

## PIPELINES

**MACKENZIE GAS PROJECT  
SUPPLEMENTAL INFORMATION  
PROJECT UPDATE**

## INTRODUCTION

## 3.1.1 PIPELINE ROUTING

The routing of the gathering, NGL and gas pipelines remains the same, except for a 1.4 km addition to the gas pipeline route to provide for relocating the Great Bear River compressor station. Pipeline lengths are summarized by region in:

- Table 3-1 for the gathering and NGL pipelines
- Table 3-2 for the gas pipeline

Although there are site-specific adjustments, overall land requirements are expected to remain at about 9,150 ha, including the pipeline rights-of-way, facility sites and supporting infrastructure.

**Table 3-1: Length of Gathering Pipelines and NGL Pipeline by Region**

Region	Route Name	Total Length (km)	Private Lands (km)
<b>Gathering Pipelines</b>			
Inuvialuit Settlement Region	Niglintgak lateral	14.7	0
	Parsons Lake lateral	26.4	0
	Taglu lateral	80.9	23.4
	Storm Hills lateral	52.2	0
Gwich'in Settlement Area	Storm Hills lateral	15.0	3.3
<b>Total</b>		<b>189.2</b>	<b>26.7</b>
<b>NGL Pipeline</b>			
Gwich'in Settlement Area	N/A	166.2	102.9
Sahtu Settlement Area, K'ahsho Got'ine District	N/A	231.1	118.9
Sahtu Settlement Area, Tulita District	N/A	59.9	36.0
<b>Total</b>		<b>457.2</b>	<b>257.8</b>

## 3.1.2 PIPELINE DESIGN

The design of project pipelines remains the same, including:

- pipeline operating pressures
- pipeline operating temperature guidelines
- the proposed line pipe design parameters, such as grade and wall thickness
- the location and proposed method for each watercourse crossing

### 3.1.2 PIPELINE DESIGN (cont'd)

Engineering continues to improve technical definition around these design parameters.

A modified construction plan and schedule has been developed in response to community input, the availability of construction labour and equipment, and increased costs.

**Table 3-2: Length of Gas Pipeline by Region**

<b>Region</b>	<b>Total Length (km)</b>	<b>Private Lands (km)</b>
Gwich'in Settlement Area	166.2	102.9
Sahtu Settlement Area, K'ahsho Got'ine District	231.1	118.9
Sahtu Settlement Area, Tulita District	270.4	128.3
Deh Cho Region	528.0	10.4
Alberta	0.05	0.0
<b>Total*</b>	<b>1,195.8</b>	<b>360.5</b>
Note*: Rounded to 0.1 km		

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CONSTRUCTION PLAN MODIFICATIONS

3.2.1 CONSTRUCTION PLAN

The construction plan assumes four years of construction for infrastructure, pipelines and associated facilities (see Figure 3-1). To address the availability of labour and increased costs, the construction plan has been adjusted to reduce peak winter construction labour and camp needs by distributing pipeline construction activities more evenly over three full winter seasons.

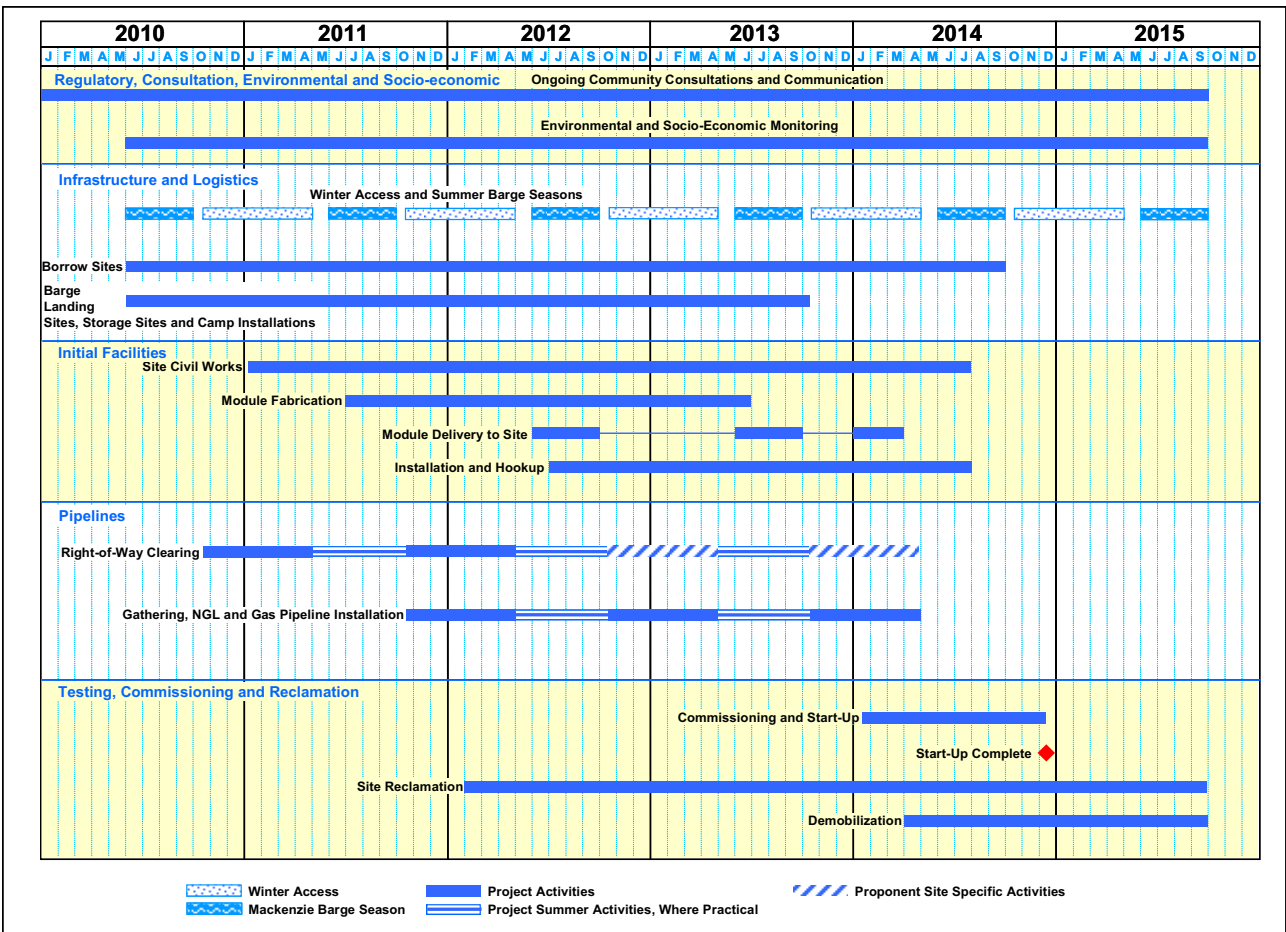


Figure 3-1: Construction Schedule for Pipeline and Initial Facilities

### 3.2.1 CONSTRUCTION PLAN (cont'd)

The first year (2010–2011) involves preparation activities, such as building the infrastructure needed for construction, and clearing the rights-of-way for the first season of pipeline installation. Pipeline and pipeline facilities installation will begin in 2011–2012 and be complete by 2014.

Table 3-3 summarizes the field activities that will occur during construction, by season.

**Table 3-3: Construction Activities by Season**

Season	Activity
Summer 2010	<ul style="list-style-type: none"> <li>• Mobilize some equipment, small camps and fuel for initial site development</li> <li>• Develop borrow sites and stockpile borrow material</li> <li>• Begin to develop barge landing sites</li> <li>• Begin to install main construction camp pads and stockpile pads</li> <li>• Mobilize equipment, small camps and fuel for right-of-way clearing</li> <li>• Transport fuel by barge and truck to support future construction</li> </ul>
Winter 2010–2011	<ul style="list-style-type: none"> <li>• Continue borrow site development work</li> <li>• Develop barge landing sites</li> <li>• Install main construction camp pads, stockpile pads and facilities pads</li> <li>• Begin installing main infrastructure, including camps and field-erected tanks</li> <li>• Survey, clear and, potentially, grade the right-of-way and facility sites</li> </ul>
Summer 2011	<ul style="list-style-type: none"> <li>• Mobilize pipe, equipment, camps and fuel to support main construction</li> <li>• Install construction camps</li> <li>• Clear pipeline right-of-way, where practical</li> <li>• Continue developing and operating borrow sites</li> <li>• Continue installing infrastructure and facility pads</li> </ul>
Winter 2011–2012 First pipe-laying season	<ul style="list-style-type: none"> <li>• Construct pipeline sections with multiple construction spreads</li> <li>• Continue surveying and clearing right-of-way and facility sites</li> <li>• Continue developing and operating borrow sites and installing infrastructure, including camps and field-erected tanks</li> <li>• Install pile foundations at facility sites</li> <li>• Begin pipeline right-of-way construction cleanup</li> </ul>
Summer 2012	<ul style="list-style-type: none"> <li>• Mobilize pipe, equipment, camps and fuel to support main construction</li> <li>• Install construction camps</li> <li>• Clear pipeline right-of-way, where practical</li> <li>• Transport facility modules from Hay River</li> <li>• Install pile foundations at facility sites</li> <li>• Begin facility assembly at sites and continue construction</li> <li>• Continue developing and operating borrow sites and installing infrastructure</li> </ul>

Table 3-3: Construction Activities by Season (cont'd)

Season	Activity
Winter 2012–2013 Second pipe-laying season	<ul style="list-style-type: none"> <li>• Construct pipeline sections with multiple construction spreads</li> <li>• Continue surveying and clearing right-of-way and facility sites, where required</li> <li>• Continue developing and operating borrow sites and installing infrastructure, including camps and field-erected tanks</li> <li>• Install pile foundations at facility sites</li> <li>• Continue pipeline right-of-way construction cleanup and reclamation</li> </ul>
Summer 2013	<ul style="list-style-type: none"> <li>• Mobilize pipe, equipment, camps and fuel to support main construction</li> <li>• Install construction camps</li> <li>• Clear pipeline right-of-way, where practical</li> <li>• Transport facility modules from Hay River and offshore locations</li> <li>• Continue installing facility modules and construction</li> <li>• Continue developing and operating borrow sites and installing infrastructure</li> </ul>
Winter 2013–2014 Third pipe-laying season	<ul style="list-style-type: none"> <li>• Complete surveying and clearing right-of-way and facility sites, where required</li> <li>• Construct remaining pipeline sections with multiple construction spreads</li> <li>• Transport facility modules to remote sites</li> <li>• Complete pipeline construction</li> <li>• Continue operating borrow sites</li> <li>• Continue facility construction</li> <li>• Continue pipeline right-of-way construction cleanup and reclamation</li> <li>• Begin demobilizing camps and equipment</li> </ul>
Summer 2014	<ul style="list-style-type: none"> <li>• Complete facility construction</li> <li>• Begin commissioning and start-up activities for pipelines and facilities</li> <li>• Begin infrastructure and borrow site reclamation</li> <li>• Continue pipeline right-of-way construction cleanup and reclamation</li> <li>• Continue demobilizing camps and equipment</li> </ul>
Winter 2014–2015	<ul style="list-style-type: none"> <li>• Complete commissioning and start-up activities</li> <li>• Start up and begin operating facilities and pipelines in Q4 2014</li> <li>• Continue pipeline right-of-way construction cleanup and reclamation</li> <li>• Continue demobilizing camps and equipment</li> </ul>
Summer 2015	<ul style="list-style-type: none"> <li>• Complete pipeline right-of-way construction cleanup and reclamation</li> <li>• Complete reclamation of infrastructure sites not required for operations</li> <li>• Complete demobilization</li> </ul>



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## CONSTRUCTION SPREADS

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**3.3.1 PIPELINE INSTALLATION ACTIVITIES**

Construction activities continue to require four winters. As described in the November 2005 Project Update, the construction plan included:

- an initial season of infrastructure construction and some pipeline right-of-way clearing
- a season of pipeline installation with limited scope for gathering pipelines north of Swimming Point, including seven horizontal directionally drilled (HDD) pipeline crossings
- two seasons of pipeline installation based on five construction spreads with an average progress of 4 km per day

To reduce peak labour and equipment requirements, the construction plan has been modified to distribute work more evenly. The current construction plan is based on:

- an initial season of infrastructure construction and some pipeline right-of-way clearing
- three seasons of pipeline installation based on four construction spreads with an average progress of 2 km per day

The peak number of construction workers required has been reduced by about 30%. For further information on workforce requirements, see Section 7, Expenditures and Workforce.

**3.3.2 CONSTRUCTION ZONES**

The total pipeline construction has been split into four construction zones (A, B, C and D) versus five previously, with one spread working pipeline installation each winter season. Activity within each spread remains the same and involves:

- an initial winter for preparation activities, including clearing the right-of-way, collecting data required for construction and confirming site-specific designs
- a winter for pipeline installation followed by initial construction cleanup
- a winter for final cleanup and reclamation

## 3.3.2 CONSTRUCTION ZONES (cont'd)

Right-of-way clearing activities are now planned to be completed during the first two winters of construction, 2010–2011 and 2011–2012. This plan takes advantage of available construction time and reduces peak labour requirements in future years. At sensitive sites, such as some slopes and watercourse crossings, clearing activities are planned to occur during the winter of pipeline installation.

For the regional location of the construction zones and pipeline spreads, see Table 3-4. Figure 3-2 shows planned boundaries of the pipeline construction spreads.

**Table 3-4: Location and Length of Mackenzie Gas Pipeline Construction Spreads**

Construction Zone	Year of Installation	Segment From	Segment To	Spread Length (km)	Number of Lines	Nominal Pipe Size
D	1	East Channel	Taglu	40	1	26
	1	Taglu	Niglintgak	15	1	16
	1	East Channel	Storm Hills	41	1	26
	2	Inuvik Area Facility	Storm Hills	67	1	32
	2	Storm Hills	Parsons Lake	26	1	18
	3	Inuvik Area Facility	KP 120	120	2	30, 10
C	1	Tulita	Norman Wells	80	1	30
	1	Norman Wells	Enbridge Interconnect	1	1	10
	1	Norman Wells	KP 394	62	2	30, 10
	2	KP 394	KP 254	140	2	30, 10
	3	KP 254	KP 120	134	2	30, 10
B	1	KP 914	KP 794	120	1	30
	2	KP 794	KP 674	120	1	30
	3	KP 674	Tulita	140*	1	30
A	1	KP 1024	KP 1109	85	1	30
	2	KP 1109	NGTL Interconnect	85	1	30
	3	KP 914	KP 1024	110	1	30

Note\*: Includes adding 1.4 km to the gas pipeline route for relocating the Great Bear River compressor station.

Spread lengths and the direction of installation have been modified to:

- reflect the available construction season, based on historical weather data for beginning and ending construction, as discussed in the response to Undertaking JRP J U-94 (JRP Exhibit J-IORVL-00764)
- reduce construction activity in the Noel and Jimmy Lakes area during the early winter period of caribou presence along the Storm Hills lateral
- reflect locations of pipeline construction camps

Construction seasons range from about 90 days in the southern Deh Cho Region to about 150 days in the Inuvialuit Settlement Region. Days on which construction cannot be undertaken because of poor weather, such as storms or extreme temperature, remain at 10% of available construction work days.

Spread lengths are:

- shortened from about 155 km to between 85 and 110 km in the Deh Cho Region
- about the same, at about 140 km, in the Sahtu Settlement Area
- increased from about 100 km to 120 in the Gwich'in Settlement Area
- equalized to about 95 km in the Inuvialuit Settlement Region

Pipeline construction camps are now generally located in the middle of a spread, instead of one camp at each end of the spread.

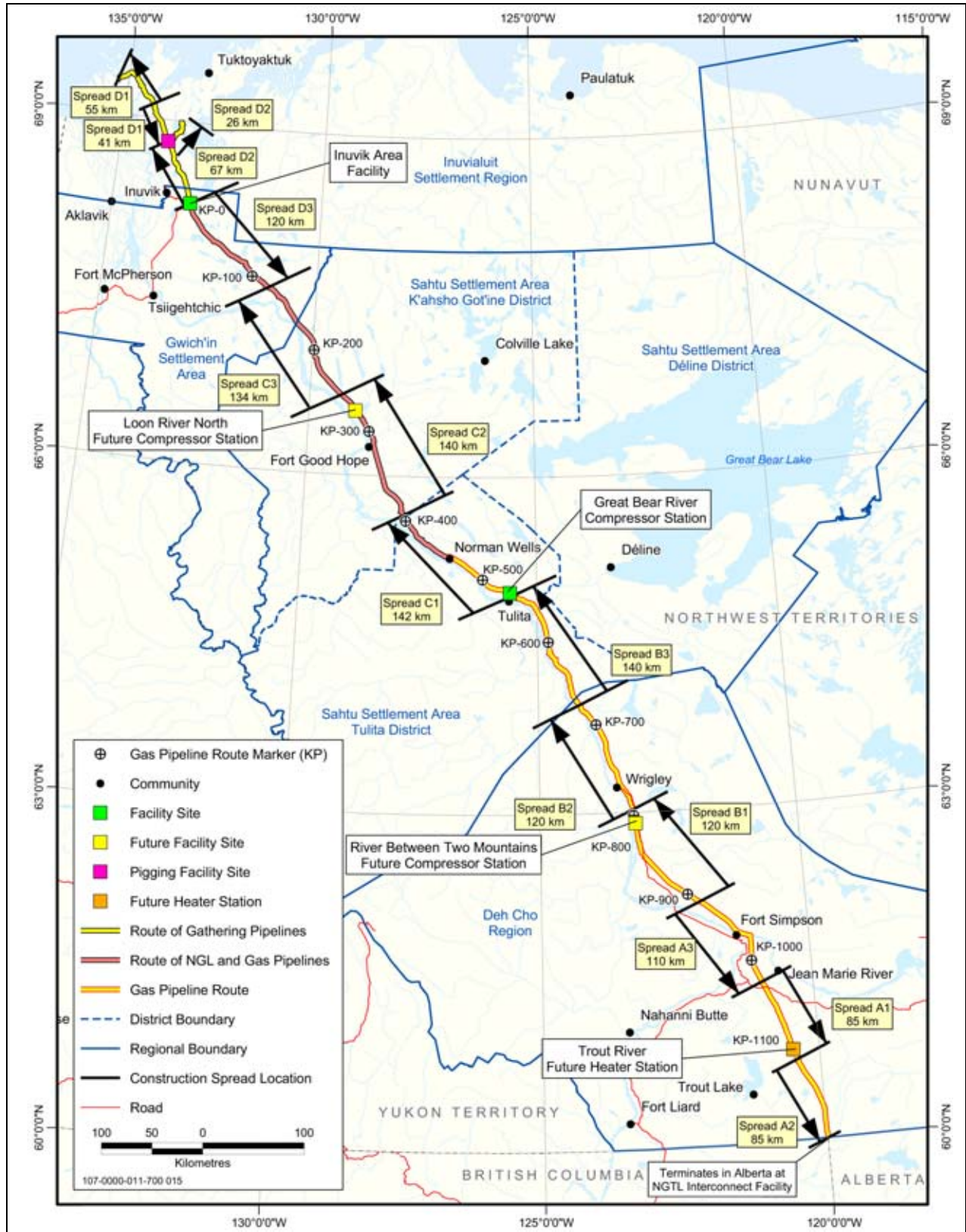


Figure 3-2: Pipeline Construction Spreads

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## WATERCOURSE CROSSINGS

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**3.4.1 TOTAL WATERCOURSE CROSSINGS**

A total of 643 watercourses will be crossed by the gathering, NGL and gas pipelines. The list of proposed watercourse crossings was provided in the response to information requests:

- NEB 8.28 (NEB Exhibit IORVL-139)
- JRP DFO 4.01 (JRP Exhibit J-IORVL-00425)

As engineering and construction planning progresses, the selection of the watercourse crossing technique will follow the decision-making process outlined in the response to information request JRP 5.01 (JRP Exhibit J-IORVL-00798).

**3.4.2 GREAT BEAR RIVER RELOCATION**

Relocating the Great Bear River compressor station and adding 1.4 km to the gas pipeline route has not resulted in any changes to watercourse crossings.

**3.4.3 TIMING OF HDD CROSSINGS**

Trenchless crossings will be undertaken by using horizontal directional drilling techniques.

The proposed timing of the HDD crossings remains the same. These crossings are planned to be completed during the first two years of pipeline installation. This will maintain schedule flexibility to complete the crossing in the following winter season if an HDD cannot be completed as planned.

**3.4.4 LARGE WATERCOURSE CROSSINGS**

Table 3-5 summarizes the site-specific drawings for the large watercourse crossings.

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## WATERCOURSE CROSSINGS

Table 3-5: Large Watercourse Crossings with Specific Drawings

Crossing Name	Kilometre Post from Engineering Alignment Sheet <sup>1</sup>	Proposed Construction Method	Exhibit Number	
			NEB	JRP
Kumak Channel	Niglintgak	Trenchless	SCL-33b	N/A
Kanguk Channel	N 12.01	Trenchless	IORVL-00110	J-IORVL-00471 to J-IORVL-00477
Kuluarpak Channel	N 13.31	Trenchless	IORVL-00114	J-IORVL-00478 to J-IORVL-00484
Harry Channel	T 1.52	Trenchless	IORVL-00131	J-IORVL-00564 to J-IORVL-00567
East Channel	T 38.82	Trenchless	IORVL-00137	J-IORVL-00590 to J-IORVL-00592
Tieda River	253.6	Open cut	To be assigned <sup>2</sup>	J-IORVL-00952 <sup>3</sup>
Loon River	285.1	Isolated	To be assigned <sup>2</sup>	J-IORVL-00952 <sup>3</sup>
Hare Indian River	309.8	Trenchless	IORVL-00157	J-IORVL-00721 to J-IORVL-00724
Donnelly River	363.3	Open cut	To be assigned <sup>2</sup>	J-IORVL-00952 <sup>3</sup>
Great Bear River	536.3	Trenchless	IORVL-00187	J-IORVL-00877, J-IORVL-00878 and J-IORVL-00884
Big Smith Creek	593.1	Isolated	To be assigned <sup>2</sup>	J-IORVL-00952 <sup>3</sup>
Blackwater River	677.1	Trenchless	IORVL-00169	J-IORVL-00782 to J-IORVL-00784
Ochre River	736.8	Trenchless	IORVL-00183	J-IORVL-00867 to J-IORVL-00870
River Between Two Mountains	803.6	Isolated	To be assigned <sup>2</sup>	J-IORVL-00952 <sup>3</sup>
Willowlake River	830.0	Trenchless	IORVL-00151	J-IORVL-00646 to J-IORVL-00649
Mackenzie River	976.4	Trenchless	IORVL-00188	J-IORVL-00879 to J-IORVL-00882
Jean Marie Creek No. 1	1022.4	Isolated	To be assigned <sup>2</sup>	J-IORVL-00952 <sup>3</sup>
Trout River	1078.8	Isolated	To be assigned <sup>2</sup>	J-IORVL-00952 <sup>3</sup>

Note:

1. N = Niglintgak lateral of the gathering system. T = Taglu lateral of the gathering system.
2. Updated response to information request NEB INAC 1.34, filed with the National Energy Board on March 15, 2007.
3. Provided to the Joint Review Panel in response to Undertaking J U-191.