

4.0 CORRIDOR AND FACILITY SITE SELECTION

The Project includes further looping of the existing 1,150 km TMPL system from Edmonton to Burnaby in operation since 1953. The 987 km of pipeline that will be looped as part of TMEP traverses a wide range of landforms from flat farmland to mountainous terrain. Land use varies from densely populated urban areas around Edmonton, Vancouver and elsewhere to sparsely populated rural agricultural and forested Crown lands. The pipeline segments to be constructed as part of the Project will also potentially cross over 500 rivers and streams, 8 provincial parks and 13 Indian Reserves (IRs).

An overview of the general routing objectives/criteria and proposed pipeline corridor is provided in Section 4.2 of Volume 2. A more detailed description of the pipeline corridor and selection process is provided in Section 2.8 of Volume 4A.

This section provides an overview of the selection process for the proposed pipeline corridor, including a discussion of how environmental, socio-economic, Aboriginal engagement, stakeholder consultation and other factors influenced pipeline corridor selection. While the proposed pipeline will generally require a construction right-of-way of 45 m, a 150 m corridor was selected to define the boundaries of the environmental resource surveys, landowner contacts and other survey needs.

This section also describes the site selection for permanent facilities such as terminals, pump stations (including access roads and power lines) and mainline block valves, as well as the site selection process for temporary facilities used during construction, such as staging and stockpile sites, equipment storage sites, construction office sites, construction work camps, work areas for trenchless watercourse crossings, temporary access roads, borrow pits and log decks.

4.1 Overview of Corridor Selection Process

This subsection provides a summary of the TMEP corridor selection process. Throughout this subsection, the abbreviation “KP” refers to “Kilometre Posts”, approximately 1 km apart, along the existing TMPL easement or right-of-way (also known as Line 1 in Volumes 2 and 4), while the abbreviation “RK” refers to “Reference Kilometres”, approximately 1 km apart along the proposed pipeline corridor (also known as Line 2 in Volumes 2 and 4). The reader is also directed to view Figure 4.1-1 for general reference to KPs and RKs and the preliminary photomosaic Environmental Alignment Sheets at a scale of 1:15,000 in Alberta and 1:10,000 in BC that are provided in Volume 6E.

Early in the Project planning process, Trans Mountain decided to maximize usage of the existing TMPL 18 m wide right-of-way to the greatest extent practical to reduce environmental and socio-economic effects and facilitate efficient pipeline operations. The existing TMPL pipeline has been operating safely for more than 60 years and its location is well known to local TMPL operations crews, landowners, surface management agencies and local emergency responders. By constructing on or adjacent to the existing TMPL right-of-way, the number of new or additional landowners is reduced. Furthermore, landowners and surface management agencies are accustomed to the presence of a pipeline, and understand the types of land practices that maintain pipeline safety. The environmental and socio-economic effects can generally be reduced by constructing beside the existing TMPL right-of-way since it is possible to share temporary workspace that has been previously affected by construction, thereby minimizing the width of land and amount of vegetation to be disturbed. Similar benefits occur where the new pipeline is planned beside rights-of-way of other linear facilities, including other pipelines, power lines, highways, roads, railways, fiber optic transmission systems (FOTS) and other utilities. Finally, access to the right-of-way and power lines to the pump stations are already established, reducing the need to create additional disturbance for ancillary facilities.

Following detailed field surveys as described in Section 2.8 of Volume 4A, it was determined that, while it was possible to construct on or adjacent to the existing TMPL right-of-way for approximately two thirds of the TMEP distance (see note in Section 4.3), it was not possible in all cases due to engineering, constructability, geotechnical, environmental, socio-economic, Aboriginal interests or other reasons. At these locations, a number of potential alternative corridors were examined. Major alternative corridors that were considered but rejected are described in Section 4.2. Selected alternative corridors involving major deviations from the existing TMPL right-of-way worthy of a more detailed evaluation are also described in Section 4.2. The proposed pipeline corridor is summarized in Section 4.3.

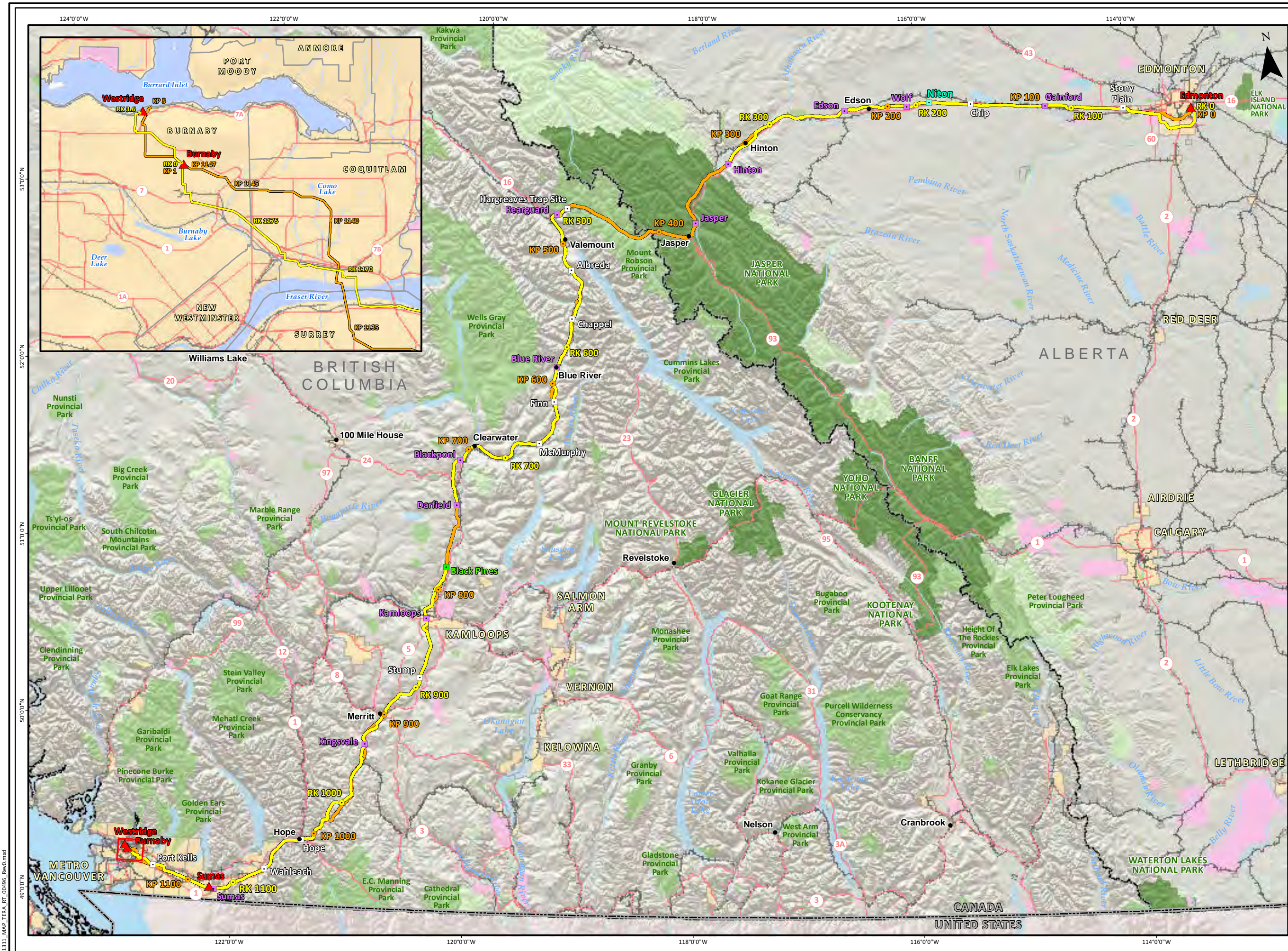


FIGURE 4.1-1

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 FLNR, 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 FLNR, 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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BRITISH COLUMBIA

ALBERTA

MAP NUMBER	201311_MAP_TERA_RT_00496_REV0	PAGE	SHEET 1 OF 1
DATE	December 2013	TERA REF.	7894
SCALE	1:2,250,000	PAGE SIZE	11x17
DRAWN	AJS	CHECKED	TGG

ALL LOCATIONS APPROXIMATE

4.2 Environmental, Socio-Economic and Associated Factors Considered in Pipeline Corridor Selection

Environmental, socio-economic, Aboriginal engagement, stakeholder consultation and other factors relating to pipeline corridor selection are discussed from east to west in the direction of pipeline flow. In general, the factors influencing selection of the proposed pipeline corridor are more complex in BC than Alberta. The bulk of the Rocky Mountains on the continental divide were crossed by the TMX Anchor Loop Project constructed in 2008, however, the proposed pipeline corridor must still cross several interior mountain ranges before entering the rich agricultural land and urban development in the Lower Mainland. A large portion of the urban development in the Lower Mainland, Kamloops and elsewhere has occurred after construction of TMPL in 1953. Likewise, the provincial parks potentially encountered by the Project have been established since TMPL was built.

4.2.1 *Edmonton to Hinton Segment*

This pipeline segment is characterized by dense urban development in the east, graduating to scattered country residential development, agricultural land and forests in the west.

Given that the TMPL Edmonton Terminal is on the east side of the City of Edmonton, it is difficult for a pipeline heading to the West Coast to avoid traversing the city. Trans Mountain examined three alternative corridors through Edmonton, each requiring a crossing of the North Saskatchewan River, the primary environmental feature in the area. The original TMPL 18 m right-of-way bypassed the then southern limits of the city, but 60 years of urban growth have caused the city boundaries to move many kilometres further south (see Plate 1 at the end of Section 4.2). Rather than run adjacent to hundreds of residential properties, Trans Mountain chose to take advantage of the Edmonton Transportation/Utility Corridor (TUC) established by the Province of Alberta in the 1970s. Accordingly, a major deviation from the existing TMPL right-of-way to the south takes place in the first 45 km of pipeline corridor. Final placement of TMPL within the TUC will be as directed by Alberta Infrastructure, the TUC administrator. Trans Mountain also examined the TUC around the north side of Edmonton but rejected that corridor when Alberta Infrastructure advised that a private land in-holding currently blocks the north TUC to future pipelines.

The proposed pipeline corridor rejoins the TMPL right-of-way west of Edmonton, following it through less developed areas of the City of Spruce Grove and the Town of Stony Plain before entering more rural landscapes and scattered country residential development in Parkland County. The existing TMPL right-of-way traverses Wabamun Lake Provincial Park for several kilometres. Wabamun Lake Provincial Park is located on the north shore of Wabamun Lake and was established as a provincial park in 1955 after construction of TMPL in 1953. The current proposed pipeline corridor passes north of the park; however, recent discussions with Alberta Tourism, Parks and Recreation indicate that it may be possible to follow TMPL through the park. During consultation, public stakeholders were open to routing the alternative corridor through the park, as it is in a utility corridor and adjacent to Highway 16. From an environmental and socio-economic perspective, crossing through the park parallel to the existing TMPL right-of-way is preferable because it is shorter, parallels an existing right-of-way, has fewer highway and road crossings and affects fewer private landowners.

Further west, the proposed pipeline corridor generally follows the TMPL right-of-way, crossing the Pembina River and McLeod River close to or beside the existing right-of-way towards the Town of Edson, which is bypassed immediately to the south. For the remainder of the length in Alberta, the proposed pipeline corridor generally follows the TMPL right-of-way with one main exception. Since the existing TMPL right-of-way passes through the middle of the Town of Hinton for 10.7 km, crossing adjacent to a number of residential and other private properties including a golf course, an improvement was made to follow a proposed new Highway 16 bypass that avoids the developed part of the town to the south. The proposed pipeline corridor then rejoins the TMPL right-of-way and eventually connects to the previously looped section of TMPL at the Hinton Pump Station.

4.2.2 *Hargreaves to Darfield Segment*

This pipeline segment is characterized by mountainous forested terrain alternating with dispersed rural residential and agricultural parcels in narrow mountain river valleys.

Commencing at Hargreaves Trap Site on the west side of Mount Robson Provincial Park and the western flank of the Rocky Mountains, the proposed pipeline corridor generally follows the TMPL right-of-way through the Fraser River valley except for a deviation to avoid Rearguard Falls Provincial Park and a crossing of the Fraser River west of the existing Rearguard Pump Station. Crossing the Fraser River east of Rearguard Pump Station is unavoidable, however, a dual crossing will be installed to avoid crossing the park and the Fraser River at a second location. The proposed pipeline corridor then rejoins the TMPL right-of-way, crossing over a height of land to enter the Rocky Mountain Trench. The Village of Valemount is bypassed to the west. Further south, the proposed pipeline corridor follows the existing TMPL right-of-way through successive narrow mountain valleys occupied by Camp Creek and the Albreda River, respectively.

As it continues to follow the existing TMPL right-of-way in a southerly direction, the proposed pipeline corridor enters the North Thompson River valley, which it generally follows for several hundred kilometres as far as the City of Kamloops. In the upper reaches of the valley, the TMPL right-of-way crosses the North Thompson River five times in less than 4 km. One crossing of the North Thompson River is unavoidable, however, an alternative corridor with reduced effects on watercourse crossings was sought by conducting field reconnaissance and gathering readily available resource information (see Figure 4.2-1 and Table 4.2-1). Following a study of four alternative corridors, the East Alternative is preferred since it: crosses the North Thompson River only once; crosses the least amount of Riparian Reserve Zone, Old Growth Management Area and critical moose winter range; is relatively short; has the fewest highway crossings; and avoids French's Hill, a known rapid earth slide hazard. For these reasons, the proposed pipeline corridor deviates from the TMPL right-of-way to incorporate the East Alternative which parallels a nearby BC Hydro high voltage transmission line and forestry road for approximately 15 km.

The proposed pipeline corridor continues to generally follow the existing TMPL right-of-way, descending the narrow, forested North Thompson River valley towards the Community of Blue River, entering the Interior Plateau. At Blue River, the proposed pipeline corridor is located immediately west of the community adjacent to the existing TMPL right-of-way and passes through the existing Blue River Pump Station. An alternative corridor from Blue River to the District of Clearwater was investigated. It would have involved: deviating from the North Thompson River valley; bypassing Blue River Pump Station; ascending 800 m up a steep hill; dropping into the upper reaches of the Raft River watershed; and then paralleling the Raft River to rejoin the TMPL right-of-way at Clearwater. Although 15% shorter, this alternative was rejected since it would encounter unacceptable pipe hydraulics and open up new corridor in habitat for a *Species at Risk Act* (SARA)-listed species – the Groundhog Mountain Caribou herd. South of Blue River, the proposed pipeline corridor continues to generally follow the existing TMPL right-of-way in the North Thompson River valley, except for an easterly deviation south of Froth Creek to avoid potential slope instability issues along Highway 5 at a place locally known as Messiter Hill. For the most part, the eastern deviation follows existing forestry roads, cut blocks and a BC Hydro high voltage transmission line. Further on, the proposed pipeline corridor rejoins the TMPL right-of-way as far south as Finn Creek Provincial Park.

Finn Creek Provincial Park is a Class A Park designated in 1996. Since it was uncertain whether BC Parks would permit a second pipeline in the park, Trans Mountain examined alternative corridors, both in the field and using readily available information sources (see Figure 4.2-2 and Table 4.2-2). Three alternatives were studied and evaluated from an environmental and socio-economic perspective. It was concluded that, assuming BC Parks approval, the TMPL Trenchless Alternative is preferred because it is short and involves a trenchless crossing of both Finn Creek and the northern tip of the park. If a trenchless crossing proves not feasible following further geotechnical field investigations, and assuming BC Parks approval, a conventional crossing of the park is preferred because it is the shortest alternative, parallels an existing right-of-way, avoids crossing an unnamed creek and does not involve clearing a new corridor to the east. BC Parks recently approved Trans Mountain's Stage 1 request to proceed to a Stage 2 application in the BC Parks boundary adjustment process.

Further south, the proposed pipeline corridor continues following the existing TMPL right-of-way through the widening North Thompson River valley, passing by the communities of Avola, Vavenby and the District of Clearwater before encountering two portions of the North Thompson River Provincial Park, a Class A Provincial Park designated in 1967. The northern portion of the park and the Clearwater River crossing is unavoidable whereas there is an alternative to avoid the southern portion of the park to the west. Two alternative corridors were studied and evaluated from an environmental and socio-economic

perspective (see Figure 4.2-3 and Table 4.2-3). It was concluded that, assuming BC Parks approval, the TMPL Alternative through the park is preferable because it is shorter, avoids highway crossings and encounters fewer private parcels. The current proposed pipeline corridor passes west of the park, although BC Parks recently approved Trans Mountain's Stage 1 request to proceed to a Stage 2 application in the BC Parks boundary adjustment process. The Stage 2 application would also incorporate the northern portion of the park described above.

Further south, the proposed pipeline corridor continues along the North Thompson River valley in the Interior Plateau, following the TMPL right-of-way as far south as Darfield Pump Station.

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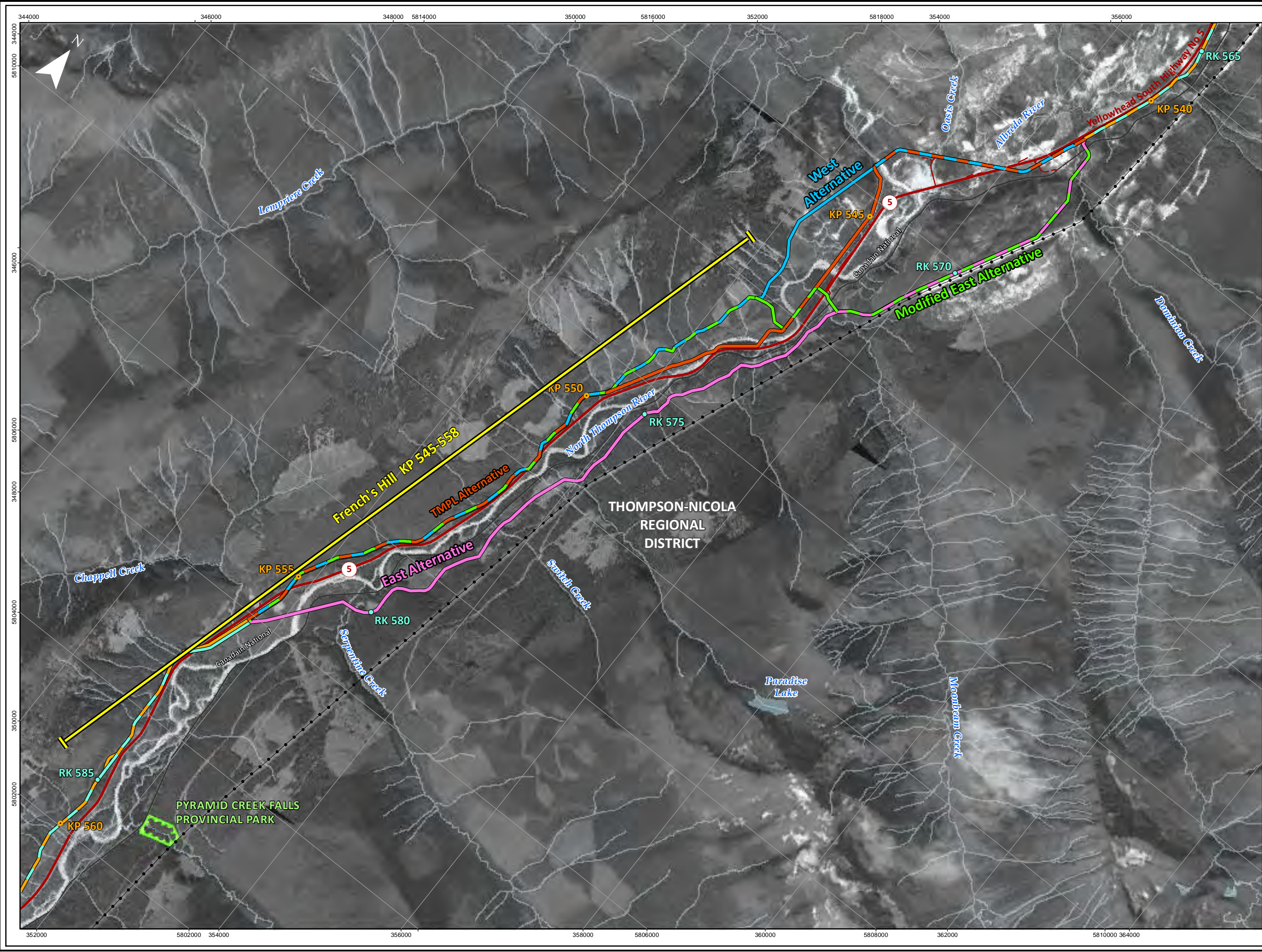


FIGURE 4.2-1
FIVE NORTH THOMPSON RIVER CROSSINGS
ALTERNATIVE CORRIDORS
TRANS MOUNTAIN
EXPANSION PROJECT

Five North Thompson River Crossings
Alternative Corridors

- TMPL Alternative
- West Alternative
- Modified East Alternative
- East Alternative
- Reference Kilometre Post (RK)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
- Highway
- Paved Road
- Resource Road
- Transmission Line
- Railway
- Watercourse
- Park or Protected Area
- Waterbody

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Projection: NAD 1983 UTM Zone 11N. Baseline TMPL Route Revision 0, provided by KMC, May 2012. Proposed Corridor V6 provided by UPI, August 23, 2013; Transmission Lines: BC Hydro, 2011; Transportation: IHS Inc., 2007, BC FLNRO, 2012; Geopolitical Boundaries: Natural Resources Canada, 2003, IHS Inc., 2011; First Nation Lands: Government of Canada, 2013, BC FLNRO, 2005; Hydrology: BC FLNRO, 2008; Civic Facilities: DMTI Spatial Inc., 2013; Imagery: Provided by KMC, 2013, NASA Geospatial Interoperability Program 2005.



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MAP NUMBER		PAGE	
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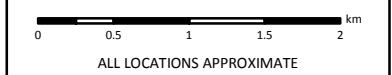
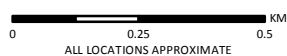
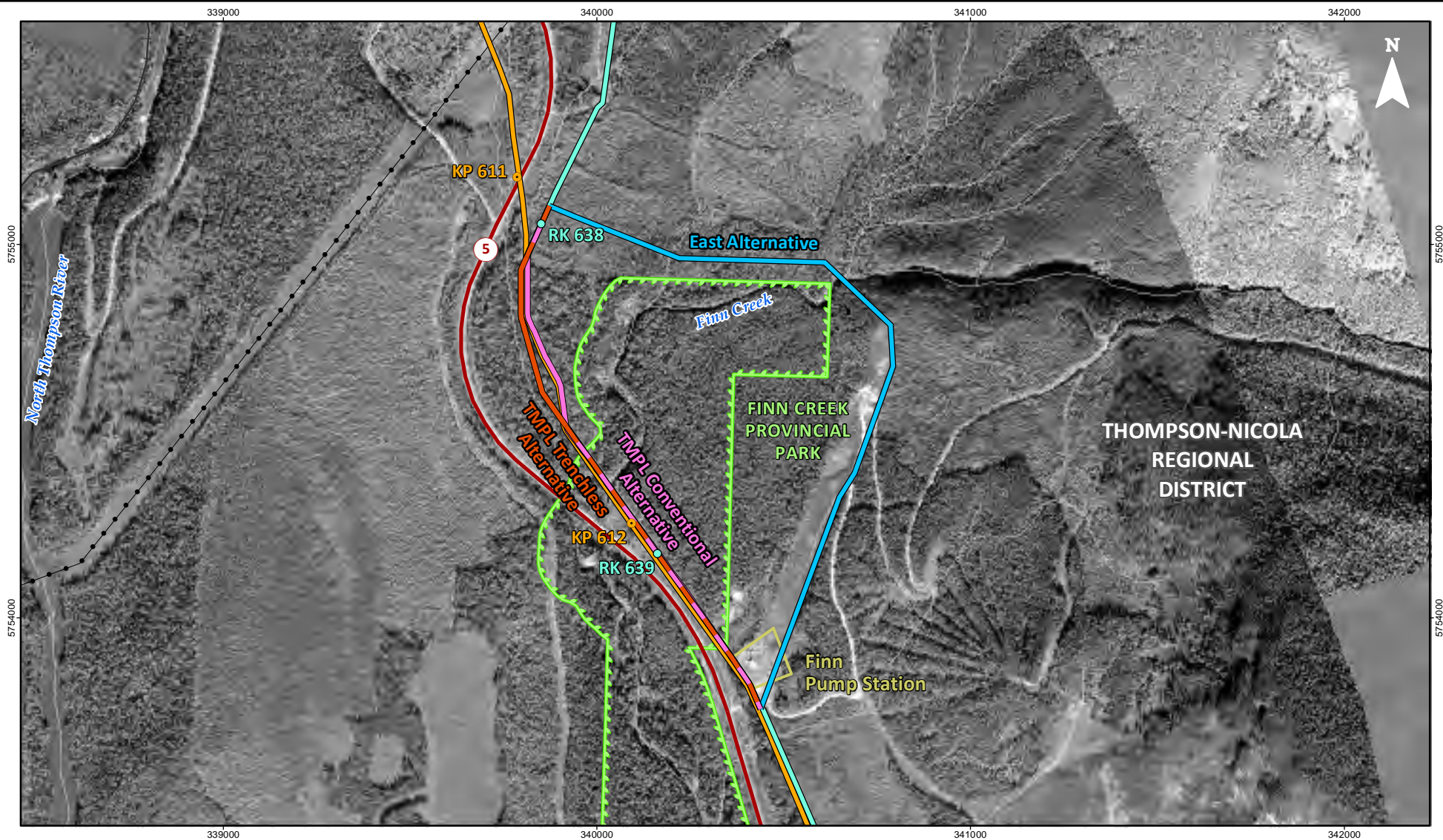


TABLE 4.2-1

**EVALUATION OF ALTERNATIVE CORRIDORS – FIVE NORTH THOMPSON RIVER CROSSINGS
(KP 541.1 TO KP 555.9) (RK 567.1 TO RK 581.8)**

Factors	TMPL Alternative	West Alternative	Modified East Alternative	East Alternative
LENGTHS				
Length of pipeline corridor (km)	14.9	14.7	15.5	14.7
Length following existing TMPL right-of-way (km)	14.9	9.7	7.4	0.2
Length following other linear features (other pipelines, power lines, highways, roads, FOTS, railways, etc.) (km)	0	2.6	5.9	10.8
Length of "new" corridor (km)	0	2.4	2.2	3.7
Total parallels (km)	14.9	12.3	13.3	11.0
CROSSINGS				
No. of highway crossings (No.)	4	4	4	0
No. of road (arterial, collector, local) crossings (No.)	0	0	0	0
No. of railway crossings (No.)	0	0	2	2
Crossings of named rivers (No.)	6 (5 x North Thompson River; Albreda River)	2 (North Thompson River; Albreda River)	1 (North Thompson River)	1 (North Thompson River)
Crossings of named creeks (No.)	3 (Dominion Creek; Oasis Creek; Moonbeam Creek)	2 (Dominion Creek; Oasis Creek)	2 (Dominion Creek; Moonbeam Creek)	4 (Dominion Creek; Switch Creek; Serpentine Creek; Moonbeam Creek)
Crossings of other watercourses (No.)	12	19	11	10
Total watercourses (No.)	21	23	14	15
GEOTECHNICAL				
Length crossing slopes > 50% on the fall line (km)	0	0	0	0
Length crossing slopes > 50% on sidehill (km)	1.0	1.5	1.6	2.4
Natural hazard potential (km)	High: 0.5 Medium: 1.7 Low: 12.7	High: 0.1 Medium: 2.0 Low: 12.6	High: 0.2 Medium: 1.7 Low: 13.6	High: 0.9 Medium: 2.0 Low: 11.8
Length of thin veneer of overburden or exposed bedrock (km)	1.7	3.2	3.4	2.6
HYDRAULIC ACCEPTABILITY				
	Yes	Yes	Yes	Yes
LAND				
Indian Reserve (km)(name)	0	0	0	0
Provincial Crown (km)	14.9	14.7	15.3	14.1
Private (km)	0	0	0.2	0.6
Unknown Parcels (km)	0	0	0	0
ENVIRONMENT				
Length within Riparian Reserve Zone (km)	2.8	0.5	0.5	0.2
Old Growth Management Area (legal) (km)	1.7	1.6	2.3	1.1
Old Growth Management Area (non-legal) (km)	0	0	0	0
Late winter or early winter habitat for mountain caribou (km) (Wells Gray or Groundhog)	8.6	9.0	9.0	8.7
Wetlands crossed (km), community forests crossed (km), woodlots crossed (km), designated Ungulate Winter Range (km), and Wildlife Habitat Areas (km) (species)	0	0	0	0
SOCIO-ECONOMIC				
Parks and protected areas (km)(name), Agricultural Land Reserve (km), and community watersheds (No.)	0	0	0	0
Land and Resource Management Plan (LRMP) area (km)(name)	14.9 (Kamloops LRMP)	14.7 (Kamloops LRMP)	15.5 (Kamloops LRMP)	14.7 (Kamloops LRMP)
LRMP Resource Management Zones crossed (km)(zone)	14.9 (Tk'emlups te Secwepemc Traditional Territory) 14.9 (Visually Sensitive Areas) 11.1 (Critical Moose Winter Range)	14.7 (Tk'emlups te Secwepemc Traditional Territory) 14.7 (Visually Sensitive Areas) 8.8 (Critical Moose Winter Range)	15.5 (Tk'emlups te Secwepemc Traditional Territory) 11.4 (Visually Sensitive Areas) 6.0 (Critical Moose Winter Range)	9.9 (Tk'emlups te Secwepemc Traditional Territory) 14.7 (Visually Sensitive Areas) 0.7 (Critical Moose Winter Range)
ABORIGINAL AND STAKEHOLDER ENGAGEMENT				
Aboriginal Support	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.
Stakeholder Support	No notable feedback on this route option. Stakeholders are interested in reducing the number of river crossings.	Support for alternatives that reduce the number of river crossings without increasing environmental risk.	Support for alternatives that reduce the number of river crossings without increasing environmental risk.	Support for alternatives that reduce the number of river crossings without increasing environmental risk.
CONSTRUCTABILITY AND COST				
Constructability	5 North Thompson River crossings: 2 trenchless, 3 open cut; 1 Albreda River trenchless crossing.	New corridor along west side of valley: 1 North Thompson River crossing (open cut); 1 Albreda River crossing - trenchless crossing rejected due to slope instability issues.	Follows BC Hydro right-of-way; new corridor across to west side of valley; 1 North Thompson River crossing (trenchless).	Follows BC Hydro right-of-way, logging roads and new corridor along east side of valley; 1 North Thompson River crossing (trenchless).
Estimated Construction Cost (\$ millions)	\$55.8	\$48.6	\$51.1	\$49.2



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201308_MAP_TERA_RT_00391_REV0_02_FINNCREEK	7894	0	SHEET 1 OF 1
DATE	December 2013		
SCALE	1:15,000	DISCIPLINE	RT
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Finn Creek Provincial Park Alternative Corridors

- TMPL Conventional Alternative
- TMPL Trenchless Alternative
- East Alternative
- Reference Kilometre Post (RK)
- Kilometre Post (KP)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Trans Mountain Pipeline (TMPL)
- Transmission Line
- Watercourse
- Highway
- Railway
- Finn Creek Provincial Park

Projection: NAD 1983 UTM Zone 11N. Baseline TMPL Route Revision 0, provided by KMC, May 2012. Proposed Corridor V6 provided by UPI, August 23, 2013; Transmission Lines: BC Hydro, 2011; Transportation: IHS Inc., 2007, BC FLNRO, 2012; Geopolitical Boundaries: Natural Resources Canada, 2003, IHS Inc., 2011, BC FLNRO, ; First Nation Lands: Government of Canada, 2013, BC FLNRO, 2005; Hydrology: BC FLNRO, 2008; Imagery: Provided by KMC, 2013, NASA Geospatial Interoperability Program 2005.

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FIGURE 4.2-2

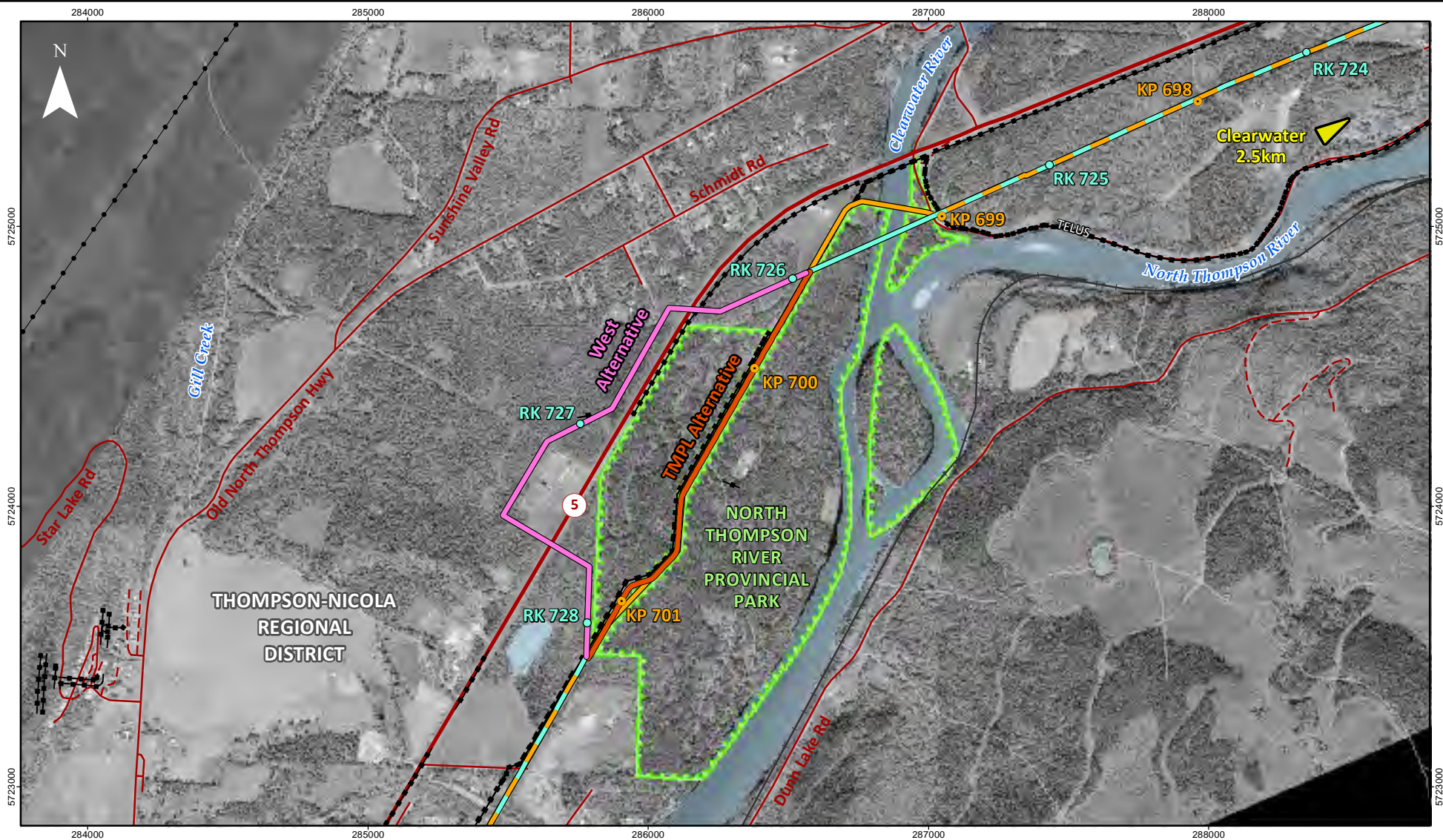
FINN CREEK PROVINCIAL PARK
ALTERNATIVE CORRIDORS

TRANS MOUNTAIN
EXPANSION PROJECT

TABLE 4.2-2

**EVALUATION OF ALTERNATIVE CORRIDORS – FINN CREEK PROVINCIAL PARK
(KP 611.2 TO KP 612.6) (RK 638.0 TO RK 639.5)**

Factors	TMPL Alternative (Conventional)	TMPL Alternative (Trenchless)	East Alternative
LENGTHS			
Length of pipeline corridor (km)	1.5	1.6	2.1
Length following existing TMPL right-of-way (km)	1.4	1.6	0.1
Length following other linear features (other pipelines, power lines, highways, roads, FOTS, railways, etc.) (km)	0	0	1.3
Length of "new" corridor (km)	0.1	0	0.7
Total parallels (km)	1.4	1.6	1.4
CROSSINGS			
No. of highway crossings (No.)	0	0	0
No. of road (arterial, collector, local) crossings (No.)	0	0	0
No. of railway crossings (No.)	0	0	0
Crossings of named rivers (No.)	0	0	0
Crossings of named creeks (No.)	1 (Finn Creek)	1 (Finn Creek)	1 (Finn Creek)
Crossings of other watercourses (No.)	0	0	1
Total watercourses (No.)	1	1	2
GEOTECHNICAL			
Length crossing slopes > 50% on the fall line (km)	0	0	0
Length crossing slopes > 50% on sidehill (km)	0	0	0.1
Natural hazard potential (km)	High: 0.0 Medium: 0.0 Low: 1.5	High: 0.0 Medium: 0.0 Low: 1.5	High: 0.0 Medium: 0.0 Low: 2.1
Length of thin veneer of overburden or exposed bedrock (km)	0.0	0.0	0.0
HYDRAULIC ACCEPTABILITY			
	Yes	Yes	Yes
LAND			
Indian Reserve (km)(name)	0	0	0
Provincial Crown (km)	1.5	1.6	2.1
Private (km)	0	0	0
ENVIRONMENT			
Old Growth Management Area (legal) (km)	0	0	0.3
Old Growth Management Area (non-legal) (km)	0.1	0.1	0
Late winter or early winter habitat for mountain caribou (km) (Wells Gray or Groundhog)	0.8	0.8	0
Length within Riparian Reserve Zone (km), wetlands crossed (km), community forests crossed (km), woodlots crossed (km), designated Ungulate Winter Range (km), and Wildlife Habitat Areas (km) (species)	0	0	0
SOCIO-ECONOMIC			
Parks and protected areas (km)(name)	0.7 (Finn Creek Provincial Park) - would require boundary adjustment	0.7 (Finn Creek Provincial Park) - would require boundary adjustment	0
Agricultural Land Reserve (km)	0	0	0
Community watersheds (No.)	0	0	0
LRMP area (km) (name)	1.5 (Kamloops LRMP)	1.6 (Kamloops LRMP)	2.1 (Kamloops LRMP)
LRMP Resource Management Zones crossed (km)(name)	1.5 (Tk'emlúps le Secwepemc Traditional Territory) 1.5 (Visually Sensitive Areas)	1.6 (Tk'emlúps le Secwepemc Traditional Territory) 1.6 (Visually Sensitive Areas)	2.1 (Tk'emlúps le Secwepemc Traditional Territory) 2.1 (Visually Sensitive Areas)
ABORIGINAL AND STAKEHOLDER ENGAGEMENT			
Aboriginal Support	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.
Stakeholder Support	General support for alternatives that avoid or reduce effects on provincial parks.	General support for alternatives that avoid or reduce effects on provincial parks.	General support for alternatives that avoid or reduce effects on provincial parks.
CONSTRUCTABILITY AND COST			
Constructability	Flow isolation crossing of Finn Creek and conventional trench construction through the balance of Finn Creek Provincial Park. Relatively flat terrain through the park south of the Creek.	Trenchless crossing of Finn Creek and Finn Creek Provincial Park.	Isolated crossing of Finn Creek and conventional trench construction bypassing Finn Creek Provincial Park to the east. Difficult terrain with extensive grade work on steep slopes in close proximity to BC Hydro line.
Estimated Construction Cost (\$ millions)	\$2.9	\$6.8	\$4.9



0 0.25 0.5 0.75 KM
ALL LOCATIONS APPROXIMATE

MAP NUMBER	TERA REF.	PAGE
201308_MAP_TERA_RT_00391_Rev0_03_NTHOMPSONR-PP	7894	SHEET 1 OF 1
DATE	REVISION	DISCIPLINE
December 2013	0	RT
SCALE	PAGE SIZE	DESIGN
1:20,000	8.5 x 11	DM
DRAWN	CHECKED	DESIGN
SES	TGG	DM

North Thompson River Provincial Park

Alternative Corridors

- TMPL Alternative
- West Alternative

- Reference Kilometre Post (RK)
- Kilometre Post (KP)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Trans Mountain Pipeline (TMPL)

- Highway
- Railway
- Paved Road
- Resource Road

- Transmission Line
- Fiber Optic Transmission System (FOTS)
- Watercourse
- North Thompson River Provincial Park

Projection: NAD 1983 UTM Zone 11N. Baseline TMPL Route Revision 0, provided by KMC, May 2012. Proposed Corridor V6 provided by UPI, August 23, 2013; Transmission Lines: BC Hydro, 2011; Transportation: IHS Inc., 2007, BC FLNRO, 2012; Geopolitical Boundaries: Natural Resources Canada, 2003, IHS Inc., 2011; First Nation Lands: Government of Canada, 2013, BC FLNRO, 2005; Hydrology: BC FLNRO, 2008; FOTS: ICIS, 2012; Imagery: Provided by MKC, 2013, NASA Geospatial Interoperability Program 2005.

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FIGURE 4.2-3

NORTH THOMPSON RIVER
PROVINCIAL PARK
ALTERNATIVE CORRIDORS

TRANS MOUNTAIN
EXPANSION PROJECT

TABLE 4.2-3

**EVALUATION OF ALTERNATIVE CORRIDORS – NORTH THOMPSON RIVER PROVINCIAL PARK
(KP 699.6 TO KP 701.2) (RK 725.9 TO RK 728.1)**

Factors	TMPL Alternative	West Alternative
LENGTHS		
Length of pipeline corridor (km)	1.6	2.2
Length following existing TMPL right-of-way (km)	1.6	0.2
Length following other linear features (other pipelines, power lines, highways, roads, FOTS, railways, etc.) (km)	0	1.3
Length of "new" corridor (km)	0	0.7
Total parallels (km)	1.6	1.5
CROSSINGS		
No. of highway crossings (No.)	0	2
No. of road (arterial, collector, local) crossings (No.)	3	2
No. of railway crossings (No.)	0	0
Crossings of named rivers (No.)	0	0
Crossings of named creeks (No.)	0	0
Crossings of other watercourses (No.)	0	0
Total watercourses (No.)	0	0
GEOTECHNICAL		
Length crossing slopes > 50% on the fall line (km)	0	0
Length crossing slopes > 50% on side hill (km)	0	0
Natural hazard potential (km)	High: 0.0 Medium: 0.0 Low: 1.6	High: 0.0 Medium: 0.0 Low: 2.2
Length of thin veneer of overburden or exposed bedrock (km)	0.0	0.0
HYDRAULIC ACCEPTABILITY	Yes	Yes
LAND		
Indian Reserve (km) (name)	0	0
Provincial Crown (km)	1.4	0.4
Private (km)	0.2	1.6
Unknown Parcels (km)	0	0.2
No. of private parcels (No.)	1	6
ENVIRONMENT		
Old Growth Management Area (non-legal) (km)	0.2	0
Length within Riparian Reserve Zone (km), wetlands crossed (km), community forests crossed (km), woodlots crossed (km), Wildlife Habitat Areas (km) (species), designated Ungulate Winter Range (km), late winter or early winter habitat for mountain caribou (km) (Wells Gray or Groundhog) , and Old Growth Management Area (legal) (km)	0	0
SOCIO-ECONOMIC		
Parks and protected areas (km) (name)	1.4 (North Thompson River Provincial Park) - would require boundary adjustment.	0
Agricultural Land Reserve (km)	0	0
Community watersheds (No.)	0	0
Municipalities crossed	Clearwater	Clearwater
LRMP area (km) (name)	2.0 (Kamloops LRMP)	2.2 (Kamloops LRMP)
ABORIGINAL AND STAKEHOLDER ENGAGEMENT		
Aboriginal Support	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.
Stakeholder Support	General support for alternatives that avoid provincial parks.	General support for alternatives that avoid provincial parks.
CONSTRUCTABILITY AND COST		
Constructability	TMPL Alternative is slightly hummocky requiring additional extra work space in park for grade cuts.	West Alternative crosses to the west side of Highway 5 to avoid North Thompson River Provincial Park and passes through terrain equivalent to the TMPL Alternative before crossing back to the east side of Highway 5 to rejoin the TMPL corridor.
Estimated Cost (\$ millions)	\$3.1	\$4.2

4.2.3 *Black Pines to Hope Segment*

This pipeline segment is characterized by rolling grasslands in the vicinity of Kamloops and Merritt in the north, graduating to forested and mountainous terrain in the south.

From the location of the proposed Black Pines Pump Station (see Section 4.4) in the Interior Plateau, the proposed pipeline corridor follows the TMPL right-of-way on the west side of the lower North Thompson River valley, which now averages 2 km in width, becoming increasingly settled and agricultural. The community of Westsyde in the City of Kamloops has recently expanded along a broad terrace of the river, encroaching on the TMPL right-of-way (see Plate 2). Lac du Bois Grassland Protected Area is located immediately west of Westsyde. The protected area was first established in 1996 after TMPL was constructed and additional lands were added through a designated expansion in 2013. These additions overlap the existing TMPL right-of-way at two short locations north of Westsyde and at a longer location (1.5 km) in the Batchelor Hills area further south, which is unavoidable. During the consultation process, strong community support was expressed by some stakeholders for a corridor west of Westsyde through the protected area following a FOTS right-of-way (see Plate 3), while others raised concerns about effects of the Project on the protected area. Both alternative corridors were studied and evaluated from an environmental and socio-economic perspective (see Figure 4.2-4 and Table 4.2-4). It was concluded that, assuming BC Parks approval, the West Alternative is preferred because it crosses slightly fewer watercourses, considerably fewer private parcels and avoids the community of Westsyde. BC Parks recently approved Trans Mountain's Stage 1 request to proceed to a Stage 2 application in the BC Parks boundary adjustment process. The Stage 2 application would also incorporate the 2013 additional lands described above.

The proposed pipeline corridor then rejoins the TMPL right-of-way and crosses the Thompson River just east of the Kamloops Airport, ascending the south slope of the river valley to eventually connect to the Kamloops Pump Station on the south side of Highway 5.

The proposed pipeline corridor generally follows the existing TMPL right-of-way across a semi-forested upland plateau from Kamloops to Merritt, with three possible exceptions. The first is a jog to the west on the property of the proposed KGHM Ajax Mining Inc. copper and gold mine to avoid Jacko Lake and a narrow valley, where there is insufficient room to install a second pipeline. Further south, the existing TMPL right-of-way crosses the corners of two IRs north of Merritt (Zoht 5 and Zoht 4), where minor deviations avoiding the IRs are being considered in addition to following beside TMPL through the IRs.

The proposed pipeline corridor follows the existing TMPL right-of-way through the eastern limits of the City of Merritt in the Nicola River valley, cutting the northwest corner of the Joeyaska IR No. 2. A minor deviation avoiding the IR to the north and west is also being considered. Further south, the proposed pipeline corridor continues to follow the existing TMPL right-of-way up the Coldwater River valley, traversing Coldwater IR No. 1 for 7 km.

Based on correspondence from the Coldwater Indian Band, several alternative corridors east and west of the IR were studied and evaluated from an environmental and socio-economic perspective (see Figure 4.2-5 and Table 4.2-5). The currently proposed pipeline corridor is the East Corridor, although the Modified East Alternative is also under consideration. From an environmental and socio-economic perspective, and with the Coldwater Indian Band's approval, the preferred corridor would switch to the TMPL Modified Alternative Corridor as it: is the shortest; generally parallels an existing right-of-way; crosses the fewest watercourses; encounters the least amount of bedrock; and crosses the least amount of designated Ungulate Winter Range habitat.

Further south, the proposed pipeline corridor rejoins the existing TMPL right-of-way ascending the narrowing Coldwater River valley to just south of Kingsvale Pump Station. The terrain becomes increasingly mountainous as the proposed pipeline corridor extends further south through the Hozameen Range of the Cascade Mountains. From Kingsvale Pump Station, the proposed pipeline corridor deviates from the existing TMPL right-of-way several times to parallel the Spectra gas pipeline right-of-way which generally parallels the existing TMPL right-of-way in the Coldwater River valley area. These deviations are generally undertaken to take advantage of better terrain, to reduce the number of Coldwater River crossings or to minimize the length in the Riparian Reserve Zone.

In the upper reaches of the Coldwater River valley, the existing TMPL right-of-way is in close proximity to Coldwater River Provincial Park for 2 km, crosses the divide into the Coquihalla Summit Recreation Area and continues southwards through the Coquihalla Lakes area, over a 185 m “Jump Off” into the narrow gorge locally known as Coquihalla Canyon, eventually crossing the Coquihalla River 13 times in less than 20 km (see Plate 4). There is limited working room in Coquihalla Canyon for a second pipeline and constructability is a concern. An alternative corridor with reduced effects on water crossings was sought. After considerable field reconnaissance, a West Alternative Corridor was identified which follows a combination of a Spectra gas pipeline right-of-way, a FOTS right-of-way and the right-of-way of the relatively recently constructed Coquihalla Highway (Highway 5) through the Boston Bar Creek drainage west of Coquihalla Canyon. Both alternative corridors were studied and evaluated from an environmental and socio-economic perspective (see Figure 4.2-6 and Table 4.2-6). It was concluded that the West Alternative is preferred because it: entails 1 river crossing as opposed to 16; crosses considerably less terrain with high natural hazard potential; has considerably less length through the Riparian Reserve Zone, Old Growth Management Areas, and designated Ungulate Winter Range; avoids Coldwater River Provincial Park and crosses slightly less of the Coquihalla Summit Recreation Area. The two corridors rejoin where Boston Bar Creek flows into the Coquihalla River.

From this point to the District of Hope, the proposed pipeline corridor follows the narrow and steep Coquihalla River valley beside one of the existing rights-of-way occupied either by TMPL, Coquihalla Highway, Spectra or FOTS, depending upon the most constructible terrain and other factors. For example, the existing TMPL right-of-way traverses Coquihalla River Provincial Park for 3 km, whereas the proposed pipeline corridor avoids the park altogether. Once in the District of Hope, the proposed pipeline corridor generally follows the existing TMPL or the Spectra rights-of-way and, at the request of the Union Bar Indian Band, avoids the Kawkawa Lake IR No. 16. The proposed pipeline corridor continues west, crossing the Coquihalla River upstream of its confluence with the Fraser River and entering Hope Pump Station.

4.2.4 Hope to Burnaby Segment

West of the District of Hope, the proposed pipeline corridor generally follows the existing TMPL and Highway 1 (Trans-Canada Highway) rights-of-way in the narrow strip of land between the Fraser River and the Skagit Range of the Cascade Mountains. The remainder of the proposed pipeline corridor traverses the rich agricultural lands of the Lower Mainland of BC, which becomes increasingly urbanized from the Fraser Valley Regional District west to Metro Vancouver. Most of the agricultural lands are part of the provincial Agricultural Land Reserve. The proposed pipeline corridor generally follows the existing TMPL right-of-way unless otherwise specifically mentioned.

The proposed pipeline corridor continues west into the Lower Mainland, although minor deviations are being considered to avoid Ohamil IR No. 1, Peters IR No. 1A and Popkum IR No. 1. East of the City of Chilliwack, the proposed pipeline corridor crosses to the north side of the Trans-Canada Highway to parallel a BC Hydro power line in order to avoid a crossing of Bridal Veil Falls Provincial Park and Popkum IR No. 2. A small portion of Cheam Lake Wetland Regional Park is crossed for approximately 100 m, although in response to considerable opposition from the public and Fraser Valley Regional District, minor deviations are being considered in this area to avoid the park.

Further west, the proposed pipeline corridor passes through the City of Chilliwack, with minor deviations being considered to avoid crossing Grass IR No. 15 and Tzeachten IR No. 13. The Vedder River is the major watercourse crossed in the Chilliwack area. Further west, the proposed pipeline corridor enters the City of Abbotsford, crossing the Sumas River and surrounding agricultural Sumas Prairie before ascending the forested south flank of Sumas Mountain. The existing TMPL right-of-way provides for a branchline to access TMPL's Sumas Terminal. On the west side of Sumas Mountain, the proposed pipeline corridor crosses increasingly urbanized areas and a golf course in the vicinity of Clayburn. Towards the western end of the City of Abbotsford, the proposed pipeline corridor crosses the Matsqui Main IR No. 2, although a minor deviation is being considered to the south. The proposed pipeline corridor then enters the Township of Langley and continues along the existing TMPL right-of-way until the vicinity of the Salmon River valley south of Fort Langley. From this point onwards to the Fraser River crossing, urbanization in Langley and the City of Surrey has encroached considerably on the existing TMPL right-of-way in the past 60 years, making contiguous looping extremely difficult. For this reason an alternative pipeline corridor was sought. Trans Mountain chose to take advantage of the existing

Canadian National Railway Company (CN) right-of-way and new South Fraser Perimeter Road corridor on the south side of the Fraser River. Accordingly, the proposed pipeline corridor leaves the existing TMPL right-of-way near a golf course and heads north on new corridor a short distance across farmland in the Salmon River valley before reaching the CN right-of-way. Minor deviations in the Salmon River area are being considered to follow property lines, a second golf course and avoid a local natural area further north if possible before joining the CN right-of-way. From this point, the proposed pipeline corridor turns west, paralleling the CN right-of-way and later the South Fraser Perimeter Road right-of-way in a westerly direction through Langley and Surrey to the crossing location of the Fraser River near the Port Mann Bridge. The proposed pipeline corridor traverses the edge of the Surrey Bend Regional Park for about 3 km, although a minor deviation is being considered to reduce this length by taking advantage of surplus land released from the recently constructed South Fraser Perimeter Road project.

Two primary locations are being considered to cross the main stem of the Fraser River between the cities of Surrey and Coquitlam using horizontal directional drilling (HDD), a trenchless method of construction (see Plate 5). Currently, the proposed pipeline corridor is located approximately 500 m east of the existing TMPL pipeline, but an alternative location is being considered on the east side of the Port Mann Bridge. On the north side of the Fraser River, urbanization in the cities of Coquitlam and Burnaby has encroached considerably on the existing TMPL right-of-way in the past 60 years to make contiguous looping extremely difficult (see Plate 6). The proposed pipeline corridor follows the Lougheed Highway, although a deviation is being considered to traverse existing industrial lands and railway easements within the Brunette River Conservation Area. Both the proposed pipeline corridor and the deviation eventually connect to TMPL's Burnaby Terminal via other city streets.

4.2.5 *Burnaby to Westridge Segment*

From the Burnaby Terminal to the Westridge Marine Terminal on Burrard Inlet, urbanization in the City of Burnaby has encroached considerably on the existing TMPL right-of-way in the past 60 years to make contiguous looping with twin 762 mm (NPS 30) OD buried delivery lines extremely difficult. The proposed pipeline corridor follows alongside Burnaby Mountain Parkway, Hastings Street, and Cliff Avenue before turning east into TMPL's Westridge Marine Terminal. Other more direct alternatives involving partial or total trenchless (HDD or tunnel) methods of construction are also under consideration.

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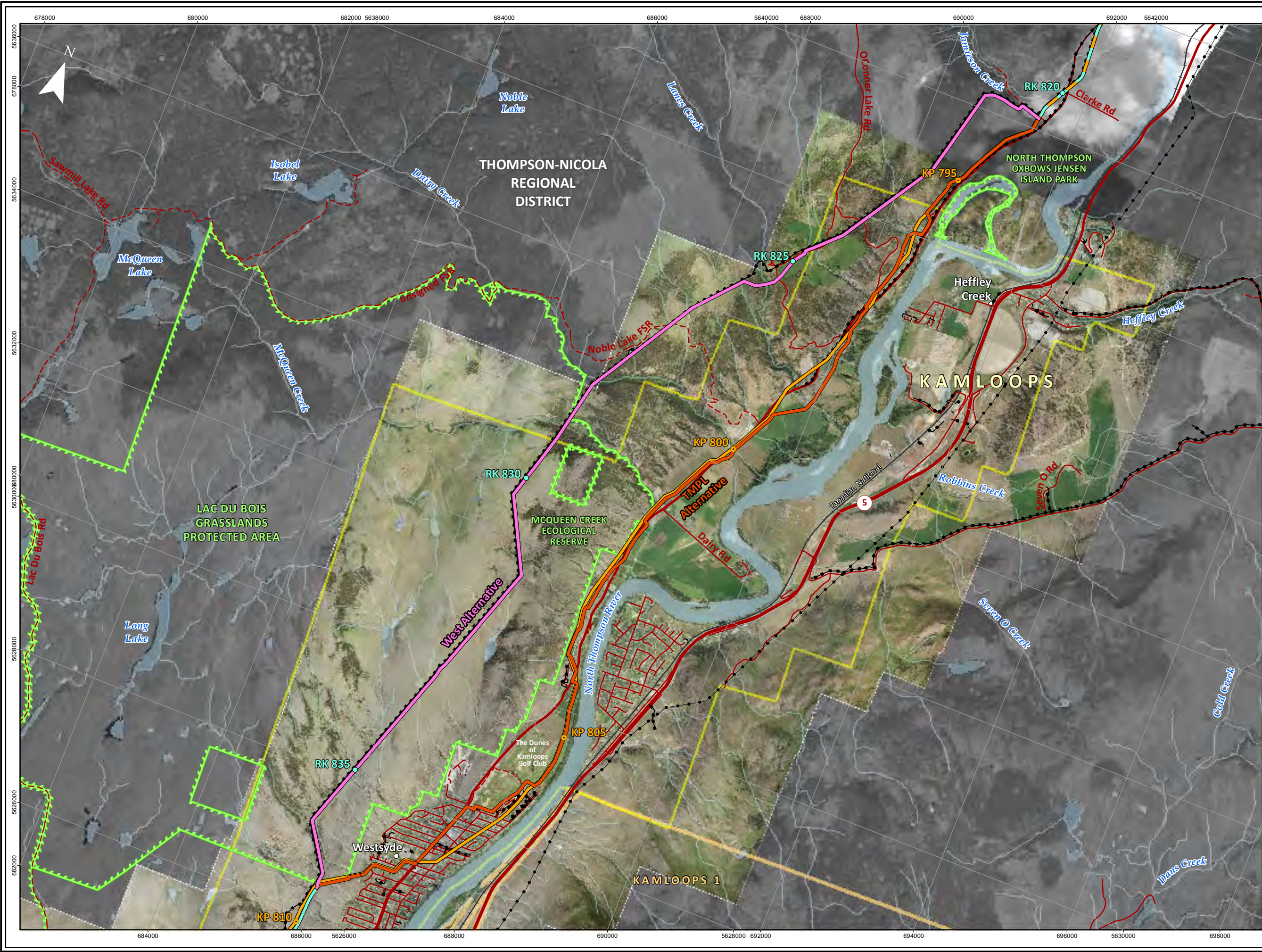


FIGURE 4.2-4
LAC DU BOIS GRASSLANDS
PROTECTED AREA
ALTERNATIVE CORRIDORS

TRANS MOUNTAIN
EXPANSION PROJECT

Lac Du Bois Grasslands Protected Area
Alternate Corridors

- TMPL Alternative
- West Alternative
- Reference Kilometre Post (RK)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
- Highway
- Paved Road
- Resource Road
- Railway
- Fiber Optic Transmission System (FOTS)
- Transmission Line
- Other Existing Pipeline
- Populated Place
- Urban Area
- Park or Protected Area
- Waterbody
- Watercourse
- Indian Reserve

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MAP NUMBER	TERA REF.	REVISION	PAGE
201308_MAP_TERA_RT_00391_REV0_4_LACDUBOISPP	7894	0	SHEET 1 OF 1
DATE	December 2013	REVISION	0
SCALE	1:50,000	DISCIPLINE	RT
DRAWN	TPH	CHECKED	TGG
		DESIGN	DM

0 0.5 1 1.5 2 km

ALL LOCATIONS APPROXIMATE

TABLE 4.2-4

**EVALUATION OF ALTERNATIVE CORRIDORS – LAC DU BOIS GRASSLANDS PROTECTED AREA
(KP 793.5 TO KP 809.4) (RK 820.5 TO RK 836.9)**

Factors	TMPL Alternative	West Alternative
LENGTHS		
Length of pipeline corridor (km)	16.6	16.4
Length following existing TMPL right-of-way (km)	12.6	0.1
Length following other linear features (other pipelines, power lines, highways, roads, FOTS, railways, etc.) (km)	2.5	15.7
Length of "new" corridor (km)	1.5	0.6
Total parallels (km)	15.1	15.8
CROSSINGS		
No. of highway crossings (No.)	0	0
No. of road (arterial, collector, local) crossings (No.)	24	4
No. of main power line crossings (No.)	0	0
No. of distribution power line crossings (No.)	1	0
No. of railway crossings (No.)	0	0
Crossings of named rivers (No.)	0	0
Crossings of named creeks (No.)	3 (Dairy Creek; McQueen Creek; Lanes Creek)	3 (Dairy Creek; McQueen Creek; Lanes Creek)
Crossings of other watercourses (No.)	25	23
Total watercourses (No.)	28	26
GEOTECHNICAL		
Length crossing slopes > 50% on the fall line (km)	0	0
Length crossing slopes > 50% on sidehill (km)	0.2	0
Natural hazard potential (km)	High: 0.0 Medium: 1.7 Low: 14.8	High: 0.0 Medium: 0.0 Low: 16.4
Length of thin veneer of overburden or exposed bedrock (km)	0.6	3.2
Hydraulic Acceptability	Yes	Yes
LAND		
Indian Reserve (km) (name)	0	0
Provincial Crown (km)	2.0	13.7
Private (km)	14.5	1.8
Unknown Parcels (km)	0	0.9
No. of private parcels (No.)	72	4
ENVIRONMENT		
Length within Riparian Reserve Zone (km)	0.1	0
Woodlots crossed (km)	0.4	0
Wildlife Habitat Areas (km) (species), Old Growth Management Area (legal) (km), Old Growth Management Area (non-legal) (km), designated Ungulate Winter Range (km), wetlands crossed (km), and late winter or early winter habitat for mountain caribou (km) (Wells Gray or Groundhog)	0	0
SOCIO-ECONOMIC		
Parks and protected areas (km) (name)	0.2 (Lac Du Bois Grasslands Protected Area) - would require boundary adjustment	7.9 (Lac Du Bois Grasslands Protected Area) - would require boundary adjustment
Agricultural Land Reserve (km)	11.6	10.2
Community watersheds (No.)	0	0
Municipalities crossed	Kamloops	Kamloops
LRMP area (km) (name)	16.6 (Kamloops LRMP)	16.4 (Kamloops LRMP)
LRMP Resource Management Zones crossed (km)	Tk'emlúps te Secwepemc Traditional Territory (16.6) Visually Sensitive Areas (16.6) Settlement Resource Management Zone (3.7)	Tk'emlúps te Secwepemc Traditional Territory (16.4) Visually Sensitive Areas (11.7) Critical Deer Winter Range (7.2)
ABORIGINAL AND STAKEHOLDER ENGAGEMENT		
Aboriginal Support	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.
Stakeholder Support	Westside residents have expressed strong support for avoiding Westside and traversing the Protected Area. If the West Alternative is not possible then this option is preferred by stakeholders.	Naturalists concerned about Protected Area and mitigation/compensation for environmental effects.
CONSTRUCTABILITY AND COST		
Constructability	TMPL parallel combined with complex in-street construction along Westside Road plus some residential backyard construction.	FOTS parallel along north west slope through Lac Du Bois Grassland Protected Area.
Estimated Construction Cost (\$ millions)	\$50.0	\$30.6

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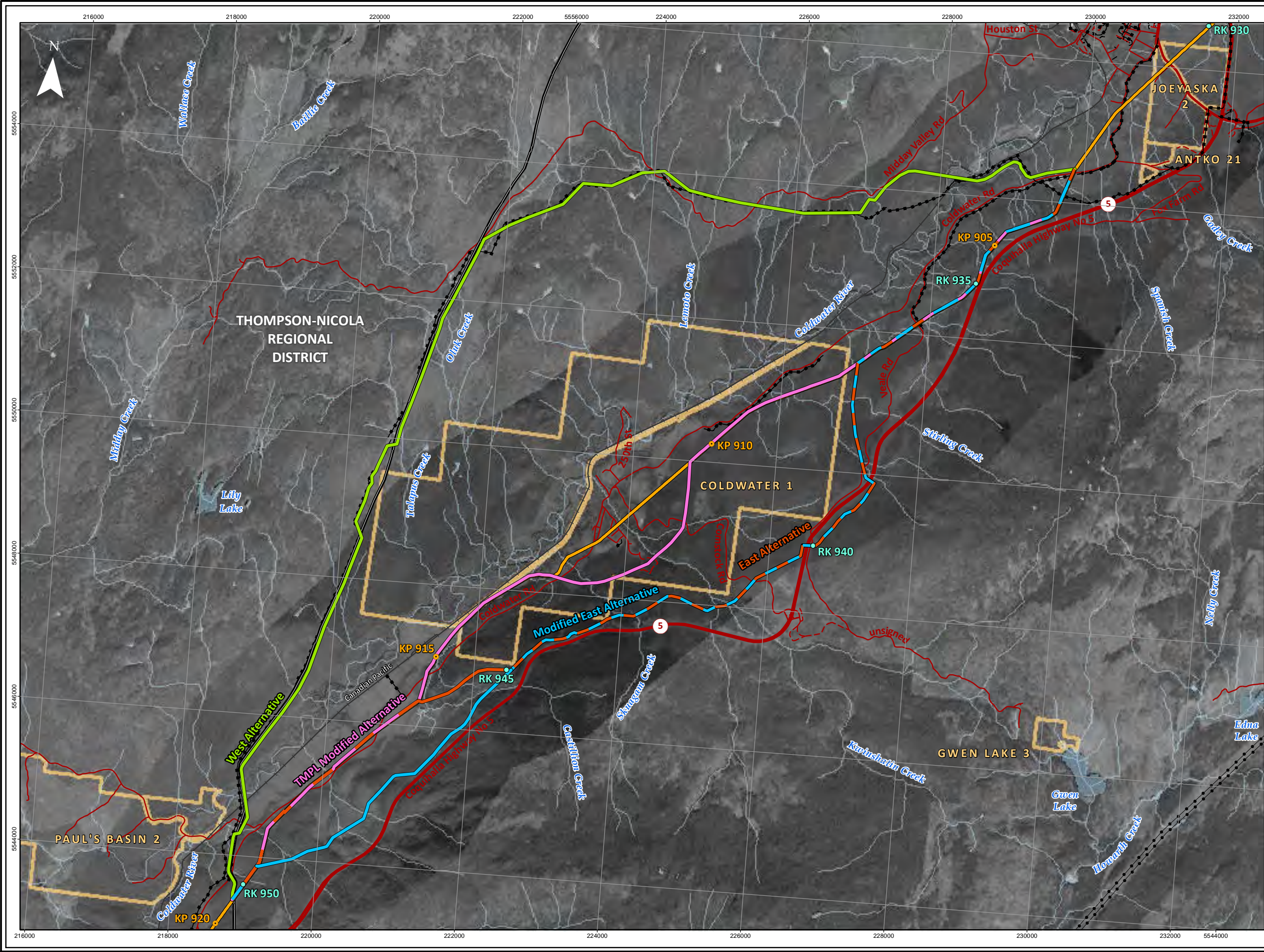


FIGURE 4.2-5
COLDWATER INDIAN RESERVE
ALTERNATIVE CORRIDORS
TRANS MOUNTAIN
EXPANSION PROJECT

- Coldwater Indian Reserve**
Alternative Corridors
- TMPL Modified Alternative
 - West Alternative
 - East Alternative
 - Modified East Alternative
- Reference Kilometre Post (RK)
- Trans Mountain Expansion Project
Proposed Pipeline Corridor
- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
- Highway
- Paved Road
- Resource Road
- Railway
- Spectra Pipeline
- Fibre Optic Transmission System (FOTS)
- Transmission Line
- Park or Protected Area
- Waterbody
- Watercourse
- Indian Reserve

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MAP NUMBER		PAGE	
201308_MAP_TERA_RT_00391_REV0_05_COLDWATERIR		SHEET 1 OF 1	
DATE	December 2013	TERA REF.	7894
REVISION	0	DISCIPLINE	RT
SCALE	1:50,000	PAGE SIZE	11x17
DRAWN	SES	CHECKED	TGG
DESIGN	DM		

0 0.5 1 1.5 2 km
ALL LOCATIONS APPROXIMATE

TABLE 4.2-5

**EVALUATION OF ALTERNATIVE CORRIDORS - COLDWATER INDIAN RESERVE
(KP 903.5 TO KP 919.5) (RK 933.1 TO RK 950.7)**

Factors	TMPL Modified Alternative	West Alternative	East Alternative	Modified East Alternative
LENGTHS				
Length of pipeline corridor (km)	16.7	19.3	17.5	17.5
Length following existing TMPL right-of-way (km)	13.9	0.1	8.3	5.0
Length following other linear features (other pipelines, power lines, highways, roads, FOTS, railways, etc.) (km)	1.7	18.5	5.7	7.6
Length of "new" corridor (km)	1.1	0.7	3.5	4.9
Total parallels (km)	15.6	18.5	14.0	12.6
CROSSINGS				
No. of highway crossings (No.)	0	0	2	2
No. of road (arterial, collector, local) crossings (No.)	8	4	7	5
No. of railway crossings (No.)	0	0	0	0
Crossings of named rivers (No.)	0	2 (2 x Coldwater River)	0	0
Crossings of named creeks (No.)	5 (Stirling, Skugam, Kwinshatin, Castillon, Salem)	4 (Oluk, Salem, Lemoto x 2)	5 (Stirling, Skugam, Kwinshatin, Castillon, Salem)	5 (Stirling, Skugam, Kwinshatin, Castillon, Salem)
Crossings of other watercourses (No.)	16	24	16	18
Total watercourses (No.)	21	30	21	23
GEOTECHNICAL				
Length crossing slopes > 50% on the fall line (km)	0	0	0	0
Length crossing slopes > 50% on sidehill (km)	0	0.2	0.3	0.5
Natural hazard potential (km)	High: 0 Medium: 1.4 Low: 15.3	High: 0 Medium: 2.2 Low: 17.1	High: 0 Medium: 0 Low: 17.5	High: 0 Medium: 0 Low: 17.5
Length of thin veneer of overburden or exposed bedrock (km)	0.3	4.5	3.3	4.1
HYDRAULIC ACCEPTABILITY	Yes	Yes	Yes	Yes
LAND				
Indian Reserve (km)(name)	7.0 (Coldwater IR 1)	0	0	0
Provincial Crown (km)	3.5	14.2	11.1	11.4
Private (km)	6.1	5.0	6.3	3.8
Unknown Parcels (km)	0.1	0.1	0.1	2.3
No. of private parcels (No.)	19	7	20	16
ENVIRONMENT				
Length within Coldwater River Riparian Reserve Zone (km)	0	0.6	0	0
Woodlots crossed (km)	0.2	0.7	0.2	0
Wildlife Habitat Areas for SARA listed species (km) (species)	0	1.6 (Williamson's Sapsucker)	0	0
Old Growth Management Area (non-legal) (km)	0.3	1.3	1.2	1.2
Designated Ungulate Winter Range (km)	3.6	13.4	11.2	13.7
Wetlands crossed (km), community forests crossed (km), and Old Growth Management Area (legal) (km)	0	0	0	0
SOCIO-ECONOMIC				
Parks and protected areas (km) (name)	0	0	0	0
Agricultural Land Reserve (km)	5.1	6.1	4.7	4.2
Community watersheds (No.)	2	0	2	2
LRMP area (km) (name)	0	0	0	0
ABORIGINAL AND STAKEHOLDER ENGAGEMENT				
Aboriginal Support	No	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.
Stakeholder Support	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.
CONSTRUCTABILITY AND COST				
Constructability	Crosses Coldwater IR 1; paralleling the existing TMPL right-of-way; skirts to the east of the more developed area.	Requires 2 Coldwater River trenchless crossings; includes Spectra right-of-way and FOTS parallel.	Skirts to east side of the Coldwater IR 1; includes 2 crossings of the Coquihalla Highway 5.	Skirts to the east side of Coldwater IR 1; includes 2 crossings of Coquihalla Highway 5.
Estimated Construction Cost (\$ millions)	\$31.3	\$41.2	\$33.2	\$33.1

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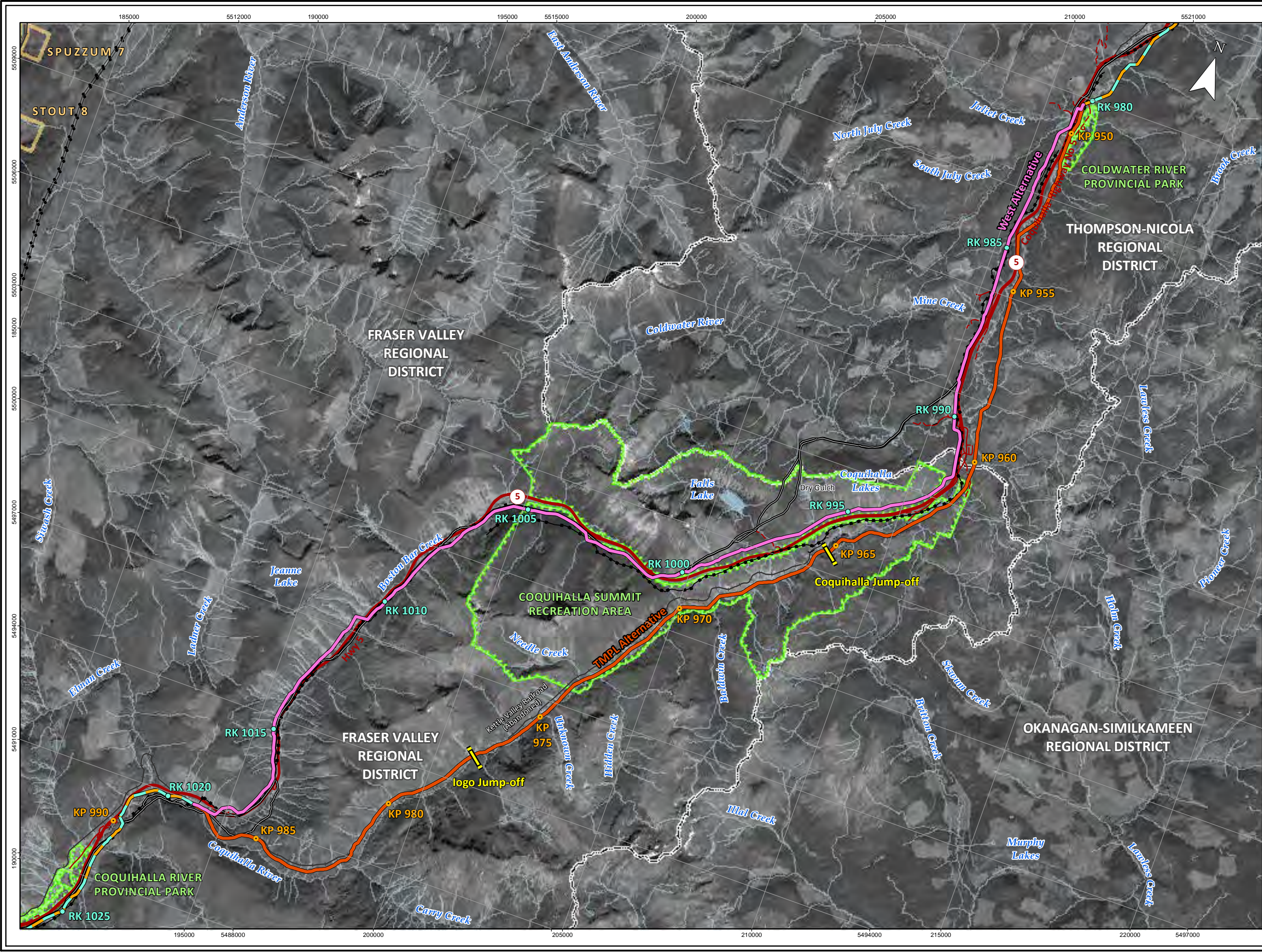


FIGURE 4.2.6
COLDWATER RIVER PROVINCIAL PARK:
COQUIHALLA VS. BOSTON BAR
ALTERNATIVE CORRIDORS
TRANS MOUNTAIN
EXPANSION PROJECT

Coldwater River Provincial Park:
Coquihalla vs. Boston Bar
Alternative Corridors

- TMPL Alternative
- West Alternative
- Reference Kilometre Post (RK)
- Trans Mountain Expansion Project Proposed Pipeline Corridor
- Kilometre Post (KP)
- Trans Mountain Pipeline (TMPL)
- Highway
- Paved Road
- Resource Road
- Railway
- Transmission Line
- Spectra Pipeline
- Fiber Optic Transmission System (FOTS)
- Park or Protected Area
- Waterbody
- Watercourse
- Indian Reserve
- Regional District Boundary

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Projection: NAD 1983 UTM Zone 11N. Baseline TMPL Route Revision 0, provided by KMC, May 2012. Proposed Corridor V6 provided by UPI, August 23, 2013; Transmission Lines: BC Hydro, 2011; Transportation: IHS Inc., 2007, BC FLNRO, 2012; Geopolitical Boundaries: Natural Resources Canada, 2003, IHS Inc., 2011; First Nation Lands: Government of Canada, 2013, BC FLNRO, 2005; Hydrology: BC FLNRO, 2008; Civic Facilities: DMTI Spatial Inc. 2013; Spectra Pipelines and FOTS Lines: KMC, 2012; Imagery: Provided by KMC, 2013, NASA Geospatial Interoperability Program 2005.



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MAP NUMBER		PAGE	
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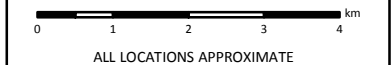


TABLE 4.2-6

**EVALUATION OF ALTERNATIVE CORRIDORS – COLDWATER RIVER PROVINCIAL PARK –
COQUIHALLA VERSUS BOSTON BAR (KP 949.1 TO KP 987.3) (RK 980.3 TO RK 1019.2)**

Factors	TMPL Alternative	West Alternative
LENGTHS		
Length of pipeline corridor (km)	37.9	39.0
Length following existing TMPL right-of-way (km)	37.9	0.6
Length following other linear features (other pipelines, power lines, highways, roads, FOTS, railways, etc.) (km)	0	36.9
Length of new corridor (km)	0	1.5
Total parallels (km)	37.9	37.5
CROSSINGS		
No. of highway crossings (No.)	0	4
No. of road (arterial, collector, local) crossings (No.)	16	7
No. of railway crossings (No.)	0	0
Crossings of named rivers (No.)	16 (13 x Coquihalla River; 3 x Coldwater River)	1 (Coldwater River)
Crossings of named creeks (No.)	7 (Baldwin Creek; Norley Creek; Juliet Creek; unnamed creek; Needle Creek; Hidden Creek; Boston Bar Creek)	4 (Mine Creek; Juliet Creek; Fallslake Creek; Boston Bar Creek)
Crossings of other watercourses (No.)	39	45
Total watercourses (No.)	62	50
GEOTECHNICAL		
Length crossing slopes > 50% on the fall line (km)	0.2	0
Length crossing slopes > 50% on sidehill (km)	4.4	2.5
Natural hazard potential (km)	High: 12.5 (includes Coquihalla and Iago jump-offs) Medium: 9.0 Low: 16.3	High: 1.1 (includes Dry Gulch) Medium: 5.5 Low: 32.4
Length of thin veneer of overburden or exposed bedrock (km)	7.3	13.0
HYDRAULIC ACCEPTABILITY	Yes	Yes
LAND		
Indian Reserve (km) (name)	0	0
Provincial Crown (km)	37.8	36.5
Private (km)	0.1	0.9
Unknown Parcels (km)	0	1.6
ENVIRONMENT		
Length within Riparian Reserve Zone (km)	13.5	0.5
Old Growth Management Area (legal) (km)	0	1.7
Old Growth Management Area (non-legal) (km)	2.8	0
Designated Ungulate Winter Range (km)	2.5	0
Late winter or early winter habitat for mountain caribou (km) (Wells Gray or Groundhog), wetlands crossed (km), community forests crossed (km), woodlots crossed (km), and Wildlife Habitat Areas (km) (species)	0	0
SOCIO-ECONOMIC		
Parks and protected areas (km)(name)	13.3 (Coquihalla Summit Recreation Area) - would require impact assessment	12.7 (Coquihalla Summit Recreation Area) – would require impact assessment
Agricultural Land Reserve (km), community watersheds (No.), and LRMP area (km)(name)	0	0
ABORIGINAL AND STAKEHOLDER ENGAGEMENT		
Aboriginal Support	No major comments received to date. Consultation ongoing.	No major comments received to date. Consultation ongoing.
Stakeholder Support	General support for alternatives that reduce slope and stability risk. General support for alternatives that avoid provincial parks.	General support for alternatives that reduce the slope and stability risk. General support for alternatives that avoid provincial parks.
CONSTRUCTABILITY AND COST		
Constructability	16 river crossings; Crosses Coquihalla and Iago jump-offs in Coquihalla Canyon.	1 river crossing; West Alternative generally follows the existing Spectra gas pipeline right-of-way and FOTS alongside the Coquihalla Highway. Crosses Dry Gulch.
Estimated Construction Cost (\$ millions)	\$141.2	\$112.2



Plate 1 Existing TMPL right-of-way (shown in yellow) surrounded by urban development within the City of Edmonton.



Plate 2 Existing TMPL right-of-way (shown in yellow) encroached by urban development through the community of Westsyde.



Plate 3 Existing FOTS right-of-way within Lac Du Bois Grasslands Protected Area.



Plate 4 Existing TMPL right-of-way within Coquihalla Canyon in foreground and proposed corridor beside Coquihalla Highway and FOTS in mid-ground.



Plate 5 Overlooking the existing crossing of the Fraser River looking east with existing TMPL right-of-way (shown in yellow) in foreground, proposed pipeline corridor (shown in orange) in mid-ground and Port Mann Bridge in background.



Plate 6 Looking south along the existing TMPL right-of-way (shown in yellow) encroached by urban development in the City of Coquitlam, BC.

4.3 Proposed Pipeline Corridor

Every effort has been made to follow the existing TMPL right-of-way or other existing rights-of-way as much as possible. Of a total length of 990 km, the proposed pipeline corridor follows the existing TMPL right-of-way for 662 km (67%) and the rights-of-way of other linear facilities for 220 km (22%) for a total parallel length of 882 km (89%). The remaining 108 km (11%) are on new corridor. The proposed pipeline corridor is shown on all the mapping in the remainder of this document and the preliminary Environmental Alignment Sheets provided in Volume 6E.

Note that Volumes 5A and 5B utilize preliminary results of parallel calculations, whereas the other volumes in the NEB application utilize final numbers. As a result, there is a slight discrepancy. The final percentages of TMPL parallel, other parallel and new corridor are 73%, 17% and 10%, respectively.

For purposes of this application, it was necessary to identify a proposed pipeline corridor to focus environmental and other studies. The environmental and socio-economic assessment was conducted by overlaying the proposed pipeline corridor on the project environmental setting and making predictions about environmental effects based on available information, known mitigation practices and professional judgment. It is recognized that additional landowner, stakeholder, environmental, socio-economic, geotechnical, and other information will come forward that will lead to improvements in the location of the pipeline corridor. In addition, the pipeline routing specialists are continuing to refine the proposed 150 m corridor and narrow it down to a pipeline construction right-of-way. These improvements will adopt the routing criteria, strategies and guidelines described in Volume 4A, Section 2.8 without jeopardizing pipeline safety and security. Where corridor modifications occur, additional studies will be completed to confirm predictions and implement appropriate mitigation from the EPPs. No fundamental change in the overall conclusion of no significant adverse effects is anticipated. Additional information is provided in Section 9.0 of Volumes 5A and 5B.

4.4 Permanent Facility Site Selection

4.4.1 Introduction

The TMEP is a loop of the existing 1,150 km TMPL system from Edmonton to Burnaby that has been in operation since 1953. As well as the looping of the pipeline, several new or expanded facilities (e.g., pump stations, storage tanks, etc.) are required to efficiently operate the pipeline system. An overview of the general facility site selection objectives/criteria and the proposed facility sites is provided in Section 4 of Volume 2. A detailed description of the facilities associated with the TMEP is provided in Sections 3.3, 3.4 and 3.5 of Volume 4A.

New and/or expanded permanent facilities are required for the successful operations of the pipeline component of the Project.

The permanent facilities associated with the Project include the following.

- Installing 23 new sending and receiving traps (16 on TMPL and TMEP), for in-line inspection tools at 9 existing sites and one new site.
- Adding 35 new pumping units at 12 locations (*i.e.*, 11 existing and 1 new pump station sites).
- Reactivating the existing Niton Pump Station that has been maintained in a deactivated state.
- Constructing 20 new tanks located at the terminals near Edmonton (5). Sumas (1) and Burnaby (14), preceded by demolition of two existing tanks near Edmonton (1) and Burnaby (1), for a net total of 18 tanks added to the system.
- 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.

This subsection describes the site selection criteria and site selection process used by the Project team to choose the sites where permanent facility sites will be located.

4.4.2 Site Selection Criteria

Edmonton, Sumas and Burnaby Terminals

The Project includes the addition of storage tanks at the existing Edmonton Terminal, Sumas Terminal and Burnaby Terminal locations. Additional booster pumps and metering facilities are also proposed for the Edmonton and Burnaby facilities. Site selection for these new facilities is primarily focused on minimizing environmental and land use disturbance by utilizing existing facility locations. The proposed expansion of the existing terminal locations is based on the following site selection criteria.

- Maximize safety of personnel and the public during construction and operations.
- Reduce environmental effects and new disturbances.
- Limit effects on terrestrial vegetation and wildlife habitat.
- Accommodate facility expansion within existing property boundaries.
- Integrate the expansion works with existing operations.
- Ensure existing infrastructure (e.g., access roads) are in place and suitable for Project needs.
- Minimize issues related to undesirable topography or terrain instability.
- Avoid culturally sensitive areas.
- Avoid conflicting land uses and encroachment upon residences/communities.
- Accommodate Aboriginal community, landowner, regulatory authorities and other stakeholder feedback, to the extent feasible.

All work associated with the Project to be conducted at Edmonton, Sumas and Burnaby terminals will be conducted within the footprint of the existing industrial sites on Trans Mountain-owned lands. No new land will be acquired for the expansion of existing facilities or the installation of new facilities at the terminal locations.

Westridge Marine Terminal

The Project includes an expansion of the existing tanker loading facilities at the Westridge Marine Terminal. Site selection is primarily focused on reducing environmental and land use disturbance by utilizing existing facility locations. Expansion of the existing dock facility is based on the following criteria.

- Maximize safety of personnel and the public during construction and operations.
- Provide the highest level of navigational safety, both for vessels berthing at Westridge Marine Terminal and for other vessels transiting the inlet or at one of the four anchorages nearby.
- Provide three Aframax capable berths, allowing capacity for vessels to wait for cargo or transit windows to reduce pressure.
- Allow the existing dock to remain in service during the construction of the new dock complex, and specifically until the new Berth 1 can be commissioned.
- Reduce the overall footprint and the effect to the community views.
- Eliminate the deep-water dredging and reduce the amount of dredging for the foreshore expansion.
- Minimal storm surge effect is expected at the existing dock site. Available public information suggests that the hazard from a tsunami is very low for the area.
- Reduce environmental effects and new disturbances.

- Reduce effects to terrestrial vegetation and wildlife habitat by using existing disturbed lands to the extent feasible.
- Avoid parks and recreational areas.
- Accommodate land-based component of facility expansion within existing property boundaries.
- Proximity of existing facilities to nearby existing infrastructure (e.g., access road, electric power supply).
- Avoid culturally sensitive areas.
- Avoid conflicting land uses and encroachment upon residences/communities.
- Accommodate Aboriginal community, landowner, regulatory authorities and other stakeholder feedback to the extent feasible.

Pump Stations

Pump station sites are largely selected according to the hydraulic pressure requirements of the pipelines. Pump station location was determined following selection criteria designed to respond to construction, operational, environmental and land use constraints. Factors affecting the selection of pump station sites included the pipeline diameter, pipeline operating pressures, the hydraulic and elevation profile and the type of liquid being transported (high or low viscosity). New pump stations to be located on a previously undisturbed site (*i.e.*, Black Pines) were typically provided a siting range of +2 km downstream or -1 km upstream along the existing TMPL right-of-way, centred on the hydraulic optimum. Once the optimal hydraulic points were selected, the following site selection criteria were considered in the final placement of the pump stations.

- Locate the site on existing or former pump station sites or on lands owned by Trans Mountain. Where this was not possible, the following criteria were used.
 - Consult landowners to seek voluntary agreement to acquire the necessary lands with respect to surrounding land use and constraints.
 - Reduce disturbance by utilizing previously disturbed sites, where practical.
 - Locate site near existing infrastructure (e.g., access roads, power lines), to the extent feasible.
 - Locate the site within less environmentally sensitive areas, to the extent feasible.
 - Avoid areas of terrain instability.
 - Avoid wetlands and riparian areas.
 - Avoid conflicting land uses and encroachment upon residences and communities, wherever practical.
 - Avoid known archaeological, heritage and traditional land use sites.
 - Accommodate Aboriginal community, landowner and regulatory authorities and other stakeholder feedback to the extent feasible.

Trans Mountain first identified lands that had been previously disturbed for other uses. In all instances, with the exception of Black Pines Pump Station, existing sites that have been previously used as pump stations or other company uses were selected for development of new pump stations by the Project.

Mainline Block Valves

Site selection criteria for mainline block valves will include:

- engineering and operations requirements;
- meet industry codes and standards, at a minimum;
- avoid wetlands and other sensitive environmental features;
- locate in vicinity of existing access roads and power supplies, if feasible;
- avoid steep slopes, unstable terrain and poorly drained areas; and
- avoid being immediately adjacent to major watercourses.

4.4.3 Terminal Site Selection

Edmonton Terminal

All new and upgraded facilities associated with the Edmonton Terminal will be constructed on Trans Mountain-owned lands on a previously disturbed, industrial area.

Sumas Terminal

The site for the new tank to be constructed at the Sumas Terminal is located to the north of the existing tanks on Trans Mountain-owned land. The land where the new facilities will be installed has been previously disturbed. There may be a small amount of clearing required along the north fenceline of the terminal site to make space available for an access road and to relocate an existing power line.

To make space available for the new tank, an existing containment berm will be dismantled and the area graded level to support the foundation for the new tank. A new containment berm will be constructed before the new tank is put into operation. The new containment berm will be comprised of the materials from the existing berm as well as the graded materials, provided these materials are acceptable for such a use (*i.e.*, non-porous).

A power line that is currently located on the north edge of the existing cleared area may be relocated to make space available for the new tank. Electrical facilities will not be upgraded as part of this development.

Burnaby Terminal

All lands required for the new and upgraded facilities associated with the Burnaby Terminal are owned by Trans Mountain. Some onsite riparian vegetation associated with several drainage channels that traverse the facility site will need to be cleared.

Westridge Marine Terminal

All new and upgraded facilities associated with the on-shore portion of the Westridge Marine Terminal will be located within the existing disturbed area on land that is owned by Trans Mountain. Additional reclaimed foreshore lands will be required to provide the space required for the new and upgraded facilities associated with the off-shore component of the Westridge Marine Terminal.

4.4.4 Pump Station Site Selection

Edmonton Pump Station

All new and upgraded facilities associated with the Edmonton Pump Station will be constructed on Trans Mountain-owned lands within a previously disturbed, industrial area.

Gainford Pump Station

All lands required for this new pump station are owned by Trans Mountain. Some of the lands are previously undisturbed by industrial developments and remain intact with a native tree cover. The new pump station will be located to the northwest of the existing pump station facilities. The size of the station operating area associated with the Gainford Pump Station will be increased by approximately 0.6 ha on lands that are owned by Trans Mountain.

Niton Pump Station

The two deactivated pumping units associated with TMPL will be reactivated as part of TMEP. No new lands will be acquired for this aspect of the Project. All works planned for the Niton Pump Station will occur within the fenced site of the existing pump station on land that is owned by Trans Mountain. There will be no new facilities constructed at the Niton Pump Station associated with TMEP.

Wolf Pump Station

The expansion of the facilities at Wolf Pump Station will be to the west of the existing facilities on previously disturbed lands that are owned by Trans Mountain. A new pump building will be located adjacent to the existing pump building. The existing electrical infrastructure will be reused for TMEP operations. No new disturbance to previously undisturbed lands will be necessary at Wolf Pump Station.

Edson Pump Station

All land required for the planned upgrades and expansion of the Edson Pump Station is owned by Trans Mountain. All of the land required by the Project has been previously disturbed.

Hinton Pump Station

A new pump station will be built immediately adjacent to the existing Hinton Pump Station. Additional new lands will have to be acquired by Trans Mountain for the new pump station. The existing fence line will be expanded to the west by approximately 35 m, increasing the station operating area by approximately 0.3 ha.

Jasper Pump Station

All construction work to be conducted at the Jasper Pump Station will be located within the current fenced area of the existing pump station. There will be no new disturbance of previously undisturbed lands outside of the current fenced area associated with this work. Trans Mountain will not have to expand the lease they currently hold with Parks Canada.

Rearguard Pump Station

Additional new lands will have to be acquired by Trans Mountain for the development required at the Rearguard Pump Station. The existing fence line associated with this station will be expanded to the east by approximately 100 m, which will increase the station operating area by approximately 0.7 ha. The area that will be developed for this new pump station is relatively flat and has been previously disturbed.

Blue River Pump Station

All construction activities planned for the Blue River Pump Station will take place on previously disturbed lands that are owned by Trans Mountain. A new pump building will be located adjacent to the existing pump building. The existing electrical infrastructure will be reused for TMEP operations.

Blackpool Pump Station

All lands required for the planned expansion and upgrades associated with the Blackpool Pump Station are owned by Trans Mountain. All of the lands have been previously disturbed.

Darfield Pump Station

Trans Mountain will need to acquire a small amount of additional land (approximately 0.07 ha) located outside of the current fence line of the Darfield Pump Station to the north in order to accommodate the

new scraper facilities to be installed at this site. The lands located to the north of the existing pump station are currently being used for agricultural purposes. Negotiations to acquire these lands by voluntary agreement are currently underway.

Black Pines Pump Station

The Black Pines Pump Station is the only new pump station location required for the Project that is not associated with a currently existing pump station. Pumping facilities for both TMPL and TMEP will be installed at Black Pines.

The general location for this pump station was selected based on the hydraulic optimum that considers the operating pressures and throughput of product in both TMPL and TMEP pipelines. The general location was identified along a 2 km length of the pipeline between KP 784 and KP 786 of the existing pipeline system. A field reconnaissance was conducted in December 2012 to further refine the location of the pump station to increase the distance from the nearest residences while keeping the station within the range of the identified hydraulic preference. The general terrain of the land was also considered during this reconnaissance to ensure the selected site was not located on steep slopes, in a wetland or close to waterbodies.

The preliminary site selected for the pump station is located at RK 811.8 (KP 784.6). This location is tree covered with mature coniferous trees (see Plate 7). The surface materials where the pump station would be located consist of a debris fan. Therefore, further geotechnical assessments will be required at this site to determine the optimum location for the station as well as to determine appropriate mitigation measures to protect the facilities from a potential debris flow during the operations phase of the Project. The current surface of the site is sloped, which would require grading to level the surface for construction and operations of the pump stations.



Plate 7 Aerial view of the proposed Black Pines Pump Station Site (May 27, 2013).

It is anticipated that an area of 150 m x 150 m will be required for the construction of the pump station and associated facilities (e.g., sending/receiving traps). This area would generally be located to the west of the current Trans Mountain right-of-way, with the exception of the containment pond, which would be located east of the existing right-of-way. Final layout of the proposed pump station will be determined during detailed engineering design.

The lands that have been identified for this new pump station are currently privately owned. Trans Mountain will seek to acquire the lands needed for the construction and operation of the Black Pines Pump Station. Trans Mountain is currently negotiating with the landowners to acquire the land required for the Black Pines Pump Station.

Black Pines Power Line Route Selection Process

A search for existing power lines with a suitable voltage rating that is required for the Black Pines Pump Station was conducted after the preliminary site for the pump station was identified. A suitable existing power line was identified on the east side of Highway 5, which is to the east of the Black Pines Pump Station site (Figure 4.4-1).

A desktop assessment of existing surface encumbrances (e.g., residences, farm buildings, etc.) and terrain and landscape features in the area surrounding the preliminary pump station site and the existing power line was conducted. Representatives of Trans Mountain and TERA conducted a field reconnaissance of the Black Pines area in December 2012 to verify the results of the desktop assessment.

A representative of Trans Mountain met with BC Hydro in February 2013 to discuss the potential to 'tap' into the existing power line at one of three potential locations along the line and to discuss high level routing considerations for the new power line. BC Hydro indicated that a 'tap' into this power line would be possible and that their preference would be to avoid routing the new power line across an island in the North Thompson River.

The preliminary power line route was selected to:

- reduce overall route length;
- reduce the number of bends in the line;
- avoid close proximity to residences; and
- avoid routing over an island in the North Thompson River.

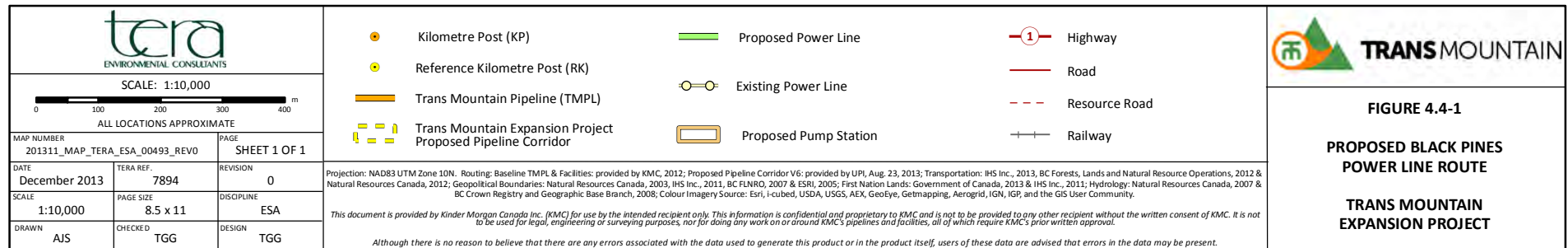
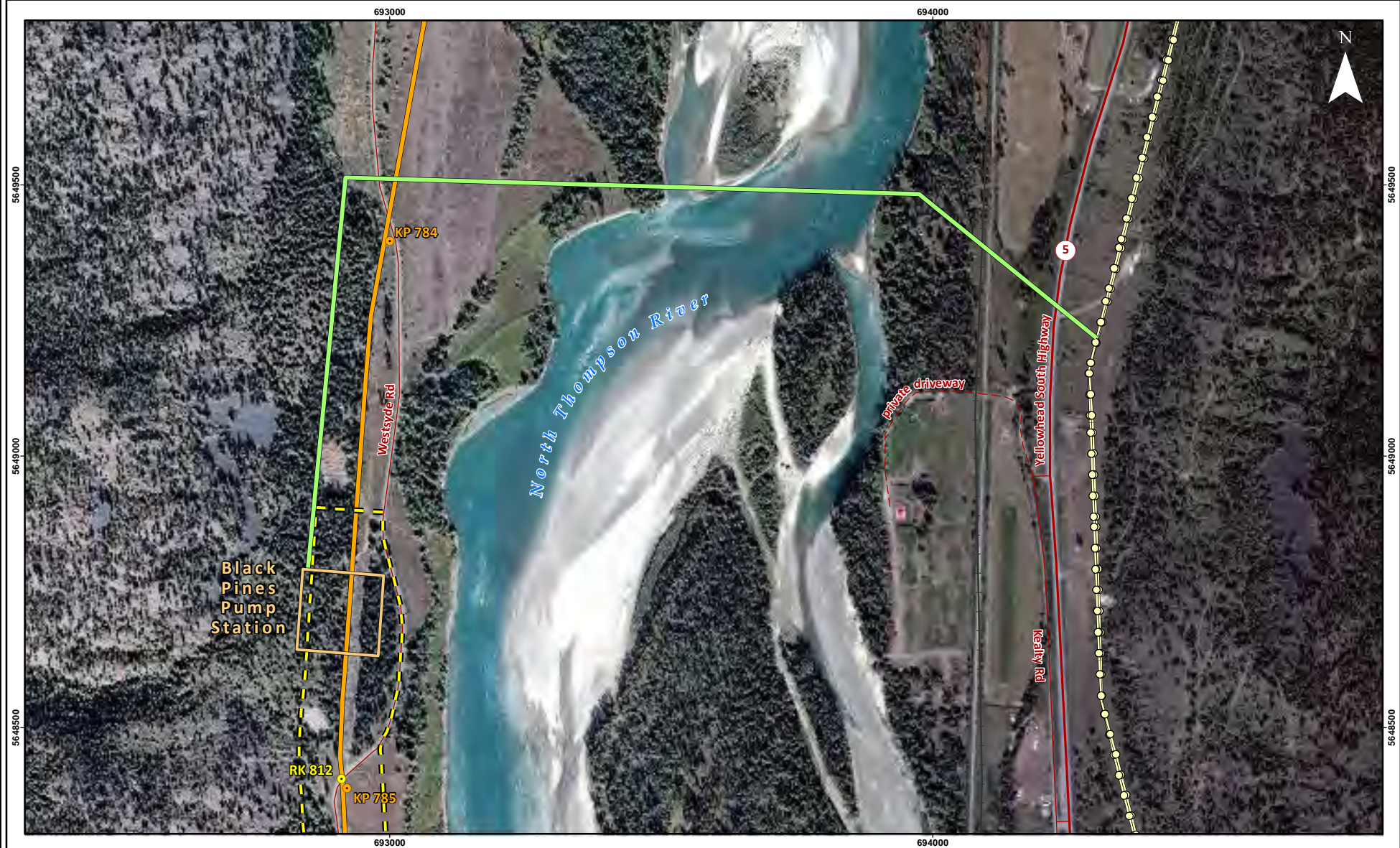
With these considerations in mind, a preliminary route option was selected to the north of the island identified as a routing constraint by BC Hydro. The route crosses the North Thompson River and then turns to the south on the west side of Westsyde Road where it intersects with the north boundary of the preliminary Black Pines Pump Station site.

A route option to the south of the island in the North Thompson River was not considered due to a higher density in residences on both the east and west sides of the North Thompson River.

A representative of Trans Mountain presented the preliminary 'tap' in location and route option to BC Hydro on May 13, 2013. BC Hydro endorsed both the route and the 'tap' location on May 31, 2013.

Access Road Route Selection Process

Depending on the final site selected for the pump station, a suitable location to construct the access road intersecting with Westsyde Road will be chosen. The terrain as well as the line-of-sight along Westsyde Road will be considered when selecting the access road required for the Black Pines Pump Station. Given the close proximity of the preferred site for the Black Pines Pump Station to Westsyde Road, the access road will be short (i.e., less than 100 m).



Kamloops Pump Station

All new and upgraded facilities to be constructed at the Kamloops Pump Station associated with TMEP will be constructed on lands that are owned by Trans Mountain on previously disturbed, industrial land.

Kingsvale Pump Station

A new pump station and electrical substation will be constructed immediately adjacent to the existing Kingsvale Pump Station. The power line that currently feeds the existing pump station is undersized for the added load associated with the new pump station. Therefore, a new 138 kV power line, approximately 23.5 km in length, will also be required to provide electricity to this pump station.

The land required for the new pump station and electrical substation to be installed at Kingsvale is owned by Trans Mountain. Some new clearing and grading will be required to create a level working surface for the construction of the new facilities at Kingsvale Pump Station.

Kingsvale Power Line Route Selection Process

A search for existing power lines with suitable voltage rating as required for the Kingsvale Pump Station that are located in the vicinity of the Kingsvale Pump Station was conducted. A suitable power line exists on the east side of Highway 5A, which is to the east of the Kingsvale Pump Station site (Figure 4.4-2).

A desktop assessment of existing surface encumbrances (e.g., residences, farm buildings, etc.) as well as terrain and landscape features in the area surrounding the study area between the Kingsvale Pump Station and the existing power line was conducted. Representatives of Trans Mountain and TERA conducted a field reconnaissance of the area in December 2012 to verify the results of the desktop assessment.

A representative of Trans Mountain met with BC Hydro in February 2013 to discuss the potential to 'tap' into the existing power line and to discuss high level routing considerations for the new power line. BC Hydro indicated that a 'tap' into this power line would be possible.

The preliminary power line route option was selected to:

- reduce overall route length;
- reduce the number of bends in the line;
- parallel existing linear features, to the extent practical; and
- avoid close proximity to residences.

With these considerations in mind, a preliminary route option was selected based on a desktop assessment of the area.

An aerial reconnaissance of the preliminary route option was conducted on May 27, 2013. Based on this reconnaissance several minor adjustments to the preliminary route alignment were made to avoid paralleling a drainage channel as well as steep sidehill terrain.

A representative of Trans Mountain presented the preliminary 'tap' in location and route options to BC Hydro on May 13, 2013. BC Hydro will have to approve the routing for the new power line since the selected route must meet their satisfaction from an operations perspective as well as future expansion considerations, if the selected route is located adjacent to the existing 500 kV transmission corridor. BC Hydro endorsed the selected route and the 'tap' location into the existing power line on May 31, 2013. However, BC Hydro has conducted an analysis to determine whether there will be an issue of induced current on the new power line required for the Kingsvale Pump Station. The result of the study indicated that there are no issues with the proposed route. The final route alignment for this power line will be selected during detailed design of the Project.

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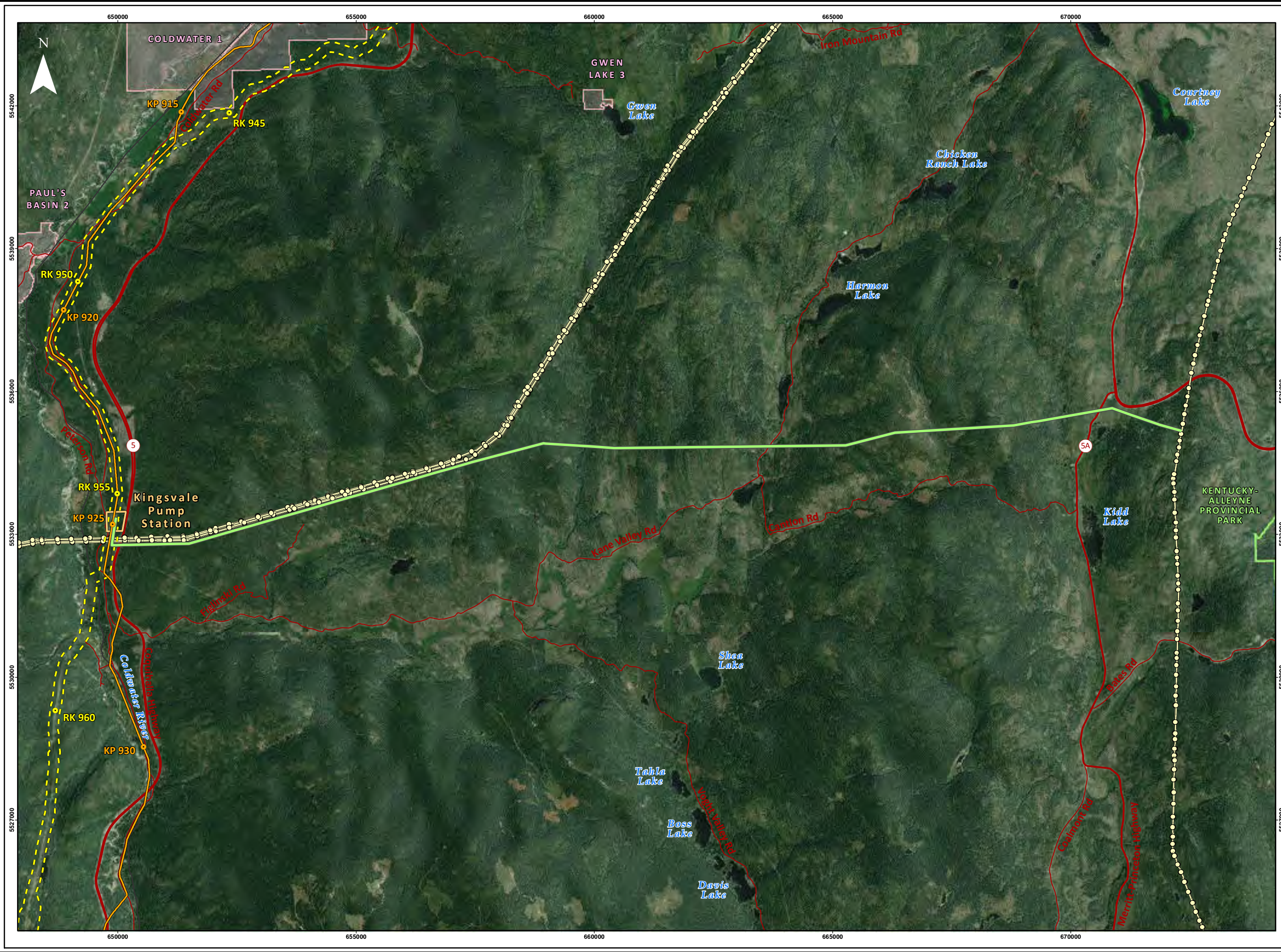













FIGURE 4.4-2
PROPOSED KINGSVALE
POWER LINE ROUTE
TRANS MOUNTAIN EXPANSION PROJECT

-  Kilometre Post (KP)
-  Trans Mountain Pipeline (TMPL)
-  Proposed Power Line
-  Trans Mountain Expansion Project Proposed Pipeline Corridor
-  Subject Property Facility Boundary
-  Highway
-  Paved Road
-  Existing Power Line
-  Railway
-  National Park / Provincial Park / Protected Area
-  Indian Reserve / Métis Settlement

Projection: NAD 1983 UTM Zone 10N.
Routing: Baseline TMPL & Facilities: provided by KMC, 2012; Proposed Pipeline Corridor V6: provided by UPL, Aug. 23, 2013; Transportation: IHS Inc., 2013; Natural Resources Canada, 2011; Geopolitical Boundaries: Natural Resources Canada, 2003, Altalis, 2012, IHS Inc., 2011, ESRI, 2005; First Nation Lands: Government of Canada, 2013; Parks and Protected Areas: Natural Resources Canada, 2013, Altalis, 2013, Alberta Tourism, Parks and Recreation, 2012, BC FLNRO, 2008; Hydrology: IHS Inc., 2004; Imagery Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community.

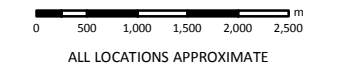
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The Proposed Power Line Route

The proposed power line route extends to the northwest along an existing access road from the 'tap' in location to the existing power line. From here, the proposed route continues to the west of Highway 5A before turning to the southwest. The proposed route then turns to the northwest and continues westward until it nears the existing 500 kV transmission corridor approximately 8 km east of the Kingsvale Pump Station. The proposed route then turns to the west and parallels the existing 500 kV transmission line corridor with an offset of 70 m south of the southernmost conductor on the existing transmission line. After crossing to the west of Highway 5, the proposed route turns to the north following the existing TMPL right-of-way before it enters the lands where the new substation will be constructed within the Kingsvale Pump Station site.

Pressure Control Station

A pressure control station may be required on both TMPL and TMEP. It is likely that this facility would be installed at the Hope Pump Station if it is determined during detailed design that it is required for operations.

Existing access and electrical facilities for the Hope Pump Station will be sufficient for the construction and operation of the pressure control station.

The lands required for the pressure control station are owned by Trans Mountain.

Sumas Pump Station

There will be a new pumping unit installed on the 609.6 mm OD (NPS 24) pipeline heading south from the Sumas Pump Station into Washington State (*i.e.*, the Puget Sound line).

The land required for the new pumping unit to be installed at the existing Sumas Pump Station is owned by Trans Mountain and has been previously disturbed by industrial activity.

4.4.5 Mainline Block Valves Site Selection

Once the approximate locations of mainline block valves have been identified, using the criteria listed above in Section 4.3.2, the sites will be subject to an environmental assessment. Detailed environmental surveys (*e.g.*, soils, vegetation and wildlife) will be conducted, where warranted, to determine any potential environmental issues associated with these sites.

The evaluation of mainline block valve locations will be conducted as far in advance of their intended use, as practical, in order to allow adequate time to identify and evaluate any alternate sites. In the event that specific mitigation is warranted for a specific site, the measures developed will be documented in the Environmental As-Built Report (see Volume 6A). General provisions will be included in the contract documents that commit contractors to site protection/restoration measures at sites identified, evaluated and used during the construction program. Mitigation measures to be used at mainline block valve sites will be as described in Section 7.0 of Volume 5A and Volume 6B (Pipeline EPP). All applicable approvals for the mainline block valves will be acquired prior to use of the site or area. The level of mitigation measures applied will ensure that any residual environmental effects are reduced to a level that is not significant.

4.5 Temporary Facility Site Selection

4.5.1 Introduction

New and/or expanded temporary facilities will be required during the construction of the Project. The temporary facilities associated with TMEP will include:

- staging and stockpile sites;
- equipment storage sites;
- construction office sites;

- construction work camps (likely one in Alberta and two in BC);
- trenchless crossing work areas;
- shoo-flies/temporary access roads;
- borrow pits; and
- log decks.

This subsection describes the site selection criteria and site selection process that will be used by the Project team to select the sites where temporary facility sites will be located.

4.5.2 Temporary Facility Site Selection Criteria

The following site selection criteria will be used to evaluate and select temporary facility sites and workspace.

- Selection of an optimal location for construction needs.
- Locate the facility in the vicinity of similar existing facilities to reduce environmental and land use disturbances.
- Locate temporary facilities that require the use of utilities at sites already serviced by roads and utilities.
- Avoidance, to the extent practical, of areas of native vegetation by maximizing the use of previously cleared or broken lands, or lands currently under industrial land use.
- Preferential selection of grassed areas over bush or wooded areas when temporary workspace is necessary on lands supporting native vegetation.
- Avoidance, to the extent practical, of known locations that provide site-specific habitat for wildlife species of concern or apply special mitigation (refer to Section 7.0 of Volume 5A).
- Avoidance, to the extent practical, of known sites that support vascular plant species of concern or apply special mitigation (refer to Section 7.0 of Volume 5A).
- Avoidance, to the extent practical, of steep slopes, organic soils and poorly-drained areas.
- Avoidance, to the extent practical, of known areas with heritage resource sites or apply special mitigation (refer to Section 7.0 of Volume 5B).
- Avoidance of locations adjacent to a conflicting land use where potential noise, dust or visual concerns could not be readily mitigated.
- Avoidance of parks and protected areas.
- Abide by requests of Aboriginal communities, landowners and regulatory authorities, to the extent feasible.

4.5.3 Temporary Facility Site Selection

The need for and the respective general location of these sites are the responsibility of the pipeline or facilities construction contractor. However, all temporary workspace and temporary facility site locations will require the approval of the Inspector(s) or qualified designate.

Once the location of temporary workspace or a temporary facility for use during construction has been identified, the sites will be assessed and, where appropriate, approved by the Inspector(s) or qualified

designate. Detailed environmental surveys (e.g., soils, vegetation and wildlife) will be conducted, where warranted, to determine any potential environmental issues.

The evaluation of potential temporary facility sites/workspace will be conducted as far in advance of its intended use, as practical, in order to allow an adequate time to chose and evaluate any alternate sites. In the event that specific mitigation is warranted for the site, the measures developed will be documented in the Environmental As-built Report (see Volume 6A). General provisions will be included in the contract documents that commit contractors to site protection/restoration measures at sites identified, evaluated and used during the construction program. Mitigation measures to be used at temporary facility sites and temporary work areas are described in Section 7.0 of Volume 5A and Volume 6B (Pipeline EPP). All applicable approvals for the temporary facility site or workspace will be acquired prior to use of the site or area. The level of mitigation applied will ensure that any residual environmental effects are reduced to a level that is not significant.

4.6 References

4.6.1 GIS Data and Mapping References

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