 – August 10
WT-671	971.0	971.3	10	647826	5519401	647710	5519231	b-76-D/92-H-15	Potential Riparian Swamp (broad-leaf treed swamp)	Watercourse (BC-561)	Open
WT-672	972.0	972.1	10	647184	5518759	647121	5518695	a-67-D/92-H-15	Potential Basin Shallow Open Water (open water pond)	Watercourse (BC-562)	July 15 – August 15
WT-1120	989.2	989.2	10	643262	5503286	643270	5503234	d-92-H/92-H-11	Potential Basin Marsh (seasonal emergent marsh)	Watercourse (BC-581)	Open

Note: 1 For detailed results see the Fisheries (British Columbia) Technical Report in Volume 5C.

TABLE 5.3-4

POTENTIAL FISH-BEARING WETLANDS ENCOUNTERED ALONG THE PROPOSED PIPELINE CORRIDOR FOR THE HOPE TO BURNABY SEGMENT

Wetland ID	Start RK	End RK	Start UTM			End UTM		Legal Location	Wetland Class	Watercourse Name and Class	Least Risk Biological Window
			Zone	Easting	Northing	Easting	Northing				
WT-1460	1051.4	1051.5	10	607150	5468996	607110	5469034	c-32-H/92-H-5	Basin Shallow Open Water (open water pond)	Watercourse (BC-658)	August 1 – October 31
WT-741	1102.1	1102.2	10	571622	5439076	571506	5439000	a-22-H/92-G-1	Riparian Shallow Open Water (open water pond) with emergent marsh areas	Watercourse (BC-716)	July 15 – September 15
WT-743	1102.6	1102.8	10	571448	5438574	571275	5438507	c-12-H/92-G-1	Potential Riparian Marsh (seasonal emergent marsh)	Watercourse (BC-719)	TBD
WT-770	1132.5	1132.5	10	543989	5440135	543952	5440154	c-32-E/92-G-1	Basin Marsh (seasonal emergent marsh)	Watercourse (BC-738)	Open
WT-750	1138.0	1138.1	10	538780	5441857	538694	5441977	a-58-E/92-G-1	Potential Riparian Swamp (shrubby swamp)	Watercourse (BC-747)	Open
WT-755	1139.7	1139.8	10	537185	5442437	537142	5442476	a-70-E/92-G-1	Potential Basin Shallow Open Water (open water pond)	Watercourse (BC-748)	TBD
WT-783	1147.3	1147.4	10	529876	5444399	529747	5444345	a-88-H/92-G-2	Potential Riparian Marsh (deep marsh)	Watercourse (BC-753)	TBD
WT-1078	1153.9	1154.0	10	525511	5447828	525463	5447831	c-12-J/92-G-2	Potential Riparian Marsh (seasonal emergent marsh)	Watercourse (BC-767)	TBD
WT-1100	1161.6	1161.8	10	518568	5449513	518442	5449614	c-40-J/92-G-2	Potential Riparian Marsh (deep marsh)	Watercourse (BC-773)	TBD
WT-1216	1176.4	1176.6	10	506697	5455336	506579	5455411	b-3-D/92-G-7	Potential Flat Swamp (shrubby swamp)	Watercourse (BC-784)	TBD

Note: 1 For detailed results see the Fisheries (British Columbia) Technical Report in Volume 5C.

5.3.2 Wetlands of Special Concern: Rare Plants or Rare Ecological Communities

Detailed information regarding wetlands of special concern: rare plant and rare ecological community observations is summarized in the Vegetation Technical Report (Volume 5C). Tables 5.3-5 to 5.3-8 list wetlands encountered by the proposed pipeline corridor that are associated with rare plants and/or rare ecological communities, including wetlands of special concern (*i.e.*, Red and Blue-listed wetlands in BC). Wetlands of special concern potentially located along the proposed Kingsvale power line were not identified during the 2012 and 2013. Supplemental vegetation surveys conducted in 2014 will determine if additional wetlands located along the Project and the Kingsvale power line are considered to be provincially listed.

Terrestrial Ecosystem Mapping

Terrestrial Ecosystem Mapping (TEM) was conducted for a 2 km band generally centred on the centre of the proposed pipeline corridor. The objectives of the TEM are to describe, in general terms, the pre-construction diversity, relative abundance and distribution of vegetation communities as well as the distribution of structural stages, and to provide an ecological framework for additional vegetation and wildlife assessments. The polygons that are delineated through this process represent relatively homogenous ecosystems and structural stages. For more information on the TEM for the Project see Appendix C of the Vegetation Technical Report for the TEM results for the Project (Volume 5C).

TABLE 5.3-5

RARE PLANT AND RARE ECOLOGICAL COMMUNITIES OBSERVATIONS WITHIN WETLANDS ENCOUNTERED ALONG THE PROPOSED EDMONTON TO HINTON SEGMENT

Wetland ID	Legal Location, Approx. RK	Wetland Class	Rare Plant or Rare Ecological Community	Provincial Ranking[1]
WT-277	11-10-53-4 W5M RK 100.9 to RK 101.0	Flat Swamp (shrubby swamp)	Beaked willow/red-osier dogwood community	S3?
WT-470	12-22-53-8 W5M RK 141.8 and RK 141.9	Horizontal Fen (treed fen)	White birch/stiff club-moss woodland community	S2?
WT-479	12-23-53-10 W5M RK 159.8 to RK 159.9	Riparian Fen (treed fen)	Snakeskin liverwort	S2
WT-479	12-23-53-10 W5M RK 159.4 to RK 159.9	Riparian Fen (treed fen)	Saxifrage species	N/A
WT-487	12-29-53-11 W5M RK 174.8 to RK 174.9	Flat Swamp (shrubby swamp)	Goldthread	S3
WT-428	5-26-53-14 W5M RK 199.8	Riparian Fen (shrubby fen)	Meadow bitter cress	S3
WT-428	5-26-14 W5M 199.8	Riparian Fen (shrubby fen)	Golden saxifrage	S3?
WT-502	9-24-53-15 W5M to 16-24-53-15 W5M RK 206.9	Riparian Marsh (deep marsh)	Golden saxifrage	S3?
WT-513.1	14-14-53-18 W5M RK 240.1	Basin Fen (shrubby fen)	Prairie wedge grass	S2
WT-515	15-15-53-18 W5M RK 241.6	Horizontal Fen (treed fen)	Golden saxifrage	S3?
WT-516	7-17-53-18 W5M RK 245.1	Riparian Marsh (seasonal emergent marsh)	Prairie wedge grass	S2
WT-517	5-18-53-18 W5M RK 247.9	Riparian Swamp (shrubby swamp)	Golden saxifrage	S3?
WT-791	2-5-53-19 W5M RK 257.1	Basin Marsh (deep marsh)	Beaked sedge marsh community	S2
WT-791	2-5-53-19 W5M RK 257.1	Basin Marsh (deep marsh)	Slender naiad	S2
WT-1547	3-1-53-20 W5M to 4-1-53-20 W5M RK 261.0 to 261.4	Horizontal Fen (treed fen)	Golden saxifrage	S3?

TABLE 5.3-5 Cont'd

Wetland ID	Legal Location, Approx. RK	Wetland Class	Rare Plant or Rare Ecological Community	Provincial Ranking[1]
WT-833	1-5-53-20 W5M RK 267.1	Basin Water (open water pond)	Linear-leaved pondweed	S2
WT-834	6-6-53-20 W5M RK 269.6	Riparian Marsh (seasonal emergent marsh)	Golden saxifrage	S3?
WT-1550.1 A	13-32-52-21 W5M RK 278.7 to RK 278.8	Basin Fen (treed fen)	Capitate sedge	S3
WT-1569 A	14-33-49-26 W5M RK 339.3	Basin Fen (shrubby fen)	Short-tail rush	S2

Sources: ACMIS 2013, NatureServe 2013, Vegetation Technical Report (Volume 5C)

Note: 1 Provincial (S) ranks are assigned by the provincial and federal Conservation Data Centre(s) (CDC[s]); in cases of conflict or missing data, the provincial CDC will have preference. Ranks range from 1 (five or fewer occurrences) to 5 (demonstrably secure under present conditions).

TABLE 5.3-6

RARE PLANT AND RARE ECOLOGICAL COMMUNITIES OBSERVATIONS WITHIN WETLANDS ENCOUNTERED ALONG THE PROPOSED HARGREAVES TO DARFIELD SEGMENT

Wetland ID	Legal Location, Approx. RK	Wetland Class	Rare Plant or Rare Ecological Community	Provincial Ranking[1]	BC Listed Wetlands[2]
WT-4	a-94-C/83-D-14 RK 523.6 to RK 523.9	Riparian Marsh (deep marsh with shrubby swamp areas)	Bebb's willow/bluejoint reedgrass community (Ws03)	S3	Blue
WT-9	b-1-C/83-D-14 RK 532.7	Basin Fen (treed fen)	Scrub birch/water sedge community (Wf02)	S3	Blue
WT-17	d-30-H/83-D-11 RK 553.9 to RK 554.1	Basin Marsh (deep marsh)	Swamp horsetail-beaked sedge community (Wm02)	S3	Blue
WT-32	a-19-A/83-D-11 RK 565.4 to RK 565.6	Riparian Marsh (deep marsh)	Swamp horsetail-beaked sedge community (Wm02)	S3	Blue
WT-54	d-63-F/83-D-3 RK 611.0 to RK 611.2	Riparian Swamp (shrubby swamp)	Bebb's willow/bluejoint reedgrass community (Ws03)	S3	Blue
WT-84	b-5-F/83-D-3 RK 617.1 to RK 617.5	Riparian Marsh (seasonal emergent marsh)	Common cattail marsh community (Wm05)	S3	Blue
WT-88	c-76-C/83-D-3 RK 619.9 to RK 620.0	Riparian Swamp (mixedwood treed swamp)	Sitka willow-Pacific willow/skunk cabbage community (Ws51)	S2	Red
WT-90 and WT-91	d-66-C/83-D-3 to C-66-C/83-D-3 RK 620.8 to RK 621.0	Riparian Marsh (deep marsh) associated with Riparian Water (open water pond)	Crested wood fern	S2S3	Blue
WT-90	c-66-C/83-D-3 RK 620.1 to RK 621.1	Riparian Marsh (deep marsh)	Common cattail marsh community (Wm05)	S3	Blue
WT-96	c-66-C/83-D-3 RK 638.9 to RK 639.0	Basin Marsh (seasonal emergent marsh)	Common cattail marsh community (Wm05)	S3	Blue
WT-121and WT-123	b-93-C/82-M-14 to D-84-C/82-M-14 RK 649.4 to RK 649.8	Riparian Water (open water pond) associated with Riparian Marsh (deep marsh)	Common cattail marsh community (Wm05)	S3	Blue
WT-133	b-56-C/82-M-14 RK 654.3	Flat Swamp (Mixedwood treed swamp)	Silvery sedge	SU	
WT-144	b-88-K/82-M-11 RK 661.1 to RK 661.8	Basin Marsh (deep marsh)	Swamp horsetail-beaked sedge community (Wm02)	S3	Blue
WT-151	d-42-L/82-M-11 RK 666.0 to RK 666.1	Potential Basin Marsh (deep marsh)	Crested wood fern	S2S3	Blue
WT-1347	c-26-G/82-M-12 RK 695.3	Basin Marsh (seasonal emergent marsh)	Hard-stemmed bulrush deep marsh community (Wm06)	S3	Blue
WT-171	b-20-F/82-M-12 RK 708.7	Basin Marsh (seasonal emergent marsh)	Common cattail marsh community (Wm05)	S3	Blue

TABLE 5.3-6 Cont'd

Wetland ID	Legal Location, Approx. RK	Wetland Class	Rare Plant or Rare Ecological Community	Provincial Ranking[1]	BC Listed Wetlands[2]
WT-172	a-57-E/82-M-12 RK 715.5 to RK 715.8	Riparian Swamp (shrubby swamp)	Bebb's willow/bluejoint reedgrass community (Ws03)	S3	Blue
WT-190, WT-191, WT-192, WT-194,	d-10-H/92-P-9 to b-10-H/92-P-9 RK 732.3 to 732.6	Potential Flat Swamp (needle-leaf treed swamp) associated with a Basin Marsh (seasonal emergent marsh)	Tender sedge	S2S3	Blue
WT-201	a-81-B/92-P-9 to b-81-B/92-P-9 RK 734.7 to RK 734.8	Potential Riparian Water (open water pond)	Tender sedge	S2S3	Blue
WT-209	c-73-B/92-P-9 RK 737.0 to RK 737.1	Riparian Swamp (shrubby swamp)	Bebb's willow/bluejoint reedgrass community (Ws03)	S3	Blue
WT-217	c-68-J/92-P-8 RK 750.0	Basin Water (open water pond)	Mexican mosquito fern	S2	Red

Sources: BC CDC 2013, NatureServe 2013, Vegetation Technical Report (Volume 5C)

Notes: 1 Provincial (S) ranks are assigned by the provincial and federal Conservation Data Centre(s) (CDC[s]); in cases of conflict or missing data, the provincial CDC will have preference. Ranks range from 1 (five or fewer occurrences) to 5 (demonstrably secure under present conditions).

2 BC Status: there are four provincial lists that ecological communities are assigned to depending on their conservation status. These are as follows: RED – ecological communities that are extirpated, endangered or threatened, BLUE: ecological communities that are considered to be of Special Concern, YELLOW: ecological communities that are secure and NO STATUS: ecological communities that have not been ranked.

TABLE 5.3-7

RARE PLANT AND RARE ECOLOGICAL COMMUNITIES OBSERVATIONS WITHIN WETLANDS ENCOUNTERED ALONG THE PROPOSED BLACK PINES TO HOPE SEGMENT

Wetland ID	Legal Location, Approx. RK	Wetland Class	Rare Plant or Rare Ecological Community	Provincial Ranking[1]	BC Listed Wetlands[2]
WT-580	c-92-D/92-I-9 RK 862.4 to RK 862.5	Basin Marsh (seasonal emergent marsh)	Common cattail marsh community (Wm05)	S3	Blue

Sources: BC CDC 2013, NatureServe 2013, Vegetation Technical Report (Volume 5C)

Notes: 1 Provincial (S) ranks are assigned by the provincial and federal Conservation Data Centre(s) (CDC[s]); in cases of conflict or missing data, the provincial CDC will have preference. Ranks range from 1 (five or fewer occurrences) to 5 (demonstrably secure under present conditions).

2 BC Status: there are four provincial lists that ecological communities are assigned to depending on their conservation status. These are as follows: RED – ecological communities that are extirpated, endangered or threatened, BLUE: ecological communities that are considered to be of Special Concern, YELLOW: ecological communities that are secure and NO STATUS: ecological communities that have not been ranked.

TABLE 5.3-8

RARE PLANT AND RARE ECOLOGICAL COMMUNITIES OBSERVATIONS WITHIN WETLANDS ENCOUNTERED ALONG THE PROPOSED HOPE TO BURNABY SEGMENT

Wetland ID	Legal Location, Approx. RK	Wetland Class	Rare Plant or Rare Ecological Community	Provincial Ranking[1]	BC Listed Wetlands[2]
WT-1103	a-21-K/92-H-4 RK 1080.3	Potential Riparian Marsh (seasonal emergent marsh)	Common cattail marsh community (Wm05)	S3	Blue
WT-1395	b-98-H/92-G-2 RK 1148.7 to 1148.8	Hummock Marsh (seasonal emergent marsh)	Hard-stemmed bulrush deep marsh community (Wm06)	S3	Blue

Sources: BC CDC 2013, NatureServe 2013, Vegetation Technical Report (Volume 5C)

Notes: 1 Provincial (S) ranks are assigned by the provincial and federal Conservation Data Centre(s) (CDC[s]); in cases of conflict or missing data, the provincial CDC will have preference. Ranks range from 1 (five or fewer occurrences) to 5 (demonstrably secure under present conditions).

2 BC Status: there are four provincial lists that ecological communities are assigned to depending on their conservation status. These are as follows: RED – ecological communities that are extirpated, endangered or threatened, BLUE: ecological communities that are considered to be of Special Concern, YELLOW: ecological communities that are secure and NO STATUS: ecological communities that have not been ranked.

Wetlands of Special Concern

During the 2012 and 2013 wetland field program wetlands in BC were classified to the Mackenzie and Moran (2004) wetland site associations. Some of these classifications are considered to be of conservation concern and are listed. During the 2012 and 2013 wetland field program 1 Red-listed, 5 Blue-listed and 4 Yellow-listed site associations were identified. Table 5.3-9 provides a list of these sensitive site associations broken up by biogeoclimatic zone.

TABLE 5.3-9

DISTRIBUTION OF WETLAND SITE ASSOCIATIONS IN BRITISH COLUMBIA BY BIOGEOCLIMATIC ZONE

Site Class	Site Association[1]	BC Status[2]	Biogeoclimatic Zone															
			Expected Distribution of Site Association[3]								Observed Field Distribution of Site Association							
			BG	PP	ESSF	ICH	IDF	MS	SBS	CWH	BG	PP	ESSF	ICH	IDF	MS	SBS	CWH
Bog (Wb)	Wb01: Black spruce – Creeping-snowberry – Peat moss								X									
	Wb02: Lodgepole pine – Bog rosemary – Peat moss					X			X[w]									
	Wb05: Black spruce – Water sedge – Peat moss	Yellow				X		X	XXX								√	
	Wb06: Tamarack – Water sedge – Fen moss								X									
	Wb07: Lodgepole pine – Water sedge – Peat moss				X	X	X	X										
	Wb08: Black spruce – Soft-leaved sedge – Peat-moss					X	X	X	XX									
	Wb09: Black spruce – Common horsetail – Peat-moss								X									
	Wb10: Lodgepole pine – Few-flowered sedge – Peat-moss				X	X			X									
	Wb11: Black spruce – Buckbean – Peat-moss	Blue							X[w]									
	Wb12: Scheuchzeria – Peat-moss					X			X									
	Wb13: Shore sedge – Buckbean – Peat-moss				X	X			X									
	Wb50: Labrador tea – Bog-laurel – Peat-moss									X[s]								
	Wb51: Shore pine – Black crowberry – Tough peat-moss									XX								
	Wb52: Common juniper – Tufted clubrush – Hoary rock-moss									XX[oc]								
	Wb53: Shore pine – Yellow-cedar – Tufted clubrush									XX[oc]								
Fen (Wf)	Wf01: Water sedge – Beaked sedge	Yellow			X	XX	XXX	XXX	XXX	X[i]								
	Wf02 Scrub birch – Water sedge	Blue			X	XX	XX	XX	XX								√	
	Wf03 Water sedge – Peat-moss	Yellow			XX				X									
	Wf04: Barclay's willow – Water sedge – Glow moss	Yellow			XXX			X	X									
	Wf05: Slender sedge – Common hook-moss	Blue				XX	XX	XX	XX									
	Wf06: Sledge sedge – Buckbean	Blue				X	X		X									
	Wf07: Scrub birch – Buckbean – Shore sedge	Yellow				X	X		X									
	Wf08: Shore sedge – Buckbean – Hook-moss	Blue			X		X	X	X									
	Wf09: Few-flowered spike-rush – Hook-moss	Red			X			X	X									
	Wf10: Hudson Bay clubrush – Red hook-moss								X									
	Wf11: Tufted clubrush – Star moss	Blue			X	X		X	X									
	Wf12: Narrow-leaved cotton-grass – Marsh-marigold	Yellow			XXX													
	Wf13: Narrow-leaved cotton-grass – Shore sedge	Blue			XX			X										
	Wf50: Narrow-leaved cotton grass – Peat-moss									X								
	Wf51: Sitka sedge – Peat-moss					X				XX								
	Wf52: Sweet gale – Sitka sedge	Red								XX[s]								
	Wf53: Slender sedge – White beak-rush	Red								XX[s]								

TABLE 5.3-9 Cont'd

Site Class	Site Association[1]	BC Status[2]	Biogeoclimatic Zone															
			Expected Distribution of Site Association[3]								Observed Field Distribution of Site Association							
			BG	PP	ESSF	ICH	IDF	MS	SBS	CWH	BG	PP	ESSF	ICH	IDF	MS	SBS	CWH
Marsh (Wm)	Wm01: Beaked sedge – Water sedge	Yellow	X	X	X	XXX	XXX	XX	XX	X				√	√		√	
	Wm02: Swamp horsetail – Beaked sedge	Blue				X	X	X	XX					√			√	
	Wm03: Awned sedge	Red	X	X			X											
	Wm04: Common spike-rush	Blue	X	X		XX	X	X	XX	X								
	Wm05: Cattail	Blue	XXX	XXX		XX	XX	X	XX	X[s]				√	√			
	Wm06: Great bulrush	Blue	XXX	XXX		X	XX	XX	X	X					√			√
	Wm07: Baltic rush	Red	X	X			XX											
	Wm50: Sitka sedge – Hemlock-parsley	Blue								XX								
	Wm51: Three-way sedge	Red				X				X								
Swamp (Ws)	Ws01: Mountain alder – Skunk cabbage – Lady fern					XX			XX[w]					√				
	Ws02: Mountain alder – Pink spirea – Sitka sedge	Yellow			X	XX	X	X	X[w]	X				√	√		√	
	Ws03: Bebb's willow – Bluejoint	Blue	X	X			XX	X	XX					√	√		√	
	Ws04: Drummond's willow – Beaked sedge					X	X	X	XX					√			√	
	Ws05: MacCalla's willow – Beaked sedge	Blue					X		X									
	Ws06: Sitka willow – Sitka sedge	Yellow				XX			X[w]					√				
	Ws07: Spruce – Common horsetail – Leafy moss				X	XX	XX	XX	XXX					√			√	
	Ws08: Subalpine fir – Sitka valerian – Common horsetail				XX													
	Ws09: Black spruce – Skunk cabbage – Peat-moss					XX			X[w]					√				
	Ws10: Western redcedar – Spruce – Skunk cabbage					XX								√				
	Ws11: Spruce – Subalpine fir – Skunk cabbage								X[w]									
	Ws50: Pink spirea – Sitka sedge	Yellow				X			X[w]	XX								
	Ws51: Sitka willow – Pacific willow – Skunk cabbage	Red				X				X				√				
	Ws52: Red alder – Skunk cabbage									XX								
	Ws54: Western redcedar – Western hemlock – Skunk cabbage									XX								
Shallow Open Water (Ww)[4]	Common pondweed																	
	Fennel-leaved pondweed – Widgeon-grass																	
	Large-leaved pondweed																	
	Long-stalked pondweed																	
	Muskgrass																	
	Narrow-leaved bur-reed																	
	Water lobelia – Bristle-like quillwort																	
	Water shield – Bladderwort																	
	Water smartweed																	

TABLE 5.3-9 Cont'd

Site Class	Site Association[1]	BC Status[2]	Biogeoclimatic Zone															
			Expected Distribution of Site Association[3]								Observed Field Distribution of Site Association							
			BG	PP	ESSF	ICH	IDF	MS	SBS	CWH	BG	PP	ESSF	ICH	IDF	MS	SBS	CWH
Shallow Open Water (Ww)[4] (cont'd)	Wavy water-nymph – Robbin's pondweed																	
	White water-buttercup																	
	Yellow pond-lily – Richardon's pondweed																	
	Yellow pond-lily – Robbin's pondweed																	
	Yellow pond-lily – Water clubrush																	

Notes:
1. The wetland site associations listed are those from MacKenzie and Moran (2004) and terrestrial ecosystems (*i.e.*, saline meadow transition, shrub-carr transition and flood bench classes) have not been included.
2. BC Conservation Data Centre (CDC) provincial status. Ecosystems not tracked by the BC CDC have been left blank.
3. Expected distribution of site associations based on MacKenzie and Moran (2004). Incidental wetlands (*i.e.*, less than 5% of wetlands) are indicated as 'x', minor wetlands (*i.e.*, 5-25% of wetlands) are indicated as 'xx' and major wetlands (*i.e.*, greater than 25% of wetlands) are indicated as 'xxx'. Modifiers include: w = wet/very wet subzones only, n = northern subzones only, s = southern subzones only, oc = outer coast (hypermaritime) only and i = inland areas only.
4. MacKenzie and Moran (2004) does not assign site association codes to shallow water class wetlands or provide expected distribution by biogeoclimatic zone. .

5.3.3 Wetland Wildlife and Wildlife Habitat

Information regarding wetland wildlife and wildlife habitat is detailed in the Wildlife Technical Report (Volume 5C).

Amphibians identified during wildlife surveys in Alberta include western toad, wood frog, boreal chorus frog and blotched tiger salamander. During the wetland surveys in Alberta, long-toed salamander was identified (Sensitive in Alberta). In BC, amphibian species observed during wildlife surveys include Columbia spotted frog, Pacific chorus frog, boreal chorus frog, long-toed salamander, northwestern salamander, green frog, northern red-legged frog, roughskin newt, American bullfrog, wood frog, western toad, coastal tailed frog, northern Pacific treefrog and blotched tiger salamander. Four of these species are considered to be of conservation concern, blotched tiger salamander (Red-listed in BC), coastal tailed frog (Blue-listed in BC and *SARA* Schedule 1 or COSEWIC-listed as Special Concern), northern red-legged frog (Blue-listed in BC and *SARA* Schedule 1 or COSEWIC-listed as Special Concern) and western toad (Sensitive in Alberta, Blue-listed in BC and *SARA* Schedule 1 or COSEWIC-listed as Special Concern).

Aerial waterbird surveys were conducted during the staging period in 2012, breeding period and staging period in 2013 along each of the proposed pipeline segments. Table 5.3-10 outlines the numbers of waterbirds observed during these time periods for the proposed pipeline corridor. Examples of species documented include Canada goose, mallard, ring-necked duck and American wigeon.

TABLE 5.3-10

RESULTS OF THE AERIAL WATERBIRD SURVEYS CONDUCTED IN 2012 AND 2013

Pipeline Segment	Observed Fall Staging 2012	Observed Breeding 2013	Observed Fall Staging 2013
Edmonton to Hinton	252	645	1,686
Hargreaves to Darfield	125	148	93
Black Pines to Hope	559	471	488
Hope to Burnaby Burnaby to Westridge	141	61	1,320

Source: Wildlife Technical Report (Volume 5C)

During the wildlife surveys in 2012 and 2013, 13 waterbird species of special conservation concern were recorded. Table 5.3-11 provides a list detailing these species and their respective conservation status. For more detailed information on these observations see the Wildlife Technical Report (Volume 5C).

TABLE 5.3-11

WATERBIRD SPECIES OF SPECIAL CONSERVATION CONCERN

Common Name	Federal Designation (*SARA* Schedule 1 or COSEWIC-listed)	Alberta Designation	BC Designation
American bittern		Sensitive	
American white pelican			Red
Black tern		Sensitive	
Double-crested cormorant			Blue
Great blue heron *fannini sp.*	Special Concern		Blue
Horned grebe	Special Concern	Sensitive	Yellow
Lesser scaup		Sensitive	Yellow
Long-billed curlew	Special Concern		Blue
Northern pintail		Sensitive	Yellow
Sandhill crane		Sensitive	Yellow
Sora		Sensitive	Yellow
Trumpeter swam		At Risk	

TABLE 5.3-11 Cont'd

Common Name	Federal Designation (*SARA* Schedule 1 or COSEWIC-listed)	Alberta Designation	BC Designation
Western grebe		Sensitive	Red

Source: Wildlife Technical Report (Volume 5C).

Recent beaver activity or evidence of previous activity was documented at a number of wetlands crossed by the proposed pipeline corridor during the wetland and wildlife surveys. Table 5.3-12 provides a list of these locations.

TABLE 5.3-12

BEAVER ACTIVITY OBSERVATIONS AT WETLANDS ALONG THE PROPOSED PIPELINE CORRIDOR

Pipeline Segment	Wetland ID	Legal Location, Approx. Wetland RK Range	Wetland Class	Comments
Edmonton to Hinton	WT-317	2-12-53-28 W4M RK 65.4 to RK 65.5	Basin Shallow Open Water (open water pond)	Beaver modified
	WT-344	10-9-53-3 W5M RK 91.0 to RK 91.1	Riparian Marsh (seasonal emergent marsh)	Beaver modified
	WT-275	11-10-53-4 W5M RK 100.5 to RK 101.2	Basin Marsh (seasonal emergent marsh)	Beaver activity
	WT-354	9-9-53-4 W5M RK 101.9 to RK 101.9	Basin Marsh (seasonal emergent marsh)	Beaver activity
	WT-356	10-9-53-4 W5M RK 101.9 to RK 102.3	Flat Swamp (shrubby swamp)	Beaver activity
	WT-456	11-16-53-7 W5M RK 132.7 to RK 133.1	Riparian Shallow Open Water (open water pond)	Beaver activity
	WT-486	9-29-53-11 W5M RK 173.6 to RK 173.7	Riparian Marsh (seasonal emergent marsh)	Beaver activity
	WT-491	10-26-53-12 W5M RK 178.9 to RK 179.0	Riparian Marsh (seasonal emergent marsh)	Beaver modified
	WT-493	7-26-53-12 W5M RK 178.9 to RK 178.9	Potential Channel Fen (treed fen)	Beaver activity
	WT-502	16-24-53-15 W5M RK 206.7 to RK 207.4	Riparian Marsh (deep marsh)	Beaver activity
	WT-443	6-19-53-17 W5M RK 236.5to RK 236.7	Riparian Marsh (seasonal emergent marsh)	Beaver activity
	WT-792	3-5-53-19 W5M RK 257.7 to RK 257.8	Riparian Swamp (Shrubby Swamp)	Beaver modified
	WT-843	8-20-52-23 W5M RK 299.0 to RK 299.7	Riparian Marsh (seasonal emergent marsh)	Beaver modified
Hargreaves to Darfield	WT-21	a-8-H/83-D-11 RK 556.4 to RK 556.8	Riparian Shallow Open Water (open water pond) associated with a Riparian Swamp (shrubby swamp)	Beaver activity
	WT-901	c-78-A/83-D-11 RK 559.3 to RK 559.3	Riparian Swamp (mixedwood treed swamp) with open water component	Beaver activity
	WT-32	a-19-A/83-D-11 RK 565.4 to RK 565.6	Riparian Marsh (deep marsh)	Beaver activity
	WT-900	b-75-C/83-D-3 RK 620.1 to RK 620.3	Riparian Swamp (mixedwood treed swamp) with open water component	Beaver activity
	WT-109	d-45-F/82-M-14 RK 643.7 to RK 644.1	Basin Marsh (seasonal emergent marsh) with shrubby swamp component	Beaver activity
	WT-108	d-45-F/82-M-14 RK 643.8 to RK 644.1	Basin Shallow Open Water (open water pond)	Beaver activity
	WT-116	d-14-F/82-M-14 RK 647.0 to RK 647.1	Riparian Swamp (mixedwood treed swamp) associated with a marsh component	Beaver activity

TABLE 5.3-12 Cont'd

Pipeline Segment	Wetland ID	Legal Location, Approx. Wetland RK Range	Wetland Class	Comments
Hargreaves to Darfield (cont'd)	WT-120	b-93-C/82-M-14 RK 649.2 to RK 649.5	Riparian Swamp (mixedwood treed swamp)	Beaver activity
	WT-149	a-70-K/82-M-11 RK to 663.7 to RK 664.0	Riparian Marsh (deep marsh)	Beaver activity
	WT-203	b-81-B/92-P-9 RK 734.6 to RK 735.0	Riparian Marsh (deep marsh) with shrubby swamp component	Beaver activity
Hope to Burnaby	WT-1460	c-32-H/92-H-5 RK 1051.4 to RK 1051.5	Basin Shallow Open Water (open water pond)	Beaver activity
	WT-1460	c-32-H/92-H-5 RK 1051.4 to RK 1051.5	Basin Shallow Open Water (open water pond) / unclassified aquatic	Beaver sign

Source: Wildlife Technical Report (Volume 5C) and wetland field survey results.

5.3.4 Regulatory Approvals and Permitting

In Alberta COP notifications for temporary disturbance include all wetlands, excluding fens and bogs (unless an open water component is present) and *Water Act* approval from AESRD for permanent disturbance. In BC, *Water Act* notifications under Section 9.0 to the BC OGC include all wetlands. The previously provided Tables 5.1-6 to 5.1-10 outline the wetlands where Trans Mountain will work with appropriate regulatory authorities to determine what is required with respect to provincial permits.

6.0 DISCUSSION AND MITIGATION RECOMMENDATIONS

6.1 Pipeline

6.1.1 Potential Alteration to Wetland Function

Pipeline construction and maintenance activities will likely result in the alteration of wetland habitat, hydrological and biogeochemical function. All three functions (*i.e.*, habitat, hydrological and biogeochemical) are directly and indirectly related to one another, influencing the overall wetland function (Figure 6.1-1).

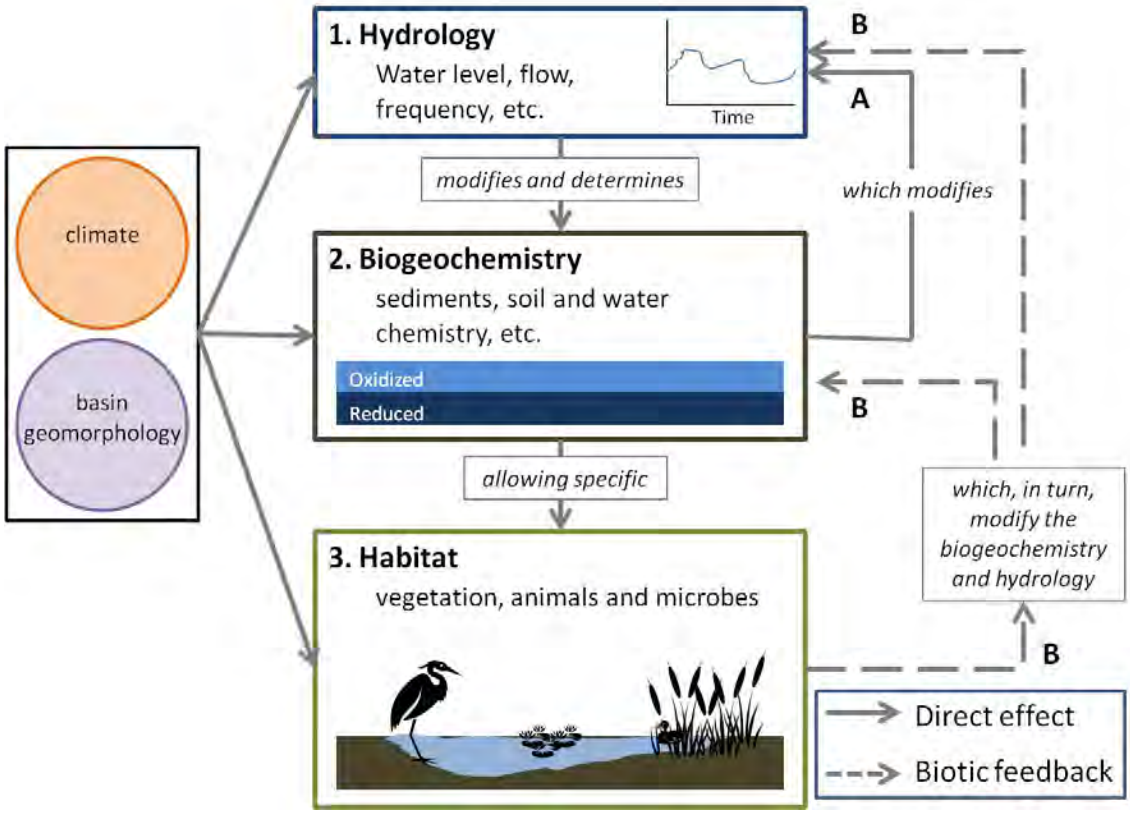

Figure 6.1-1 Conceptual diagram illustrating the effects and connectivity of hydrology, biogeochemistry and habitat features of a wetland on overall wetland function

Source: Modified from Mitsch and Gosselink 2007

To avoid permanent loss of wetland function, Trans Mountain has developed measures to avoid or reduce the adverse effects of construction on wetland habitat, hydrological and biogeochemical functions. These measures include construction scheduling (*i.e.,* avoiding construction during periods of high water), wetland substrate handling, sediment and erosion control, water management, invasive species management and reclamation using natural recovery and, where appropriate, woody vegetation staking. Wetland mitigation measures are identified in the Project-specific Pipeline EPP and Facilities EPP in Volumes 6B and 6C, respectively.

Project mitigation has been developed to allow affected wetlands to return to the same level of functionality as documented during pre-construction surveys following the temporary construction disturbances. Wetland function post-construction monitoring (PCM) will identify any areas where remedial measures may be warranted to assist with functional recovery of wetlands.

The potential effects on wetland function associated with the construction of the proposed pipeline across wetlands are described in Section 7.3.8 of Volume 5A and include alteration of wetland function:

- habitat function;

- hydrological function; and
- biogeochemcial function.

6.1.2 Federal Policy on Wetland Conservation

Where feasible, the proposed pipeline corridor has been routed to reduce potential effects on wetlands by implementing a routing decision framework which also meets the intent of the FPWC by taking into consideration the following:

- avoiding wetlands, where feasible;
- minimizing length traversing environmentally sensitive areas such as protected areas, or areas containing vegetation and wildlife habitat for species with special conservation status;
- where practical, following existing linear infrastructure (*e.g.*, pipelines, power lines, roads);
- using the shortest route practical;
- where avoidance is not technically or economically feasible, implementing construction and reclamation mitigation measures; and
- monitoring wetland function and recover post-construction.

6.1.3 Supplemental Studies

An extensive field program combined with aerial surveys of the proposed pipeline corridor provided a good understanding of the wetlands encountered by the Project. Additional surveys may be warranted once the pipeline construction right-of-way is refined. Desktop study / literature review as well as the incorporation of information gathered as a result of 60 years of the existing TMPL, assisted in the development of the assessment and proposed mitigation measures. To confirm the assessment results and gather site-specific information to support the recommended mitigation measures and EPPs, supplemental studies may be warranted at locations listed in Table 6.1-1.

The total number of wetlands along the final pipeline route will be further refined in 2014. It is anticipated that the total number of wetlands will be reduced once the 150 m wide proposed pipeline corridor is refined to the final pipeline route. The methodology outlined in this report will be used to identify, delineate and classify any additional wetlands during the supplemental surveys which will be conducted by qualified wetland ecologists.

TABLE 6.1-1

LOCATIONS IDENTIFIED FOR WETLAND SURVEY IN 2014

Pipeline Segment/Pump Station/Terminal/Power Line	Number of Potential Wetlands
Edmonton to Hinton	78
Hargreaves to Darfield	49
Black Pines to Hope	84
Kingsvale Power Line	23
Hope to Burnaby	49
Burnaby to Westridge	1
TOTAL	284

Additional information gathered during ongoing engagement with potentially affected Aboriginal communities will be incorporated into Project planning, including the EPPs and the Environmental Alignment Sheets, as appropriate.

6.1.4 General Recommendations

The potential effects on the wetland function indicator associated with the construction and operations of the pipeline listed in Table 6.1-2 were identified based on the results of the literature review, desktop analysis, field surveys and through Aboriginal participation during wetland field surveys as well as consultation with regulatory authorities and stakeholders.

A summary of mitigation measures provided in Table 6.1-2 was principally developed in accordance with Trans Mountain standards as well as industry, federal and provincial regulatory guidelines including Stepping Back from the Water (AESRD 2012), Provincial Wetland Restoration/Compensation Guide (AENV 2007) and Wetland Ways (Wetland Stewardship Partnership 2009), as well as knowledge gained from wetland post-construction monitoring for previous projects (*e.g.,* Enbridge Pipelines Inc. (Enbridge) [TERA 2011a,b,c,d, 2012a,b,c,d], Kinder Morgan Canada Inc. (Kinder Morgan) [Critchley and Foote 2009, TERA 2011e,f,g,h, 2012e, 2013] and NOVA Gas Transmission Ltd. (NOVA Gas) [TERA 2011i, 2012f]) and peer-reviewed publications on wetland function (Price *et al.* 2005, Ryder *et al.* 2005, Shem *et al.* 1993, Van Dyke *et al.* 1994).

6.1.5 Traditional Ecological Knowledge

A comprehensive review of the recommended mitigation measures provided in Table 6.1-2 and of all the issues raised by participating Aboriginal communities was conducted with each community during the field surveys and during follow-up results review (Section 3.6.2). Concerns related to wetlands resources were addressed by the proposed mitigation measures discussed. Participants have not recommended any mitigation strategies related to wetlands resources additional to those described in the EPP to be implemented for the Project.

TABLE 6.1-2

POTENTIAL EFFECTS AND RECOMMENDED MITIGATION MEASURES – PIPELINE CONSTRUCTION AND OPERATION

Potential Effect	Pipeline Segment	Spatial Boundary[1]	Key Recommendations/Mitigation Measures [EPP Reference][2]
1. Wetland Loss or Alteration – Wetland Function			
1.1 Potential loss or alteration of wetlands of High Functional, High-Moderate, Low-Moderate and Low Functional Condition (*i.e.*, habitat, hydrology, biogeochemistry)	All	LSA	Habitat • Ensure that all applicable approvals, licenses and permits are in place prior to commencing applicable construction activities [Section 6.0 of EPP]. • Adhere to applicable clearing guidelines for the protection of streams and wetlands provided in the *Forest Practices Code*, Riparian Management Area Guidebook in BC (AESRD 2012, BC MFLNRO 1995), where riparian management zones (widths) are identified based on stream or wetland class [Section 8.1]. • Follow applicable DFO Operational Statements outlining conditions and measures to avoid serious harm to fish or any permanent alteration to, or destruction of, fish habitat when working in or near a waterbody that has been identified as providing fish habitat [Section 8.7.1 of EPP].. • Fell all timber within the staked construction boundaries during survey line clearing. No fallen or leaning trees will be permitted outside of the staked construction boundaries or into watercourses/wetlands/lakes [Section 6.0]. • Protect vegetation mat from construction disturbance. Any TWS located within the boundary of a wetland must be approved by Trans Mountain's Environmental Inspector(s) [Section 7.0]. • Reduce the removal of vegetation in wetlands to the extent practical. Conduct ground level cutting, mowing or mulching or walking-down of wetland vegetation instead of grubbing. The method of removal of wetland vegetation is subject to approval by the Environmental Inspectors and Resource Specialists [Section 7.0]. • Narrow down the area of disturbance to the extent practical and clearly mark the area to be cleared [Section 7.0]. • Salvage flagged or fenced live trees or shrubs from the banks of wetlands if requested by the Environmental Inspector(s) or noted on the Environmental Alignment Sheets. Store salvaged trees and shrubs along the side of the construction right-of-way in a manner such that they do not dry out before replanting during reclamation [Section 7.0]. • Prohibit clearing of extra TWS within the riparian buffer, only the trench and TWS areas will be cleared. Ensure staging areas for watercourse/wetland crossing construction, grade/borrow areas for wetland ramps and spoil storage areas are located a minimum of 10 m from the banks of watercourses/wetland/lake boundaries. This distance may be reduced by the Lead Environmental Inspector and the Environmental Inspector(s) where appropriate controls are in place and where no riparian area is present (*e.g.,* cultivated or disturbed lands that abut the watercourse banks or boundaries of the wetland) [Section 8.1]. • Restrict root grubbing in wet areas, where practical, to avoid creation of bog holes [Section 8.1]. • Restrict root grubbing to the area located outside of the vegetated riparian buffer adjacent to watercourses, wetlands and lakes. There will be no grubbing within vegetated buffers adjacent to watercourses, wetland and lakes except along the trench line and, where warranted, at vehicle crossing areas. See additional grubbing measures in Section 8.1 of the Pipeline EPP. • Allow wetlands to recover naturally (*i.e.*, do not seed wetland areas) [Section 8.6.3]. • Spread mulch to a depth of no more than 5 cm along the construction right-of-way in areas classified as treed peatlands [Section 8.6.3]. • Replant salvaged trees/shrubs along the disturbed riparian margins of the wetland as directed by the Environmental Inspector(s) and as identified in the resource-specific mitigation tables for vegetation and wetlands provided in Appendices J and K, respectively [Section 8.7.4]. • See additional wetland measures in the Pipeline EPP.

TABLE 6.1-2 Cont'd

Potential Effect	Pipeline Segment	Spatial Boundary[1]	Key Recommendations/Mitigation Measures [EPP Reference][2]
1.1 Potential loss or alteration of wetlands of High Functional, High-Moderate, Low-Moderate and Low Functional Condition (*i.e.*, habitat, hydrology, biogeochemistry) (cont'd)	All	LSA	<u>Hydrology</u> • Install berms and/or cross ditches on approach slopes to wetlands, where warranted [Section 7.0]. • Maintain drainage across the construction right-of-way during all phases of construction [Section 7.0]. • Grade away from watercourses/wetlands/lakes to reduce the risk of introduction of soil and organic debris. Do not place windrowed or fill material in watercourses/wetlands/lakes during grading. Keep wetland soils separate from upland soils [Section 8.2]. • Install sack trench breakers back from the edge of watercourses where the banks consist of organic material to prevent sloughing of backfill into the channel (see Trench Breaker – Watercourse/Wetland Drawing in Appendix R) [Section 8.4]. • Install trench breakers, where warranted, at the edge of perched wetlands to prevent the pipeline trench from acting as a drain (see Trench Breaker – Watercourse/Wetland Drawing in Appendix R) [Section 8.4]. • Do not dewater any wetland during isolated crossing construction [Section 8.7.4]. • Ensure that wetlands are reclaimed to their pre-construction profile. Remove all corduroy and ramps through sloughs or wetlands, in all circumstances [Section 8.4]. • Leave a trench crown during clean-up of peatlands and non-peat wetlands to allow for settlement of backfilled material within the trench [Section 8.6.3]. • Re-establish surface drainage patterns in wetlands/peatlands to as close to the pre-construction contours as practical during reclamation. Leave frequent breaks in the trench crown in any areas identified as peatland to reduce the risk of ponding water and to re-establish drainage connectivity across the wetland [Section 8.6.3]. • Excavate the trench with wide pad, low-ground-pressure equipment or operate standard equipment from mats [Section 8.7.4]. • Store excavated material in a manner that does not interfere with natural drainage patterns. If necessary, haul spoil to a nearby location for storage (*e.g.,* for wet spoil that does not stack well) [Section 8.7.4]. • Use geotextile products and porous polypropylene materials in peatland areas and other poor drainage areas to: – increase the load bearing capacity; – prevent mixing of subgrade and fill; and – allow for the passage of water [Section 9.0]. • See additional wetland measures in the Pipeline EPP. <u>Biogeochemistry</u> • Install a temporary sediment barrier (*e.g.,* sediment fences), where warranted, to eliminate the flow of sediment from spoil piles and disturbed areas into nearby waterbodies including wetlands (see Sediment Fence Drawing in Appendix R) [Section 8.7.1]. • Implement the Wet/Thawed Soils Contingency Plan (see Appendix B) during wet/thawed soil conditions when wet or thawed soils are encountered during construction [Section 8.2]. • Avoid rutting and admixing of wetland soils during non-frozen soil conditions. Install appropriate ramps using mats (*e.g.,* swamp mats) or geotextile and spoil ramps [Section 8.7.4]. • Do not dispose of upland woody debris in mineral wetland [Section 8.1]. • Salvage surface material in unsaturated wetlands, giving extra attention to maintaining dormant root stocks for replacement, where feasible. Salvage a maximum of 40 cm of surface soil if the peat is deeper than 40 cm or to the depth of colour change where there is less than 40 cm of surface material. Ensure a minimum of 15 cm of surface and subsoil is stripped if peat is less than 15 cm [Section 8.2]. • Salvage the upper layer of root zone material (maximum of 0.5 m) over the trench area and retain for use in capping the trench following backfilling [Section 8.7.4].

TABLE 6.1-2 Cont'd

Potential Effect	Pipeline Segment	Spatial Boundary[1]	Key Recommendations/Mitigation Measures [EPP Reference][2]
1.1 Potential loss or alteration of wetlands of High Functional, High-Moderate, Low-Moderate and Low Functional Condition (*i.e.*, habitat, hydrology, biogeochemistry) (cont'd)	All	LSA	• Use salvaged surface material or trench spoil as a containment/barrier (see Watercourse Crossing – Open Cut Method for Flowing Watercourses Drawing in Appendix R) if deep water is encountered and the trench area warrants isolation. Consider using spoil material from the trench line as a containment barrier where salvaged surface material is primarily composed of organic material and is likely not able to support a berm/barrier. Location to be determined by Environmental Inspector(s). Alternate dam devices such as an Aquadam or meter bags may also be used to isolate the trench area. Pump excess water from work area and trench to opposite side of berm or work ramp [Section 8.7.4]. • Pump water into stable and well-vegetated areas. Monitor discharge areas and change the hose discharge location if adequate natural filtration is no longer feasible and sedimentation could occur [Section 8.7.4]. • Backfill the trench with excavated trench spoil. Remove any excess trench spoil to an upland location approved by the appropriate regulatory authorities [Section 8.7.4]. • Backfill peat and mineral soils in the appropriate order such that peat material rather than the underlying mineral soils remain at the surface so that future drainage through the shallow peat material is not impeded [Section 8.7.4]. • Replace any remaining salvaged upper soil (root zone) material over the trench area. Reclaim the wetland to as close as feasible to its pre-construction profile and ensure no permanent trench crown is left following trench crown subsidence [Section 8.7.4]. • Install temporary erosion and sediment control structures (*e.g.,* sediment fences, coir logs) immediately following the completion of backfilling lands adjacent to water crossings and wetlands where the potential for sedimentation of the watercourse or wetland exists (see Sediment Fence Drawing and Coir/Straw Log Installation Drawing in Appendix R) [Section 8.4]. • Maintain sediment fences in place at (non-peat) wetland boundaries, where warranted, until a vegetation cover has stabilized the adjacent construction areas [Section 7.0]. • See additional measures in the Pipeline EPP. <u>Monitoring</u> • Conduct Wetland Function Post-Construction Monitoring (PCM) to review the recovery of wetland function within the construction right-of-way. <u>Operations</u> • Implement mitigation measures provided in table during operations activities within a wetland.
1.2 Potential contamination of wetlands (*i.e.*, habitat, hydrology, biogeochemistry) due to a spill during construction	All	LSA	• Bulk hazardous materials in temporary construction yards or other designated areas except for quantities required for the daily construction activities. Wastes will be stored in temporary construction yards or other designated areas and removed during final clean-up. Fuel, oil or hazardous materials required to be stored on-site will be stored within secondary containment that is to be located greater than 300 m from a watercourse, wetland or lake [Section 7.0]. • Ensure that during construction no fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides, or other chemicals are dumped on the ground or into waterbodies. In the event of a spill, implement the Spill Contingency Plan (see Appendix B) [Section 7.0]. • Do not store fuel, oil or hazardous material within 300 m of a watercourse or waterbody [Section 7.0]. • Do not wash equipment or machinery in watercourses, wetlands or lakes. Control wastewater from construction activities, such as equipment washing or cement mixing, to avoid discharge directly into any body of water [Section 7.0].

Notes: 1 LSA = Wetland LSA.

2 Detailed mitigation measures are outlined in the Pipeline EPP (Volume 6B).

6.1.6 Wetland Function Post-Construction Monitoring

Project mitigation will be implemented during construction to allow affected wetlands to return to the same functional conditions as documented during the existing assessment. Wetland Function Post-Construction Monitoring (PCM) will be conducted during subsequent years during the growing season to review the area of disturbance and identify any wetlands where remedial measures should be implemented to assist with the wetland function recovery.

During the Wetland Function PCM Program, ground-based surveys will be conducted by wetland ecologists who have a broad, interdisciplinary knowledge base in vegetation, hydrology, soils, wildlife and wildlife habitat. Wetland ecologists view wetlands as dynamic landscape systems (*i.e.*, all variables are interrelated) and complete functional assessments using professional judgement. Ground-based surveys will be conducted, photographs will be taken and locations will be georeferenced at each wetland where construction has occurred. Results of the Wetland Function PCM will be provided to the NEB.

The development of a functional database to document wetland function condition will be developed so that existing (i.e., pre-construction) information is available to support post-construction monitoring results. During post-construction surveys this information will be available for comparison not only at wetlands where potential construction related functional issues are noted but also at wetlands where appropriate recovery is exhibited. By employing the same wetland functional assessment criteria as was used during the existing study, a quantitative measurement of overall wetland function for each wetland encountered by the Project can be determined so that existing (baseline) conditions can be compared to post-construction conditions over time. This monitoring will demonstrate whether a wetland is on the trajectory towards achieving the goal of “no net loss” of wetland function within the post-construction monitoring timeframe, or whether additional remedial action is required to assist the wetland recovery and achieve this goal.

Based on the findings during the Wetland Function PCM Program, recommendations for remedial measures will be provided, if warranted, to promote the successful return of wetland function to the pre-construction conditions as quickly as practical and within the duration of the PCEM Program. Wetland function post-construction monitoring will be conducted during the first full growing season after clean-up and otherwise, as per NEB Certificate Conditions. If a wetland is not determined as having at least the same functional conditions as documented during the pre-construction assessment, Trans Mountain will continue to monitor those specific wetlands in years three and five after construction. Trans Mountain will continue to engage in discussions with Environment Canada

6.2 Pump Stations

6.2.1 Supplemental Studies

Additional wetland surveys may be warranted in 2014 at pump stations where wetlands have been identified and along the Kingsvale power line (*e.g.*, subject to power line alignment). The methodology outlined in this report will be used to identify, delineate and classify any additional wetlands during the supplemental surveys and will be conducted by qualified wetland ecologists.

6.2.2 General Recommendations

The potential effects on the wetland function indicator associated with the Kingsvale power line listed in Table 6.2-1 were identified based on the results of the literature review, desktop analysis as well as consultation with regulatory authorities and stakeholders.

A summary of mitigation measures provided in Table 6.2-1 was principally developed in accordance with Trans Mountain standards as well as industry and provincial regulatory guidelines, knowledge gained from wetland post-construction monitoring for previous projects (and peer-reviewed publications on wetland function as described in Section 6.1.4.

TABLE 6.2-1

POTENTIAL EFFECTS AND RECOMMENDED MITIGATION MEASURES – PUMP STATION CONSTRUCTION AND OPERATION

Potential Effect	Pump Station/Terminal	Spatial Boundary[1]	Key Recommendations/Mitigation Measures [EPP Reference][2]
Wetland Loss or Alteration – Wetland Function			
1.1 Potential loss or alteration of wetlands of High Functional, High-Moderate, Low-Moderate and Low Functional Condition (*i.e.*, habitat, hydrology, biogeochemistry)	Kingsvale Power line	LSA	<u>Habitat</u> • Ensure that all required approvals, licenses and permits are in place prior to commencing applicable construction activities [Section 6.0 of EPP]. • Ensure TWS does not encroach within vegetated buffers at waterbodies or wetlands unless approved by the appropriate regulatory authority [Section 6.0]. • Ensure approvals are in place prior to works where the facility boundary encounters the boundaries of wetlands [Section 7.0]. • Protect vegetation mat from construction disturbance, to the extent feasible. Any TWS located within the boundary of a wetland must be approved by the Environmental Inspector [Section 7.0]. • Locate all additional work areas (such as graded areas or additional topsoil/root zone material storage areas) a minimum of 10 m from wetland boundaries except where adjacent upland is cultivated or hay land, or disturbed land, unless otherwise approved. Ensure landowner/land authority approvals are in place for all additional TWS prior to use [Section 7.0]. • Conduct ground level cutting, mowing and/or mulching of wetland vegetation instead of grubbing. The method of removal of wetland vegetation is subject to approval by the Environmental Inspector [Section 7.0]. • Prevent ground disturbance by using a protective layer such as frost packing, snow, ice or matting between wetland vegetation mat/seedbed and construction equipment [Section 7.0]. • Allow wetlands to recover naturally (*i.e.*, do not seed wetland areas) [Section 7.0]. • Restrict root grubbing in wet areas, where practical, to avoid creation of bog holes [Section 8.1]. • Align new access roads or extensions of existing roads to avoid wetlands and peatlands, to the extent feasible [Section 9.0]. • Conduct pre-clearing of timber and/or mowing of native pasture/hay where directed by the Environmental Inspector prior to the onset of the migratory bird nesting (see Appendices L for listing of dates) [Section 8.1]. • Consider install bird deterrents (*e.g.*, avian reflectors, marker balls, swinging markers, flappers) on shield wires (where applicable) in the vicinity of select wetlands and riparian areas to deter birds away from the infrastructure [Section 11.3].
	Kingsvale Power line	LSA	<u>Hydrology</u> • Install berms and/or cross ditches on approach slopes to wetlands, where warranted [Section 7.0]. • Ensure that dewatering points are not located within 50 m of a watercourse/wetland/lake. Dewatering locations must be approved by the Lead Activity Inspector and the Environmental Inspector [Section 11.2]. • Maintain sediment fences in place at non-peat wetland boundaries, where warranted, until a vegetation cover has stabilized the adjacent construction areas [Section 7.0]. • Adhere to the measures outlined in the Wet/Thawed Soils Contingency Plan (see Appendix B) during wet/thawed soil conditions [Section 7.0 and 8.2]. • Postpone construction, suspend equipment travel or utilize construction alternatives in the event of wet or thawed soils in order to reduce terrain disturbance and soil structure damage [Section 7.0]. • Install erosion and sediment control structures and materials (*e.g.*, subsoil berm or sediment fencing) and implement, as warranted, erosion control measures outlined in the Soil Erosion and Sediment Control Contingency Plan (see Appendix B) to ensure that sediments in surface water draining from the facility site do not adversely affect the surrounding terrain or waterbodies. In particular, control erosion on grade cuts adjacent to the development zone at facility sites [Section 7.0].

TABLE 6.2-1 Cont'd

Potential Effect	Pump Station/Terminal	Spatial Boundary[1]	Key Recommendations/Mitigation Measures [EPP Reference][2]
1.1 Potential loss or alteration of wetlands of High Functional, High-Moderate, Low-Moderate and Low Functional Condition (*i.e.*, habitat, hydrology, biogeochemistry) (cont'd)	Kingsvale Power line	LSA	• Ensure that hydrovac slurry will not be pumped into or allowed to flow into a watercourse/wetland/lake [Section 8.1]. • Do not apply dust control suppressants to roads during windy conditions or within 300 m of a watercourse/wetland/lake [Section 9.0]. • Store mixtures of snow and soil in a manner that prevents sedimentation of watercourse/wetlands/lakes when the snow melts [Section 11.1]. • Isolate work areas in the vicinity of watercourse/wetlands/lakes to ensure water does not experience an increase in alkalinity beyond ambient conditions during construction [Section 11.2]. • Ensure that any concrete, cement, mortars or other lime-containing construction materials are not deposited, directly or indirectly, into or near any watercourse/wetland/lake. All forms, if applicable, shall be examined by qualified Inspector(s) prior to pour to ensure they are tight [Section 11.2].
1.2 Potential contamination of wetland function (*i.e.*, habitat, hydrology, biogeochemistry) due to a spill during construction	Kingsvale Power line	LSA	• Prevent water that contacts uncured or partly cured concrete during activities such as exposed aggregate wash-off, wet curing or equipment washing from directly or indirectly entering a watercourse/wetland/lake [Section 11.2]. • Maintain the identified separation distances between the following areas and a waterbody when constructing the facility site, unless otherwise approved: – fuel or hazardous material storage site - 300 m; – cleared area - 100 m; – burning site - 100 m; – subsoil pile - 100 m; and – oil change area - 100 m. • Ensure that during construction no fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides, or other chemicals are released on the ground or into any watercourse or wetland. In the event of a spill, implement the Spill Contingency Plan (see Appendix B) [Section 7.0]. • See additional spill prevention measures related to hazardous material storage and refuelling in Section 7.0 of the Facilities EPP.

Notes: 1 LSA = Wetland LSA.

2 Detailed mitigation measures are outlined in the Facilities EPP (Volume 6C).

6.2.3 Post-Construction Monitoring

Project mitigation outlined in the Project Specific EPPs will be implemented during construction. Wetland Function Post-Construction Monitoring (PCM) will be conducted during subsequent years (length of monitoring is subject to regulatory determination) during the growing season to review the area of disturbance and identify any wetlands where remedial measures should be implemented to assist with the wetland function recovery. The same methodology identified in Section 6.1.6 will be applied.

During Wetland Function PCM, overall wetland function (*i.e.,* habitat, hydrological and biogeochemical) will be assessed and wetlands will be viewed in their entirety as complex systems. For example, while typically the intent is for power line structures to span wetlands where feasible, if a structure is placed within a wetland it is not always anticipated to inhibit overall function as the relatively small wetland area disturbed by the structure will not alter the majority of the wetland processes.

6.3 Tanks

Wetlands will not be affected by construction and operation of storage tanks and associated activities. Through a review of the stormwater requirements for the Sumas Terminal, it was determined that there will likely be an incremental increase in volume of stormwater discharge. Stormwater at the Sumas Terminal is discharged into a wet area to be a potential shrubby swamp associated with an ephemeral drainage. This area will be further evaluated in 2014.

6.4 Westridge Marine Terminal

Wetlands will not be affected by construction of the Westridge Marine Terminal nor during the operations of this terminal.

7.0 SUMMARY

The following provides a summary of the wetland evaluation conducted for the 150 m wide proposed pipeline corridor.

- Wetlands were delineated and classified along the proposed segments by helicopter reconnaissance. A desktop review of overflight photographs and satellite imagery was conducted along the proposed pipeline corridor. The desktop review identified 638 potential wetlands (339 in Alberta and 299 in BC) (94.4 km) are encountered by the 150 m wide proposed pipeline corridor, comprising approximately 9.6% of the proposed pipeline corridor. Not all of these wetlands will be disturbed during the construction of the Project.

- Wetlands crossed include 141 basin marshes, 67 riparian marshes, 4 lacustrine marshes, 7 slope marshes, 2 hummock marshes, 104 flat swamps, 78 riparian swamps, 2 discharge swamps, 6 slope swamps, 45 basin water, 19 riparian water, 13 basin fens, 26 horizontal fens, 13 riparian fens, 2 channel fens, 1 feather fen, 1 slope fen and 1 basin bog.

- Of the 638 potential wetlands encountered along the proposed pipeline corridor, 148 are considered to be potentially navigable (64 in Alberta and 84 in BC).

- The 2012 and 2013 wetland field surveys were conducted on lands where access was granted and confirmed that 377 wetlands (261 in Alberta and 116 in BC) (66.5 km) are crossed by the proposed pipeline corridor, comprising approximately 6.7% of the length of the proposed pipeline corridor. Wetlands visited during the 2012 and 2013 wetland field surveys that are crossed include 140 basin marshes, 38 riparian marshes, 2 hummock marshes, 1 slope marsh, 68 flat swamps, 57 riparian swamps, 2 discharge swamps, 4 slope swamps, 12 basin water, 10 riparian water, 11 basin fens, 24 horizontal fens, 7 riparian fens and 1 feather fen.

- Potential wetlands located along the proposed Kingsvale power line were identified through review of satellite imagery. This review identified the potential for 23 wetlands to be crossed by this power line. These potential wetlands include 7 basin marshes, 7 riparian marshes, 3 flat swamps, 3 riparian swamps, 1 basin water and 2 riparian water wetlands. No wetlands were identified along the proposed Black Pines power line.

- Effects on wetlands due to pipeline construction will be reduced by implementing the general wetland mitigation measures as outlined in Table 6.1-2 and the Pipeline EPP (Volume 6B).

- Effects on wetlands due to power line installation activities will be reduced by implementing the general wetland mitigation measures as outlined in Table 6.2-1 and the Facilities EPP (Volume 6C).

- Discussions about the potential alteration of wetland function (*i.e.*, habitat, hydrological and biogeochemical) can be found in Section 7.3.8 of Volume 5A.

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TERA wishes to acknowledge those people identified in the Personal Communications for their assistance in supplying information and comments incorporated into this report.

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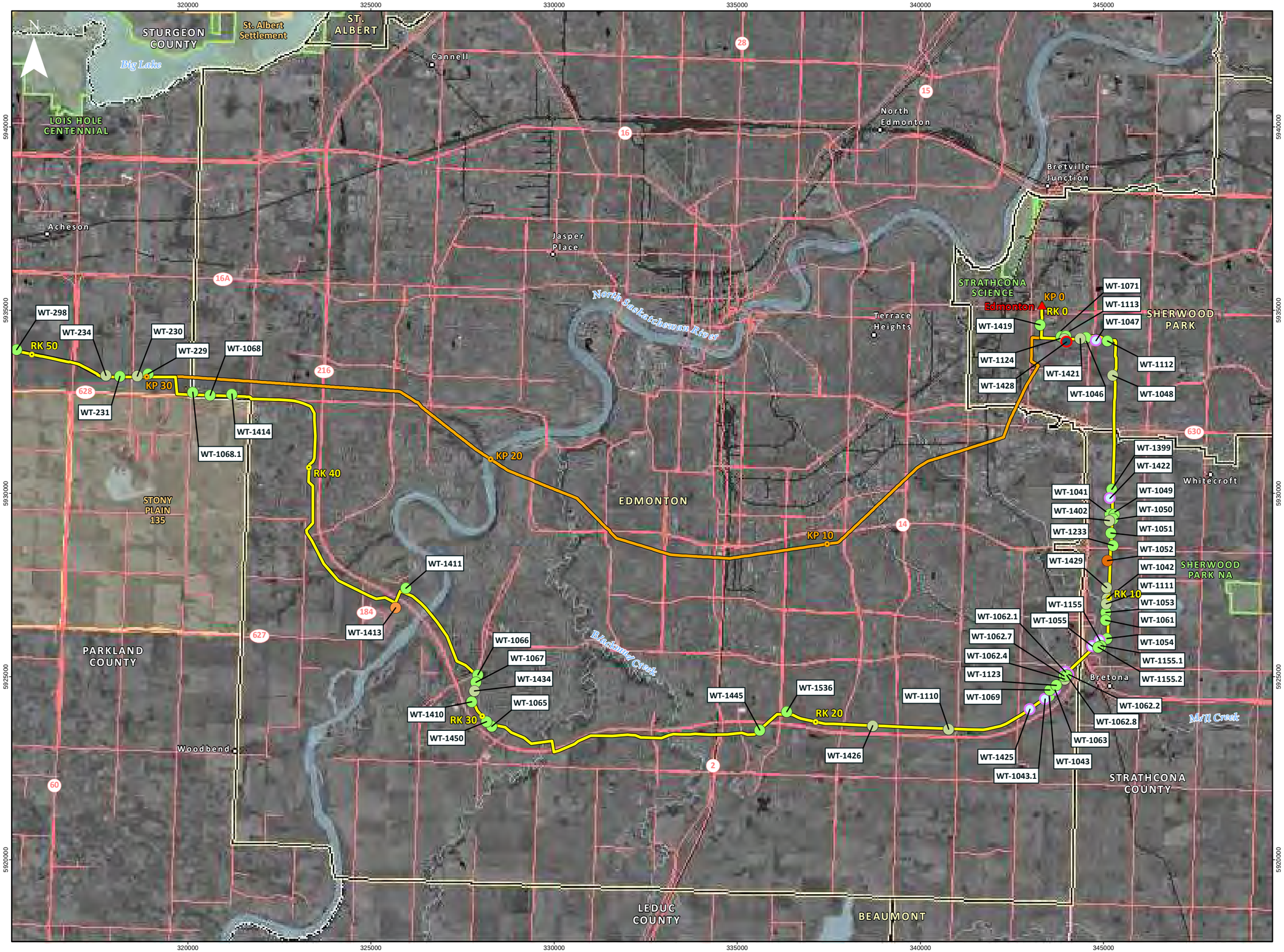
APPENDIX A

FIGURES



TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 1 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
- Reference Kilometre Post (RK)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Proposed Power Line
- Terminal
- Pump Station (Pump Additions, Station Modifications and/or Scraper Facilities)
- New Pump Station (Proposed)
- Pump Station (Reactivated)
- Existing Pump Station
- Highway
- Paved Road
- Railway
- Village / Hamlet / Community
- City / Town
- Indian Reserve / Métis Settlement
- National Park / Provincial Park / Protected Area
- Municipal / District Boundary

Wetland Classifications

- Alkali Marsh
- Broad-leaf Treed Swamp
- Deep Marsh
- Mixedwood Treed Swamp
- Needle-leaf Treed Swamp
- Non-Woody Fen
- Open Water Pond
- Seasonal Emergent Marsh
- Shrubby Fen
- Shrubby Swamp
- Treed Bog
- Treed Fen

Projection: NAD 1983 UTM Zone 12N. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: BC FLNRO, 2012, IHS Inc., 2013, Natural Resources Canada, 2011; Geopolitical Boundaries: Natural Resources Canada, 2003, BC FLNRO, 2007; AltaLIS, 2013, IHS Inc., 2013, ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010, IHS Inc., 2011; Parks and Protected Areas: Natural Resources Canada, 2013, AltaLIS, 2012, Alberta Tourism, Parks and Recreation, 2012; BC FLNRO, 2008; Hydrology: IHS Inc., 2004. B/W & Colour Imagery: 2005-2011 provided by KMC, 2012, NASA, 2005.

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MAP NUMBER: 201311_MAP_TERA_WT_00478_REV0		PAGE: SHEET 1 OF 10
DATE: December 2013	TERA REF.: 7894	REVISION: 0
SCALE: 1:100,000	PAGE SIZE: 11x17	DISCIPLINE: WT
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0 1 2 3 4 km

ALL LOCATIONS APPROXIMATE

201311_MAP_TERA_WT_00478_Rev0.mxd

TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 2 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
- Reference Kilometre Post (RK)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Proposed Power Line
- Terminal
- Pump Station (Pump Additions, Station Modifications and/or Scraper Facilities)
- New Pump Station (Proposed)
- Pump Station (Reactivated)
- Existing Pump Station
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- City / Town
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- National Park / Provincial Park / Protected Area
- Municipal / District Boundary

Wetland Classifications

- Alkali Marsh
- Broad-leaf Treed Swamp
- Deep Marsh
- Mixedwood Treed Swamp
- Needle-leaf Treed Swamp
- Non-Woody Fen
- Open Water Pond
- Seasonal Emergent Marsh
- Shrubby Fen
- Shrubby Swamp
- Treed Bog
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Projection: NAD 1983 UTM Zone 12N. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: BC FLNRO, 2012, IHS Inc., 2013, Natural Resources Canada, 2011; Geopolitical Boundaries: Natural Resources Canada, 2003, BC FLNRO, 2007; AltaLIS, 2013, IHS Inc., 2013, ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010, IHS Inc., 2011; Parks and Protected Areas: Natural Resources Canada, 2013, AltaLIS, 2012, Alberta Tourism, Parks and Recreation, 2012; BC FLNRO, 2008; Hydrology: IHS Inc., 2004. B/W & Colour Imagery: 2005-2011 provided by KMC, 2012, NASA, 2005.

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MAP NUMBER		PAGE
201311_MAP_TERA_WT_00478_REV0		SHEET 2 OF 10
DATE: December 2013	TERA REF.: 7894	REVISION: 0
SCALE: 1:100,000	PAGE SIZE: 11x17	DISCIPLINE: WT
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0 1 2 3 4 km

ALL LOCATIONS APPROXIMATE

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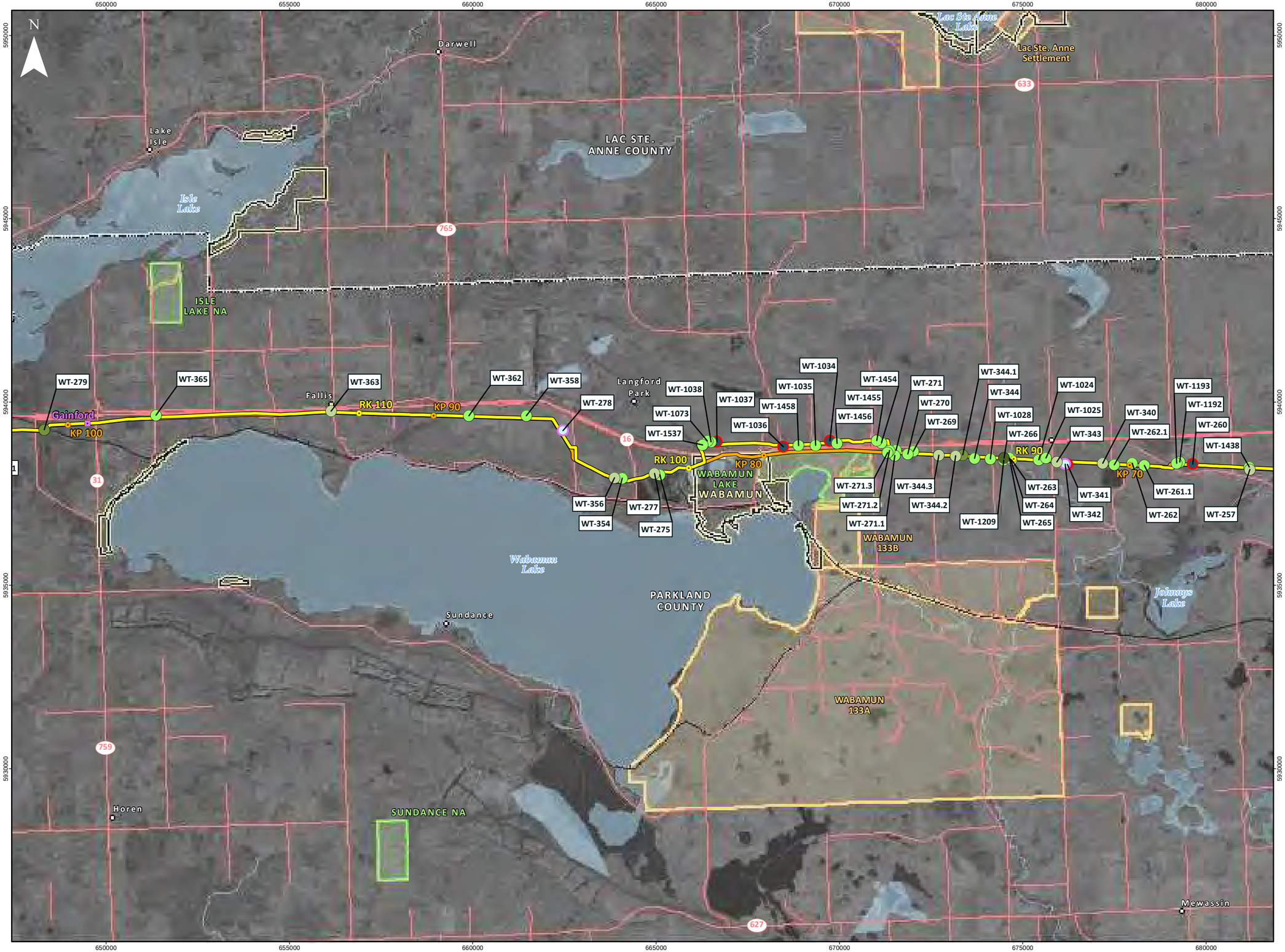

TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 3 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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DATE December 2013	TERA REF. 7894		REVISION 0
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0 1 2 3 4 km

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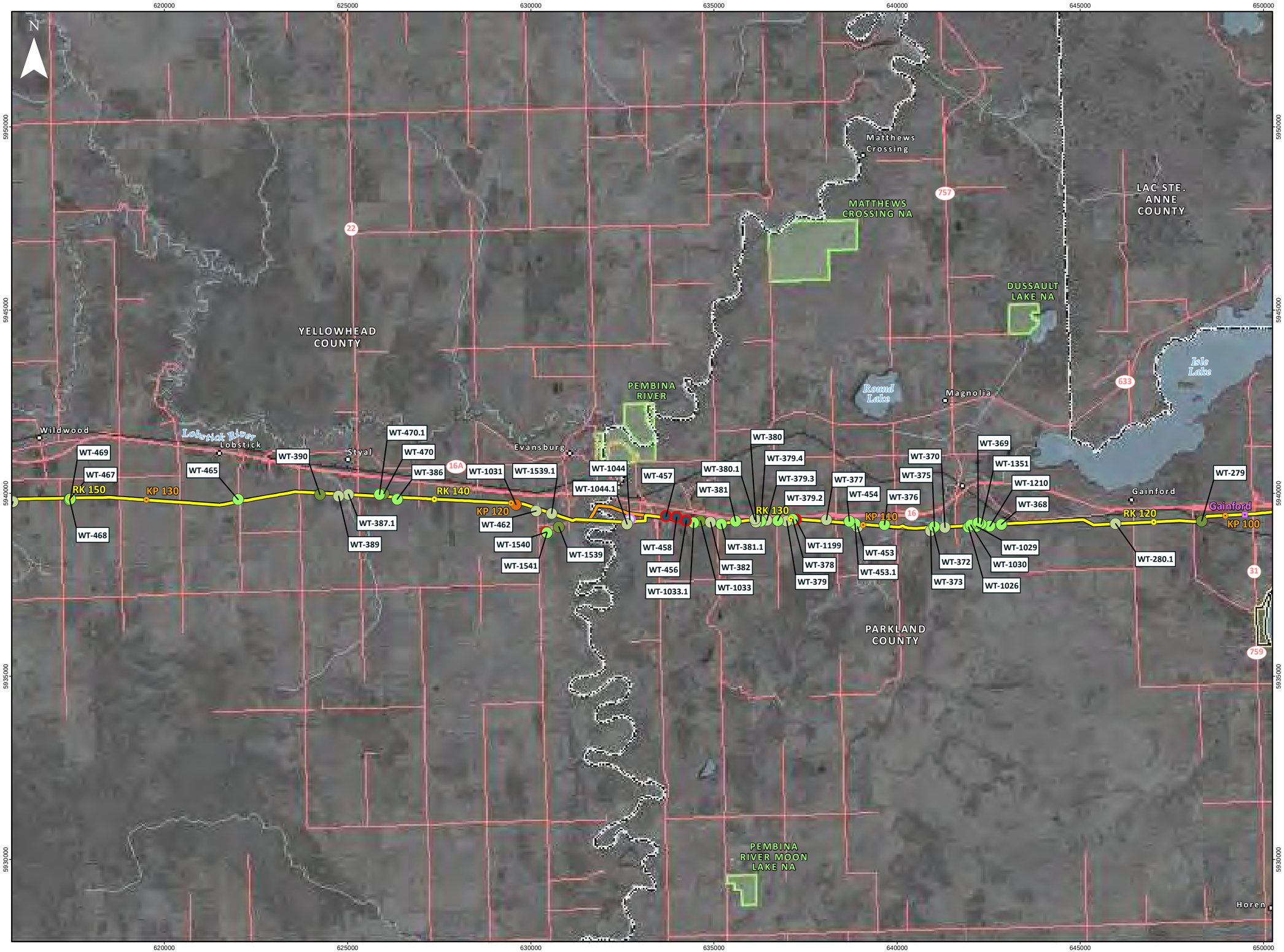

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 4 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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DATE December 2013	TERA REF. 7894		REVISION 0
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km 0 1 2 3 4

ALL LOCATIONS APPROXIMATE

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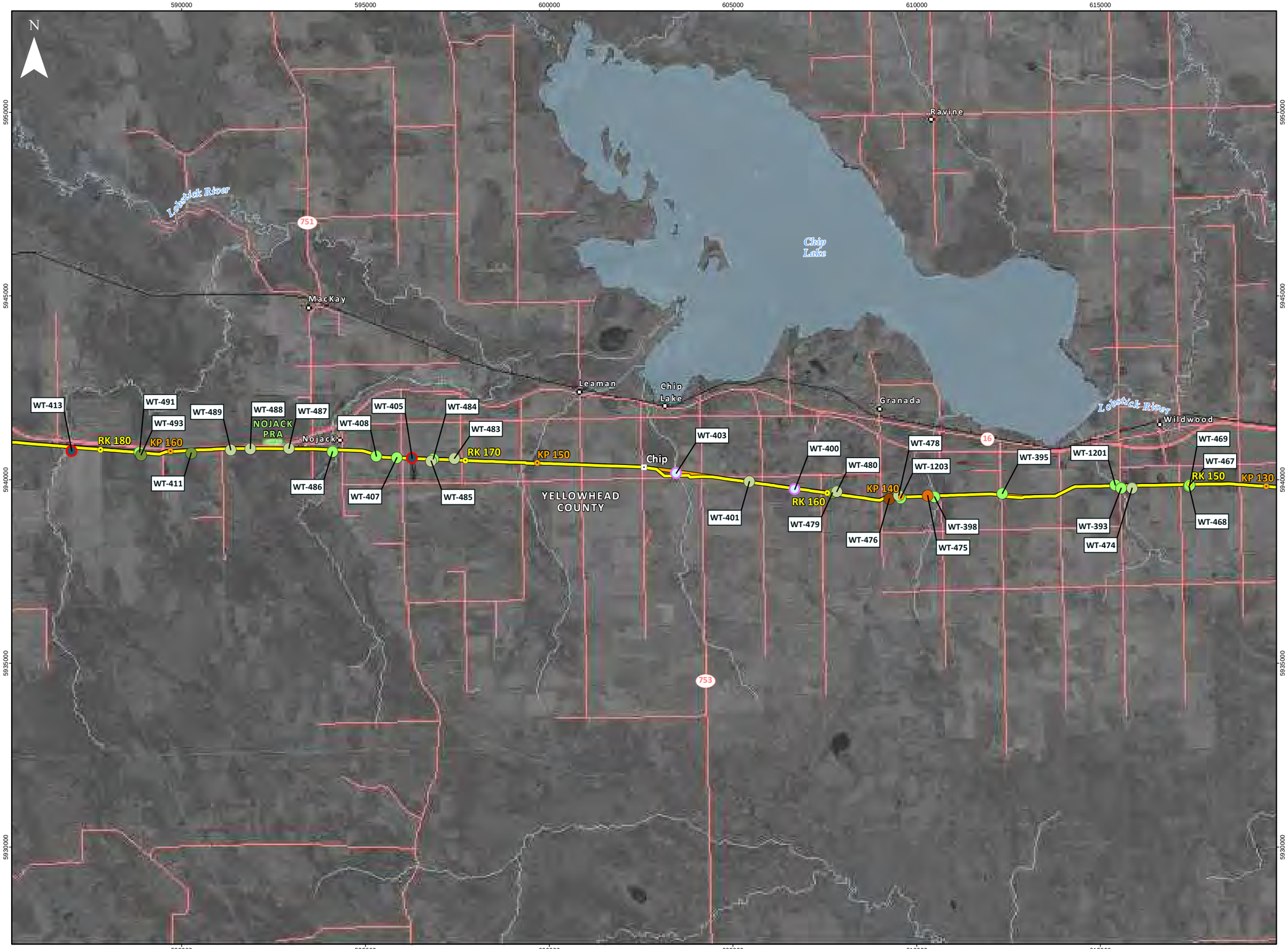

TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 5 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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DATE: December 2013	TERA REF.: 7894	REVISION: 0
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0 1 2 3 4 km

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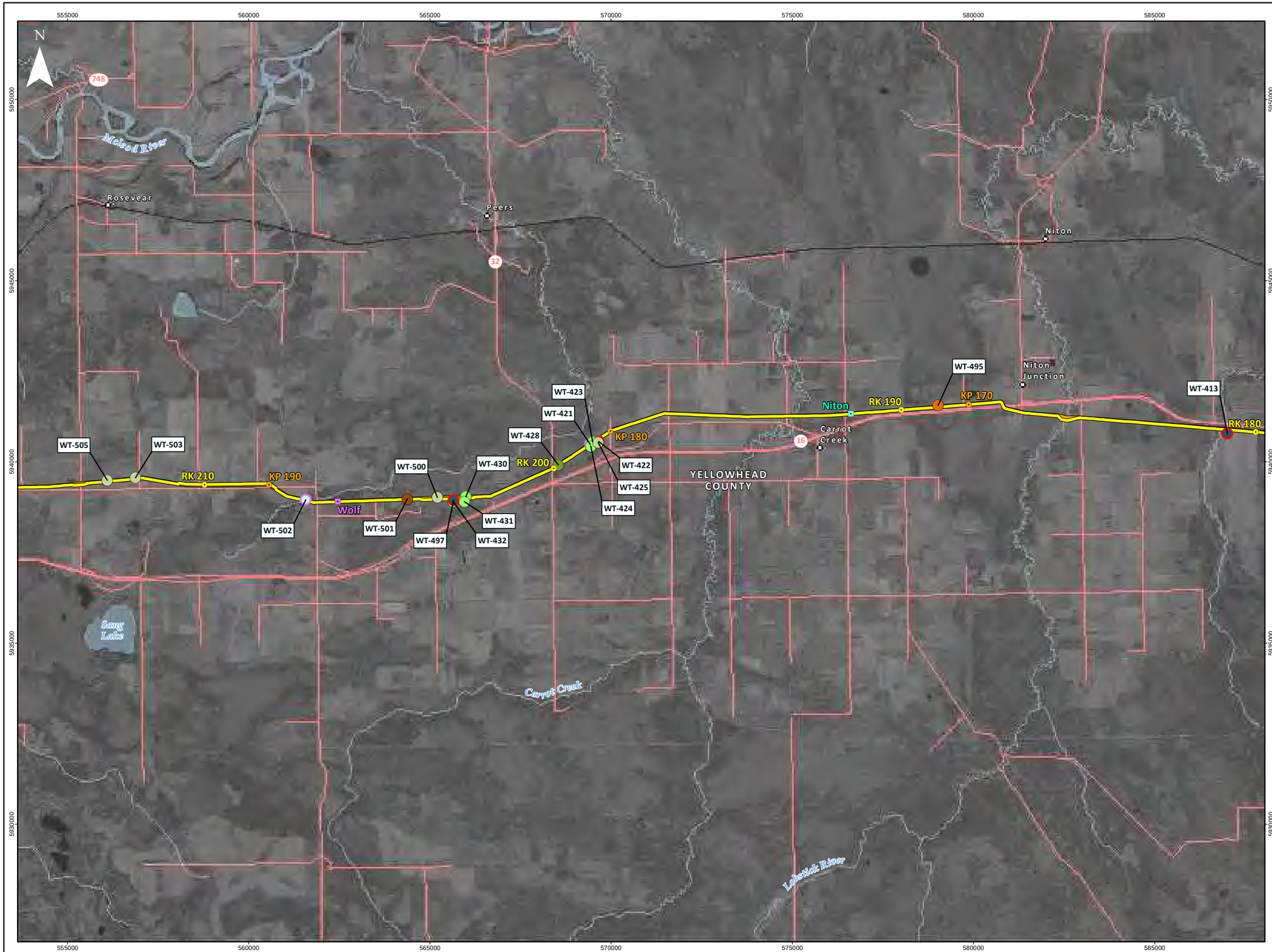

TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 6 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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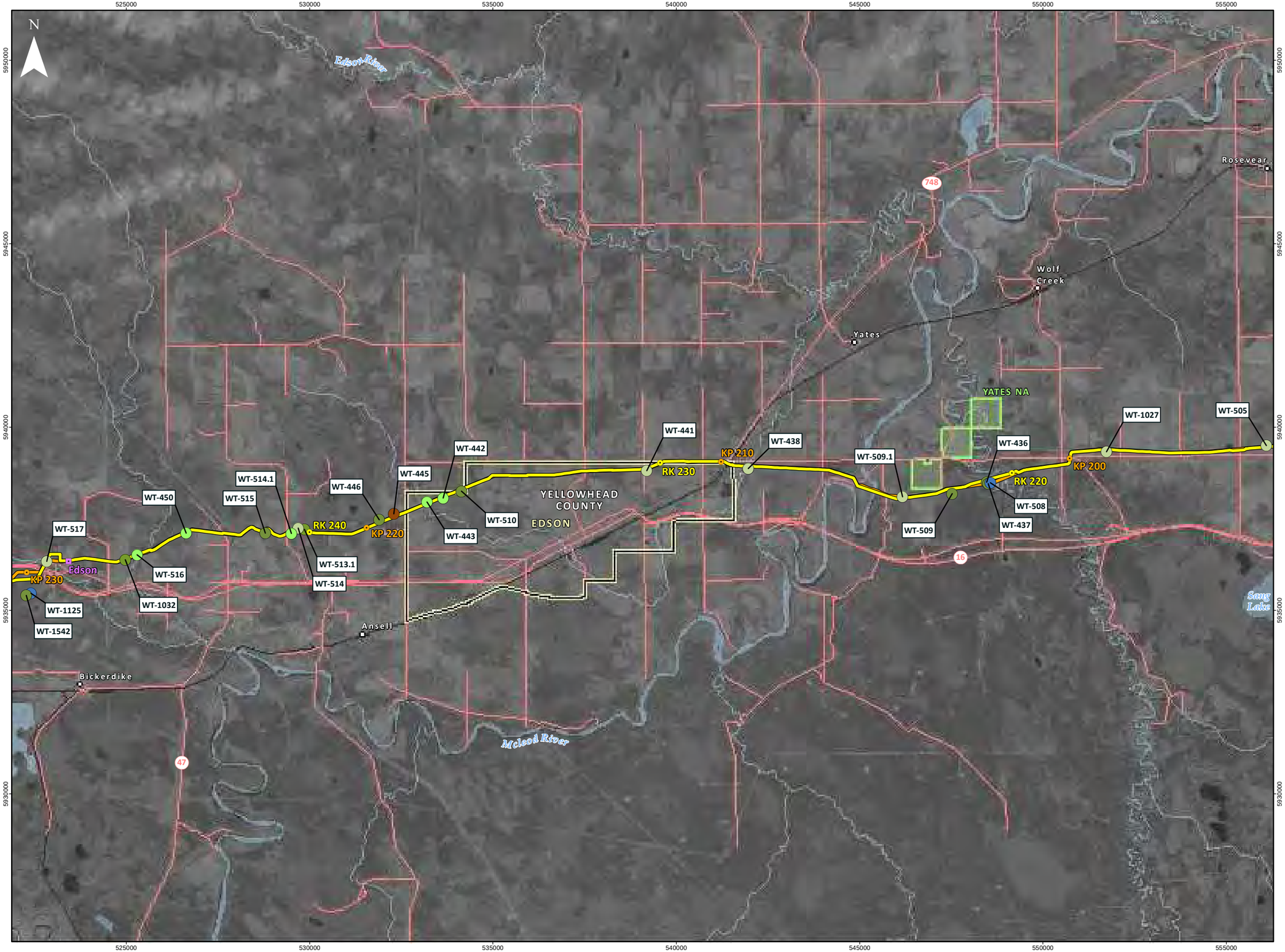

TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 7 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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km 0 1 2 3 4

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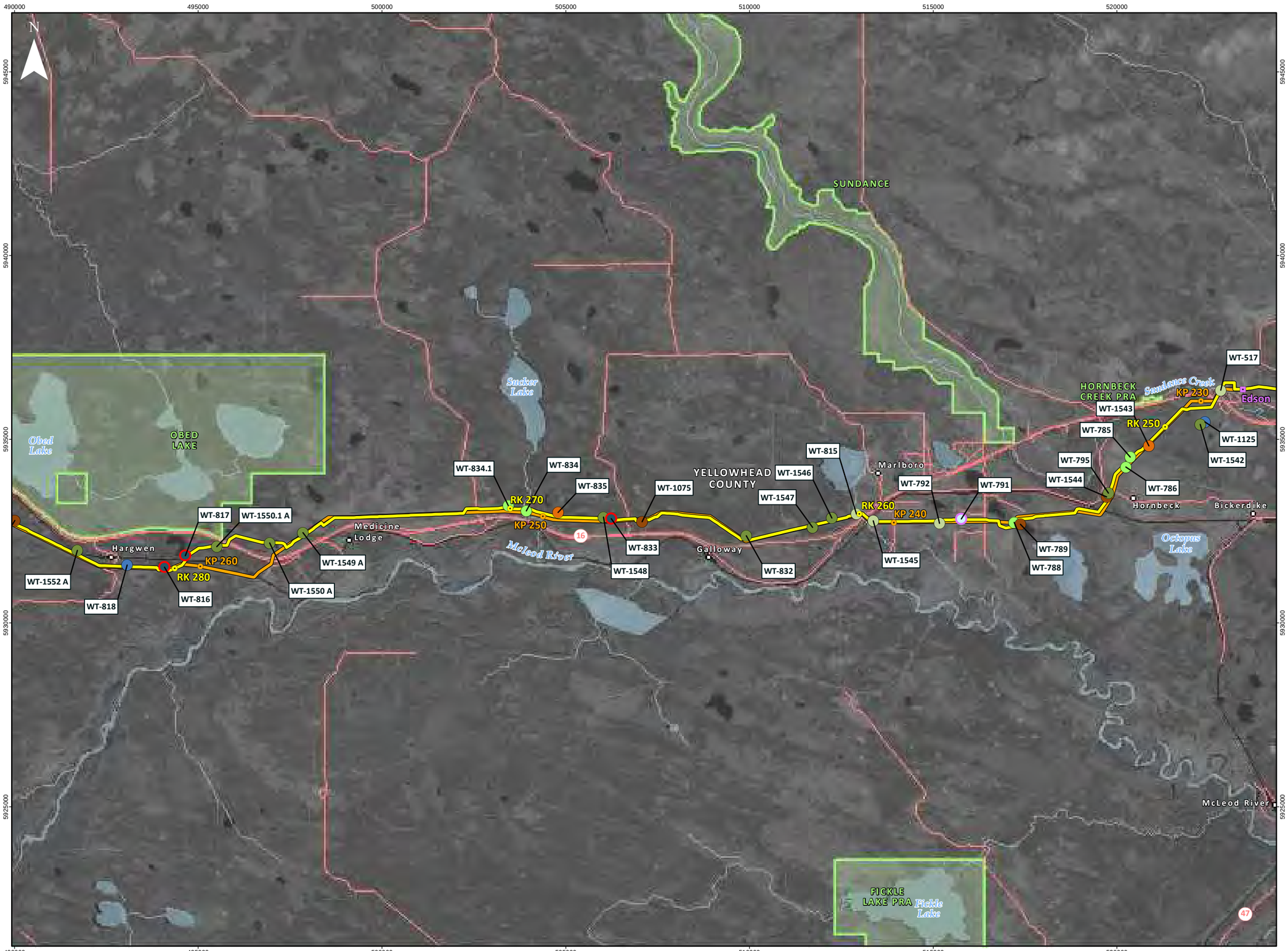

TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 8 OF 10

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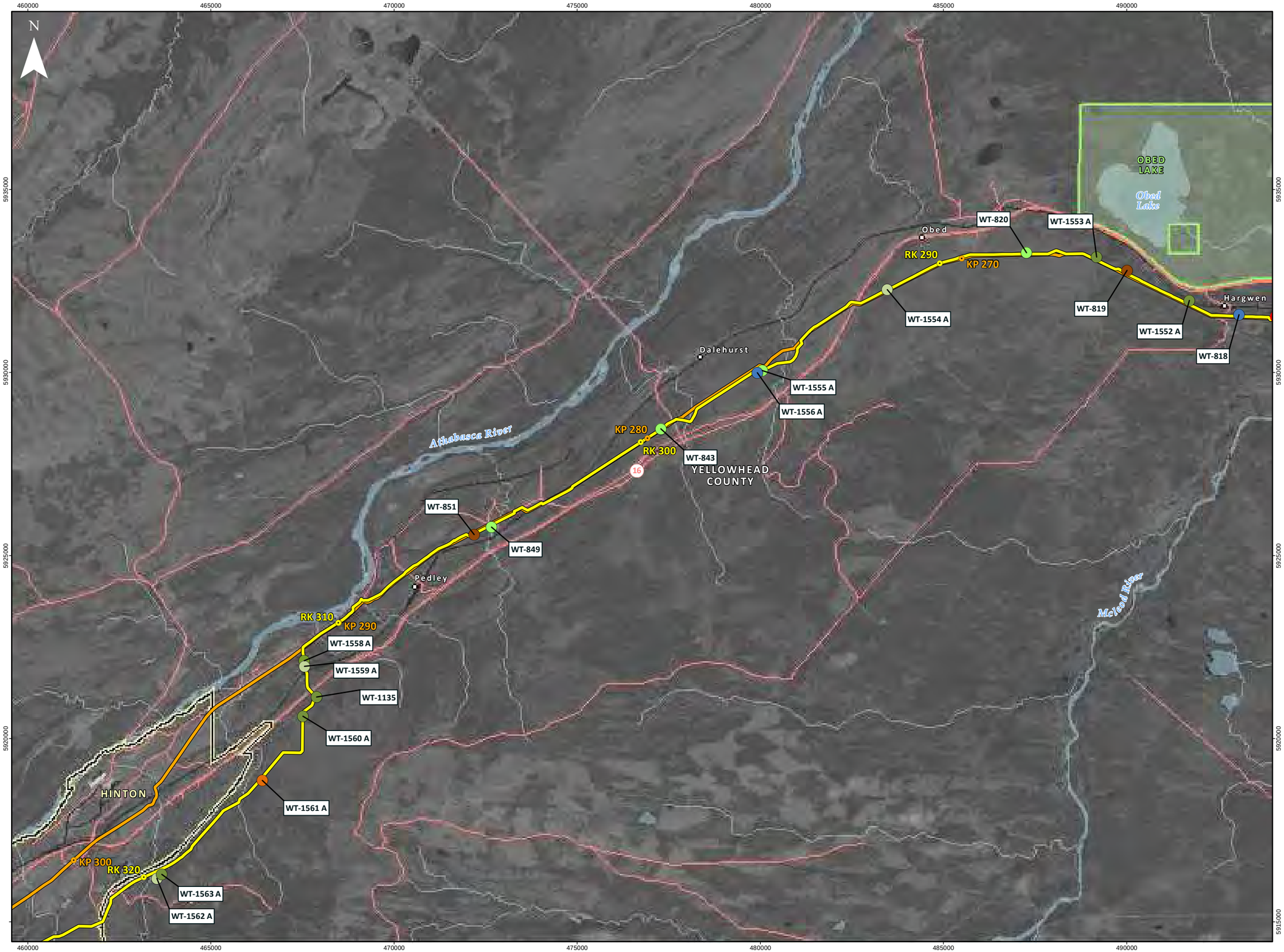

TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 9 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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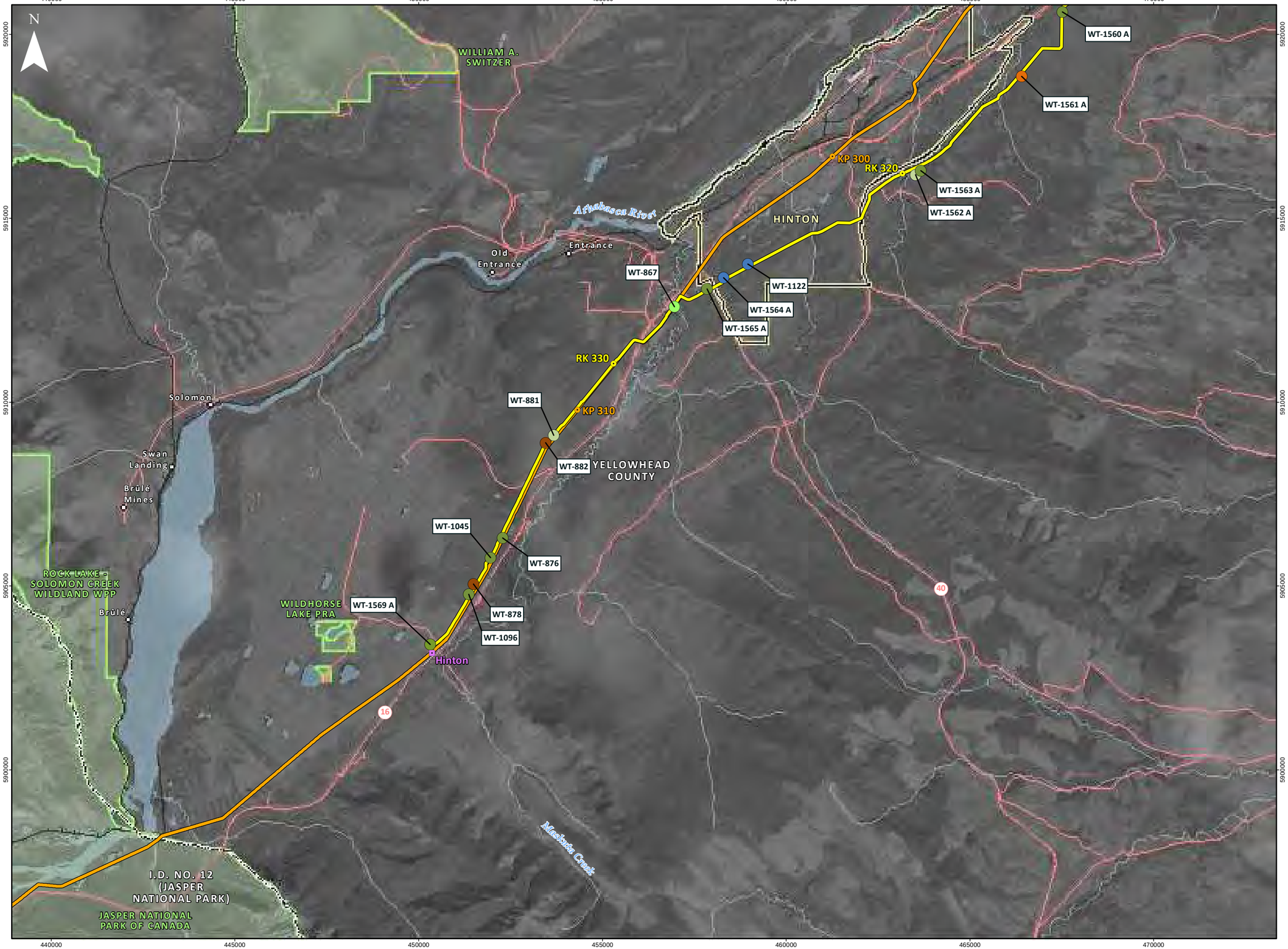

TRANS MOUNTAIN

FIGURE A1

WETLAND DELINEATION - EDMONTON TO HINTON

SHEET 10 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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MAP NUMBER			PAGE
201311_MAP_TERA_WT_00478_REV0			SHEET 10 OF 10
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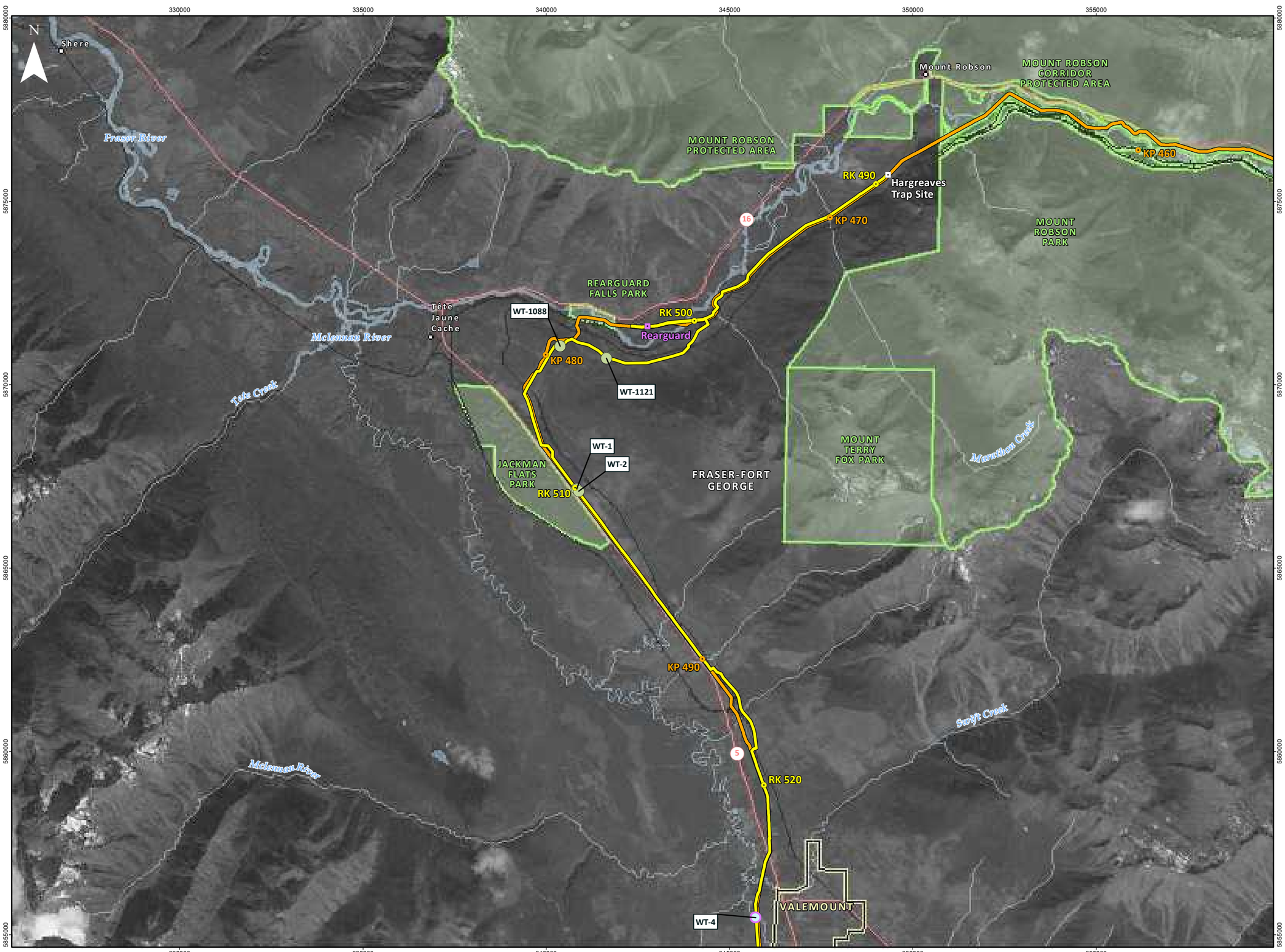

TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 1 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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- Treed Bog
- Treed Fen

Projection: NAD 1983 UTM Zone 11N. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: BC FLNRO, 2012, IHS Inc., 2013, Natural Resources Canada, 2003, BC FLNRO, 2007; AltaLIS, 2013, IHS Inc., 2013, ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010, IHS Inc., 2011; Parks and Protected Areas: Natural Resources Canada, 2013, AltaLIS, 2012, Alberta Tourism, Parks and Recreation, 2012; BC FLNRO, 2008; Hydrology: IHS Inc., 2004. B/W & Colour Imagery: 2005-2011 provided by KMC, 2012, NASA, 2005.

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DATE: December 2013	TERA REF.: 7894	REVISION: 0
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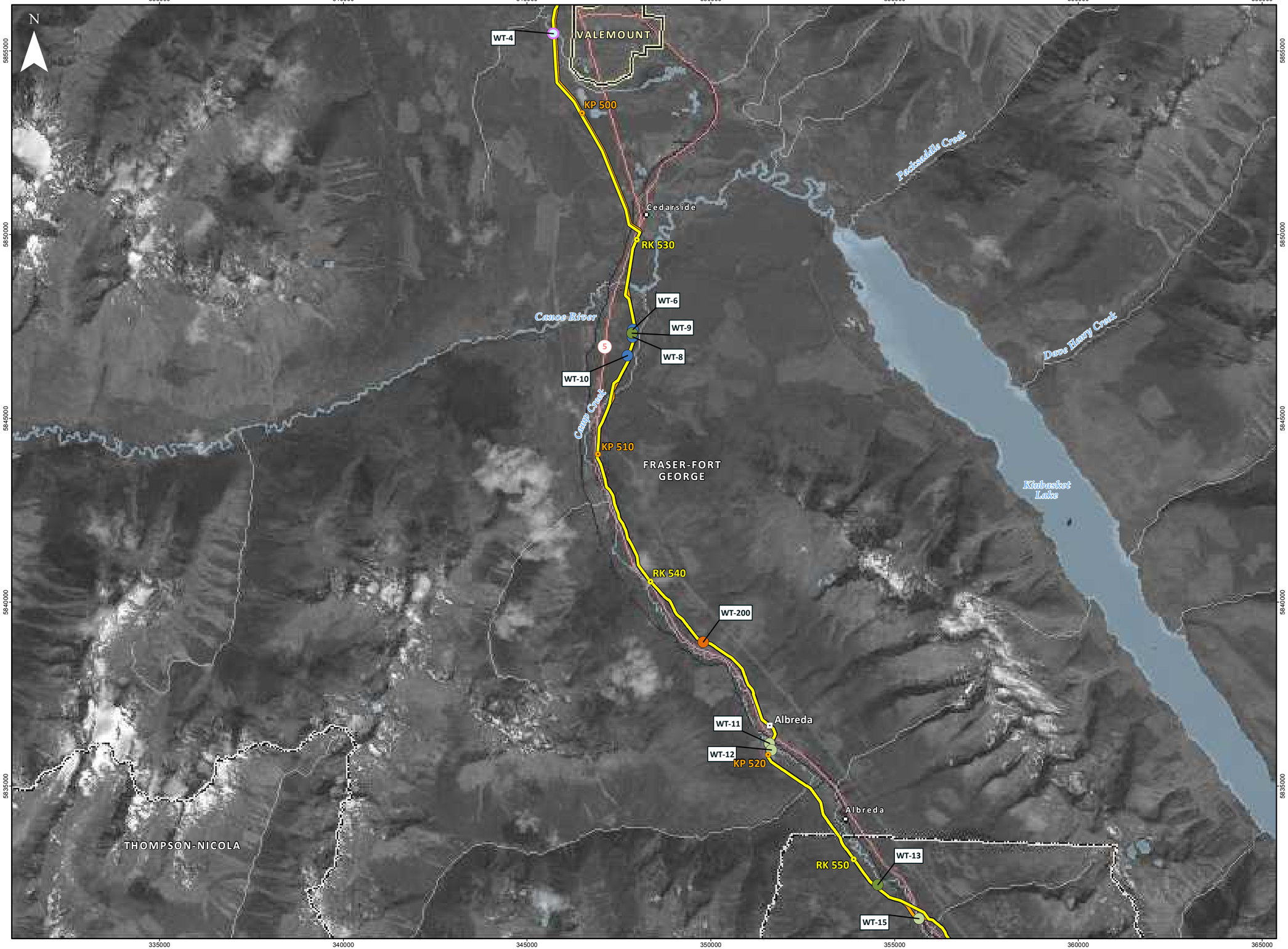

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TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 2 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
- Reference Kilometre Post (RK)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Proposed Power Line
- Terminal
- Pump Station (Pump Additions, Station Modifications and/or Scraper Facilities)
- New Pump Station (Proposed)
- Pump Station (Reactivated)
- Existing Pump Station
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- Paved Road
- Railway
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- Indian Reserve / Métis Settlement
- National Park / Provincial Park / Protected Area
- Municipal / District Boundary

Wetland Classifications

- Alkali Marsh
- Broad-leaf Treed Swamp
- Deep Marsh
- Mixedwood Treed Swamp
- Needle-leaf Treed Swamp
- Non-Woody Fen
- Open Water Pond
- Seasonal Emergent Marsh
- Shrubby Fen
- Shrubby Swamp
- Treed Bog
- Treed Fen

Projection: NAD 1983 UTM Zone 11N. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: BC FLNRO, 2012, IHS Inc., 2013, Natural Resources Canada, 2011; Geopolitical Boundaries: Natural Resources Canada, 2003, BC FLNRO, 2007; AltaLIS, 2013, IHS Inc., 2013, ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010, IHS Inc., 2011; Parks and Protected Areas: Natural Resources Canada, 2013, AltaLIS, 2012, Alberta Tourism, Parks and Recreation, 2012; BC FLNRO, 2008; Hyrdology: IHS Inc., 2004. B/W & Colour Imagery: 2005-2011 provided by KMC, 2012, NASA, 2005.

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MAP NUMBER			PAGE
201311_MAP_TERA_WT_00478_REV0			SHEET 2 OF 10
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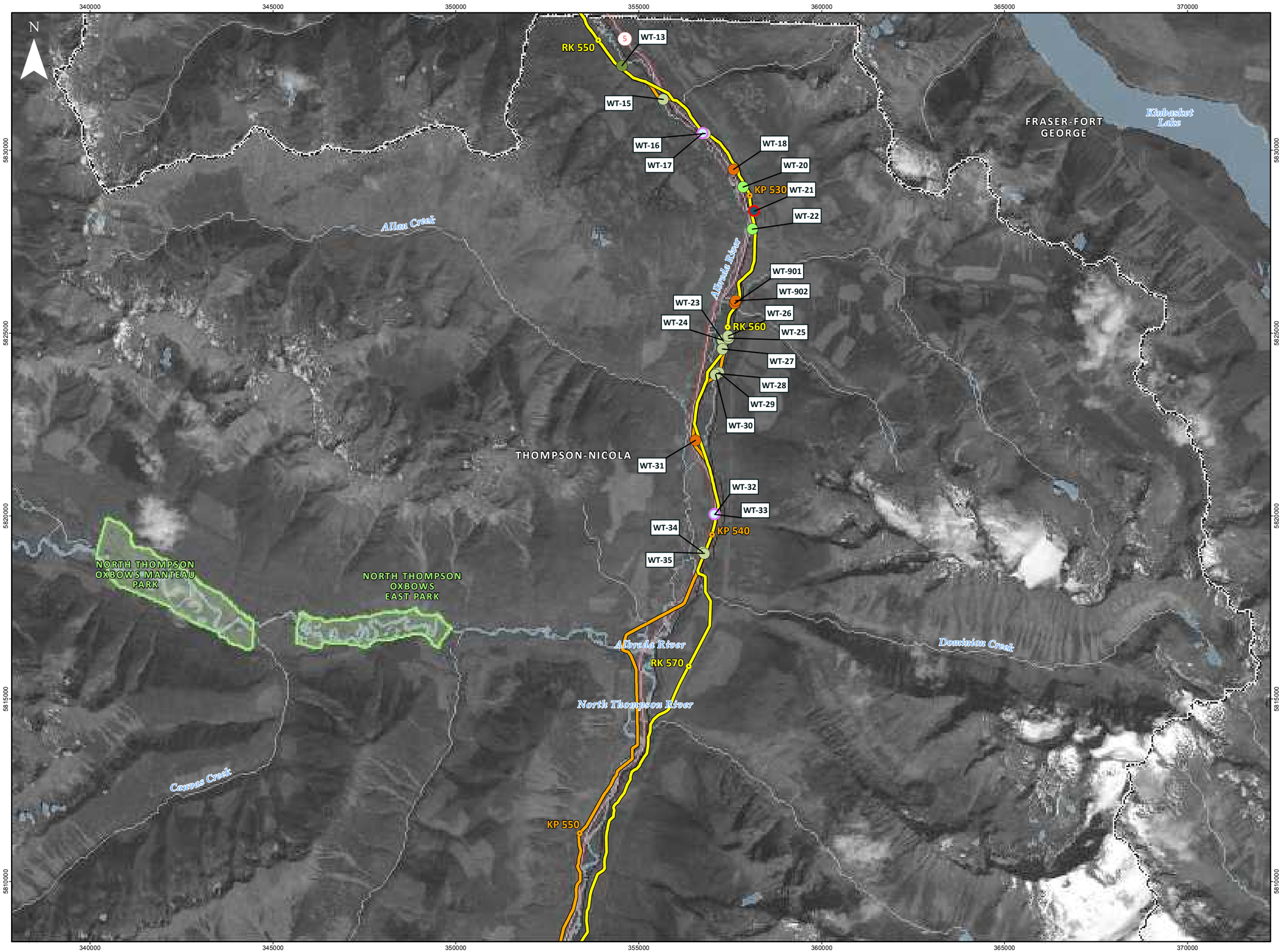

TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 3 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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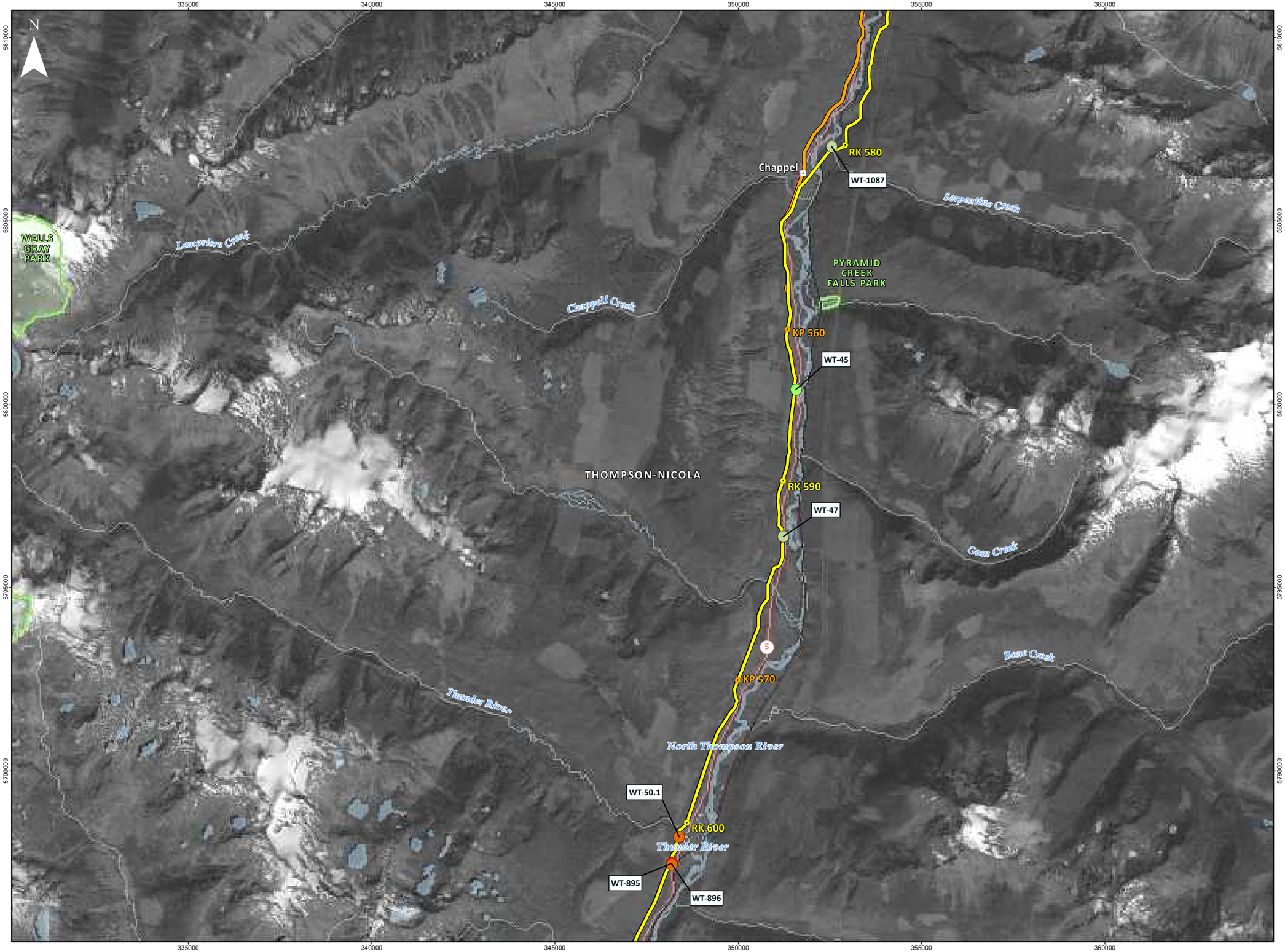

TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 4 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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- Trans Mountain Pipeline (TMPL)
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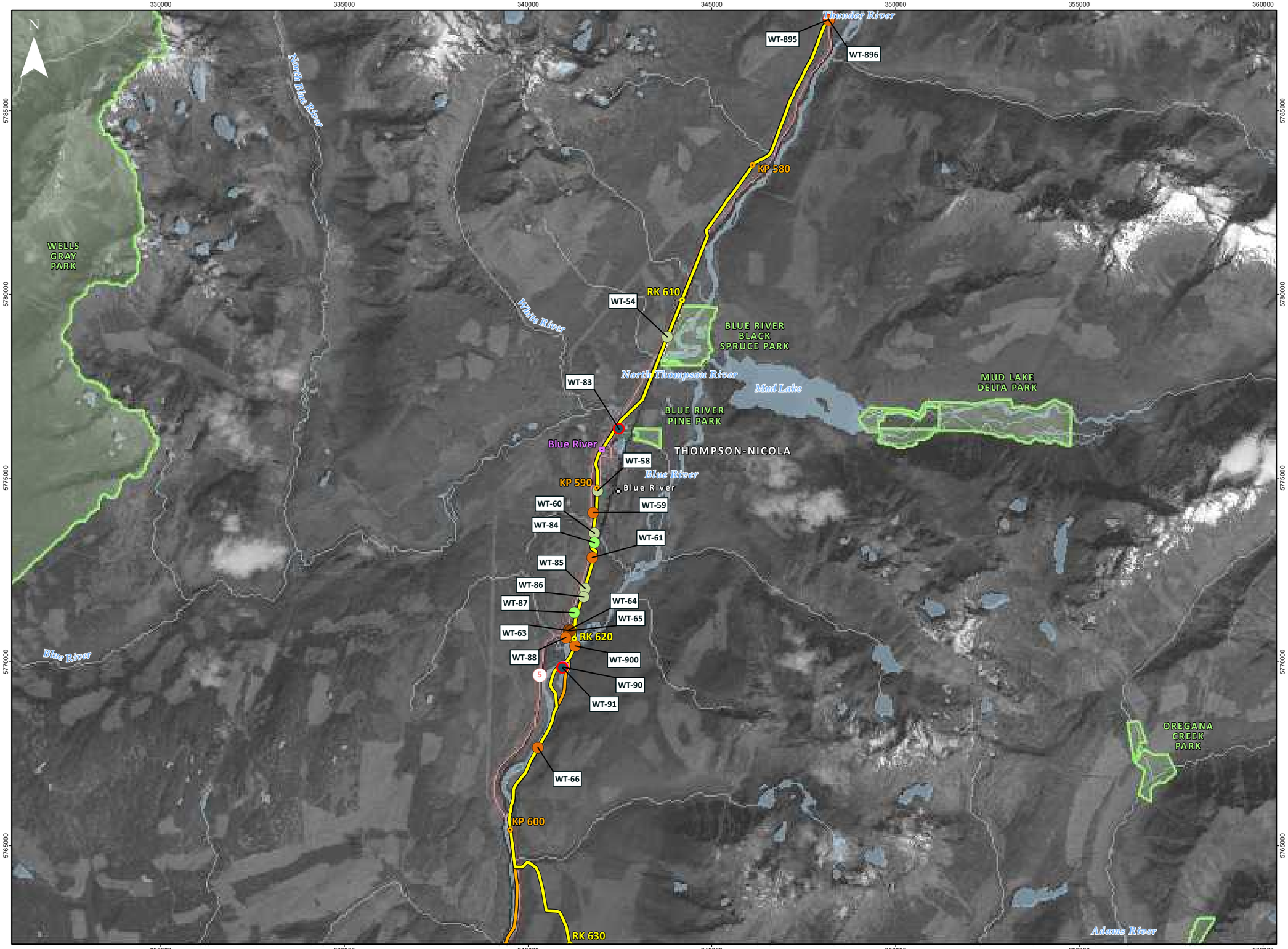

TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 5 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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- Trans Mountain Pipeline (TMPL)
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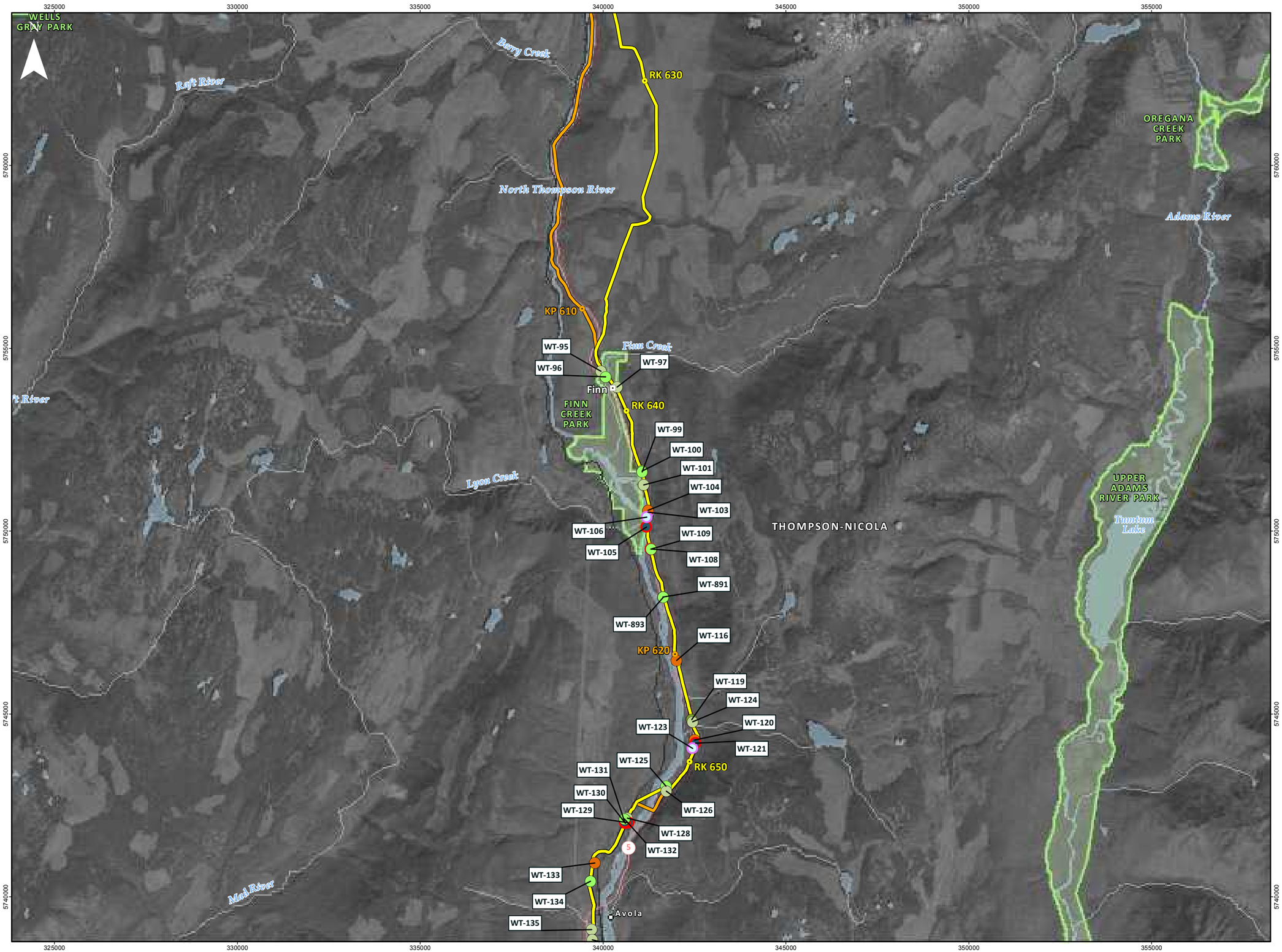

TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 6 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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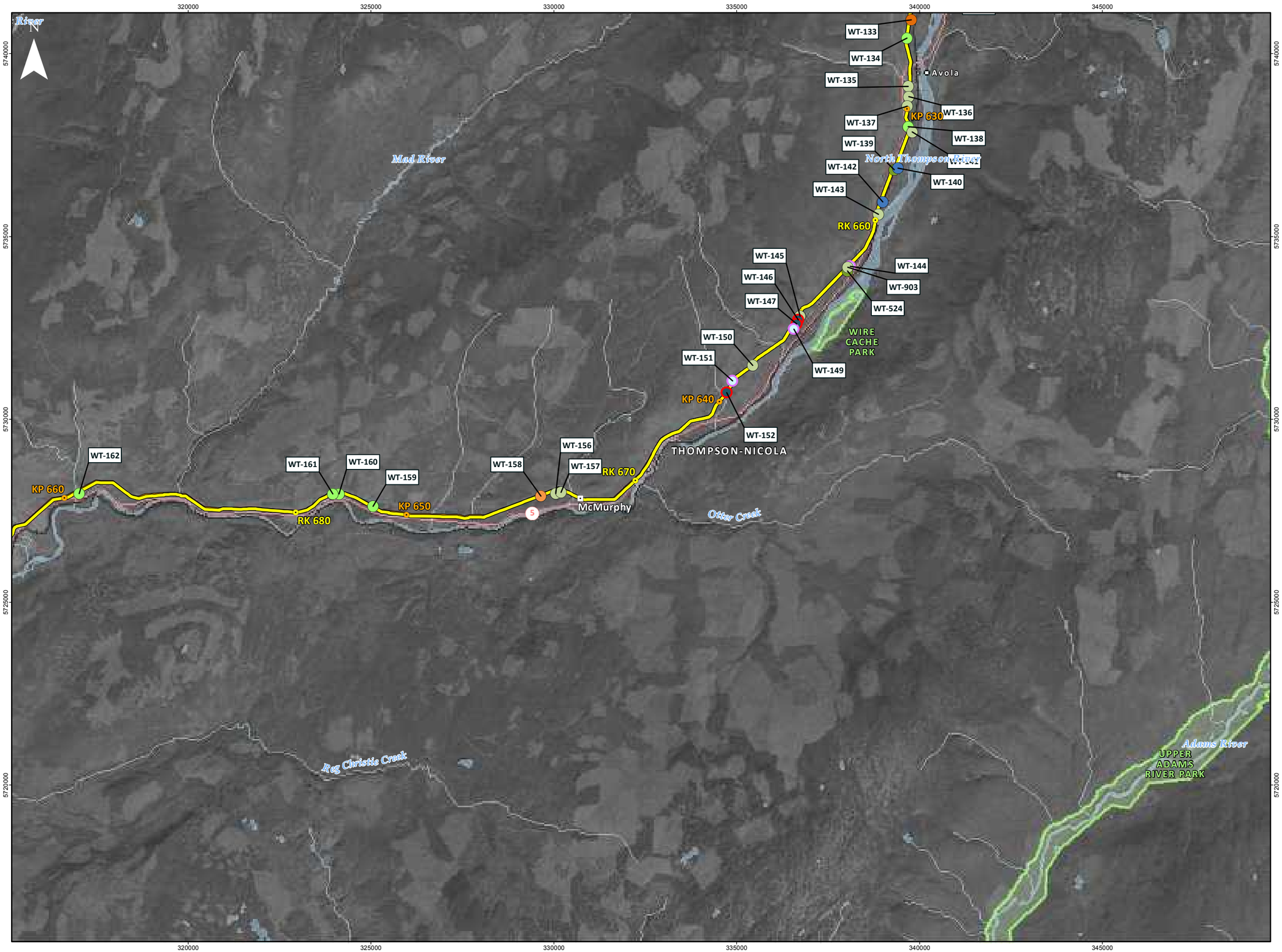

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 7 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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- Trans Mountain Pipeline (TMPL)
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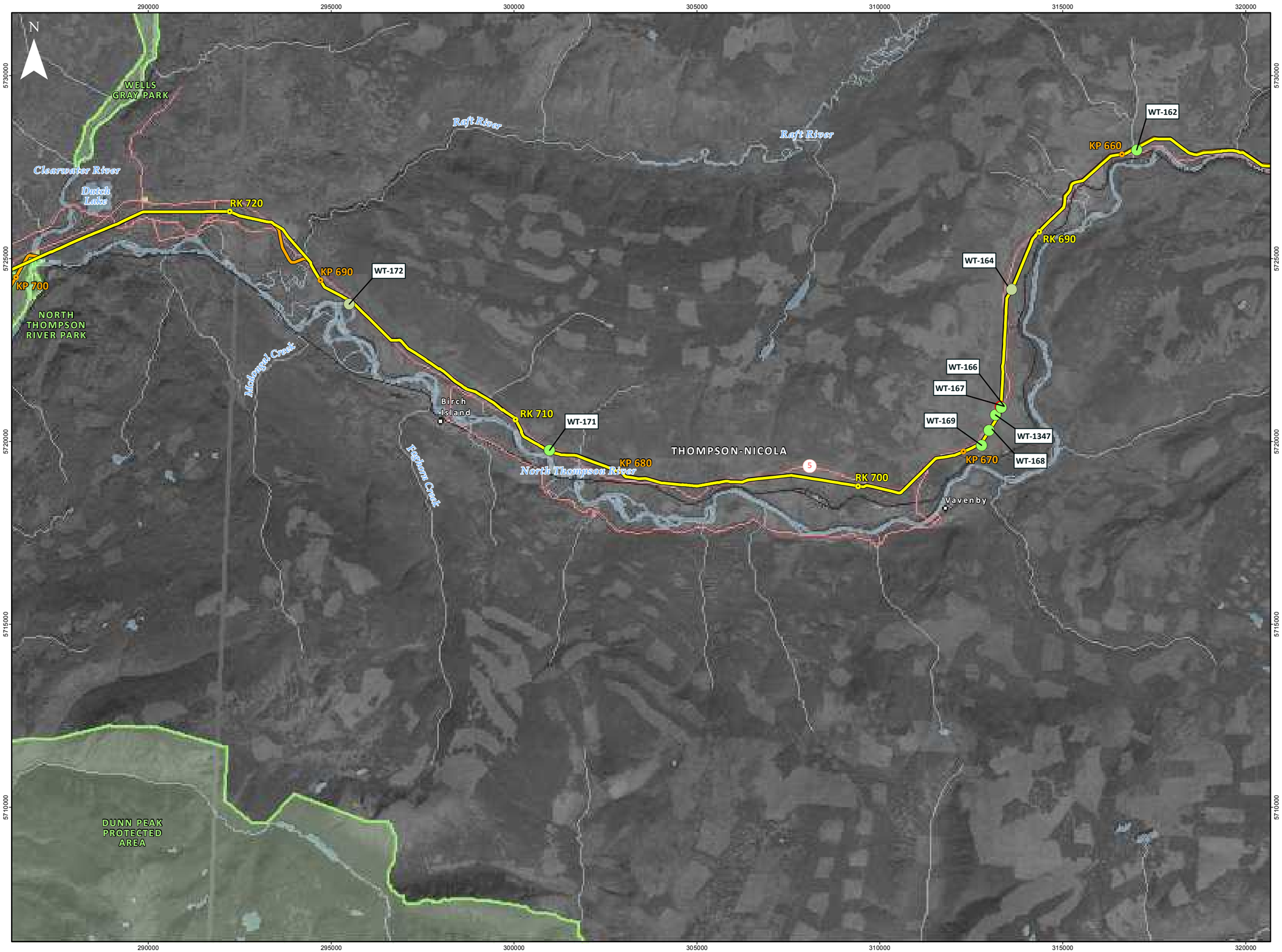

TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 8 OF 10

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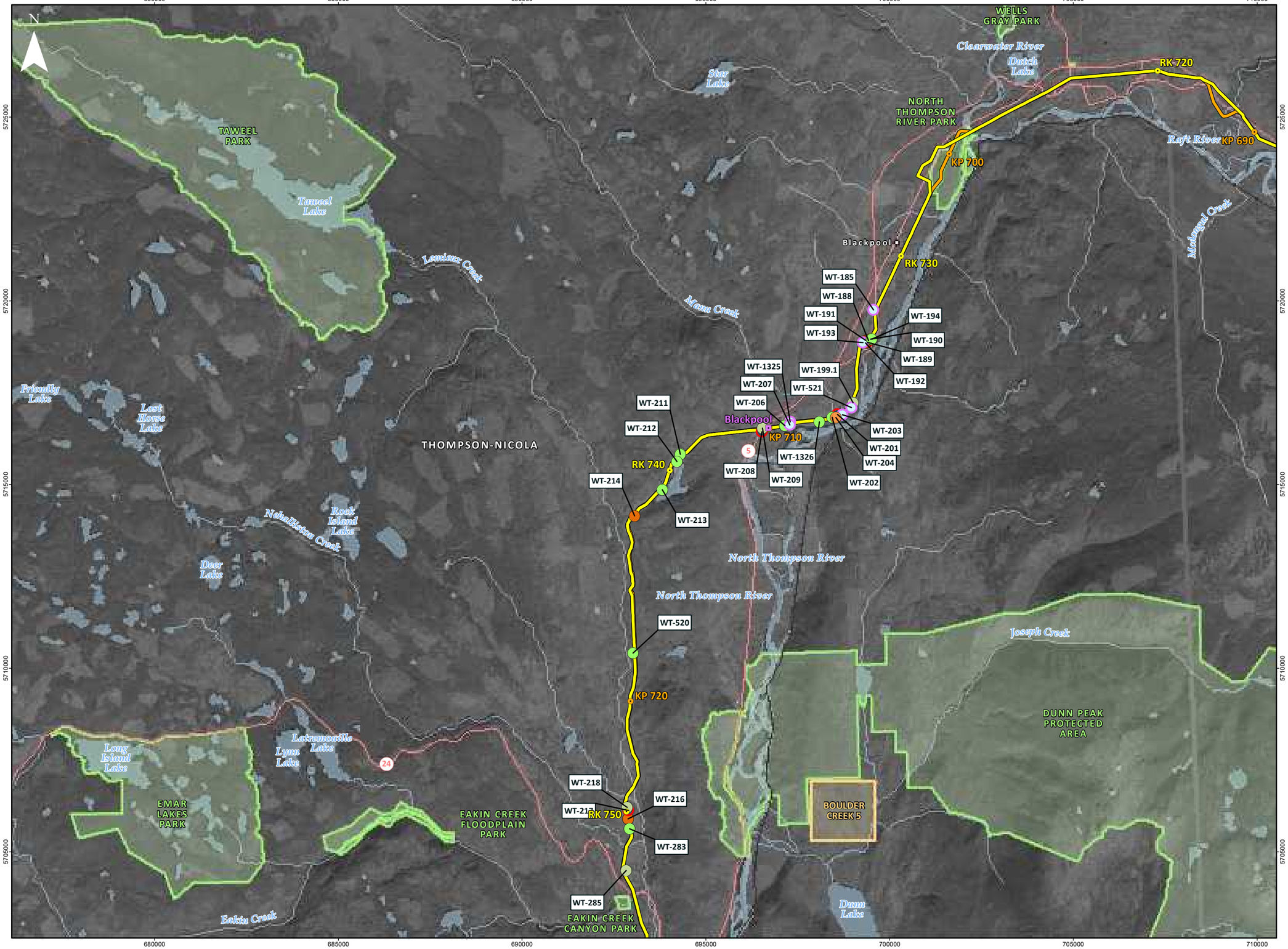

TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 9 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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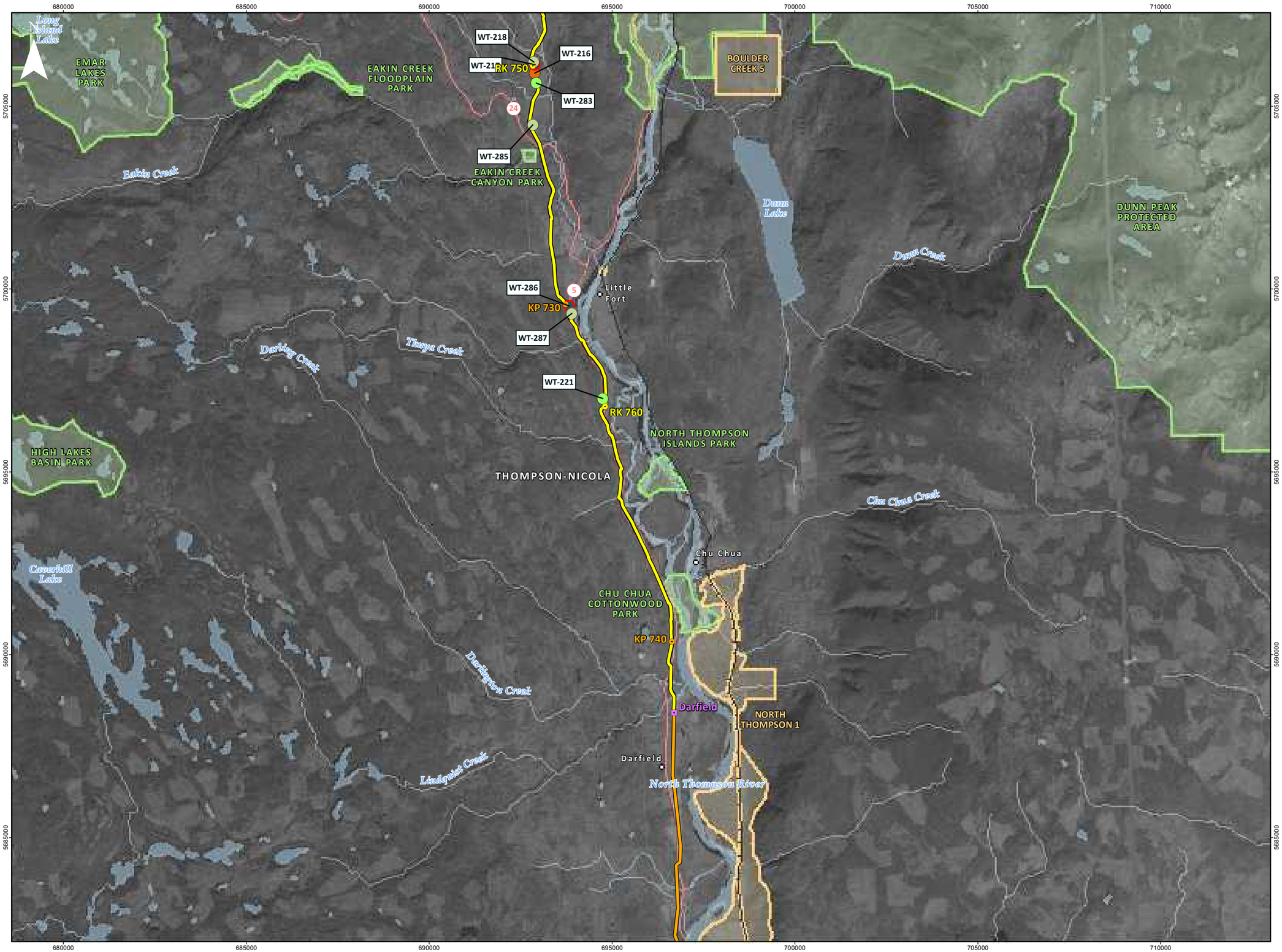

TRANS MOUNTAIN

FIGURE A2

WETLAND DELINEATION - HARGREAVES TO DARFIELD

SHEET 10 OF 10

TRANS MOUNTAIN EXPANSION PROJECT

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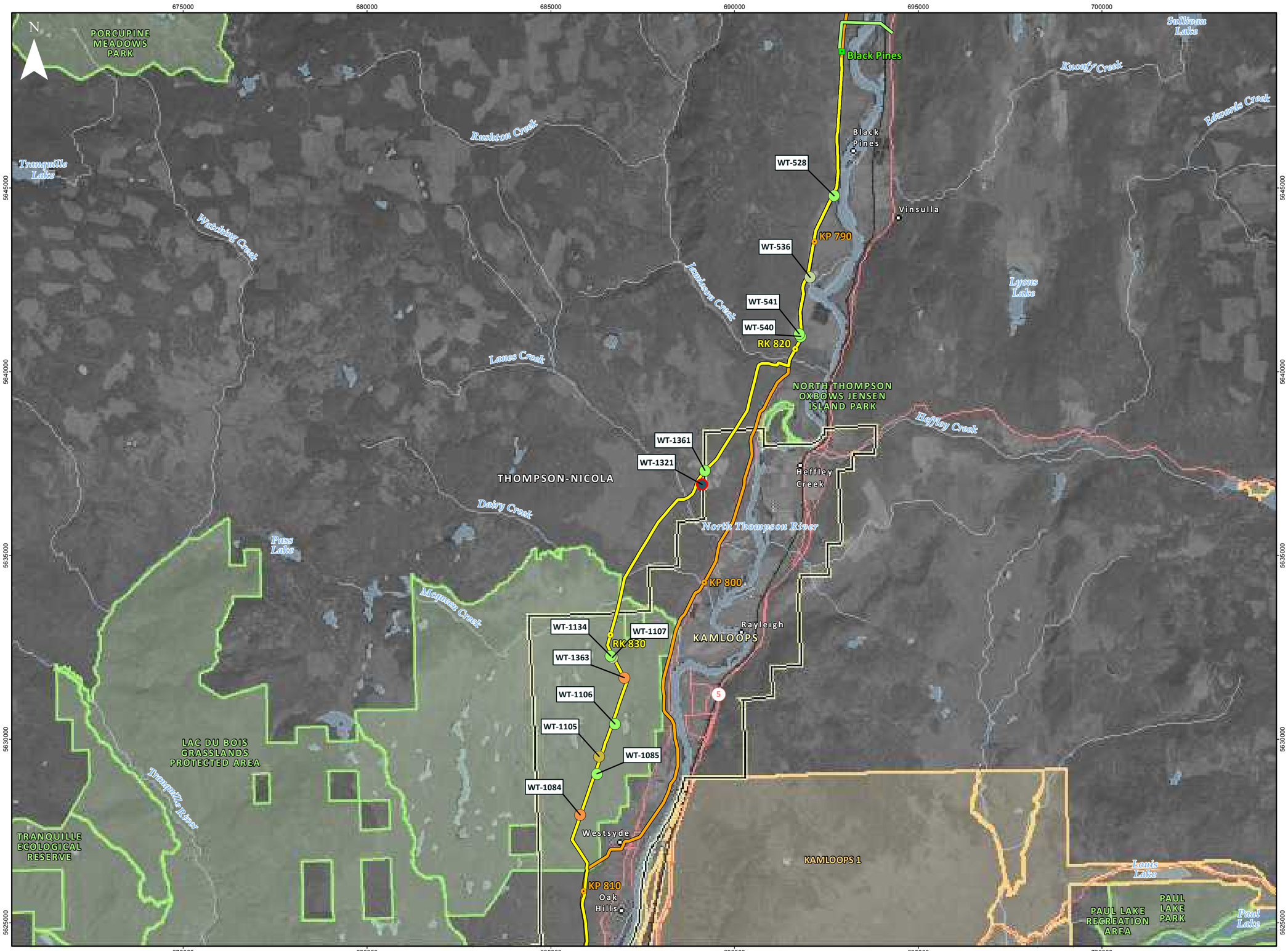

TRANS MOUNTAIN

FIGURE A3

WETLAND DELINEATION - BLACK PINES TO HOPE

SHEET 1 OF 8

TRANS MOUNTAIN EXPANSION PROJECT

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- Paved Road
- Railway
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- City / Town
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Wetland Classifications

- Alkali Marsh
- Broad-leaf Treed Swamp
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- Non-Woody Fen
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- Seasonal Emergent Marsh
- Shrubby Fen
- Shrubby Swamp
- Treed Bog
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Projection: NAD 1983 UTM Zone 10N. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: BC FLNRO, 2012, IHS Inc., 2013, Natural Resources Canada, 2011; Geopolitical Boundaries: Natural Resources Canada, 2003, BC FLNRO, 2007; AltaLIS, 2013, IHS Inc., 2013, ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010, IHS Inc., 2011; Parks and Protected Areas: Natural Resources Canada, 2013, AltaLIS, 2012, Alberta Tourism, Parks and Recreation, 2012; BC FLNRO, 2008; Hydrology: IHS Inc., 2004. B/W & Colour Imagery: 2005-2011 provided by KMC, 2012, NASA, 2005.

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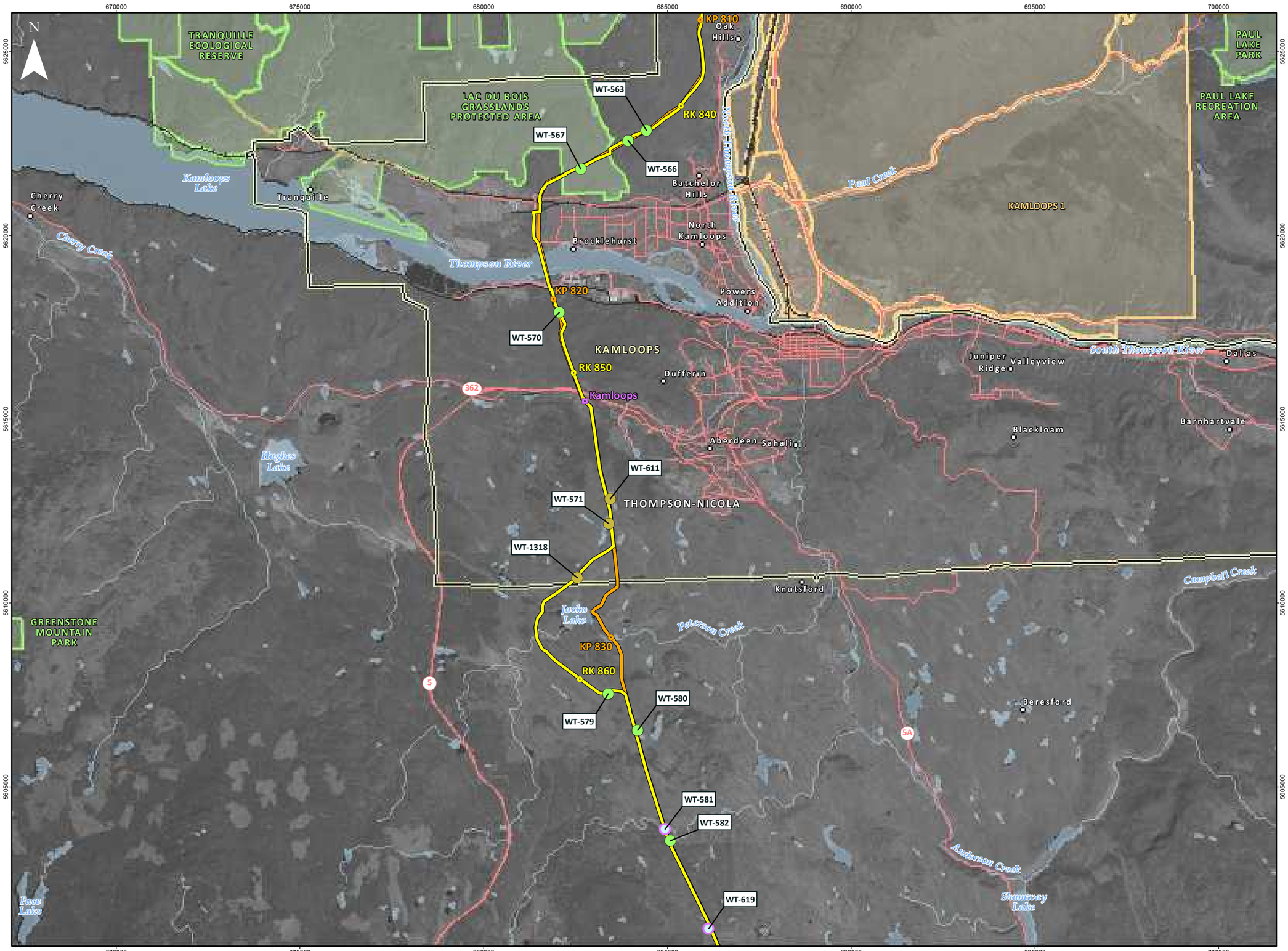

TRANS MOUNTAIN

FIGURE A3

WETLAND DELINEATION - BLACK PINES TO HOPE

SHEET 2 OF 8

TRANS MOUNTAIN EXPANSION PROJECT

- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
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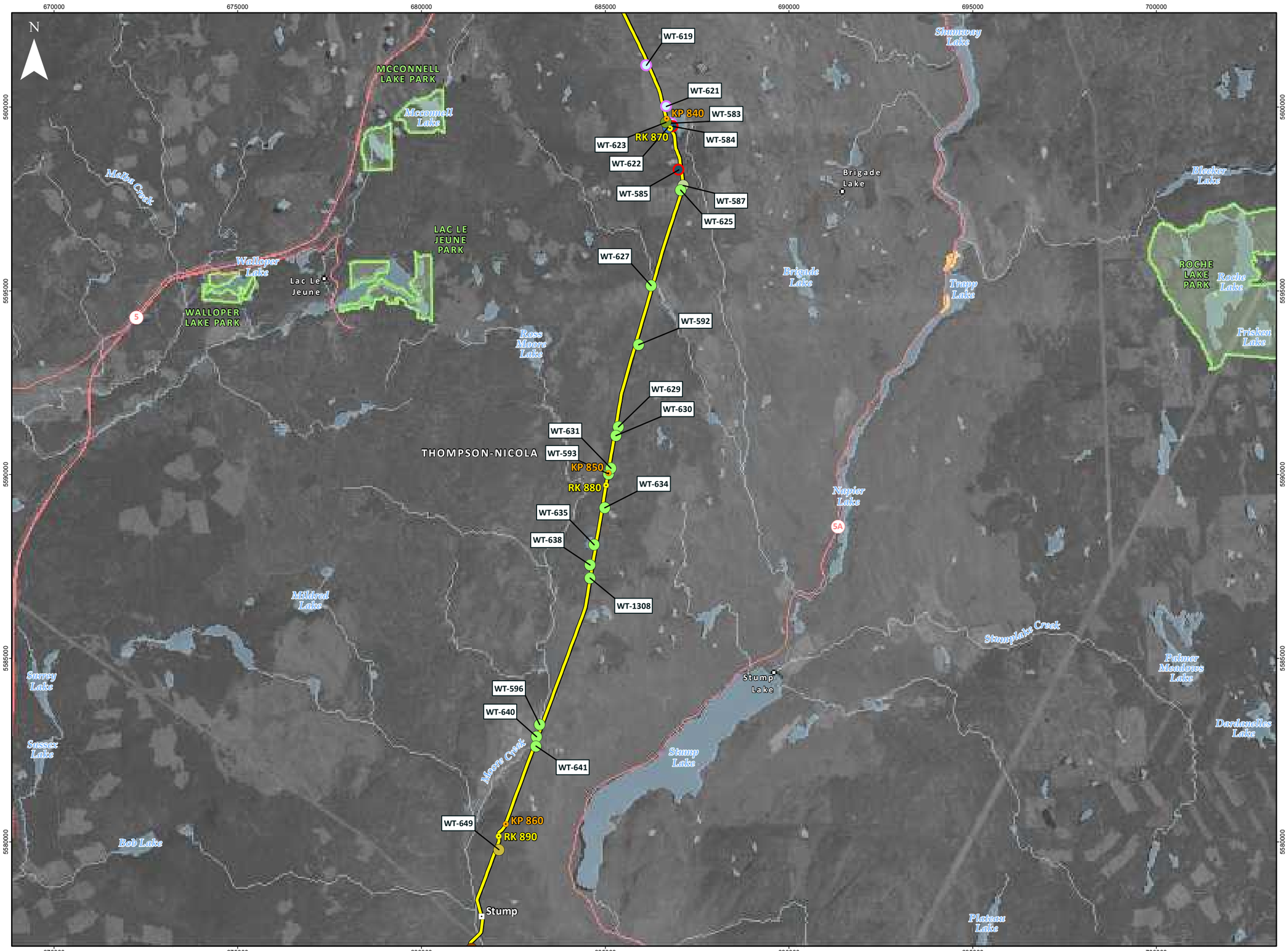

TRANS MOUNTAIN

FIGURE A3

WETLAND DELINEATION - BLACK PINES TO HOPE

SHEET 3 OF 8

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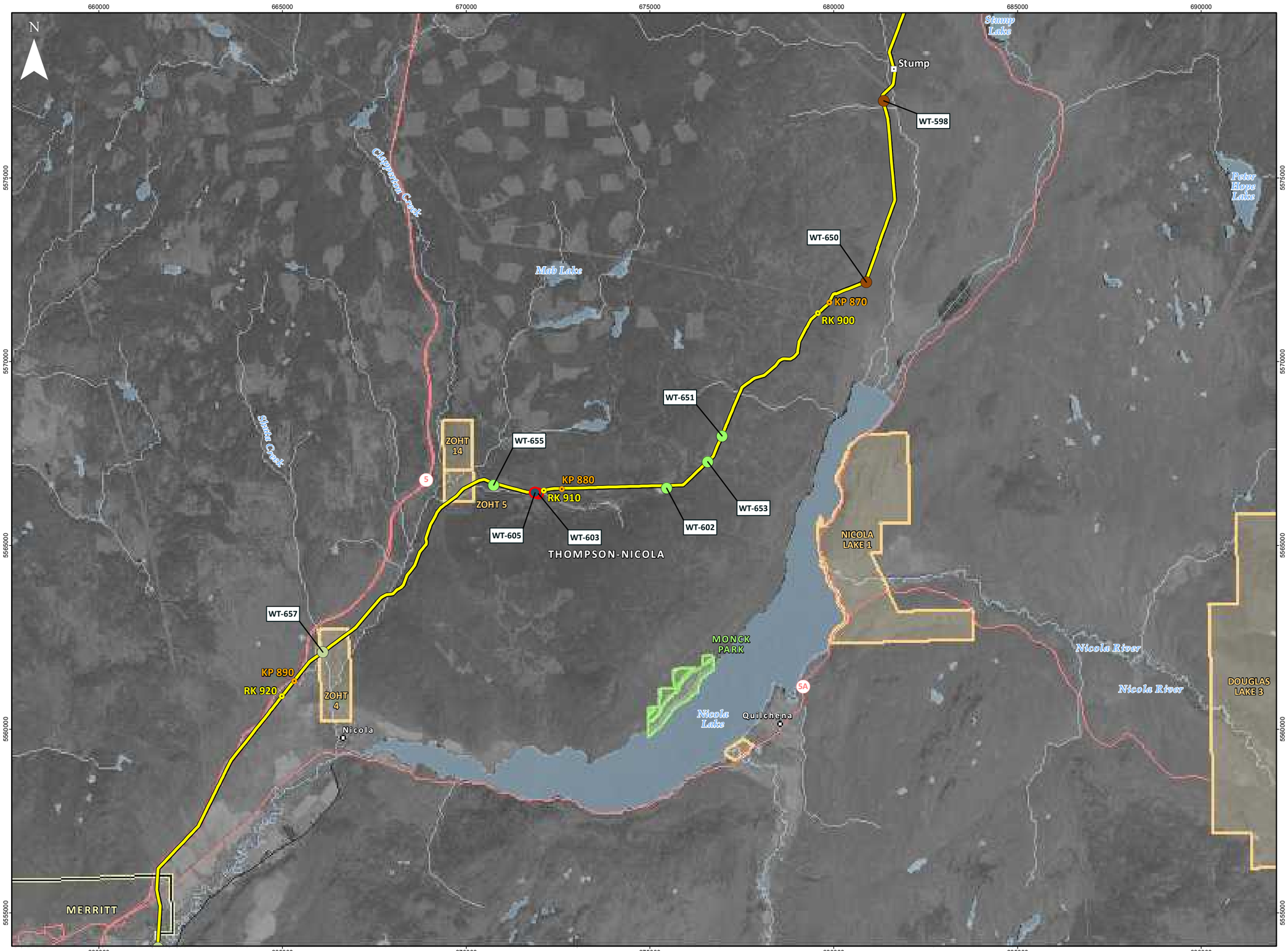

TRANS MOUNTAIN

FIGURE A3

WETLAND DELINEATION - BLACK PINES TO HOPE

SHEET 4 OF 8

TRANS MOUNTAIN EXPANSION PROJECT

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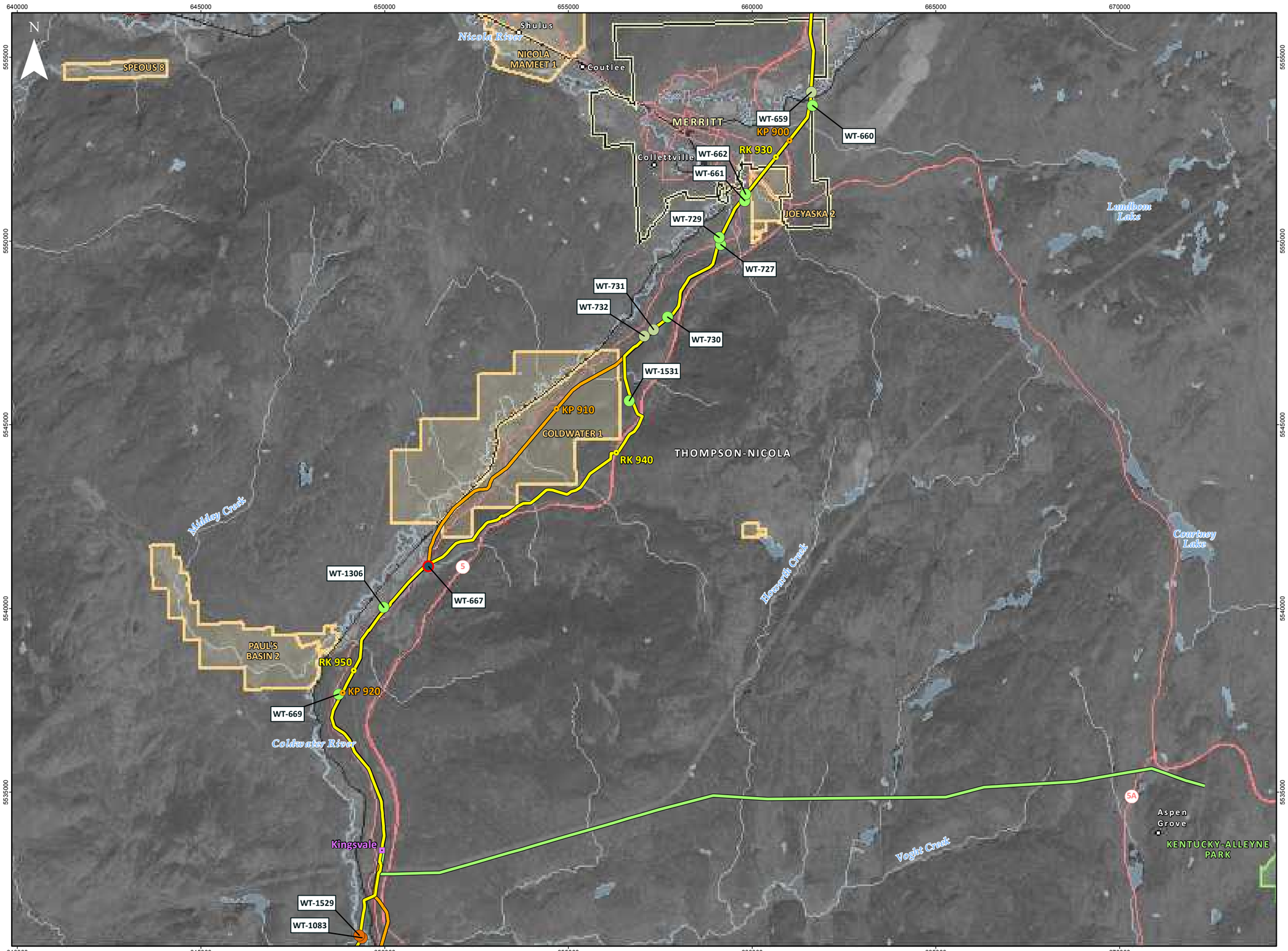

TRANS MOUNTAIN

FIGURE A3

WETLAND DELINEATION - BLACK PINES TO HOPE

SHEET 5 OF 8

TRANS MOUNTAIN EXPANSION PROJECT

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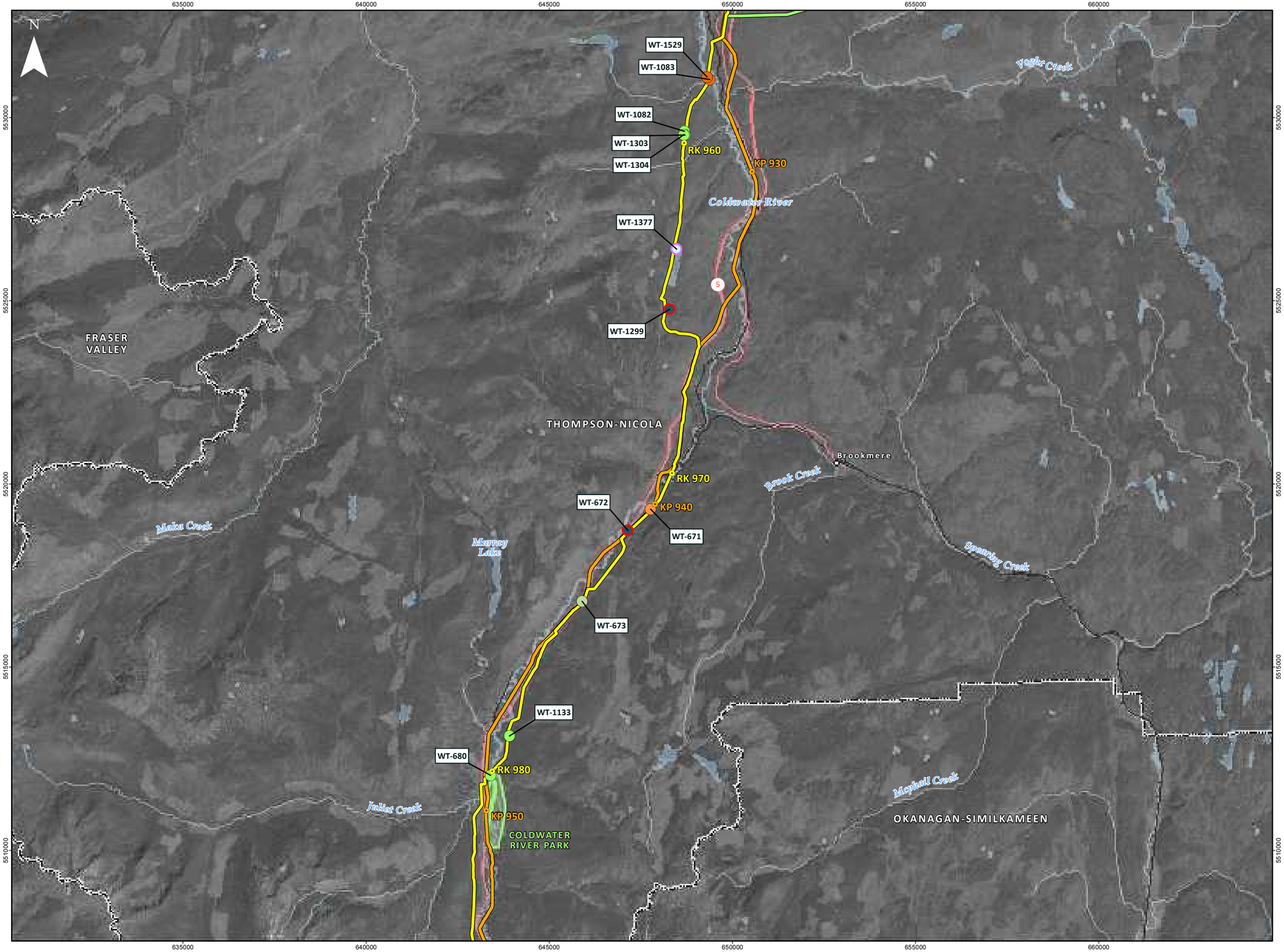

TRANS MOUNTAIN

FIGURE A3

WETLAND DELINEATION - BLACK PINES TO HOPE

SHEET 6 OF 8

TRANS MOUNTAIN EXPANSION PROJECT

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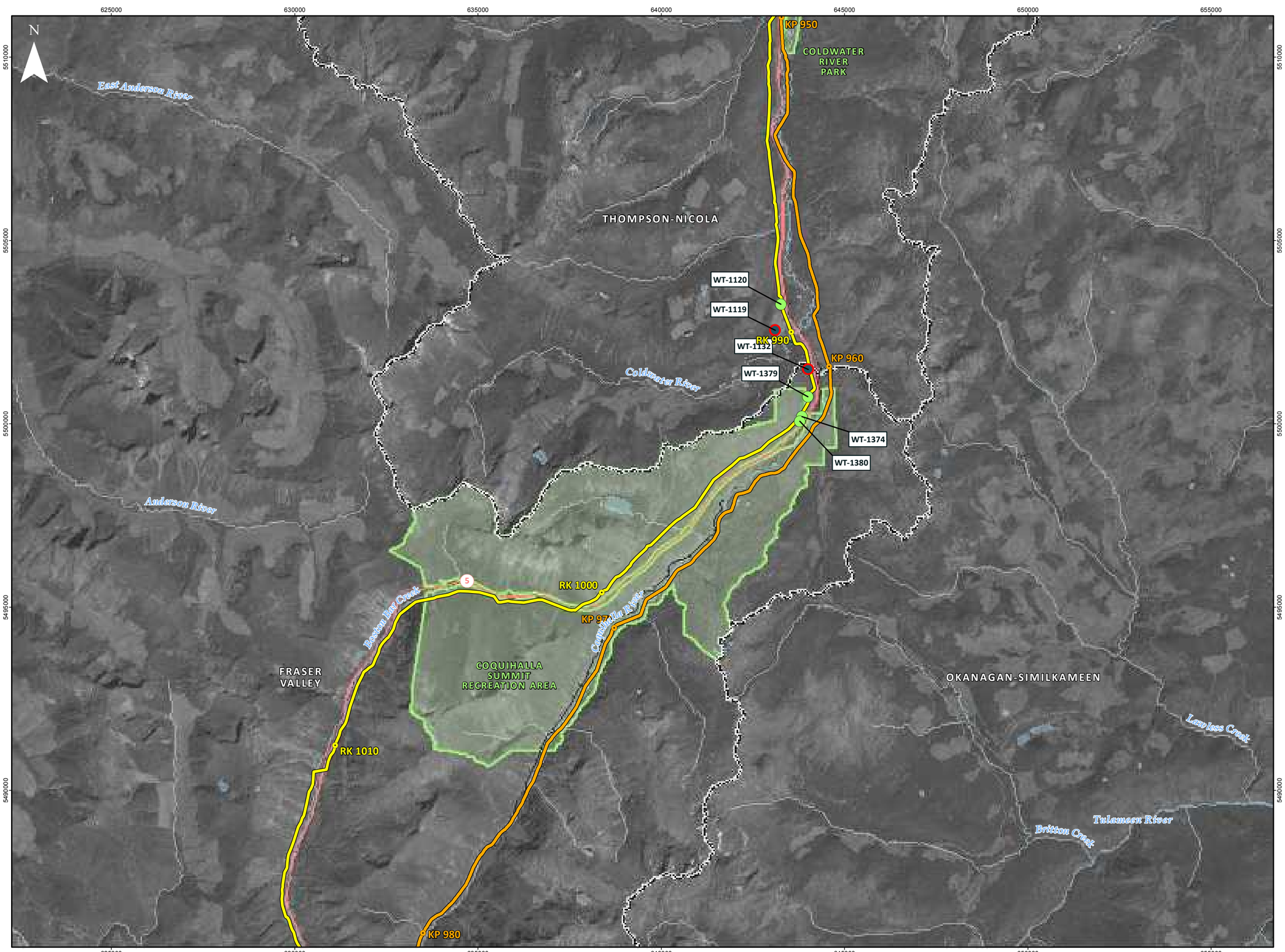

TRANS MOUNTAIN

FIGURE A3

WETLAND DELINEATION - BLACK PINES TO HOPE

SHEET 7 OF 8

TRANS MOUNTAIN EXPANSION PROJECT

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- Trans Mountain Pipeline (TMPL)
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N

Fraser River

EMORY CREEK PARK

Squeah

Dogwood Valley

Choate

1

PUCKATHOLETCHIN 11

SWAHLISEAH 14

TRAFALGAR FLAT 13

Haig

AYWAWWIS 15

SCHKAM 2

Coquihalla River

Kawkawa Lake

KP 1010

RK 1040

Othello

7

5

Hope

WT-1271

WT-712

COQUIHALLA CANYON PARK

NICOLUM RIVER PARK

177

Nicolum River

SILVER LAKE PARK

Silver Lake

3

KP 1000

RK 1030

FRASER VALLEY

Sowaqua Creek

COQUIHALLA RIVER PARK

KP 990

Dewdney Creek

RK 1020

KP 980

OKANAGAN-SIMILKAMEEN

Eight Mile Creek

201311_MAP_TERA_WT_00478_Rev0.mxd

TRANS MOUNTAIN

FIGURE A3

WETLAND DELINEATION - BLACK PINES TO HOPE

SHEET 8 OF 8

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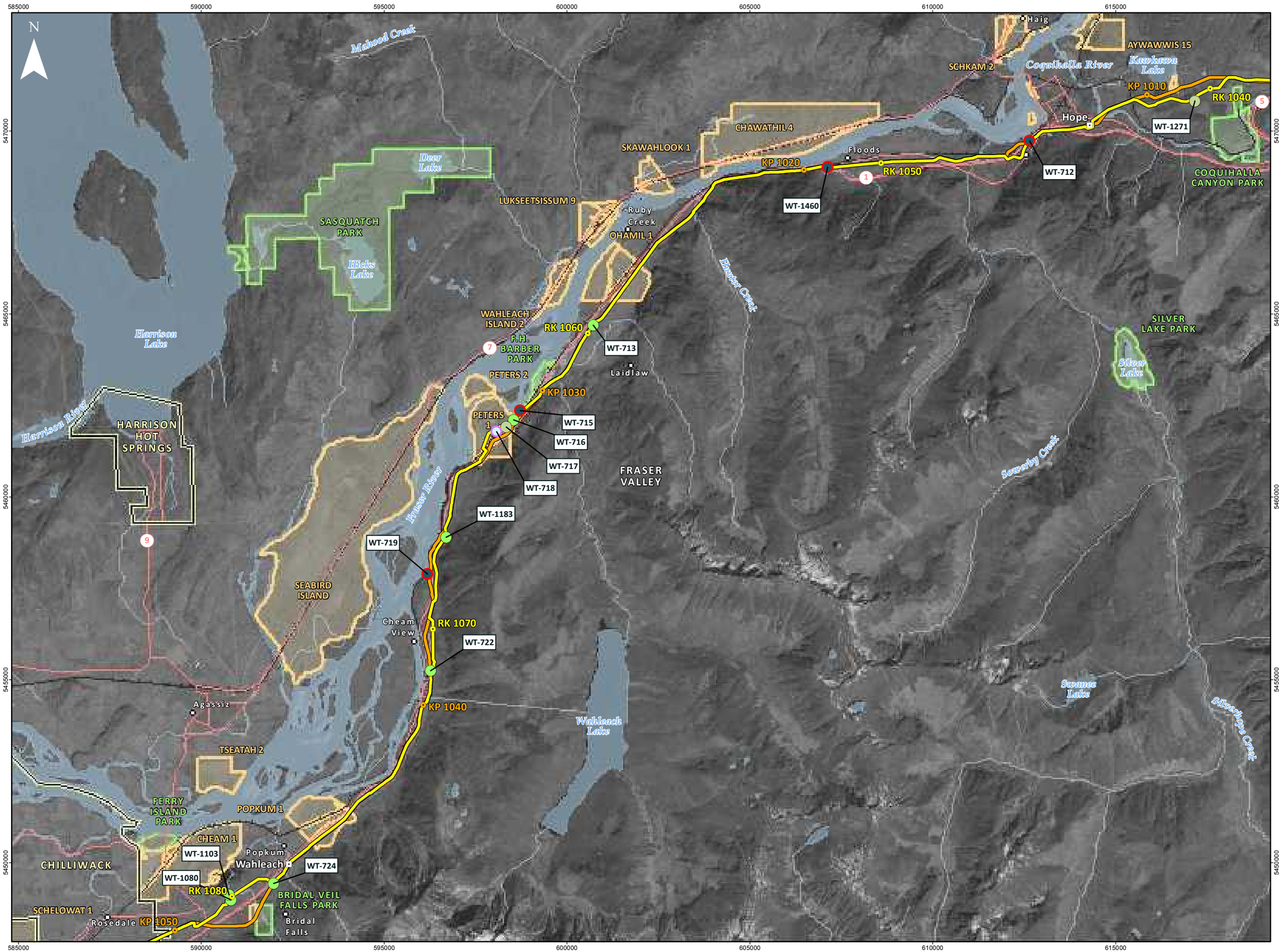

TRANS MOUNTAIN

FIGURE A4

WETLAND DELINEATION - HOPE TO WESTRIDGE

SHEET 1 OF 4

TRANS MOUNTAIN EXPANSION PROJECT

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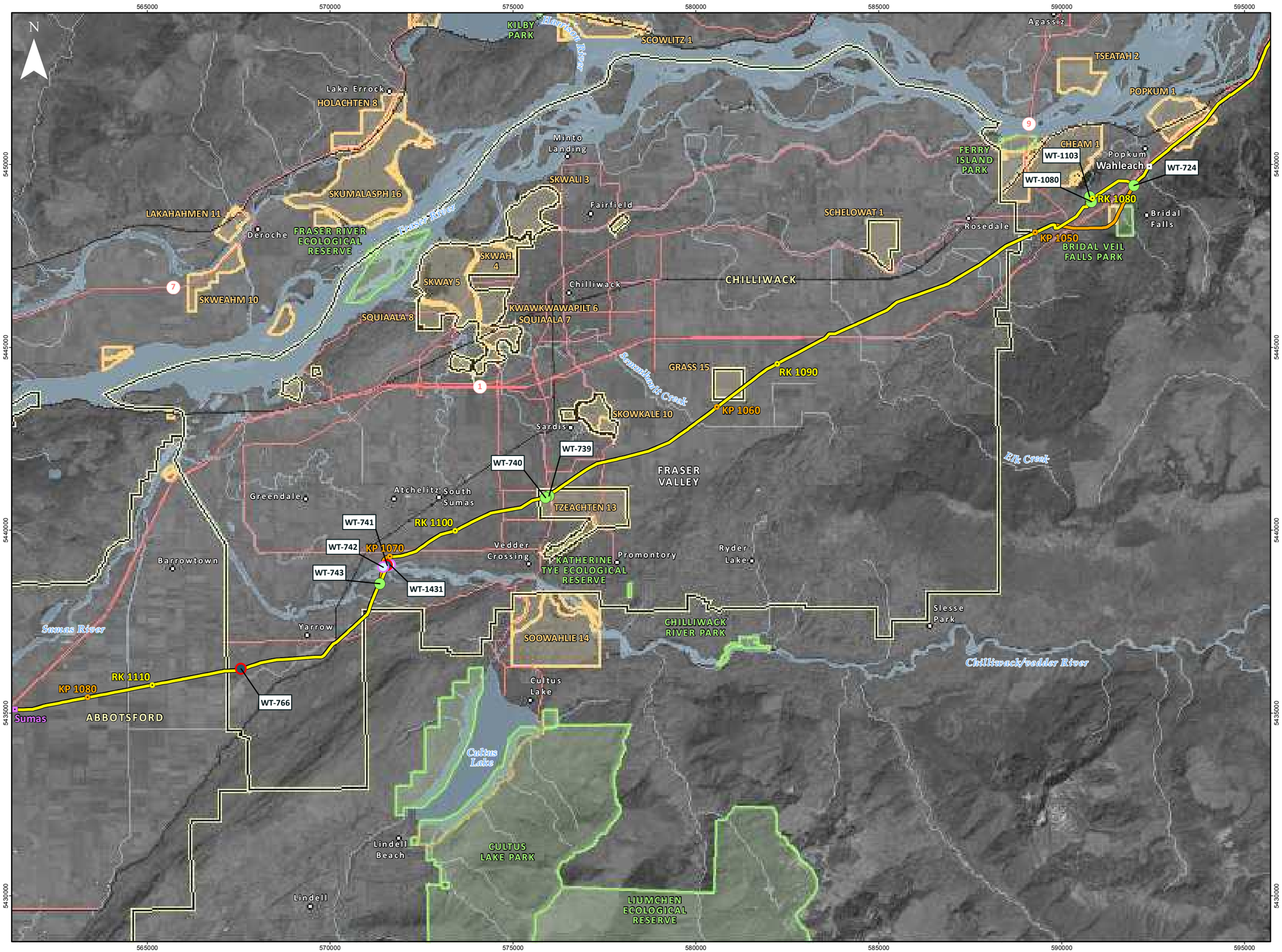

TRANS MOUNTAIN

FIGURE A4

WETLAND DELINEATION - HOPE TO WESTRIDGE

SHEET 2 OF 4

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0 1 2 3 4 km

ALL LOCATIONS APPROXIMATE

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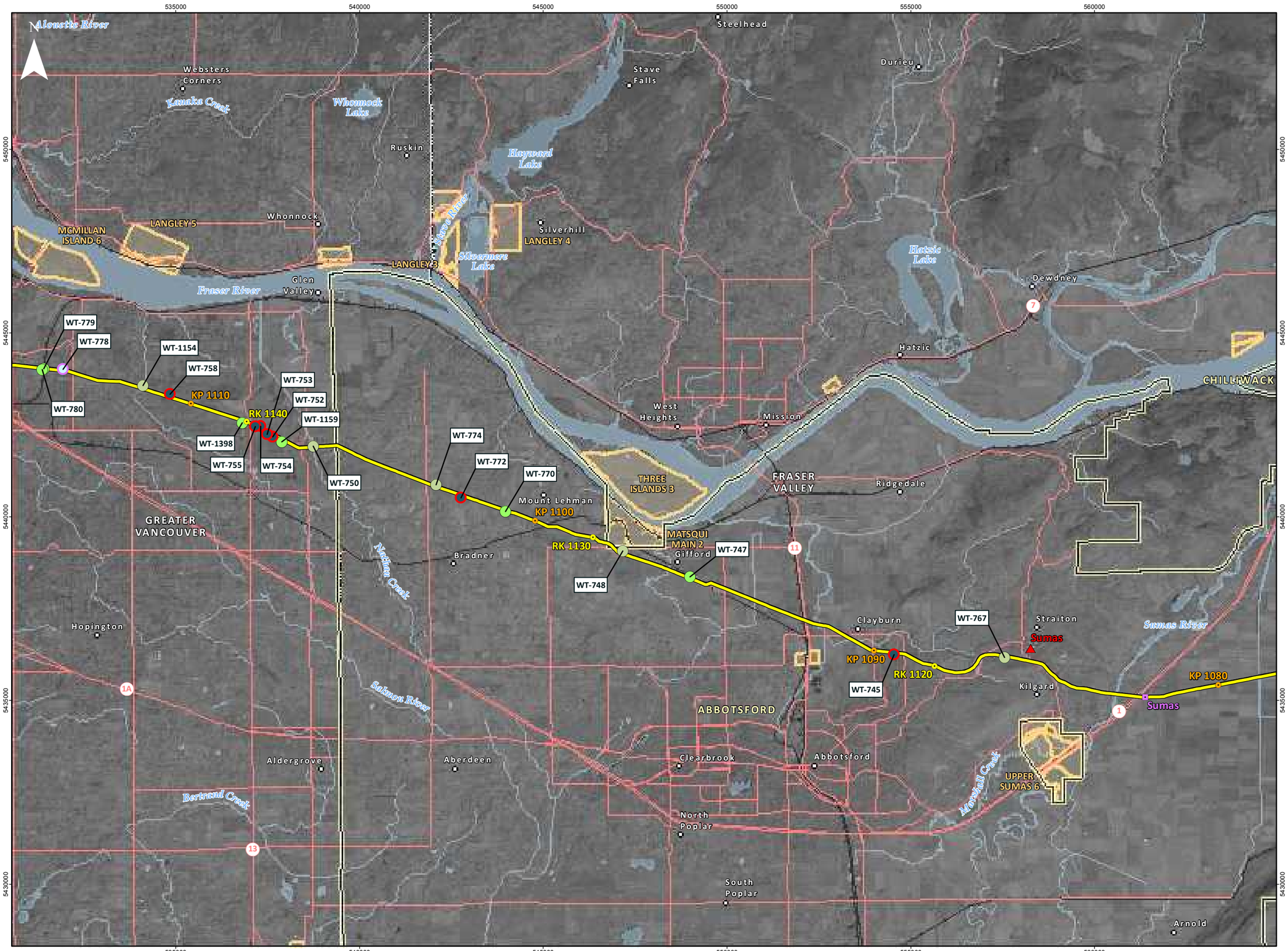

TRANS MOUNTAIN

FIGURE A4

WETLAND DELINEATION - HOPE TO WESTRIDGE

SHEET 3 OF 4

TRANS MOUNTAIN EXPANSION PROJECT

- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
- Reference Kilometre Post (RK)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Proposed Power Line
- Terminal
- Pump Station (Pump Additions, Station Modifications and/or Scraper Facilities)
- New Pump Station (Proposed)
- Pump Station (Reactivated)
- Existing Pump Station
- Highway
- Paved Road
- Railway
- Village / Hamlet / Community
- City / Town
- Indian Reserve / Métis Settlement
- National Park / Provincial Park / Protected Area
- Municipal / District Boundary

Wetland Classifications

- Alkali Marsh
- Broad-leaf Treed Swamp
- Deep Marsh
- Mixedwood Treed Swamp
- Needle-leaf Treed Swamp
- Non-Woody Fen
- Open Water Pond
- Seasonal Emergent Marsh
- Shrubby Fen
- Shrubby Swamp
- Treed Bog
- Treed Fen

Projection: NAD 1983 UTM Zone 10N. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: BC FLNRO, 2012, IHS Inc., 2013, Natural Resources Canada, 2011; Geopolitical Boundaries: Natural Resources Canada, 2003, BC FLNRO, 2007; AltaLIS, 2013, IHS Inc., 2013, ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010, IHS Inc., 2011; Parks and Protected Areas: Natural Resources Canada, 2013, AltaLIS, 2012, Alberta Tourism, Parks and Recreation, 2012; BC FLNRO, 2008; Hydrology: IHS Inc., 2004. B/W & Colour Imagery: 2005-2011 provided by KMC, 2012, NASA, 2005.

tera ENVIRONMENTAL CONSULTANTS

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

MAP NUMBER: 201311_MAP_TERA_WT_00478_REV0		PAGE: SHEET 3 OF 4
DATE: December 2013	TERA REF.: 7894	REVISION: 0
SCALE: 1:100,000	PAGE SIZE: 11x17	DISCIPLINE: WT
DRAWN: AJS	CHECKED: TGG	DESIGN: TGG

0 1 2 3 4 km

ALL LOCATIONS APPROXIMATE

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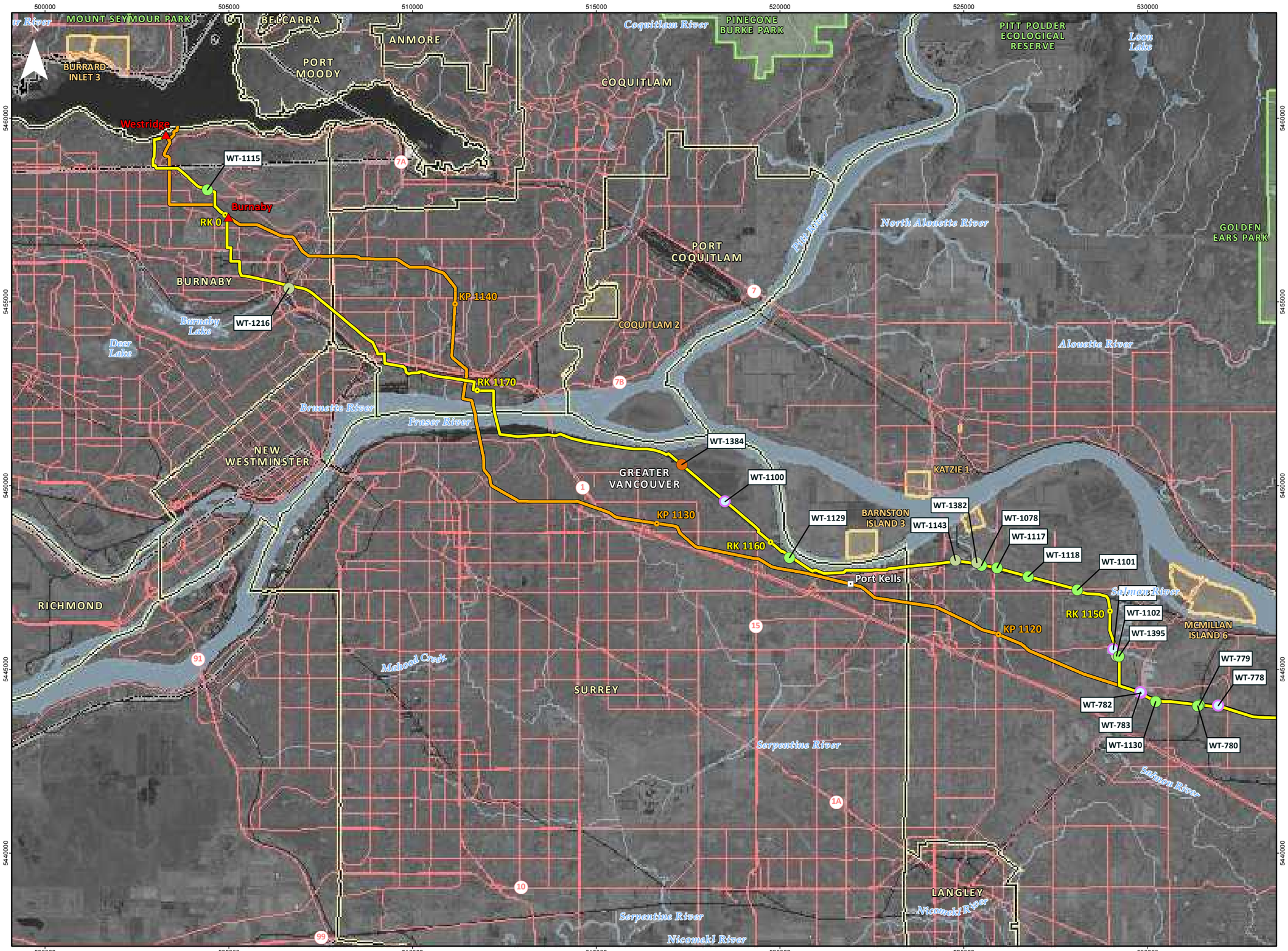

TRANS MOUNTAIN

FIGURE A4

WETLAND DELINEATION - HOPE TO WESTRIDGE

SHEET 4 OF 4

TRANS MOUNTAIN EXPANSION PROJECT

- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
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- Trans Mountain Expansion Project Proposed Pipeline Corridor
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- Terminal
- Pump Station (Pump Additions, Station Modifications and/or Scraper Facilities)
- New Pump Station (Proposed)
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Wetland Classifications

- Alkali Marsh
- Broad-leaf Treed Swamp
- Deep Marsh
- Mixedwood Treed Swamp
- Needle-leaf Treed Swamp
- Non-Woody Fen
- Open Water Pond
- Seasonal Emergent Marsh
- Shrubby Fen
- Shrubby Swamp
- Treed Bog
- Treed Fen

Projection: NAD 1983 UTM Zone 10N. Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPI, Aug. 23, 2013; Transportation: BC FLNRO, 2012, IHS Inc., 2013, Natural Resources Canada, 2011; Geopolitical Boundaries: Natural Resources Canada, 2003, BC FLNRO, 2007; AltaLIS, 2013, IHS Inc., 2013, ESRI, 2005; First Nation Lands: Government of Canada, 2013, AltaLIS, 2010, IHS Inc., 2011; Parks and Protected Areas: Natural Resources Canada, 2013, AltaLIS, 2012, Alberta Tourism, Parks and Recreation, 2012; BC FLNRO, 2008; Hydrology: IHS Inc., 2004. B/W & Colour Imagery: 2005-2011 provided by KMC, 2012, NASA, 2005.

tera ENVIRONMENTAL CONSULTANTS

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MAP NUMBER: 201311_MAP_TERA_WT_00478_REV0		PAGE: SHEET 4 OF 4
DATE: December 2013	TERA REF.: 7894	REVISION: 0
SCALE: 1:100,000	PAGE SIZE: 11x17	DISCIPLINE: WT
DRAWN: AJS	CHECKED: TGG	DESIGN: TGG

0 1 2 3 4 km

ALL LOCATIONS APPROXIMATE

201311_MAP_TERA_WT_00478_Rev0.mxd

APPENDIX B

SITE CARDS

Wetland ID: WT-1414 **CWCS Wetland Classification:** Basin Marsh (seasonal emergent marsh) **Province:** Alberta

UTM: 12U 321249 E 5932704 N **Legal Location:** 2-25-52-26 W4M **RK Start:** 43.9 **RK End:** 44.0

Overall Function

Functional Status:
- High-Moderate Functional Condition (51%): This wetland demonstrates the majority of the wetland functions expected from this type of wetland with little to no anthropogenic disturbance present within wetland.
- The emergent vegetation and standing water enables nutrient capture and retention, promoting additional vegetation growth and improved water quality.
- Low areas within the wetland cause water to pool during most of the year, which provides potential breeding habitat for amphibians.
- This wetland provides surface water retention for the surrounding fields. The surface water stored in this wetland during the spring and early summer reduces flooding and functions to maintain soil moisture and water table levels during dry times of year in the localized area.

General

Surrounding Land Use:
- This wetland is surrounded by cultivated land.

Existing Disturbance(s):
- Adjacent to a highway.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from groundwater and precipitation.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Dynamic: significant lateral flow and/or strong vertical water table fluctuations through mineral soils.

Surface Water
- No open water present. Standing water present, less than 0.5 m deep (70% wetland area).

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Wet.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- Aspen (*Populus tremuloides*).

Shrub Strata:
- Willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Cattail species (*Typha sp.*).

Moss Strata:
- None observed.

Noxious Weeds:
- Canada thistle (creeping thistle) (*Cirsium arvense*).

Undesirable Species:
- Common nettle (*Urtica dioica*), annual sow-thistle (*Sonchus oleraceus*) and curled dock (*Rumex crispus*).

Habitat Function – Wildlife

Wildlife Habitat Features:
- Shorebird foraging habitat.
- Standing water available for amphibians.

Wildlife Observations:
- Boreal chorus frog heard at time of wetland survey.
- Canada goose, American coot, northern shoveler and muskrat observed at time of wetland survey.

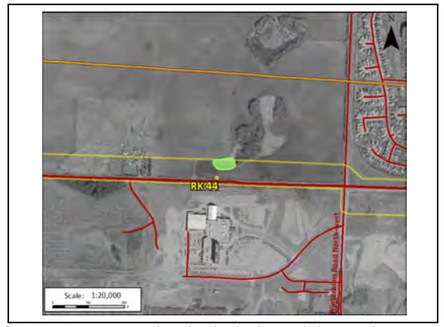

Plate 1 Imagery overview showing basin marsh (seasonal emergent marsh).

Plate 2 Aerial overview showing basin marsh (seasonal emergent marsh) (May 10, 2013).

Plate 3 View northeast through basin marsh (seasonal emergent marsh) showing standing water (May 28, 2013).

Plate 4 View east through basin marsh (seasonal emergent marsh) showing emergent vegetation (May 28, 2013).

Plate 5 View west through basin marsh (seasonal emergent marsh) showing standing water and emergent vegetation (May 28, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-246 **CWCS Wetland Classification:** Basin Marsh (seasonal emergent marsh) **Province:** Alberta

UTM: 11U 689978 E 5938018 N **Legal Location:** 2-7-53-1 W5M **RK Start:** 74.7 **RK End:** 74.7

Overall Function

Functional Status:
- High-Moderate Functional Condition (72%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The surface water storage in this seasonal wetland maintains an elevated water table and increased soil moisture throughout the spring and summer. It retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and fur-bearers.

General

Surrounding Land Use:
- This wetland is surrounded by upland forested land.

Existing Disturbance(s):
- Adjacent to a highway.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Ponds and Potholes: sites associated with small waterbodies.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Dynamic: significant lateral flow and/or strong vertical water table fluctuations through mineral soils.

Surface Water
- No open water present. Standing water present, less than 0.5 m deep (5% wetland area).

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Aspen (*Populus tremuloides*).

Shrub Strata:
- Willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Tufted hair grass (*Deschampsia cespitosa*), water smartweed (*Polygonum amphibium*) and horsetail species (*Equisetum sp.*).

Moss Strata:
- None observed

Noxious Weeds:
- No noxious weeds observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees and snags present in wetland.
- Suitable forage for ungulates (presence of willow species).
- Suitable cover for songbirds (woody vegetation present within wetland).
- Standing water available for amphibians.

Wildlife Observations:
- Wood frog, deer tracks and ungulate browsing were observed at time of wetland survey.

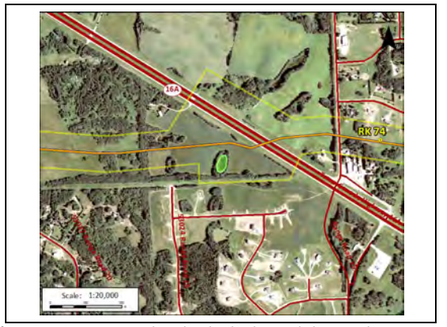

Plate 1 Imagery overview showing basin marsh (seasonal emergent marsh).

Plate 2 Aerial overview showing basin marsh (seasonal emergent marsh) (August 16, 2012).

Plate 3 View east though central portion of basin marsh (seasonal emergent marsh) showing standing water (August 13, 2012).

Plate 4 View north through basin marsh (seasonal emergent marsh) showing standing water (August 13, 2012).

Plate 5 View southeast though basin marsh (seasonal emergent marsh) showing standing water and emergent vegetation (August 13, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-260 **CWCS Wetland Classification:** Riparian Shallow Open Water (open water pond) **Province:** Alberta

UTM: 11U 679687 E 5938272 N **Legal Location:** 6-7-53-2 W5M **RK Start:** 85.0 **RK End:** 85.1

Overall Function

Functional Status:

- High-Moderate Functional Condition (57%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The surface water storage in this permanent wetland maintains an elevated water table and increased soil moisture in spring, summer and fall. It retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- This large wetland complex helps to regulate local and regional climate as well as catchment hydrology.
- The emergent vegetation and open water enables nutrient capture and retention, promoting additional vegetation growth and improved water quality.
- Provides early spring, summer and fall open water habitat and forage for waterfowl, amphibians and other wildlife such as semi-aquatic mammals (*e.g.*, muskrat, beaver).

General

Surrounding Land Use:
- This wetland is surrounded by upland forested land.

Existing Disturbance(s):
- Adjacent to residential area.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Very dynamic: highly dynamic surface water regime.

Surface Water Microtopography:
- Open water present, 0.5 - 1 m deep (40% wetland area). Standing water present, less than 0.5 m deep (10% wetland area).
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Aspen (*Populus tremuloides*) and white spruce (*Picea glauca*).

Shrub Strata:
- Willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Common tall manna grass (*Glyceria grandis*), reed canary grass (*Phalaris arundinacea*), cattail species (*Typha sp.*), sedge species (*Carex sp.*) and duckweed species (*Lemna sp.*).

Moss Strata:
- None observed.

Noxious Weeds:
- Canada (creeping) thistle (*Cirsium arvense*).

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees present in wetland.
- Suitable nesting cover for waterfowl (vegetation greater than 50 cm in height).
- Suitable cover for songbirds (woody vegetation present within wetland).
- Open and standing water available for amphibians.
- Suitable rearing areas for waterfowl (cover and access to water).

Wildlife Observations:
- Squirrel species observed at time of wetland survey.
- Black-capped chickadee, American black duck, pied-billed grebe and bufflehead observed at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland is a fish-bearing wetland (AB-28) (see Fisheries (Alberta) Technical Report in Volume 5C).

Plate 1 Imagery overview showing riparian shallow open water (open water pond).

Plate 2 Overview showing riparian shallow open water (open water pond) (August 16, 2012).

Plate 3 View east through riparian shallow open water (open water pond) showing open water along proposed pipeline corridor (August 15, 2012).

Plate 4 View southeast through riparian shallow open water (open water pond) showing graminoid vegetation (August 15, 2012).

Plate 5 View south showing open water and graminoid vegetation within riparian shallow open water (open water pond) (August 15, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-344 **CWCS Wetland Classification:** Riparian Marsh (seasonal emergent marsh) **Province:** Alberta

UTM: 11U 673742 E 5938423 N **Legal Location:** 10-9-53-3 W5M **RK Start:** 91.0 **RK End:** KP 91.1

Overall Function

Functional Status:
- High-Moderate Functional Condition (53%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The surface water storage in this seasonal wetland maintains an elevated water table and increased soil moisture in spring, summer and fall. It retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- Provides shallow water habitat migratory waterfowl and shore birds from early spring to mid- to late summer.

General

Surrounding Land Use:
- This wetland is surrounded by upland forested land.

Existing Disturbance(s):
- Adjacent to existing pipeline and transmission right-of-way.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Ponds and Potholes: sites associated with small waterbodies.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Dynamic: significant lateral flow and/or strong vertical water table fluctuations through mineral soils.

Surface Water
- No open water present. Standing water present, less than 0.5 m deep (30% wetland area).

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- Aspen (*Populus tremuloides*).

Shrub Strata:
- Willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Reed canary grass (*Phalaris arundinacea*), sedge species (*Carex sp.*), rush species (*Juncus sp.*), duckweed species (*Lemna sp.*) and cattail species (*Typha sp.*).

Moss Strata:
- None observed.

Noxious Weeds:
- Canada (creeping) thistle (*Cirsium arvense*).

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees present in wetland.
- Suitable nesting cover present for waterfowl (vegetation greater than 50 cm in height).
- Suitable rearing areas present for waterfowl (cover and access to water).
- Suitable cover for songbirds (woody vegetation present within wetland).

Wildlife Observations:
- Songbird species and red-tailed hawk heard at time of wetland survey.
- Deer tracks and shorebird species were observed at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland is associated with an Unnamed Tributary to Kilini Creek (AB-3) (see Fisheries (Alberta) Technical Report in Volume 5C).

Wildlife:
- Beaver modified.

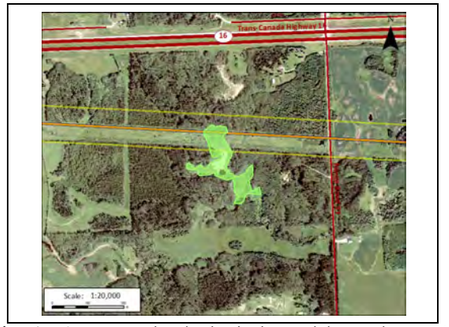

Plate 1 Imagery overview showing riparian marsh (seasonal emergent marsh).

Plate 2 Overview showing riparian marsh (seasonal emergent marsh). (August 16, 2012).

Plate 3 View southwest through riparian marsh (seasonal emergent marsh) showing standing water (August 15, 2012).

Plate 4 View north through riparian marsh (seasonal emergent marsh) showing existing transmission line right-of-way (August 15, 2012).

Plate 5 View west through riparian marsh (seasonal emergent marsh) showing graminoid vegetation (August 15, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-1031 **CWCS Wetland Classification:** Flat Swamp (mixedwood treed swamp) **Province:** Alberta

UTM: 11U 629631 E 5939706 N **Legal Location:** 7-24-53-8 W5M **RK Start:** 137.7 **RK End:** 137.8

Overall Function

Functional Status:
- High-Moderate Functional Condition (69%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and fur-bearers.
- This large wetland complex helps to regulate local and regional climate as well as catchment hydrology.

General

Surrounding Land Use:
- This wetland is located adjacent to cultivated and treed/forested land.

Existing Disturbance(s):
- Cultivated to wetland margins.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from groundwater.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Sluggish: gradual groundwater movement through peat and minor vertical water table fluctuations.

Surface Water
- No open water present. Saturated/soggy ground present at time of wetland survey.

Microtopography:
- Lawn dominated wetland with occasional occurrence of hummock and hollow microforms.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Wet.

Litter Quality:
- Moderate.

von Post:
- N/A.

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- Black spruce (*Picea mariana*) and aspen (*Populus tremuloides*).

Shrub Strata:
- Willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Sedges species (*Carex sp.*), arrow-leaved coltsfoot (*Petasites frigidus var. sagittatus*) and grass species (*Gramineae spp.*).

Moss Strata:
- None observed.

Noxious Weeds:
- Canada (creeping) thistle (*Cirsium arvense*).

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees and snags present in wetland.
- Suitable cover for songbirds (woody vegetation present within wetland).
- The moist ground and coarse woody debris provides potential habitat for amphibians.

Wildlife Observations:
- Deer scat and bed, ungulate browsing and songbird species observed at time of wetland survey.

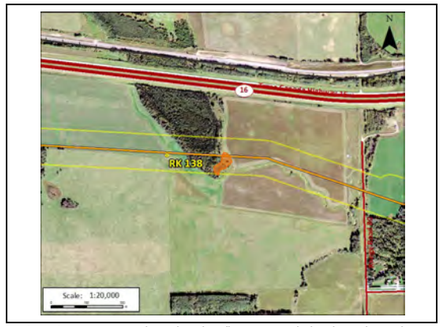

Plate 1 Imagery overview showing flat swamp (mixedwood treed swamp).

Plate 2 Overview showing flat swamp (mixedwood treed swamp) (August 16, 2012).

Plate 3 View west through flat swamp (mixedwood treed swamp) showing graminoid and woody vegetation (August 16, 2012).

Plate 4 View west through flat swamp (mixedwood treed swamp) showing dominant showing aspen stand (August 16, 2012).

Plate 5 View south through wetland flat swamp (mixedwood treed swamp) woody vegetation (August 16, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-487 **CWCS Wetland Classification:** Flat Swamp (shrubby swamp) **Province:** Alberta

UTM: 11U 592201 E 5940923 N **Legal Location:** 12-29-53-11 W5M **RK Start:** 174.6 **RK End:** 175.1

Overall Function

Functional Status:
- High Functional Condition (84%): This wetland demonstrates the majority of the wetland functions expected from this type of wetland with little to no anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- The woody vegetation provides essential cover and foraging habitat for ungulates and fur-bearers.
- Portions of the wetland have mineral substrate while some are peat-accumulating, which can result in complex biogeochemical cycling.

General

Surrounding Land Use:
- This wetland is adjacent to treed/forested land.

Existing Disturbance(s):
- Adjacent to a highway and existing pipeline right-of-way.

Associated Wetland(s):
- Shrubby fen (in LSA)

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from groundwater.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Stagnant: stagnant to very gradually moving soil water and vertical fluctuations minimal.

Surface Water
- No open water present. Standing water in low areas only.

Microtopography:
- Lawn dominated wetland with occasional occurrence of hummock and hollow microforms.

Biogeochemical Function

Soil Type:
- Hydric mineral soil with organic veneer.

Soil Moisture Regime:
- Wet.

Litter Quality:
- Poor.

von Post:
- N/A.

Nutrient Regime:
- Poor.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- Aspen (*Populus tremuloides*).

Shrub Strata:
- Willow species (*Salix sp.*) and bog birch (*Betula glandulosa*).

Herbaceous and Graminoid Strata:
- Cotton grass species (*Eriophorum sp.*), tufted hair grass (*Deschampsia cespitosa*) and sedge species (*Carex sp.*).

Moss Strata:
- Feather moss species (*Brachythecium sp.*) and peat moss species (*Sphagnum sp.*).

Noxious Weeds:
- No noxious weeds observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees and snags present in wetland.
- Suitable cover for songbirds (woody vegetation present within wetland).
- The moist ground and coarse woody debris provides potential habitat for amphibians.

Wildlife Observations:
- Songbird species heard at time of wetland survey.
- Ungulate browsing observed at time of wetland survey.

Cross-Discipline Reference

Vegetation:
- Rare plant observed, goldenthread (*Coptis trifolia*) (see Vegetation Technical Report [Volume 5C]).

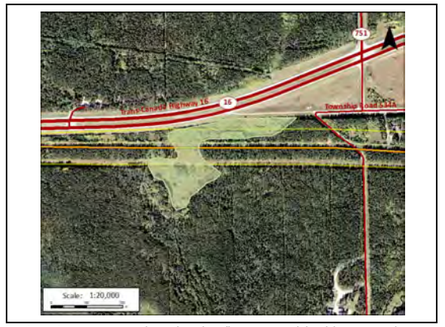

Plate 1 Imagery overview showing flat swamp (shrubby swamp).

Plate 2 Imagery overview showing flat swamp (shrubby swamp) (August 17, 2012).

Plate 3 View north through flat swamp (shrubby swamp) showing herbaceous vegetation (August 17, 2012).

Plate 4 View east through flat swamp (shrubby swamp) showing herbaceous and shrubby vegetation (August 17, 2012).

Plate 5 View south through flat swamp (shrubby swamp) showing woody vegetation (August 17, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-425 **CWCS Wetland Classification:** Riparian Swamp (shrubby swamp) **Province:** Alberta

UTM: 11U 569645 E 5940542 N **Legal Location:** 10-26-53-14 W5M **RK Start:** 198.6 **RK End:** 198.6

Overall Function

Functional Status:
- High-Moderate Functional Condition (68%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and fur-bearers.
- This large wetland complex helps to regulate local and regional climate as well as catchment hydrology.

General

Surrounding Land Use:
- This wetland is adjacent to treed/forested land.

Existing Disturbance(s):
- Adjacent to existing pipeline right-of-way.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Sluggish: gradual groundwater movement through peat and minor vertical water table fluctuations.

Surface Water
- No open water present. Standing water in low areas only.

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Wet.

Litter Quality:
- Moderate.

von Post:
- N/A.

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Absent.

Shrub Strata:
- Willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Arrow-leaved coltsfoot (*Petasites frigidus var. sagittatus*), marsh marigold (*Caltha palustris*), sedge species (*Carex sp.*), horsetail species (*Equisetum sp.*) and duckweed species (*Lemna sp.*).

Moss Strata:
- Feather moss species (*Brachythecium sp.*).

Noxious Weeds:
- No noxious weeds observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Suitable coarse woody debris habitat for amphibians.
- Suitable forage for ungulates (presence of willow species).
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Wildlife trees and snags present in wetland.
- Suitable cover for songbirds (woody vegetation present within wetland).

Wildlife Observations:
- Songbird species heard at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland is associated with an Unnamed Tributary to January Creek (AB-123) (see Fisheries (Alberta) Technical Report in Volume 5C).

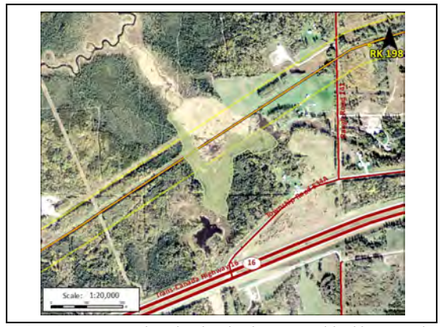

Plate 1 Imagery overview showing riparian swamp (shrubby swamp).

Plate 2 Overview showing riparian swamp (shrubby swamp) (August 17, 2012)

Plate 3 View north through riparian swamp (shrubby swamp) showing shrubby vegetation (August 18, 2012).

Plate 4 View east through riparian swamp (shrubby swamp) showing shrubby vegetation (August 18, 2012).

Plate 5 View south through riparian swamp (shrubby swamp) showing graminoid and shrubby vegetation (August 18, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-501 **CWCS Wetland Classification:** Flat Swamp (needle-leaf treed swamp) **Province:** Alberta

UTM: 11U 564493 E 5938913 N **Legal Location:** 15-20-53-14 W5M **RK Start:** 204.1 **RK End:** 204.3

Overall Function

Functional Status:
- High-Functional Condition (82%): This wetland demonstrates the majority of the wetland functions expected from this type of wetland with little to no anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- This wetland complex helps to regulate local and regional climate as well as catchment hydrology.
- Portions of the wetland have mineral substrate while some are peat-accumulating, which can result in complex biogeochemical cycling.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and fur-bearers.
- The moist ground and coarse woody debris provides potential habitat for amphibians.

General

Surrounding Land Use:
- This wetland is adjacent to treed/forested land.

Existing Disturbance(s):
- Adjacent to existing pipeline right-of-way.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from precipitation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Sluggish: gradual groundwater movement through peat and minor vertical water table fluctuations.

Surface Water
- No open water present. Standing water in low areas only.

Microtopography:
- Lawn dominated wetland with occasional occurrence of hummock and hollow microforms.

Biogeochemical Function

Soil Type:
- Mineral with an organic veneer.

Soil Moisture Regime:
- Wet.

Litter Quality:
- Moderate.

von Post:
- N/A.

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Tamarack (*Larix laricina*) and black spruce (*Picea mariana*).

Shrub Strata:
- Bog birch (*Betula glandulosa*) and Labrador tea (*Ledum sp.*).

Herbaceous and Graminoid Strata:
- Marsh-marigold (*Caltha palustris*), sedge species (*Carex sp.*), cloudberry (*Rubus chamaemorus*) and bog cranberry (*Vaccinium vitis-idaea*).

Moss Strata:
- Feather moss species (*Brachythecium sp.*) and peat moss species (*Sphagnum sp.*).

Noxious Weeds:
- No noxious weeds observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees and snags present in wetland.
- Suitable coarse woody debris habitat for amphibians.
- Suitable cover for songbirds (woody vegetation present within wetland).
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Suitable forage for ungulates.

Wildlife Observations:
- Songbird species heard at time of wetland survey.
- Flycatcher species and ungulate browsing was observed at time of wetland survey

Plate 1 Imagery overview showing flat swamp (needle-leaf treed swamp).

Plate 2 Overview showing flat swamp (needle-leaf treed swamp) (August 17, 2012).

Plate 3 View north through flat swamp (needle-leaf treed swamp) showing woody vegetation (August 20, 2012).

Plate 4 View east through flat swamp (needle-leaf treed swamp) showing woody vegetation (August 20, 2012).

Plate 5 View south through flat swamp (needle-leaf treed swamp) showing herbaceous and woody vegetation (August 20, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-508 **CWCS Wetland Classification:** Riparian Fen (non-woody fen) **Province:** Alberta

UTM: 11U 548773 E 5938523 N **Legal Location:** 9-22-53-16 W5M **RK Start:** 220.4 **RK End:** 220.8

Overall Function

Functional Status:
- High-Moderate Functional Condition (64%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- Peatlands are ubiquitous across the boreal landscape and are typically part of a larger wetland complex containing a mix of wetland and non-wetland (*e.g.,* upland forest) areas.
- This fen receives water inputs from precipitation and snowmelt as well as mineral rich ground water inputs.
- This peatland functions as a carbon sink on the landscape.
- The moist ground and coarse woody debris provides potential habitat for amphibians.
- This wetland supports the growth of *Sphagnum* moss, which increases peat accumulation rates, wetland water retention and can protect the wetland from wildfire events.

General

Surrounding Land Use:
- This wetland is adjacent to treed/forested land.

Existing Disturbance(s):
- Adjacent to existing pipeline right-of-way.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Sluggish: gradual groundwater movement through peat and minor vertical water table fluctuations.

Surface Water Microtopography:
- No open water present. Standing water in low areas only.
- Lawn dominated wetland with occasional occurrence of hummock and hollow microforms.

Biogeochemical Function

Soil Type:
- Peat (partially decomposed organic matter).

Soil Moisture Regime:
- Very Wet.

Litter Quality:
- Poor.

von Post:
- Slightly Decomposed (H1-H3, plant material still identifiable).

Nutrient Regime:
- Poor.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- Black spruce (*Picea mariana*) and tamarack species (*Larix sp.*).

Shrub Strata:
- Willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Horsetail species (*Equisetum sp.*), marsh-marigold (*Caltha palustris*), cattail species (*Typha sp.*), sedge species (*Carex sp.*) and water milfoil species (*Myriophyllum sp.*).

Moss Strata:
- Feather moss species (*Brachythecium sp*) and peat moss species (*Sphagnum sp.*).

Noxious Weeds:
- No noxious weeds observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Suitable coarse woody debris habitat for amphibians.
- Standing water available for amphibians.
- Suitable cover for songbirds (woody vegetation present within wetland).
- Wildlife trees present in wetland.

Wildlife Observations:
- Wood frog observed at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland is associated with Wolf Creek (AB-129) (see Fisheries (Alberta) Technical Report in Volume 5C).

Plate 1 Imagery overview showing riparian fen (non-woody fen).

Plate 2 View northeast through showing riparian fen (non-woody fen) showing graminoid vegetation and woody riparian fringe (August 19, 2012).

Plate 3 View east through riparian fen (non-woody fen) showing graminoid vegetation (August 19, 2012).

Plate 4 View north through riparian fen (non-woody fen) showing graminoid vegetation and woody riparian fringe (August 19, 2012).

Plate 5 View south riparian fen (non-woody fen) wetland showing graminoid vegetation (August 19, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-515 **CWCS Wetland Classification:** Horizontal Fen (treed fen) **Province:** Alberta

UTM: 11U 529139 E 5936965 N **Legal Location:** 15-15-53-18 W5M **RK Start:** 240.9 **RK End:** 241.7

<u>Overall Function</u>

Functional Status:
- High-Moderate Functional Condition (69%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- Peatlands are ubiquitous across the boreal landscape and are typically part of a larger wetland complex containing a mix of wetland and non-wetland (*e.g.,* upland forest) areas.
- This fen receives water inputs from precipitation and snowmelt as well as mineral rich ground water inputs.
- This peatland functions as a carbon sink on the landscape.
- The moist ground and coarse woody debris provides potential habitat for amphibians.
- This wetland supports the growth of *Sphagnum* moss, which increases peat accumulation rates, wetland water retention and can protect the wetland from wildfire events.

<u>General</u>

Surrounding Land Use:
- This wetland is adjacent to treed/forested land.

Existing Disturbance(s):
- Adjacent to road and lease site. Existing pipeline right-of-way crosses through centre of wetland.

Associated Wetland(s):
- None.

<u>Hydrologic Function</u>

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from groundwater.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Stagnant: stagnant to very gradually moving soil water and vertical fluctuations minimal.

Surface Water Microtopography:
- No open water present. Standing water in low areas only.
- Hummock and hollow microtopography present.

<u>Biogeochemical Function</u>

Soil Type:
- Peat (partially decomposed organic matter).

Soil Moisture Regime:
- Wet.

Litter Quality:
- Poor.

von Post:
- Slightly Decomposed (H1-H3, plant material still identifiable).

Nutrient Regime:
- Poor.

<u>Habitat Function – Wetland Vegetation</u>

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Tamarack species (*Larix sp.*), black spruce (*Picea mariana*) and white spruce (*Picea glauca*).

Shrub Strata:
- Bog birch (*Betula glandulosa*), willow species (*Salix sp.*) and Labrador tea (*Ledum groenlandicum*).

Herbaceous and Graminoid Strata:
- Solomon's-seal species (*Smilacina sp.*), bog cranberry (*Vaccinium vitis-idaea*) and sedge species (*Carex sp.*).

Moss Strata:
- Feather moss species (*Brachythecium sp*), peat-moss (*Sphagnum sp.*) and reindeer lichen (*Cladonia arbuscula*).

Noxious Weeds:
- No noxious weeds observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

<u>Habitat Function – Wildlife</u>

Wildlife Habitat Features:
- Wildlife trees and snags present in wetland.
- Suitable cover for songbirds (woody vegetation present within wetland).
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Suitable coarse woody debris habitat for amphibians.

Wildlife Observations:
- Game trails observed at time of wetland survey.

<u>Cross-Discipline Reference</u>

Vegetation:
- Rare plant observed, golden saxifrage (*Chrysosplenium iowense*) (see Vegetation Technical Report [Volume 5C]).

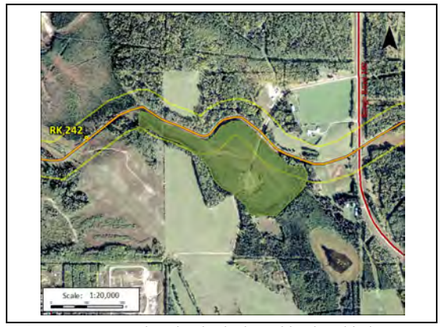

Plate 1 Imagery overview showing horizontal fen (treed fen).

Plate 2 Overview showing horizontal fen (treed fen) (August 17, 2012).

Plate 3 View north through horizontal fen (treed fen) showing woody vegetation (August 20, 2012).

Plate 4 View east through horizontal fen (treed fen) showing woody vegetation (August 20, 2012).

Plate 5 View west through horizontal fen (treed fen) showing woody vegetation (August 20, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-9 and WT-8 **CWCS Wetland Classification:** Basin Fen (treed fen) **Province:** British Columbia

UTM Start: 11 U 347853 E 5847325 N **Legal Location:** a-1-C/83-D-14 to
UTM Stop: 11U 347853 E 5847311 N b-1-C/83-D-14

RK Start: 532.6 **RK End:** 532.8 **BGC Zone:** SBSdh1

Overall Function

Functional Status:
- High Functional Condition (78%): This wetland demonstrates the majority of the wetland functions expected from this type of wetland with little to no anthropogenic disturbance present within wetland.
- This fen receives water inputs from precipitation and snowmelt as well as mineral rich ground water inputs.
- This wetland supports the growth of *Sphagnum* moss, which increases peat accumulation rates, wetland water retention and can protect the wetland from wildfire events.
- This peatland functions as a carbon sink on the landscape.
- Low areas within the wetland cause water to pool during most of the year, which provides potential breeding habitat for amphibians.
- The moist ground and coarse woody debris provides potential habitat for amphibians.

General

Surrounding Land Use:
- This wetland is located within a forested area.

Existing Disturbance(s):
- This wetland has low occurrence of weed and undesirable species.
- This wetland is adjacent to an existing pipeline right-of-way.

Associated Wetlands:
- Horizontal fen (Wb05)

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Stagnant: stagnant to very gradually moving soil water and vertical fluctuations minimal.

Surface Water:
- No open water present; standing water present, less than 0.5 m deep (60% wetland area).

Microtopography:
- Hummock and hollow microtopography present.

Biogeochemical Function

Soil Type:
- Peat (partially decomposed organic matter).

Soil Moisture Regime:
- Very wet.

Water Colour and Turbidity:
- Tea coloured and turbid at time of wetland survey.

pH (acidity/alkalinity):
- *Sphagnum* dominated (very acidic to moderately acidic).

Litter Quality:
- High.

von Post:
- Moderately decomposed (H4-H7; plant structure generally identifiable).

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Black spruce (*Picea mariana*).

Shrub Strata:
- Scrub birch (*Betula nana*), Labrador tea (*Rhododendron groenlandicum)*, pink spirea (*Spiraea douglasii* ssp. *menziesii*) and mountain alder (*Alnus incana* ssp. *tenuifolia*).

Herbaceous and Graminoid Strata:
- Water sedge (*Carex aquatilis*) and marsh cinquefoil (*Comarum palustre*).

Moss Strata:
- *Sphagnum* sp.

Weeds:
- No noxious weed species observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Open or standing water available for amphibians.
- Suitable coarse woody debris habitat for amphibians.
- Suitable forage for ungulates (presence of alder species).
- Suitable songbird cover (woody riparian area).

Wildlife Observations:
- No wildlife observed at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland (WT-8) is associated with a watercourse (BC-037) (see Fisheries (British Columbia) Technical Report in Volume 5C).

Vegetation:
- Wetland is associated with two rare ecological communities (Wf02 is Blue-listed and Wb05 is Yellow-listed).

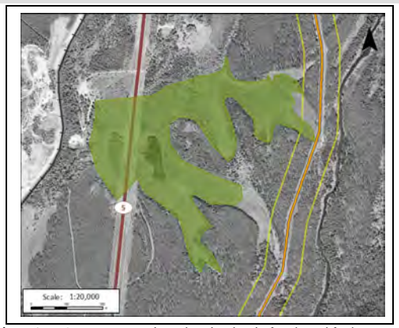

Plate 1 Imagery overview showing basin fen (treed fen) wetland complex.

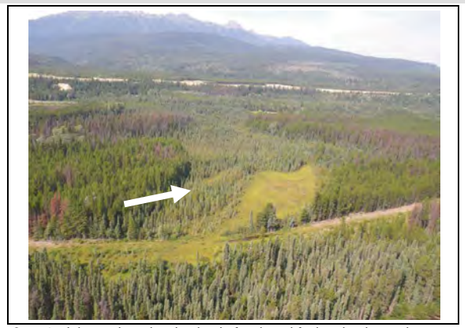

Plate 2 Aerial overview showing basin fen (treed fen)wetland complex (August 12, 2012).

Plate 3 View southwest showing graminoid vegetation in non-woody fen portion of basin fen (treed fen) wetland complex (June 11, 2013).

Plate 4 View north showing graminoid vegetation in non-woody fen portion of basin fen (treed fen) wetland complex (June 11, 2013).

Plate 5 View northeast through basin fen (treed fen) wetland complex showing woody vegetation (June 11, 2013).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-15 **CWCS Wetland Classification:** Riparian Swamp (shrubby swamp) **Province:** British Columbia

UTM: 11U 355643 E 5831432 N **Legal Location:** d-31-G/83-D-11 **RK Start:** 552.4 **RK End:** 552.6 **BGC Zone:** SBSdh1

Overall Function

Functional Status:
- High-Moderate Functional Condition (74%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The woody vegetation helps promote and maintain the soil moisture regime within the wetland.
- Portions of the wetland have mineral substrate while some are peat-accumulating, which can result in complex biogeochemical cycling.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and fur-bearers as well as shelter from weather events (*e.g.,* heat, severe wind, heavy rain or hail etc.).
- The moist ground and coarse woody debris provides potential habitat for amphibians.
- This wetland is associated with a watercourse. The watercourse has an elevated moisture regime and is increasing moisture in the lands immediately adjacent.

General

Surrounding Land Use:
- This wetland is adjacent to a highway and an existing right-of-way.

Existing Disturbance(s):
- This wetland was previously an open water beaver pond. Since the beaver dam has been breached, the wetland is functioning as a swamp.
- Adjacent right-of-way/facility has altered riparian area.
- Culvert through adjacent road appears to be performing adequately to maintain wetland soil moisture regime.

Associated Wetlands:
- None

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Dynamic: significant lateral flow and/or strong vertical water table fluctuations through mineral soils.

Surface Water:
- No open water present, standing water in low areas only.

Microtopography:
- Lawn dominated wetland with occasional occurrence of hummock microforms.

Biogeochemical Function

Soil Type:
- Mineral with an organic veneer.

Soil Moisture Regime:
- Wet.

Water Colour and Turbidity:
- Tea coloured and turbid at time of wetland survey.

pH (acidity/alkalinity):
- Unable to record pH at time of wetland survey.

Litter Quality:
- Moderate.

von Post:
- Unable to record von Post at time of wetland survey.

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- None observed.

Shrub Strata:
- Pink spirea (*Spiraea douglasii* ssp. *menziesii*), plane-leaved willow (*Salix planifolia*), mountain alder (*Alnus incana ssp. tenuifolia*), Labrador tea (*Rhododendron groenlandicum*) and MacCalla's willow (*Salix maccalliana*).

Herbaceous and Graminoid Strata:
- Water sedge (*Carex aquatilis*), shore sedge (*Carex limosa*) and marsh cinquefoil (*Comarum palustre*).).

Moss Strata:
- None observed.

Weeds :
- No noxious weed species observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees and snags present in wetland.
- Suitable songbird cover (woody vegetation present within wetland).
- Suitable forage for ungulates (presence of willow species)
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Suitable coarse woody debris habitat for amphibians.

Wildlife Observations:
- Beaver sign (pathways, felled trees) and songbird species were observed at time of wetland survey.

Cross-Discipline Reference

Vegetation:
- Wetland is associated with one rare ecological communities (Ws02 is Yellow-listed).

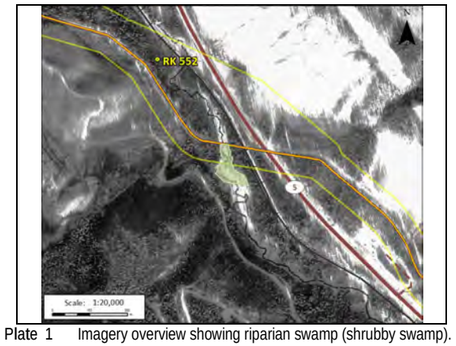

Plate 1 Imagery overview showing riparian swamp (shrubby swamp).

Plate 2 Aerial overview showing riparian swamp (shrubby swamp) (August 12, 2012).

Plate 3 View north through riparian swamp (shrubby swamp) showing dominant shrub layer (Sept. 29, 2012).

Plate 4 View east through riparian swamp (shrubby swamp) showing herbaceous vegetation (Sept. 29, 2012).

Plate 5 View of drainage through riparian swamp (shrubby swamp) (Sept. 29, 2012).

Wetland Function Site Cards
2013

Wetland ID: WT-23 **CWCS Wetland Classification:** Riparian Swamp (shrubby swamp) **Province:** British Columbia

UTM Start: 11 U 357463 E 5824936 N
UTM Stop: 11 U 357221E 5824466 N
Legal Location: d-69-A/83-D-11 **RK Start:** 560.2 **RK End:** 560.6 **BGC Zone:** ICHwk1

Overall Function

Functional Status:
- High-Functional Condition (82%): This wetland demonstrates the majority of the wetland functions expected from this type of wetland with little to no anthropogenic disturbance present within wetland.
- Woody vegetation along the margins of the wetland provides shelter and cover for ungulates and furbearers and promotes moisture retention.
- The surface water storage in this seasonal wetland helps maintain an elevated water table and increased soil moisture throughout the spring and summer.
- The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- Wetland complexes often provide unique habitat for rare plants and have high biodiversity as they are closely located and interconnected wetland/upland habitat.

General

Surrounding Land Use:
- This wetland is adjacent to a treed/forested land (tree cover in excess of 5%) and a lease road .

Existing Disturbance(s):
- This wetland has low occurrence of weed and undesirable species.
- Culvert through adjacent road appears to be performing adequately to maintain wetland soil moisture regime.

Associated Wetlands:
- None

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water Microtopography:
- No open water present, standing water present, 0.5-1 m deep (5% wetland area).
- Hummock and hollow microtopography present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Water Colour and Turbidity:
- Tea coloured and turbid at time of wetland survey.

pH (acidity/alkalinity):
- Unable to record pH at time of wetland survey.

Litter Quality:
- High.

von Post:
- Unable to record von Post at time of wetland survey.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Black spruce (*Picea mariana*).

Shrub Strata:
- Alder species (*Alnus sp.),* willow species (*Salix sp.*) and pink spirea (*Spiraea douglasii* ssp. *menziesii*).

Herbaceous and Graminoid Strata:
- Water sedge (*Carex aquatilis*), bluejoint (*Calamagrostis canadensis*) and cow parsnip (*Heracleum lanatum*).

Moss Strata:
- None observed.

Weeds:
- No weeds observed at time of wetland survey.

Undesirable Species:
- Moderate undesirable species observed at the time of wetland survey (few patches).
- Common fireweed (*Epilobium angustifolium*)

Habitat Function – Wildlife

Wildlife Habitat Features:
- Open or standing water available for amphibians.
- Suitable coarse woody debris habitat for amphibians.
- Suitable forage for ungulates (presence of willow species, etc.).
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).

Wildlife Observations:
- Wildlife trees and snags present in wetland.
- Suitable songbird cover (woody riparian area or woody vegetation present within wetland).
- Veery and grouse species heard and a hummingbird species observed at time of wetland survey.

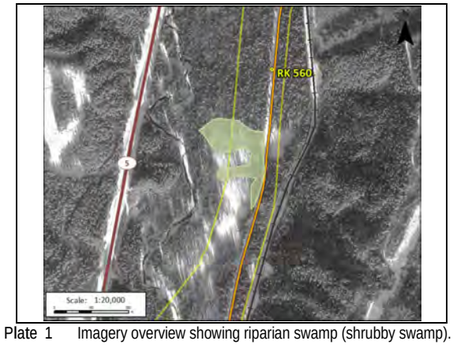

Plate 1 Imagery overview showing riparian swamp (shrubby swamp).

Plate 2 Aerial overview showing riparian swamp (shrubby swamp) (August, 12, 2012).

Plate 3 View east through riparian swamp (shrubby swamp) showing dominant shrub layer (June, 13, 2013).

Plate 4 View south showing lease road through riparian swamp (shrubby swamp) (June, 13, 2013).

Plate 5 View of culvert allowing water flow through riparian swamp (shrubby swamp) (June, 13, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-31 **CWCS Wetland Classification:** Riparian Swamp (mixedwood treed swamp) **Province:** British Columbia

UTM Start: 11 U 356538 E 5822187 N
UTM Stop: 11 U 356561 E 5821951 N
Legal Location: d-40-A/83-D-11 **RK Start:** 563.2 **RK End:** 563.4 **BGC Zone:** ICHwk1

Overall Function

Functional Status:
- High-Functional Condition (84%): This wetland demonstrates the majority of the wetland functions expected from this type of wetland with little to no anthropogenic disturbance present within wetland.
- The woody vegetation helps promote and maintain the soil moisture regime within the wetland.
- Portions of the wetland have mineral substrate while some are peat-accumulating, which can result in complex biogeochemical cycling.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and furbearers as well as shelter from weather events (*e.g.,* heat, severe wind, heavy rain or hail etc.).
- The moist ground and coarse woody debris provides potential habitat for amphibians.

General

Surrounding Land Use:
- This wetland is adjacent to a transmission line right-of-way.

Existing Disturbance(s):
- Adjacent trail does not appear to disturb wetland.

Associated Wetlands:
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receive water mainly from groundwater and/or precipitation.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water
- No open water present. Standing water in low areas only.

Microtopography:
- Hummock and hollow microtopography present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Wet.

Water Colour and Turbidity:
- Green-brown and turbid at time of wetland survey.

pH (acidity/alkalinity):
- Neutral (6.5-7.4 pH) at time of wetland survey.

Litter Quality:
- Moderate.

von Post:
- Unable to record von Post at time of wetland survey.

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Aspen (*Populus tremuloides*) and birch species (*Betula sp.).*

Shrub Strata:
- Black twinberry (*Lonicera involucrata*).

Herbaceous and Graminoid Strata:
- Small-fruited bulrush (*Scirpus microcarpus*), bluejoint (*Calamagrostis canadensis*), skunk cabbage (*Lysichiton americanus*), horsetail species (*Equisetum sp.*), lady fern (*Athyrium filix-femina ssp. cyclosorum*), blueberry species (*Vaccinium sp.*), bunchberry (*Cornus canadensis*) and large round-leaved rein orchid (*Platanthera orbiculata*).

Moss Strata:
- *Sphagnum* species.

Weeds:
- No noxious weed species observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey

Habitat Function – Wildlife

Wildlife Habitat Features:
- Standing water available for amphibians.
- Suitable coarse woody debris habitat for amphibians.
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Suitable forage for ungulates (presence of floating and submerged vegetation).

Wildlife Observations:
- Browsing sign observed at time of wetland survey.
- Wood frog observed at time of wetland survey.

Cross-Discipline Reference

Vegetation:
- Wetland is associated with one rare ecological communities (Wm05 is Blue-listed).

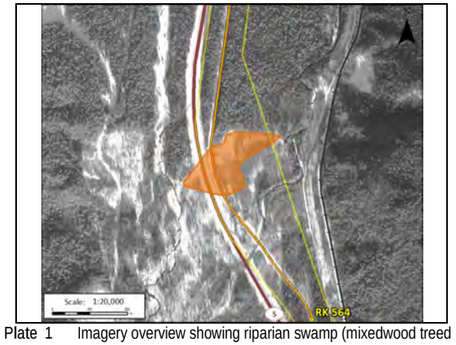

Plate 1 Imagery overview showing riparian swamp (mixedwood treed swamp)

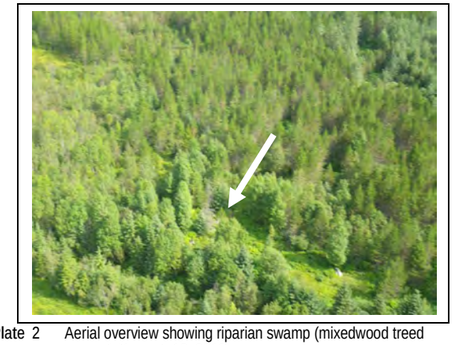

Plate 2 Aerial overview showing riparian swamp (mixedwood treed swamp) (August, 12, 2012).

Plate 3 View northeast through riparian swamp (mixedwood treed swamp) showing dominant tree and shrub layers (June 12, 2013).

Plate 4 View southwest through riparian swamp (mixedwood treed swamp) showing dominant tree and shrub layers (June 12, 2013).

Plate 5 View northwest through riparian swamp (mixedwood treed swamp) showing dominant tree and shrub layers (June

Wetland Function Site Cards
2013

Wetland ID: WT-45 **CWCS Wetland Classification:** Basin Marsh (seasonal emergent marsh) **Province:** British Columbia

UTM: 11 U 351577 E 5800445 N **Legal Location:** a-5-G/83-D-6 **RK Start:** 587.4 **RK End:** 587.5 **BGC Zone:** ICHvk1

Overall Function

Functional Status:
- High-Moderate Functional Condition (50%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The surface water storage in this seasonal wetland helps maintain an elevated water table and increased soil moisture throughout the spring.
- The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- Provides shallow water habitat for migratory waterfowl as well as amphibians in early spring.

General

Surrounding Land Use:
- This wetland is adjacent to a highway and a pipeline right-of-way.

Existing Disturbance(s):
- Culvert through adjacent road appears to be performing adequately to maintain wetland soil moisture regime.

Associated Wetlands:
- None

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receive water mainly from groundwater and/or precipitation.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Dynamic: lateral flow and strong vertical water table fluctuations through mineral soils.

Surface Water:
- Open water present, less than 0.5 m deep (3% wetland area); standing water in low areas only.

Microtopography:
- Hummocks and hollows with bare peat or mineral soil (rare to patchy bryophyte cover in wetland), present only at edge.

Biogeochemical Function

Soil Type:
- Mineral with an organic veneer.

Soil Moisture Regime:
- Very wet.

Water Colour and Turbidity:
- Blue-green and very clear at time of wetland survey.

pH (acidity/alkalinity):
- Alkaline (greater than 7.4 pH) at time of wetland survey.

Litter Quality:
- High.

von Post:
- Moderately decomposed (H4-H7; plant structure general recognizable).

Nutrient Regime:
- Very rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- Poplar species (*Poplar sp.)*.

Shrub Strata:
- Willow species (*Salix sp*.) and mountain alder (*Alnus incana ssp. tenuifolia*).

Herbaceous and Graminoid Strata:
- Beaked sedge (*Carex utriculata*), water sedge (*Carex aquatilis)* and horsetail species (*Equisetum sp.*).

Moss Strata:
- Moss species only present along edge of wetland.

Weeds:
- No noxious weed species observed at time of wetland survey.

Undesirable Species:
- Undesirable species observed at time of wetland survey (few patches).
- Clover species (*Trifolium sp.*) (only present near highway).

Habitat Function – Wildlife

Wildlife Habitat Features:
- Cover and foraging habitat available for waterfowl as well as cover available for shorebirds (emergent vegetation dominant).
- Suitable rearing waterfowl area (wetland vegetation cover on margins and open water).
- Suitable songbird cover (woody riparian area or woody vegetation present withing wetland).
- Open or standing water available for amphibians.
- Wildlife trees and snags present in wetland.
- Game trails present in wetland.

Wildlife Observations:
- Unknown fish species observed at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland is associated with a watercourse (BC-133 and BC-134) (see Fisheries (British Columbia) Technical Report in Volume 5C).

Vegetation:
- Wetland is associated with one rare ecological communities (Wm01 is Yellow-listed).

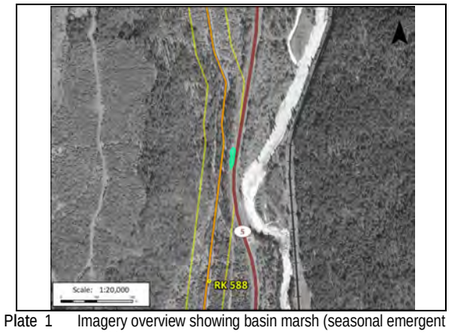

Plate 1 Imagery overview showing basin marsh (seasonal emergent marsh).

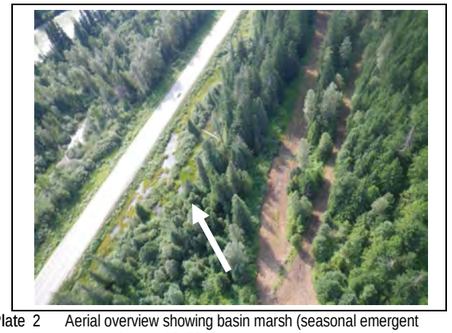

Plate 2 Aerial overview showing basin marsh (seasonal emergent marsh) (August 12, 2012).

Plate 3 View southwest showing graminoid vegetation in basin marsh (seasonal emergent marsh). (June 13, 2013).

Plate 4 View northwest showing shrubby vegetation in basin marsh (seasonal emergent marsh) (June 13, 2013).

Plate 5 View northwest through basin marsh (seasonal emergent marsh) showing open water component (June 13, 2013).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-83 **CWCS Wetland Classification:** Riparian Shallow Open Water (open water pond) **Province:** British Columbia

UTM: 11U 342434 E 5776308 N **Legal Location:** c-34-F/83-D-3 and d-35-F/83-D-3 **RK Start:** 613.9 **RK End:** 614.0 **BGC Zone:** ICHmw3

Overall Function

Functional Status:
- High-Moderate Functional Condition (55%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- This open water pond is associated with flowing water and is subject to flooding, erosion, and sedimentation.
- The surface water storage in this permanent open water pond helps maintain an elevated water table and increased soil moisture in spring, summer and fall.
- The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- Provides early spring, summer and fall open water habitat and forage for waterfowl, amphibians and other wildlife such as semi-aquatic mammals (*e.g.*, muskrat, beaver).
- This open water pond is associated with Blue River. The river has an elevated moisture regime and is increasing moisture in the lands immediately adjacent.

General

Surrounding Land Use:
- This open water pond is adjacent to a highway and upland forested area.

Existing Disturbance(s):
- This wetland receives some pedestrian traffic as it is adjacent to a recreational area.

Associated Wetlands:
- None

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water
- Open water present, 0.5-1 m deep (70% open water pond area); saturated/soggy ground with no standing water present.

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very wet.

Water Colour and Turbidity:
- Green-brown and clear at time of wetland survey.

pH (acidity/alkalinity):
- Slightly acidic (5.5-6.5 pH) at time of wetland survey.

Litter Quality:
- Moderate.

von Post:
- Unable to record von Post at time of wetland survey.

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Black spruce (*Picea mariana*), paper birch (*Betula papyrifera var. commutata*) and western redcedar (*Thuja plicata*).

Shrub Strata:
- Drummond's willow (*Salix drummondiana*.), spiraea species (*Spiraea sp.*), and red-osier dogwood (*Cornus stolonifera*).

Herbaceous and Graminoid Strata:
- Bluejoint (*Calamagrostis canadensis*) and fern species (*Blechnum sp.*).

Moss Strata:
- None observed.

Weeds :
- No noxious weed species observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Shorebird foraging habitat (mudflat or grasses less than 10 cm and soils saturated or less than 2 cm water).
- Suitable rearing/molting/staging waterfowl area (wetland vegetation cover on margins and open water).
- Open water available for amphibians.
- Suitable coarse woody debris habitat for amphibians.
- Suitable songbird cover (woody riparian area or woody vegetation present withing wetland).
- Wildlife trees and snags present in wetland.

Wildlife Observations:
- A hummingbird, a merlin, and sparrow species were heard at time of wetland survey.
- An unknown waterfowl with ducklings were observed at time of wetland survey.

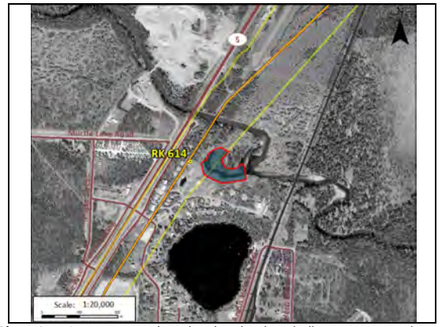

Plate 1 Imagery overview showing riparian shallow open water (open water pond).

Plate 2 Aerial overview showing riparian shallow open water (open water pond) (August, 12, 2012).

Plate 3 View east showing overview of riparian shallow open water (open water pond) and recreational area to the east (June 13, 2013).

Plate 4 View northeast through riparian shallow open water (open water pond) showing emergent vegetation (June 13, 2013).

Plate 5 View south showing riparian vegetation along southern margin of riparian shallow open water (open water pond) (June 13, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-84 **CWCS Wetland Classification:** Riparian Marsh (seasonal emergent marsh) **Province:** British Columbia

UTM Start: 11U 341822 E 5773409 N
UTM Stop:11 U 341786 E 5773074 N **Legal Location:** b-5-F/83-D-3 **RK Start:** 617.1 **RK End:** 617.5 **BGC Zone:** ICHwk1

Overall Function

Functional Status:

- High-Moderate Functional Condition (65%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- Woody vegetation along the margins of the wetland provides shelter and cover for ungulates and furbearers and promotes moisture retention.
- The surface water storage in this seasonal wetland helps maintain an elevated water table and increased soil moisture throughout the spring and summer.
- The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- Wetland complexes often provide unique habitat for rare plants and have high biodiversity as they are closely located and interconnected wetland/upland habitat.

General

Surrounding Land Use:
- This wetland is adjacent to a railway and a highway

Existing Disturbance(s):
- Adjacent railway and adjacent highway have impounded the wetland.

Associated Wetlands:
- None

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System.

Wetland Connectivity:
- Part of wetland complex.

Hydrodynamic Index:
- Mobile.

Surface Water
- No open water present; standing water present, greater than 1 m deep.

Microtopography:
- Hummock and hollow microtopography present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

pH (acidity/alkalinity):
- Slightly acidic (5.5-6.5 pH) at time of wetland survey.

Litter Quality:
- Poor.

von Post:
- Unable to record von Post at time of wetland survey.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial non-woody riparian border surrounding wetland.

Tree Strata:
- None observed.

Shrub Strata:
- Pink spirea (*Spiraea douglasii ssp. menziesii*) and willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Common cattail (*Typha latifolia*), water sedge (*Carex aquatilis*), marsh cinquefoil (Comarum palustre*)* and hard-stemmed bulrush (*Schoenoplectus acutus*).

Moss Strata:
- None observed.

Weeds and Undesirable Species:
- No weed species observed at time of wetland survey.
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Suitable rearing/molting/staging waterfowl area (wetland vegetation cover on margins and open water).
- Open or standing water available for amphibians.
- Suitable coarse woody debris habitat for amphibians.
- Suitable forage for ungulates (presence of floating and submerged vegetation and/or presence of willow species, etc.).

Wildlife Observations:
- Songbird species heard at time of wetland survey.
- Beaver sign (dam, not active) observed at time of wetland survey.

Cross-Discipline Reference

Vegetation:
- Wetland is associated with one rare ecological communities (Wm05 is Blue-listed).

Wildlife:
- Beaver sign (old beaver lodge present but not currently active).

Plate 1 Imagery overview showing riparian marsh (seasonal emergent marsh).

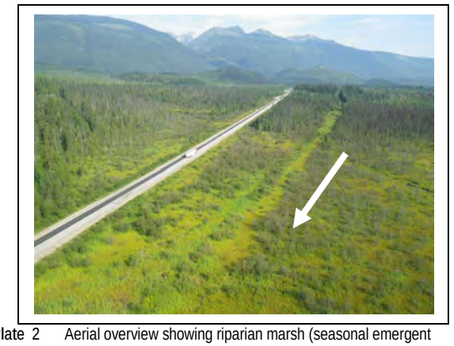

Plate 2 Aerial overview showing riparian marsh (seasonal emergent marsh) (August, 12, 2012).

Plate 3 View north through riparian marsh (seasonal emergent marsh) showing emergent vegetation (June 13, 2013).

Plate 4 View east through riparian marsh (seasonal emergent marsh). showing emergent vegetation and railway (June 13, 2013).

Plate 5 View southwest through riparian marsh (seasonal emergent marsh). showing emergent vegetation (June 13, 2013).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-61 **CWCS Wetland Classification:** Slope Swamp (mixedwood treed swamp) **Province:** British Columbia

UTM: 11U 341763 E 5772900 N **Legal Location:** b-5-F/83-D-3 **RK Start:** 617.7 **RK End:** 617.8 **BGC Zone:** ICHmw3

Overall Function

Functional Status:
- High-Functional Condition (76%): This wetland demonstrates the majority of the wetland functions expected from this type of wetland with little to no anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- Woody vegetation along the margins of the wetland provides shelter and cover for ungulates and furbearers and promotes moisture retention.
- This wetland filters sediments through an ephemeral drainage to surrounding areas and also retains nutrients.

General

Surrounding Land Use:
- This wetland is adjacent to a railway and a lease road.

Existing Disturbance(s):
- Lease road has altered the hydrology of a nearby ephemeral drainage; the drainage is unable to flow into the wetland.

Associated Wetlands:
- None

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Dynamic: significant lateral flow and/or strong vertical water table fluctuations through mineral soils.

Surface Water
- No open water present; saturated/soggy ground with no standing water present.

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Mineral with an organic veneer.

Soil Moisture Regime:
- Wet.

pH (acidity/alkalinity):
- Unable to record pH at time of wetland survey

Litter Quality:
- High.

von Post:
- Unable to record von Post at time of wetland survey.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Paper birch (*Betula papyrifera var. papyrifera*), black cottonwood (*Populus trichocarpa*), western redcedar (*Thuja plicata*) and hybrid white spruce (*Picea engelmannii X glauca*).

Shrub Strata:
- Black twinberry (*Lonicera involucrata)* and thimbleberry (*Rubus parviflorus var. parviflorus*).

Herbaceous and Graminoid Strata:
- Skunk cabbage (*Lysichiton americanus*), common horsetail (*Equisetum arvense*) and lady fern (*Athyrium filix-femina spp. cyclosorum*).

Moss Strata:
- *Pleurozioposis* moss (*Pleurozipsis sp.*).

Weeds:
- No weed species observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Suitable coarse woody debris habitat for amphibians.
- Suitable forage for ungulates (presence of floating and submerged vegetation and/or presence of willow species, etc.).
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Suitable songbird cover (woody riparian area or woody vegetation present within wetland).
- Wildlife trees and snags present in wetland.

Wildlife Observations:
- Songbird species heard at time of wetland survey.

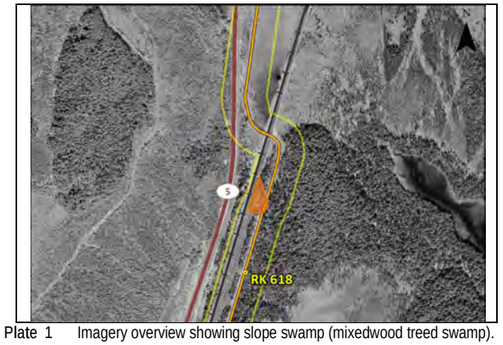

Plate 1 Imagery overview showing slope swamp (mixedwood treed swamp).

Plate 2 Aerial overview showing slope swamp (mixedwood treed swamp). (August, 12, 2012).

Plate 3 View east through slope swamp (mixedwood treed swamp) showing herbaceous vegetation (June 13, 2013).

Plate 4 View northwest through slope swamp (mixedwood treed swamp) showing herbaceous vegetation (June 13, 2013).

Plate 5 View east from lease road showing impoundment of drainage located in slope swamp (mixedwood treed swamp) (June 13, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-64 **CWCS Wetland Classification:** Riparian Swamp (needle-leaf treed swamp) **Province:** British Columbia

UTM: 11 U 341150 E 5770937N **Legal Location:** d-76-C/83-D-3 **RK Start:** 619.7 **RK End:** 619.9 **BGC Zone:** ICHmw3

Overall Function

Functional Status:

- High-Moderate Functional Condition (71%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- Wetland complexes often provide unique habitat for rare plants and have high biodiversity as they are closely located and interconnected wetland/upland habitat.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and furbearers as well as shelter from weather events (*e.g.,* heat, severe, wind, heavy rain or hail etc.).
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The surface water storage in this wetland helps maintain an elevated water table and increased soil moisture during the spring.
- Wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.

General

Surrounding Land Use:
- This wetland is adjacent to a railway and a pipeline right-of-way.

Existing Disturbance(s):
- Adjacent right-of-way and highway do not appear to disturb wetland.

Associated Wetlands:
- Shrubby swamp.

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of wetland complex.

Hydrodynamic Index:
- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water:
- No open water present, standing water present, 0.5-1 m deep.

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Water Colour and Turbidity:
- Tea coloured and turbid at time of wetland survey.

pH (acidity/alkalinity):
- Slightly acidic (5.5-6.5 pH) at time of wetland survey.

Litter Quality:
- High.

von Post:
- Moderately Decomposed (von Post scale H4-H7; plant structure general recognizable).

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous non-woody riparian border surrounding wetland.

Tree Strata:
- Western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii var. glauca*), spruce species (*Picea sp.*).

Shrub Strata:
- Pink spirea (*Spiraea douglasii ssp. menziesii*), red-osier dogwood (*Cornus stolonifera*), black twinberry (*Lonicera involucrata)* and willow species (*Salix sp.*).

Herbaceous and Graminoid Strata:
- Skunk cabbage (*Lysichiton americanus)*, bracken fern (*Pteridium aquilinum*) and common horsetail (*Equisetum arvense*).

Moss Strata:
- Moss species.

Weeds and Undesirable Species:
- No weed species observed at time of wetland survey.
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Suitable rearing/molting/staging waterfowl area (wetland vegetation cover on margins and open water).
- Open or standing water available for amphibians.
- Suitable coarse woody debris habitat for amphibians.
- Suitable forage for ungulates (presence of floating and submerged vegetation and/or presence of willow species, red-osier dogwood, etc.).
- Suitable songbird cover (woody riparian area or woody vegetation present within wetland).

Wildlife Observations:
- Songbirds heard at time of wetland survey.
- Browsing by ungulates evident at time of wetland survey.

Plate 1 Imagery overview showing riparian swamp (needle-leaf treed swamp).

Plate 2 Aerial overview showing riparian swamp (needle-leaf treed swamp) (August 12, 2012).

Plate 3 View north through riparian swamp (needle-leaf treed swamp) showing standing water (June 14, 2013).

Plate 4 View northwest showing dominant tree and shrub layer within riparian swamp (needle-leaf treed swamp) (June 14, 2013).

Plate 5 View west through riparian swamp (needle-leaf treed swamp) showing dominant tree, shrub and herbaceous layer (June 14,

Wetland Function Site Cards
2013

Wetland ID: WT-95 **CWCS Wetland Classification:** Riparian Swamp (shrubby swamp) **Province:** British Columbia

UTM: 11 U 339939 E 5754404N **Legal Location:** a-7-K/82-M-14 **RK Start:**638.68 **RK End:**638.74 **BGC Zone:** ICHmw3

Overall Function

Functional Status:
- High-Functional Condition (77%): This wetland demonstrates the majority of the wetland functions expected from this type of wetland with little to no anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and fur-bearers.

General

Surrounding Land Use:
- This wetland is surrounded by upland mixedwood forest.

Existing Disturbance(s):
- Adjacent to existing pipeline right-of-way.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water
- No open water present; standing water present, greater than 1 m deep.

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Water Colour and Turbidity:
- Green-brown and clear at time of wetland survey.

pH (acidity/alkalinity):
- Neutral (6.5-7.4) at time of wetland survey.

Litter Quality:
- Moderate.

von Post:
- N/A.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Western redcedar (*Thuja plicata*), spruce species (*Picea sp.*), paper birch (*Betula papyrifera var. papyrifera*) and western hemlock (*Tsuga heterophylla*).

Shrub Strata:
- Mountain alder (*Alnus incana ssp. tenuifolia*), pink spirea (*Spiraea douglasii* ssp. *menziesii*), willow species (*Salix sp.*), Black twinberry (*Lonicera involucrata)* and red alder (*Alnus rubra*).

Herbaceous and Graminoid Strata:
- Lady fern (*Athyrium filix-femina ssp. cyclosorum*), water sedge (*Carex aquatilis*), skunk cabbage (*Lysichiton americanus*), small-fruited bulrush (*Scirpus microcarpus*), Baltic rush (*Juncus balticus*), bluejoint (*Calamagrostis canadensis*), horsetail species (*Equisetum sp.*) and common cattail (*Typha latifolia*).

Moss Strata:
- None observed.

Noxious Weeds:
- No noxious weed species observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Standing water available for amphibians.
- Suitable forage for ungulates (presence of willow species, etc.).
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Suitable cover for songbirds (woody vegetation present within wetland).

Wildlife Observations:
- Song sparrow heard at time of wetland survey.

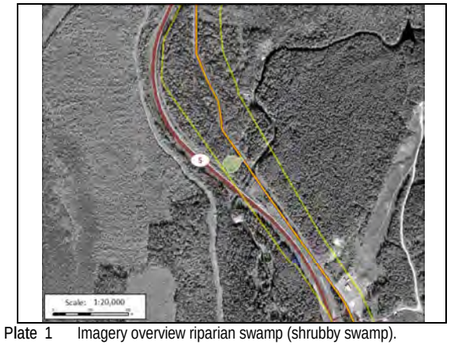

Plate 1 Imagery overview riparian swamp (shrubby swamp).

Plate 2 Overview riparian swamp (shrubby swamp) (August 12, 2012).

Plate 3 View south through riparian swamp (shrubby swamp) showing shrubby vegetation (June, 14, 2013).

Plate 4 View west through riparian swamp (shrubby swamp) showing woody vegetation and standing water (June, 14, 2013).

Plate 5 View south through riparian swamp (shrubby swamp) showing shrubby vegetation (June, 14, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-121 **CWCS Wetland Classification:** Riparian Shallow Open Water (open water pond) **Province:** British Columbia

UTM: 11U 342554 E 5744259 N **Legal Location:** b-93-C/82-M-14 **RK Start:** 649.4 **RK End:** 649.5 **BGC Zone:** ICHdw3

Overall Function

Functional Status:

- High-Moderate Functional Condition (62%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The surface water storage in this permanent wetland helps maintain an elevated water table and increased soil moisture in spring, summer and fall. The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- The emergent vegetation and open water enables nutrient capture and retention, promoting additional vegetation growth and improved water quality.
- Portions of the wetland have mineral substrate while some are peat-accumulating, which can result in complex biogeochemical cycling.
- Woody vegetation along the margins of the wetland provides shelter and cover for ungulates and fur-bearers and promotes moisture retention.
- Provides shallow water habitat migratory for waterfowl and amphibians in early spring, summer and fall.

General

Surrounding Land Use:

- This wetland is adjacent to treed/forested land.

Existing Disturbance(s):

- Highway bisects wetland.

Associated Wetland(s):

- None.

Hydrologic Function

Hydrogeomorpohology:

- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:

- Part of a wetland complex.

Hydrodynamic Index:

- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water:

- Open water present, greater than 1 m deep (10% wetland area); standing water present, 0.5-1 m deep (10% wetland area).

Microtopography:

- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:

- Hydric mineral soil with organic veneer..

Soil Moisture Regime:

- Very Wet.

Water Colour and Turbidity:

- Tea coloured and turbid at time of wetland survey.

Litter Quality:

- High.

von Post:

- N/A.

Nutrient Regime:

- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:

- Partial woody riparian border surrounding wetland.

Tree Strata:

- None observed.

Shrub Strata:

- Mountain alder (*Alnus incana ssp. tenuifolia*), bog willow (*Salix pedicellaris*), red-osier dogwood (*Cornus stolonifera*) and pink spirea (*Spiraea douglasii ssp. Menziesii*).

Herbaceous and Graminoid Strata:

- Common cattail (*Typha latifolia*), beaked sedge (*Carex utriculata*), marsh cinquefoil (*Comarum palustre*), water sedge (Carex aquatilis), skunk cabbage (*Lysichiton americanus*), lady fern (*Athyrium filix-femina ssp. cyclosorum*), small bedstraw (*Galium trifidum*) and yellow pond-lily (*Nuphar lutea*).

Moss Strata:

- Squarrose peat moss (*Sphagnum squarrosum*).

Noxious Weeds:

- No noxious weed species observed at time of wetland survey.

Undesirable Species:

- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:

- Wildlife trees present in wetland.
- Cover and foraging habitat available for waterfowl (emergent vegetation dominant).
- Suitable cover for songbirds (woody vegetation present within wetland).
- Open and standing water available for amphibians.
- Suitable forage for ungulates (presence of willow species).

Wildlife Observations:

- Pied-billed grebe and beaver dam observed at time of wetland survey.

Cross-Discipline Reference

Vegetation:

- Wetland is associated with two rare ecological communities (Wm01 is Yellow-listed and Wm05 is Blue-listed).

Plate 1 Imagery overview showing riparian shallow open water (open water pond).

Plate 2 Overview showing riparian shallow open water (open water pond) (August 12, 2012).

Plate 3 View west through riparian shallow open water (open water pond) showing open water component (September 27, 2012).

Plate 4 View north through riparian shallow open water (open water pond) showing narrow riparian fringe along road (September 27, 2012).

Plate 5 View west through riparian shallow open water (open water pond) showing open water and emergent vegetation (September 27, 2012).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-158 **CWCS Wetland Classification:** Flat Swamp (broad-leaf treed swamp) **Province:** British Columbia

UTM: 11 U 329669 E 5727917 N **Legal Location:** a-18-L/82-M-11 **RK Start:** 672.86 to **RK End:** 672.92 **BGC Zone:** ICHdw3

Overall Function

Functional Status:
- High-Moderate Functional Condition (65%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The surface water storage in this temporary wetland helps maintain an elevated water table and increased soil moisture during the spring. The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and fur-bearers.
- The moist ground and coarse woody debris provides potential habitat for amphibians.

General

Surrounding Land Use:
- This wetland surrounded by treed/forested land.

Existing Disturbance(s):
- Existing pipeline right-of-way bisects wetland.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water:
- No open water present; standing water present, less than 0.5 m deep (5% wetland area).

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Hydric mineral soil with organic veneer.

Soil Moisture Regime:
- Very Moist.

Water Colour and Turbidity:
- Tea coloured and turbid at time of wetland survey.

pH (acidity/alkalinity):
- Neutral (6.5-7.4) at time of wetland survey.

Litter Quality:
- Poor.

von Post:
- N/A.

Nutrient Regime:
- Very Poor.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), paper birch (*Betula papyrifera*) and western redcedar (*Thuja plicata*).

Shrub Strata:
- Thimbleberry (*Rubus parviflorus*), red-osier dogwood (*Cornus sericea*) and alder species (*Alnus sp.*).

Herbaceous and Graminoid Strata:
- Lady fern (*Athyrium filix-femina* ssp. *cyclosorum*), small-fruited bulrush (*Scirpus microcarpus*) and water buttercup (*Ranunculus flabellaris*).

Moss Strata:
- Red-stemmed feathermoss (*Pleurozium schreberi*)

Noxious Weeds:
- No noxious weed species observed at time of wetland survey

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees present in wetland.
- Suitable cover for songbirds (woody vegetation present within wetland).
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Suitable forage for ungulates (presence of red-osier dogwood).
- Standing water available for amphibians.

Wildlife Observations:
- No wildlife observed at time of wetland survey.

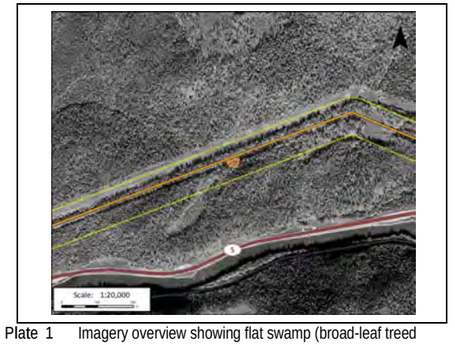

Plate 1 Imagery overview showing flat swamp (broad-leaf treed swamp).

Plate 2 Overview showing flat swamp (broad-leaf treed swamp) (August 12, 2012).

Plate 3 View west showing existing right-of-way through flat swamp (broad-leaf treed swamp) (June 16, 2013).

Plate 4 View east through flat swamp (broad-leaf treed swamp) showing herbaceous vegetation (June 16, 2013).

Plate 5 View southwest through flat swamp (broad-leaf treed swamp) showing herbaceous vegetation (June 16, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-1347 **CWCS Wetland Classification:** Basin Marsh (seasonal emergent marsh) **Province:** British Columbia

UTM: 11U 313164 E 5720728 N **Legal Location:** c-26-G/82-M-12 **RK Start:** 695.287 **RK End:** 695.288 **BGC Zone:** IDFmw2

Overall Function

Functional Status:
- Low-Moderate Functional Condition (48%): This wetland demonstrates a limited selection of the wetland functions expected from this wetland classification due to the moderately high level of anthropogenic disturbance present within wetland.
- The surface water storage in this wetland helps maintain an elevated water table and increased soil moisture during the spring. The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- Low areas within the wetland cause water to pool during most of the year, which provides potential breeding habitat for amphibians.

General

Surrounding Land Use:
- This wetland is surrounded by tame pasture.

Existing Disturbance(s):
- Adjacent to highway and existing transmission line.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Ponds and Potholes: sites associated with small waterbodies.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water
- No open water present; standing water present, less than 0.5 m deep (less than 1% wetland area).

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Mineral with an organic veneer.

Soil Moisture Regime:
- Very Moist.

Water Colour and Turbidity:
- Green-brown and clear at time of wetland survey.

pH (acidity/alkalinity):
- Alkaline (greater than 7.4) at time of wetland survey.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous non-woody riparian border surrounding wetland.

Tree Strata:
- None observed.

Shrub Strata:
- Red-osier dogwood (*Cornus stolonifera*), willow species (*Salix sp.*) and black hawthorn (*Crataegus douglasii var. douglasii*).

Herbaceous and Graminoid Strata:
- Hard-stemmed bulrush (*Schoenoplectus acutus*), cattail species (*Typha sp.*), water-hemlock species (*Cicuta sp.*), broad-leaved water plantain (*Alisma plantago-aquatica*), water crowfoot species (*Ranunculus sp.*) and common horsetail (*Equisetum arvense*).

Moss Strata:
- Brown moss species (*Drepanocladus sp.*).

Noxious Weeds:
- Bull thistle (*Cirsium vulgare*).

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Standing water available for amphibians.
- Suitable cover for songbirds (woody vegetation present within wetland).

Wildlife Observations:
- Red-winged blackbird observed at time of wetland survey.

Cross-Discipline Reference

Vegetation:
- Wetland is associated with one rare ecological community (Wm06 is Blue-listed).

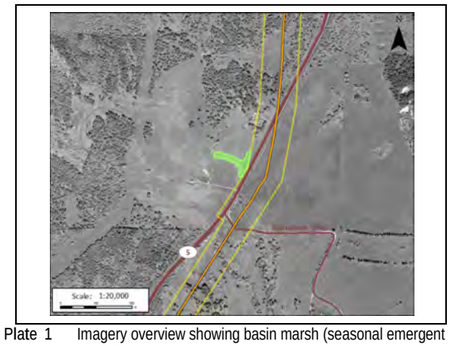

Plate 1 Imagery overview showing basin marsh (seasonal emergent marsh).

Plate 2 View northeast through basin marsh (seasonal emergent marsh) showing adjacent transmission line (June, 17, 2012).

Plate 3 View northeast through basin marsh (seasonal emergent marsh) showing adjacent herbaceous vegetation (June 17, 2013).

Plate 4 View east through basin marsh (seasonal emergent marsh) showing graminoid vegetation (June 17, 2013).

Plate 5 View south through basin marsh (seasonal emergent marsh) showing herbaceous vegetation (June 17, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-194 **CWCS Wetland Classification:** Basin Marsh (seasonal emergent marsh) **Province:** British Columbia

UTM: 10 U 699538 E 5718955 N **Legal Location:** b-10-H/92-P-9 **RK Start:** 732.39 **RK End:** 732.43 **BGC Zone:** IDFmw2

Overall Function

Functional Status:

- High-Moderate Functional Condition (63%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- Woody vegetation along the margins of the wetland provides shelter and cover for ungulates and fur-bearers and promotes moisture retention.
- The surface water storage in this wetland helps maintain an elevated water table and increased soil moisture throughout the spring and summer. The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- Wetland complexes often provide unique habitat for rare plants and have high biodiversity as they are closely located and interconnected wetland/upland habitat.

General

Surrounding Land Use:

- This wetland is adjacent to tame pasture and treed/forested land.

Existing Disturbance(s):

- Adjacent to highway and existing pipeline right-of-way. Associated with artificial dugout.

Associated Wetland(s):

- None.

Hydrologic Function

Hydrogeomorpohology:

- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:

- Part of a wetland complex.

Hydrodynamic Index:

- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water:

- Open water present; 0.5-1 m deep (15% wetland area); standing water in low areas only.

Microtopography:

- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:

- Saturated hydric, mineral soil.

Soil Moisture Regime:

- Moist.

pH (acidity/alkalinity):

- Alkaline (greater than 7.4) at time of wetland survey.

Litter Quality:

- High.

von Post:

- Slightly Decomposed (H1-H3, plant material still identifiable).

Nutrient Regime:

- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:

- Partial woody riparian border surrounding wetland.

Tree Strata:

- Hybrid spruce (*Picea engelmannii X glauca).*

Shrub Strata:

- Black hawthorn (*Crataegus douglasii)*, willow species (*Salix sp.*) and alder species (*Alnus sp.*).

Herbaceous and Graminoid Strata:

- Water sedge (*Carex aquatilis*), bluejoint (*Calamagrostis canadensis*), beaked sedge (*Carex utriculata*), Bebb's sedge (*Carex bebbii*), cattail species (*Typha sp.*) and common horsetail (*Equisetum arvense*).

Moss Strata:

- None observed.

Noxious Weeds:

- Bull thistle (*Cirsium vulgare).*

Undesirable Species:

- Hawksbeard species (*Crepis sp.*).

Habitat Function – Wildlife

Wildlife Habitat Features:

- Suitable rearing areas for waterfowl (cover and access to water).
- Suitable cover for songbirds (woody vegetation present within wetland).
- Open water available for amphibians.
- Wildlife trees present in wetland.

Wildlife Observations:

- No wildlife observed at time of wetland survey.

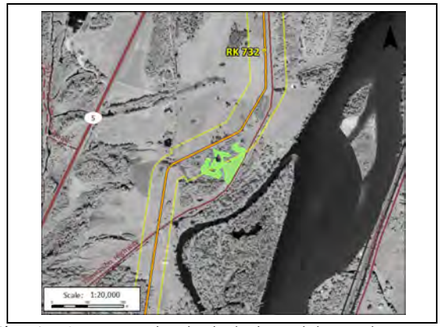

Plate 1 Imagery overview showing basin marsh (seasonal emergent marsh).

Plate 2 Overview showing basin marsh (seasonal emergent marsh) (August, 12, 2012).

Plate 3 View east through basin marsh (seasonal emergent marsh) showing associated artificial dugout (June 18, 2013).

Plate 4 View northeast through basin marsh (seasonal emergent marsh) showing graminoid vegetation (June 18, 2013).

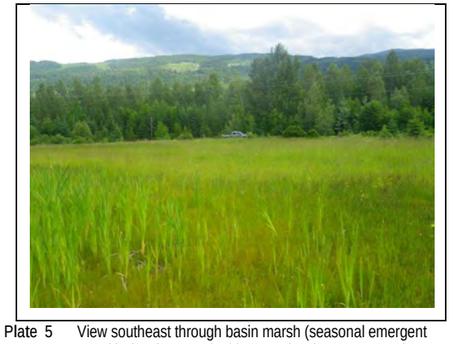

Plate 5 View southeast through basin marsh (seasonal emergent marsh) showing graminoid vegetation (June 18, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-611 **CWCS Wetland Classification:** Basin Marsh (alkali marsh) **Province:** British Columbia

UTM: 10U 683416 E 5612944 N **Legal Location:** d-63-E/92-I-9 **RK Start:** 853.5 **RK End:** 853.7 **BGC Zone:** IDFxh2a

Overall Function

Functional Status:
- Low-Moderate Functional Condition (41%): This wetland demonstrates a limited selection of the wetland functions expected from this wetland classification due to the moderately high level of anthropogenic disturbance present within wetland.
- Alkali marshes often provide a unique habitat for rare plants due to their unique biogeochemistry.
- The surface water storage in this wetland helps maintain an elevated water table and increased soil moisture throughout the spring and summer. The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- Alkali wetlands have a particularly high potential for absorption of phosphorus from the surrounding lands. The phosphorus is typically bound to calcium (as calcium phosphate), removing it from surface water but leaving it available for plants and microbes.

General

Surrounding Land Use:
- This wetland is surrounded by native grassland.

Existing Disturbance(s):
- Wetland is adjacent to existing pipeline right-of-way; moderate occurrence of undesirable species.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Ponds and Potholes: sites associated with small waterbodies.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Very dynamic: highly dynamic surface water regime.

Surface Water
- No open water present; saturated/soggy ground present at time of wetland survey.

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Alkali mineral soil.

Soil Moisture Regime:
- Very Moist.

Water Colour and Turbidity:
- Unable to examine water colour or turbidity at time of wetland survey.

pH (acidity/alkalinity):
- Unable to estimate wetland water pH at time of wetland survey.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Poor.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous non-woody riparian border surrounding wetland.

Tree Strata:
- None observed.

Shrub Strata:
- None observed.

Herbaceous and Graminoid Strata:
- Red glassword (samphire) (*Salicornia rubra*) and Nuttall's alkaligrass (*Puccinellia nuttalliana*).

Moss Strata:
- None observed.

Noxious Weeds:
- No noxious weed species observed at time of wetland survey.

Undesirable Species:
- Foxtail barley (*Hordeum jubatum ssp. jubatum*).

Habitat Function – Wildlife

Wildlife Habitat Features:
- Shorebird foraging habitat (mudflat and grasses less than 10 cm and soils saturated).

Wildlife Observations:
- American kestrel and gray jay were heard at time of wetland survey.
- Gray jay and deer tracks were observed at time of wetland survey.

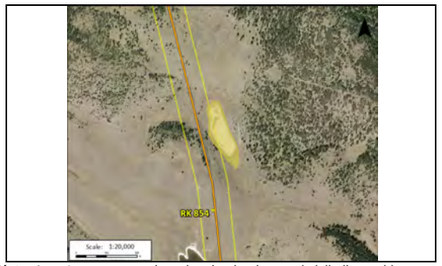

Plate 1 Imagery overview showing basin marsh (alkali marsh).

Plate 2 View north through basin marsh (alkali marsh) showing alkali vegetation (August 15, 2013).

Plate 3 View south through basin marsh (alkali marsh) showing herbaceous riparian fringe (August 15, 2013).

Plate 4 View north through basin marsh (alkali marsh) showing alkaline crust (August 15, 2013).

Plate 5 View of southeast through basin marsh (alkali marsh) showing ephemeral drainage (August 15, 2013).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-580 **CWCS Wetland Classification:** Basin Marsh (seasonal emergent marsh) **Province:** British Columbia

UTM: 10U 684157 E 5606563 N **Legal Location:** c-92-D/9-I-92 **RK Start:** 862.4 **RK End:** 862.5 **BGC Zone:** IDFxh2a

Overall Function

Functional Status:
- High-Moderate Functional Condition (52%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The surface water storage in this wetland helps maintain an elevated water table and increased soil moisture during the spring. The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- Provides shallow water habitat for migratory waterfowl and shore birds, as well as amphibians in early spring.
- Woody vegetation along the margins of the wetland provides shelter and cover for ungulates and furbearers and promotes moisture retention.
- This wetland serves as a source of water and high quality forage for livestock throughout the growing season.

General

Surrounding Land Use:
- This wetland is surrounded by native grassland.

Existing Disturbance(s):
- Adjacent to existing pipeline right-of-way. Cattle disturbance observed within wetland.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from precipitation.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Very dynamic: highly dynamic surface water regime.

Surface Water
- Open water present, less than 0.5 m deep (10% wetland area); no standing water present at time of wetland survey.

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Water Colour and Turbidity:
- Tea coloured or yellowish-deep brown and turbid at time of wetland survey.

pH (acidity/alkalinity):
- Alkaline (greater than 7.4) at time of wetland survey.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- Spruce species (*Picea sp.*) and pine species (*Pinus sp.*).

Shrub Strata:
- Willow species (*Salix spp.*), mountain alder (*Alnus incana ssp. tenuifolia*) and red-osier dogwood (*Cornus stolinfera*).

Herbaceous and Graminoid Strata:
- Common cattail (*Typha latifolia*), hard-stemmed bulrush (*Schoenoplectus acutus*), common spike-rush (*Eleocharis palustris*), beaked sedge (*Carex utriculata*), marsh cinquefoil (*Comarum palustre*) and water smartweed (*Polygonum amphibium*).

Moss Strata:
- None observed.

Noxious Weeds:
- No noxious weed species observed at time of wetland survey.

Undesirable Species:
- Flixweed (*Descurainia sophia*) and common dandelion (*Taraxacum officinale*).

Habitat Function – Wildlife

Wildlife Habitat Features:
- Cover and foraging habitat available for waterfowl (emergent vegetation dominant).
- Open water available for amphibians.
- Suitable forage for ungulates (presence of willow species).
- Suitable cover for songbirds (woody vegetation present within wetland).

Wildlife Observations:
- Woodpecker species and frog calls were heard at time of wetland survey.
- Canada goose, amphibian egg mass, red-winged blackbird, chat species and coyote scat were observed at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland is associated with a watercourse (BC-430) (see Fisheries (British Columbia) Technical Report in Volume 5C).

Vegetation:
- Wetland is associated with a rare ecological community (Wm05 is Blue-listed).

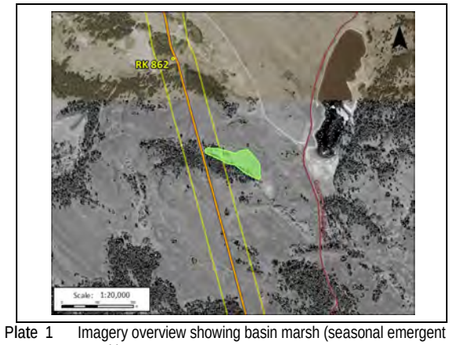

Plate 1 Imagery overview showing basin marsh (seasonal emergent marsh).

Plate 2 Overview showing basin marsh (seasonal emergent marsh) (September, 24, 2012).

Plate 3 View west through basin marsh (seasonal emergent marsh) showing emergent vegetation and standing water (May 4, 2013).

Plate 4 View south through basin marsh (seasonal emergent marsh) showing emergent vegetation (May 4, 2013).

Plate 5 View south through basin marsh (seasonal emergent marsh) showing emergent vegetation and riparian fringe (May 4, 2013).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-673 **CWCS Wetland Classification:** Flat Swamp (shrubby swamp) **Province:** British Columbia

UTM: 10U 645891 E 5516827 N **Legal Location:** b-48-D/92-H-15 **RK Start:** 974.5 **RK End:** 974.5 **BGC Zone:** IDFdk2

Overall Function

Functional Status:
- High-Moderate Functional Condition (52%): This wetland demonstrates many of the wetland functions expected from this wetland classification with some anthropogenic disturbance present within wetland.
- The woody vegetation helps promote and maintain the soil moisture regime within the wetland.
- The surface water storage in this wetland helps maintain an elevated water table and increased soil moisture during the spring. The wetland retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- Portions of the wetland have mineral substrate while some are peat-accumulating, which can result in complex biogeochemical cycling.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and furbearers.

General

Surrounding Land Use:
- This wetland is located adjacent to treed/forested land.

Existing Disturbance(s):
- Adjacent to existing pipeline right-of-way and highway.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of a wetland complex.

Hydrodynamic Index:
- Mobile: distinct flooding and drawdown or pronounced lateral water movements.

Surface Water Microtopography:
- No open water present; standing water present, less than 0.5 m deep (10% wetland area).
- Hummock and hollow microtopography present.

Biogeochemical Function

Soil Type:
- Mineral with an organic veneer.

Soil Moisture Regime:
- Wet.

Water Colour and Turbidity:
- Green-brown and clear at time of wetland survey.

pH (acidity/alkalinity):
- Unable to estimate wetland water pH at time of wetland survey.

Litter Quality:
- Poor.

von Post:
- Slightly Decomposed (H1-H3, plant material still identifiable).

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Balsam poplar (*Populus balsamifera ssp. balsamifera*).

Shrub Strata:
- Mountain alder (*Alnus incana ssp. tenuifolia*), birch-leaved spirea (*Spiraea betulifolia ssp. lucida*), red-osier dogwood (*Cornus stolinfera*), sitka willow (*Salix sitchensis*) and black twinberry (*Lonicera involucrata*).

Herbaceous and Graminoid Strata:
- Common cattail (*Typha latifolia*), bluejoint (*Calamagrostis canadensis*), water sedge (*Carex aquatilis*), sedge species (*Carex spp.*) and white-water buttercup (*Ranunculus aquatilis*).

Moss Strata:
- *Mnium* moss (*Mnium spp.*).

Noxious Weeds:
- No noxious weed species observed at time of wetland survey

Undesirable Species:
- Common dandelion (*Taraxacum officinale*).

Habitat Function – Wildlife

Wildlife Habitat Features:
- Standing water available for amphibians.
- Suitable forage for ungulates (presence of willow species).
- Suitable coarse woody debris habitat for amphibians.
- Suitable songbird cover (woody vegetation present within wetland).
-

Wildlife Observations:
- Game trails observed at time of wetland survey.

Cross-Discipline Reference

Vegetation:
- Wetland is associated with a rare ecological community (Ws02 is Yellow-listed).

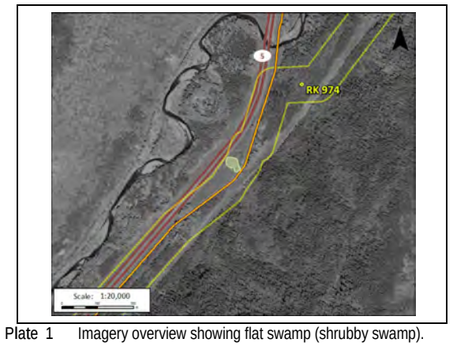

Plate 1 Imagery overview showing flat swamp (shrubby swamp).

Plate 2 Overview showing flat swamp (shrubby swamp) (September, 23, 2012).

Plate 3 View south through flat swamp (shrubby swamp) showing standing water (May 2, 2013).

Plate 4 View south through flat swamp (shrubby swamp) showing emergent and woody vegetation (May 2, 2013).

Plate 5 View south through flat swamp (shrubby swamp) showing standing water (May 2, 2013).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-1460 **CWCS Wetland Classification:** Basin Shallow Open Water (open water pond) **Province:** British Columbia

UTM: 10U 607150 E 5468996 N **Legal Location:** c-32-H/92-H-5 **RK Start:** 1051.4 to **RK End:** 1051.5 **BGC Zone:** CWHxm1

Overall Function

Functional Status:
- Low Functional Condition (23%): This wetland demonstrates few of the wetland functions expected from this wetland classification due to the high level of anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and furbearers as well as shelter from and weather events (*i.e.*, heat, severe wind, heavy rain or hail etc.).
- Low areas within the wetland cause water to pool during most of the year, which provides potential breeding habitat for amphibians.

General

Surrounding Land Use:
- This wetland is adjacent to treed/forested and cultivated land.

Existing Disturbance(s):
- Adjacent to existing right-of-way and highway.
- Culvert exists through adjacent highway.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Basin with flow but restricted by beaver activity.

Hydrodynamic Index:
- Very Dynamic: highly dynamic surface water regime.

Surface Water
- Open water present, greater than 1 m deep (90% wetland area). Standing water present, less than 0.5 m deep (5% wetland area).

Microtopography:
- Microtopographical variation is not present.

Biogeochemical Function

Soil Type:
- Non-saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Water Colour and Turbidity:
- Blue-green and very clear at time of wetland survey.

pH (acidity/alkalinity):
- Moderately acidic (4.5-5.5) at time of wetland survey.

Litter Quality:
- Moderate.

von Post:
- N/A.

Nutrient Regime:
- Poor.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- None observed.

Shrub Strata:
- Scouler's willow (*Salix scouleriana*), hardhack (*Spiraea douglasii ssp. douglasii*), green alder (*Alnus viridis ssp. crispa*) and salmonberry (*Rubus spectabilis*).

Herbaceous and Graminoid Strata:
- Reed canary grass (*Phalaris arundinacea*).

Moss Strata:
- None observed.

Noxious weeds:
- No weed species observed at time of wetland survey.

Undesirable Species:
- No undesirable species observed at time of wetland survey.

Habitat Function – Wildlife

Wildlife Habitat Features:
- Suitable forage for ungulates (presence of willow species).
- Open and standing water available for amphibians.
- Suitable cover for songbirds (woody vegetation present within wetland).
- Wildlife trees and snags present in wetland.

Wildlife Observations:
- Active beaver dams observed at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland is associated with a watercourse (BC-658) (see Fisheries (British Columbia) Technical Report in Volume 5C).

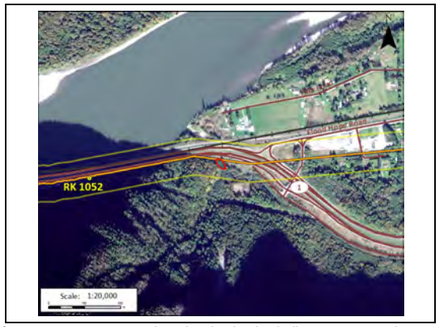

Plate 1 Imagery overview showing basin shallow open water (open water pond).

Plate 2 View east basin through shallow open water (open water pond) showing emergent vegetation (May 1, 2013).

Plate 3 View north through shallow open water (open water pond) showing emergent vegetation (May 1, 2013).

Plate 4 View north through shallow open water (open water pond) showing channel from culvert (May 1, 2013).

Plate 5 View south through shallow open water (open water pond) showing beaver-flooded area (May 1, 2013).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-741 and WT-742 **CWCS Wetland Classification:** Riparian Shallow Open Water (open water pond) **Province:** British Columbia

UTM: 10 U 571622 E 5439076 N and 571553 E 5438996 N **Legal Location:** a-22-H/92-G-1 and c-12-H/92-G-1 **RK Start:** 1102.1 to **RK End:** 1102.3 **BGC Zone:** CWHxm1

<u>Overall Function</u>

Functional Status:
- Low-Moderate Functional Condition (44%): This wetland demonstrates a limited selection of the wetland functions expected from this wetland classification due to the moderately high level of anthropogenic disturbance present within wetland.
- The woody vegetation promotes and maintains the soil moisture regime within the wetland.
- The surface water storage in this permanent wetland maintains an elevated water table and increased soil moisture in spring, summer and fall. It retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- The emergent vegetation and open water enables nutrient capture and retention, promoting additional vegetation growth and improved water quality.
- The woody vegetation provides essential cover and foraging habitat for ungulates, birds and furbearers as well as shelter from and weather events (*i.e.*, heat, severe wind, heavy rain or hail etc.).
- The moist ground and coarse woody debris provides potential habitat for amphibians.
- Provides early spring, summer and fall open water habitat and forage for waterfowl, amphibians and other wildlife such as semi-aquatic mammals (*e.g.*, muskrat, beaver).

<u>General</u>

Surrounding Land Use:
- This wetland is surrounded by treed/forested and cultivated land.

Existing Disturbance(s):
- Adjacent to road and existing right-of-way.

Associated Wetland(s):
- WT-1406.

<u>Hydrologic Function</u>

Hydrogeomorpohology:
- Fluvial System: sites associated with flowing water and subject to flooding, erosion and sedimentation.

Wetland Connectivity:
- Part of wetland complex.

Hydrodynamic Index:
- Dynamic.

Surface Water Microtopography:
- Open water present, greater than 1 m deep (85% wetland area). No standing water or saturated/soggy ground present.
- Microtopographical variation is not present.

<u>Biogeochemical Function</u>

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Very Wet.

Water Colour and Turbidity:
- Green-brown and clear at time of wetland survey.

pH (acidity/alkalinity):
- Neutral (6.5-7.4) at time of wetland survey.

Litter Quality:
- High to moderate.

von Post:
- N/A.

Nutrient Regime:
- Poor.

<u>Habitat Function – Wetland Vegetation</u>

Riparian Border:
- Continuous woody riparian border surrounding wetland.

Tree Strata:
- Balsam poplar (*Populus balsamifera*).

Shrub Strata:
- Green alder (*Alnus viridis ssp. crispa*), salmonberry (*Rubus spectabilis*), red-osier dogwood (*Cornus stolonifera*), thimbleberry (*Rubus parviflorus var. parviflorus*), hardhack (*Spiraea douglasii ssp. douglasii*), black twinberry (*Lonicera involucrata*) and Scouler's willow (*Salix scouleriana*).

Herbaceous and Graminoid Strata:
- Reed canary grass (*Phalaris arundinacea*) and sword fern (*Polystichum munitum*).

Moss Strata:
- None observed.

Noxious Weeds:
- Himalayan blackberry (*Rubus armeniacus*).

Undesirable Species:
- Curled dock (*Rumex crispus*).

<u>Habitat Function – Wildlife</u>

Wildlife Habitat Features:
- Cover and foraging habitat available for waterfowl as well as cover available for shorebirds (emergent vegetation dominant).
- Shorebird foraging habitat (less than 2 cm water).
- Suitable rearing/molting/staging waterfowl area (wetland vegetation cover on margins and open water).
- Open water available for amphibians.
- Suitable forage for ungulates (presence of willow species).
- Suitable cover for ungulates (mix of tree and shrub cover greater than 1 m in height).
- Suitable cover for songbirds (woody vegetation present within wetland).
- Wildlife trees present in wetland.

Wildlife Observations:
- Great blue heron, common merganser, minnow species and rufous hummingbird observed at time of wetland survey.

<u>Cross-Discipline Reference</u>

Aquatics:
- Wetland is associated with a watercourse (BC-716) (see Fisheries (British Columbia) Technical Report in Volume 5C).

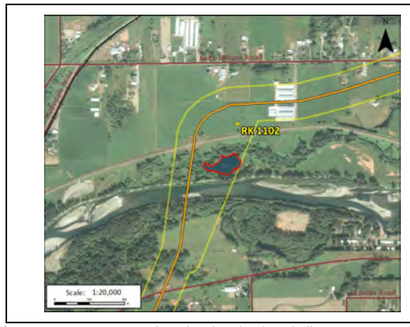

Plate 1 Imagery overview showing riparian shallow open water (open water pond).

Plate 2 View northeast through riparian shallow open water (open water pond) showing riparian vegetation (April 30, 2013)

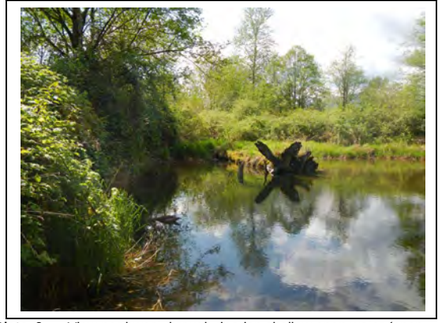

Plate 3 View northwest through riparian shallow open water (open water pond) (April 30, 2013).

Plate 4 View east through riparian shallow open water (open water pond) across backwater channel (April 30, 2013).

Plate 5 View north through riparian shallow open water (open water pond) showing open water habitat (April 30, 2013).

Wetland Function Site Cards
2013

TRANSMOUNTAIN

tera ENVIRONMENTAL CONSULTANTS

Wetland ID: WT-770 **CWCS Wetland Classification:** Basin Marsh (seasonal emergent marsh) **Province:** British Columbia

UTM: 10U 543989 E 5440135 N **Legal Location:** c-32-E/92-G-1 **RK Start:** 1132.47 to **RK End:** 1132.51 **BGC Zone:** CWHds1

Overall Function

Functional Status:
- Low-Moderate Functional Condition (25%): This wetland demonstrates a limited selection of the wetland functions expected from this wetland classification due to the moderately high level of anthropogenic disturbance present within wetland.
- The surface water storage in this temporary wetland maintains an elevated water table and increased soil moisture throughout the spring and summer. It retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- Low areas within the wetland cause water to pool during most of the year, which provides potential breeding habitat for amphibians.
- This wetland provides surface water retention for the surrounding fields. The surface water stored in this wetland during the spring and early summer reduces flooding and functions to maintain soil moisture and water table levels during dry times of year in the localized area.

General

Surrounding Land Use:
- This wetland is within tame pasture surrounded by residential area.

Existing Disturbance(s):
- Adjacent to existing pipeline right-of-way. Cattle disturbance observed within wetland.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from groundwater and precipitation.

Wetland Connectivity:
- Isolated basin.

Hydrodynamic Index:
- Dynamic.

Surface Water Microtopography:
- No open water present. Standing water in low areas only.
- Lawn dominated wetland with occasional occurrence of hummock and hollow microforms.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Wet.

Water Colour and Turbidity:
- Unable to examine water colour or turbidity at time of wetland survey.

pH (acidity/alkalinity):
- Unable to estimate wetland water pH at time of wetland survey.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- Western redcedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*).

Shrub Strata:
- Mountain alder (*Alnus incana ssp. tenuifolia*).

Herbaceous and Graminoid Strata:
- Soft-stemmed bulrush (*Schoenoplectus tabernaemontani*), water sedge (*Carex aquatilis*), reed canary grass (*Phalaris arundinacea*) and skunk cabbage (*Lysichiton americanus*).

Moss Strata:
- None observed.

Noxious Weeds:
- Canada (creeping) thistle (*Cirsium arvense*).

Undesirable Species:
- Common dandelion (*Taraxacum officinale*).

Habitat Function – Wildlife

Wildlife Habitat Features:
- Wildlife trees and snags present near wetland.
- Suitable cover for songbirds (woody vegetation present within wetland).
- Standing water available for amphibians.
- Suitable coarse woody debris habitat for amphibians.
- Suitable forage for ungulates (presence of willow species).

Wildlife Observations:
- Tree swallow, hummingbird species and deer tracks observed at time of wetland survey.

Cross-Discipline Reference

Aquatics:
- Wetland is associated with a watercourse (BC-738) (see Fisheries (British Columbia) Technical Report in Volume 5C).

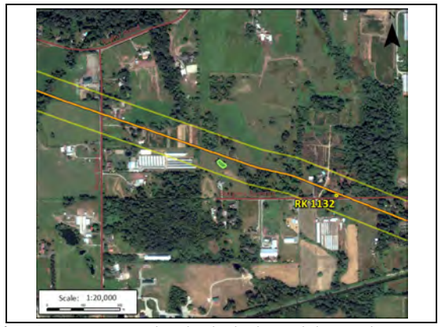

Plate 1 Imagery overview showing basin marsh (seasonal emergent marsh).

Plate 2 View east through basin marsh (seasonal emergent marsh) showing woody vegetation within wetland (April 29, 2013).

Plate 3 View west through basin marsh (seasonal emergent marsh) (April 29, 2013).

Plate 4 View southwest through basin marsh (seasonal emergent marsh) (April 29, 2013).

Plate 5 View south through basin marsh (seasonal emergent marsh) (April 29, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-1398 **CWCS Wetland Classification:** Hummock Marsh (seasonal emergent marsh) **Province:** British Columbia

UTM: 10U 536837 E 5442544 N **Legal Location:** b-70-E/92-G-1 **RK Start:** 1140.07 to **RK End:** 1140.14 **BGC Zone:** CWHds1

Overall Function

Functional Status:

- Low Functional Condition (20%): This wetland demonstrates few of the wetland functions expected from this wetland classification due to the high level of anthropogenic disturbance present within wetland.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- The moist ground and coarse woody debris provides potential habitat for amphibians.
- Low areas within the wetland cause water to pool during most of the year, which provides potential breeding habitat for amphibians.
- This wetland provides surface water retention for the surrounding fields. The surface water stored in this wetland during the spring and early summer reduces flooding and functions to maintain soil moisture and water table levels during dry times of year in the localized area.

General

Surrounding Land Use:
- This wetland is within tame pasture surrounded by residential area.

Existing Disturbance(s):
- Dugout construction, existing pipeline right-of-way and cattle disturbance present in wetland.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from groundwater and precipitation.

Wetland Connectivity:
- Part of wetland complex.

Hydrodynamic Index:
- Dynamic.

Surface Water Microtopography:
- No open water present. Standing water in low areas only.
- Lawn dominated wetland with occasional occurrence of hollow microforms.

Biogeochemical Function

Soil Type:
- Saturated hydric, mineral soil.

Soil Moisture Regime:
- Wet.

Water Colour and Turbidity:
- Unable to examine water colour or turbidity at time of wetland survey.

pH (acidity/alkalinity):
- Unable to estimate wetland water pH at time of wetland survey.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Medium.

Habitat Function – Wetland Vegetation

Riparian Border:
- No riparian border surrounding wetland.

Tree Strata:
- None observed.

Shrub Strata:
- None observed.

Herbaceous and Graminoid Strata:
- Soft-stemmed bulrush (*Schoenoplectus tabernaemontani*) and agronomic species.

Moss Strata:
- None observed.

Noxious Weeds:
- Canada (creeping) thistle (*Cirsium arvense*).

Undesirable Species:
- Common dandelion (*Taraxacum officinale*).

Habitat Function – Wildlife

Wildlife Habitat Features:
- Cover and foraging habitat available for waterfowl as well as cover available for shorebirds (emergent vegetation dominant).

Wildlife Observations:
- Canada goose and mallards observed at time of wetland survey

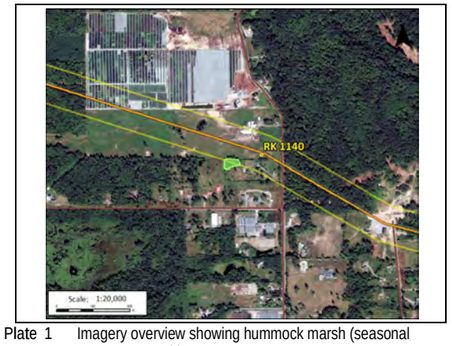

Plate 1 Imagery overview showing hummock marsh (seasonal emergent marsh).

Plate 2 View south through hummock marsh (seasonal emergent marsh) (April 30, 2013).

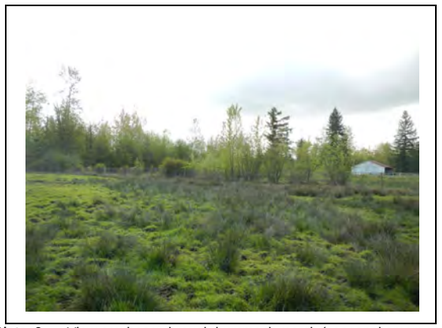

Plate 3 View southeast through hummock marsh (seasonal emergent marsh) showing tufted vegetation (April 30, 2013).

Plate 4 View northeast through hummock marsh (seasonal emergent marsh) showing drainage (April 30, 2013).

Plate 5 View southwest through hummock marsh (seasonal emergent marsh) showing microtopography (April 30, 2013).

Wetland Function Site Cards
2013

Wetland ID: WT-1395 **CWCS Wetland Classification:** Hummock Marsh (seasonal emergent marsh) **Province:** British Columbia

UTM: 10U 529216 E 5445296 N **Legal Location:** b-98-H/92-G-2 **RK Start:** 1148.7 to **RK End:** 1148.8 **BGC Zone:** CWHxm1

Overall Function

Functional Status:
- Low-Moderate Functional Condition (43%): This wetland demonstrates a limited selection of the wetland functions expected from this wetland classification due to the moderately high level of anthropogenic disturbance present within wetland.
- The surface water storage in this temporary wetland maintains an elevated water table and increased soil moisture during the spring. It retains surface water from snowmelt and heavy rain events, which reduces flooding of the surrounding land.
- The wetland retains nutrients and filters sediments through ephemeral drainages to surrounding areas.
- The moist ground and coarse woody debris provides potential habitat for amphibians.
- This wetland has low occurrence of weed and/or undesirable species.

General

Surrounding Land Use:
- This wetland is within tame pasture.

Existing Disturbance(s):
- Cattle disturbance and vehicle trails observed within wetland.

Associated Wetland(s):
- None.

Hydrologic Function

Hydrogeomorpohology:
- Palustrine System, Basins and Hollows: sites in depressions and other topographical low points with the water table near or at the surface; receives water mainly from groundwater and precipitation.

Wetland Connectivity:
- Part of wetland complex.

Hydrodynamic Index:
- Dynamic.

Surface Water
- No open water present. Saturated/soggy ground with no standing water present.

Microtopography:
- Hummocks and hollows with bare organic soil.

Biogeochemical Function

Soil Type:
- Mineral with an organic veneer.

Soil Moisture Regime:
- Wet.

Water Colour and Turbidity:
- Unable to examine water colour or turbidity at time of wetland survey.

pH (acidity/alkalinity):
- Unable to estimate wetland water pH at time of wetland survey.

Litter Quality:
- High.

von Post:
- N/A.

Nutrient Regime:
- Rich.

Habitat Function – Wetland Vegetation

Riparian Border:
- Partial woody riparian border surrounding wetland.

Tree Strata:
- None observed.

Shrub Strata:
- Black hawthorn (*Crataegus douglasii*) and red elderberry (*Sambucus racemosa*).

Herbaceous and Graminoid Strata:
- Hard-stemmed bulrush (*Schoenoplectus acutus*), sedge species (*Carex spp.*), cut-leaved anemone (*Anemone multifida*), bluejoint (*Calamagrostis canadensis*) and swamp horsetail (*Equisetum fluviatile).*

Moss Strata:
- Brachythecium moss species (*Brachythecium* spp.).

Noxious Weeds:
- Canada (creeping) thistle (*Cirsium arvense*).

Undesirable Species:
- Smooth brome (*Bromus inermis*), common dandelion (*Taraxacum officinale*), curled dock (*Rumex crispus*) and sweetclover species (*Meliotus spp.*).

Habitat Function – Wildlife

Wildlife Habitat Features:
- Suitable coarse woody debris habitat for amphibians.
- Suitable forage for ungulates (presence of willow species).
- Suitable cover for songbirds (woody vegetation present within wetland).

Wildlife Observations:
- Red-tailed hawk, deer tracks and game trails observed at time of wetland survey.

Cross-Discipline Reference

Vegetation:
- Wetland is associated with one rare ecological communities (Wm06 is Blue-listed).

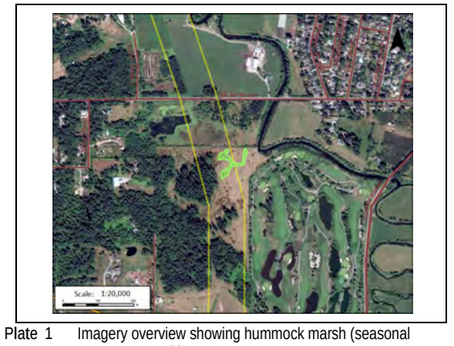

Plate 1 Imagery overview showing hummock marsh (seasonal emergent marsh).

Plate 2 View west through hummock marsh (seasonal emergent marsh) (April 28, 2013).

Plate 3 View north through hummock marsh (seasonal emergent marsh) (April 28, 2013).

Plate 4 View northwest through hummock marsh (seasonal emergent marsh) (April 28, 2013).

Plate 5 View northeast through hummock marsh (seasonal emergent marsh) showing shrubby vegetation (April 28, 2013).

Wetland Function Site Cards
2013

APPENDIX C

PHOTOPLATES

Plate 1 Overview east showing Flat Swamp (broad-leaf treed swamp with seasonal emergent marsh components [WT-1050]) near RK 7.8 at 6-16-52-23 W4M (May 10, 2013).

Plate 2 Overview southwest showing Flat Swamp (shrubby swamp [WT-1110]) near RK 16.3 at 16-25-51-24 W4M (May 10, 2013).

Plate 3 Overview southwest showing Basin Marsh (seasonal emergent marsh with deep marsh component [WT-238 and WT-239]) near RK 66.8 at 3-12-53-1 W4M (May 10, 2013).

Plate 4 Overview west showing Basin Marsh (seasonal emergent marsh [WT-484]) and Riparian Swamp (shrubby swamp [WT-485]) near RK 170.8 at 7-27-53-11 W4M and 3-27-53-1 W5M (May 10, 2013).

Plate 5 Overview west showing Flat Swamp (needle-leaf treed swamp [WT-1075]) near RK 266.1 at 3-4-53-20 W5M (May 10, 2013).

Plate 6 Overview west showing Basin Fen (non-woody fen [WT-1122]) near RK 325.0 at 8-4-51-25 W5M (May 10, 2013).

Plate 7 Overview northeast showing Flat Swamp (shrubby swamp [WT-2]) associated with Flat Swamp (shrubby swamp [WT-1]) near RK 510.0 at d-20-K/83-D-14 (August 20, 2012).

Plate 8 Overview north showing Riparian Water (open water pond [WT-91]) associated with Riparian Marsh (deep marsh [WT-90]) near RK 623.2 at d-66-C/83-D-3 (August 20, 2012).

Plate 9 Overview northwest showing Riparian Marsh (deep marsh [WT-123]) near RK 650.5 at d-84-C/82-M-14 (August 20, 2012).

Plate 10 Overview northwest showing Flat Swamp (mixedwood treed swamp [WT-133]) near RK 645.1 at c-56-C/82-M-14 (August 20, 2012).

Plate 11 Overview north showing Flat Swamp (shrubby swamp [WT-164]) near RK 691.7 at d-26-G/82-M-12 (August 20, 2012).

Plate 12 Overview west showing Flat Swamp (mixedwood treed swamp [WT-216]) associated with Flat Swamp (shrubby swamp and Basin Shallow Open Water (open water pond) [WT-217 and WT-218]) near RK 645.1 at c-68-J/92-P-8 (August 20, 2012).

Plate 13 Overview southeast showing potential Basin Marsh (seasonal emergent marsh [WT-566]) near RK 841.7 at a-72-L/92-I-9 (September 24, 2012).

Plate 14 Overview northeast showing potential Basin Marsh (deep marsh [WT-581]) near RK 865.1 at d-64-D/92-I-9 (September 24, 2012).

Plate 15 Overview northwest showing potential Lacustrine Marsh (deep marsh [WT-583]) near RK 869.7 at a-30-C/92-I-9 (September 24, 2012).

Plate 16 Overview east showing potential Riparian Marsh (seasonal emergent marsh [WT-592]) associated with Potential Basin Marsh (deep marsh [WT-591]) near RK 876.0 at d-51-L/92-I-8 (September 24, 2012).

Plate 17 Overview northeast showing potential Basin Marsh (alkali marsh [WT-649]) near RK 890.3 at d-6-E/92-I-8 (September 24, 2012).

Plate 18 Overview northeast showing potential Riparian Swamp (shrubby swamp [WT-659]) associated with Nicola River near RK 927.8 at a-50-G/92-I-2 (September 24, 2012).

Plate 19 Overview of southern portion of a potential Seasonal Emergent Marsh (seasonal emergent marsh [WT-739]) near RK1097.3 at c-37-E/92-H-4 and b-47-E/92-H-4 (September 23, 2012).

Plate 20 Overview southeast showing potential Shallow Open Water Pond (open water pond [WT-1459, 1442]) associated with Vedder River near RK 1102.5 at d-12-H/92-G-1 (September 23, 2012).

Plate 21 View southeast showing potential Shallow Open Water Ponds (open water pond [WT-772 and WT-773]) near RK 1133.8 at d-34-E/92-G-1 (September 23, 2012).

Plate 22 View southwest showing potential Shrubby Swamp (shrubby swamp [WT-750]) near RK 1138.0 at a, c, d-58-E/92-G-1 (September 23, 2012).

Plate 23 Overview northwest showing potential Riparian Swamp (shrubby swamp [WT-1154]) associated with unnamed stream near RK 1142.9 at a-73-H/92-G-2 (September 23, 2012).

Plate 24 Overview southwest showing potential Riparian Marsh (deep marsh [WT-782 and WT-783]) associated with Salmon River near RK 1147.3 at a-88-H/92-G-2 (September 23, 2012).