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TITLE	<b>SSA Application for a Type A Water Licence</b>
SECTION	5: Water Use for Pipeline Right-of-Way Travel Lane
SUBJECT	1: Pipeline Right-of-Way Travel Lane Water Requirements

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## INTRODUCTION

This section supports an application for approval to obtain the water required to construct and maintain a pipeline right-of-way travel lane within the SSA Settlement Area. It contains right-of-way alignment maps, describes the proposed undertaking, provides an estimate of the quantities of water involved and addresses water deposits. A summary of the schedule of activities is also provided.

## LOCATION OF UNDERTAKING (PART 3)

The proposed travel lane will be installed within the 30 m, 40 m and 50 m wide pipeline rights-of-way. These are shown in the following alignment maps:

- [Figure 5-1: SSA Map 1 of 53 \(KP-184 to KP-195\)](#)
- [Figure 5-2: SSA Map 2 of 53 \(KP-195 to KP-205\)](#)
- [Figure 5-3: SSA Map 3 of 53 \(KP-202 to KP-219\)](#)
- [Figure 5-4: SSA Map 4 of 53 \(KP-217 to KP-228\)](#)
- [Figure 5-5: SSA Map 5 of 53 \(KP-226 to KP-243\)](#)
- [Figure 5-6: SSA Map 6 of 53 \(KP-239 to KP-247\)](#)
- [Figure 5-7: SSA Map 7 of 53 \(KP-247 to KP-257\)](#)
- [Figure 5-8: SSA Map 8 of 53 \(KP-258 to KP-268\)](#)
- [Figure 5-9: SSA Map 9 of 53 \(KP-269 to KP-278\)](#)
- [Figure 5-10: SSA Map 10 of 53 \(KP-278 to KP-287\)](#)
- [Figure 5-11: SSA Map 11 of 53 \(KP-284 to KP-300\)](#)
- [Figure 5-12: SSA Map 12 of 53 \(KP-297 to KP-307\)](#)
- [Figure 5-13: SSA Map 13 of 53 \(KP-307 to KP-318\)](#)
- [Figure 5-14: SSA Map 14 of 53 \(KP-316 to KP-333\)](#)
- [Figure 5-15: SSA Map 15 of 53 \(KP-333 to KP-342\)](#)
- [Figure 5-16: SSA Map 16 of 53 \(KP-342 to KP-353\)](#)
- [Figure 5-17: SSA Map 17 of 53 \(KP-353 to KP-364\)](#)
- [Figure 5-18: SSA Map 18 of 53 \(KP-364 to KP-374\)](#)
- [Figure 5-19: SSA Map 19 of 53 \(KP-374 to KP-386\)](#)
- [Figure 5-20: SSA Map 20 of 53 \(KP-386 to KP-394\)](#)
- [Figure 5-21: SSA Map 21 of 53 \(KP-394 to KP-406\)](#)
- [Figure 5-22: SSA Map 22 of 53 \(KP-406 to KP-417\)](#)
- [Figure 5-23: SSA Map 23 of 53 \(KP-417 to KP-426\)](#)
- [Figure 5-24: SSA Map 24 of 53 \(KP-426 to KP-438\)](#)
- [Figure 5-25: SSA Map 25 of 53 \(KP-439 to KP-449\)](#)
- [Figure 5-26: SSA Map 26 of 53 \(KP-448 to KP-457\)](#)

- Figure 5-27: SSA Map 27 of 53 (KP-457 to KP-466)
- Figure 5-28: SSA Map 28 of 53 (KP-466 to KP-474)
- Figure 5-29: SSA Map 29 of 53 (KP-474 to KP-481)
- Figure 5-30: SSA Map 30 of 53 (KP-481 to KP-489)
- Figure 5-31: SSA Map 31 of 53 (KP-489 to KP-496)
- Figure 5-32: SSA Map 32 of 53 (KP-496 to KP-505)
- Figure 5-33: SSA Map 33 of 53 (KP-505 to KP-514)
- Figure 5-34: SSA Map 34 of 53 (KP-514 to KP-525)
- Figure 5-35: SSA Map 35 of 53 (KP-525 to KP-534)
- Figure 5-36: SSA Map 36 of 53 (KP-530 to KP-541)
- Figure 5-37: SSA Map 37 of 53 (KP-542 to KP-550)
- Figure 5-38: SSA Map 38 of 53 (KP-550 to KP-559)
- Figure 5-39: SSA Map 39 of 53 (KP-561 to KP-569)
- Figure 5-40: SSA Map 40 of 53 (KP-569 to KP-578)
- Figure 5-41: SSA Map 41 of 53 (KP-578 to KP-586)
- Figure 5-42: SSA Map 42 of 53 (KP-583 to KP-600)
- Figure 5-43: SSA Map 43 of 53 (KP-598 to KP-609)
- Figure 5-44: SSA Map 44 of 53 (KP-609 to KP-619)
- Figure 5-45: SSA Map 45 of 53 (KP-619 to KP-629)
- Figure 5-46: SSA Map 46 of 53 (KP-629 to KP-641)
- Figure 5-47: SSA Map 47 of 53 (KP-641 to KP-653)
- Figure 5-48: SSA Map 48 of 53 (KP-653 to KP-664)
- Figure 5-49: SSA Map 49 of 53 (KP-664 to KP-674)
- Figure 5-50: SSA Map 50 of 53 (KP-674 to KP-684)
- Figure 5-51: SSA Map 51 of 53 (KP-680 to KP-691)
- Figure 5-52: SSA Map 52 of 53 (KP-688 to KP-697)
- Figure 5-53: SSA Map 53 of 53 (KP-696 to KP-706)

The location of the water sources that might be used to develop and maintain the right-of-way travel lane are shown, by their centroid coordinates, in [Table 5-1](#).

**Table 5-1: Proposed Water Source Centroid Coordinates**

Water Source Name	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	Easting (m)	Northing (m)	UTM Zone
104	187.8	67.3121	-130.3895	440196	7466845	9
Mackenzie River	189.1	-	-	-	-	-
105	199.6	67.2304	-130.1694	449497	7457534	9
106	204.5	67.2112	-130.1405	450706	7455381	9
107	204.5	67.1943	-130.1658	449575	7453511	9
108	204.5	67.2032	-130.1132	451868	7454465	9
Mackenzie River	204.5	-	-	-	-	-

**Table 5-1: Proposed Water Source Centroid Coordinates (cont'd)**

<b>Water Source Name</b>	<b>Kilometre Post (KP)</b>	<b>Latitude (DD)</b>	<b>Longitude (DD)</b>	<b>Easting (m)</b>	<b>Northing (m)</b>	<b>UTM Zone</b>
109A	208.4	67.1854	-130.0537	454409	7452429	9
110	214.4	67.1384	-129.9833	457372	7447141	9
111	215.8	67.1277	-129.9920	456977	7445957	9
114	219.0	67.1017	-129.9764	457605	7443050	9
115B	223.0	67.0640	-129.9866	457095	7438855	9
115	224.2	67.0530	-129.9742	457617	7437617	9
I-08	223.5	67.0371	-129.9947	456698	7435858	9
117	228.6	67.0262	-129.9165	460082	7434594	9
118	239.2	66.9327	-129.8626	462286	7424135	9
119	239.2	66.9281	-129.8508	462796	7423619	9
120	240.4	66.9208	-129.8429	463128	7422795	9
120A	242.7	66.8669	-129.9760	457211	7416876	9
121	246.6	66.8672	-129.7791	465847	7416789	9
122	256.4	66.8127	-129.6018	473559	7410623	9
123	257.7	66.8056	-129.5782	474589	7409832	9
124	261.4	66.7959	-129.4805	478872	7408713	9
125	265.2	66.7706	-129.4289	481125	7405876	9
126	265.2	66.7647	-129.4283	481145	7405220	9
127	265.7	66.7440	-129.4658	479478	7402914	9
128	267.4	66.7520	-129.4028	482260	7403792	9
130	270.1	66.7486	-129.3200	485903	7403389	9
129	270.1	66.9081	-129.3780	483456	7421182	9
131	283.3	66.6558	-129.1425	493697	7393021	9
132	289.3	66.6208	-129.0150	499335	7389107	9
133	291.2	66.6024	-129.0191	499152	7387056	9
SKG19	295.0	66.5548	-129.0434	498073	7381755	9
135	301.1	66.6084	-128.7256	512157	7387758	9
136	304.3	66.5123	-128.8517	506596	7377023	9
137	307.9	66.4798	-128.8203	508001	7373406	9
138	324.7	66.3609	-128.6182	517081	7360188	9
139	327.5	66.3510	-128.5511	520093	7359103	9

**Table 5-1: Proposed Water Source Centroid Coordinates (cont'd)**

Water Source Name	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	Easting (m)	Northing (m)	UTM Zone
Hare Indian (Rabbit-skin) River	330.0	-	-	-	-	-
140	332.9	66.2950	-128.5210	521487	7352880	9
140A	335.6	66.2973	-128.3951	527135	7353180	9
141	338.0	66.2497	-128.5073	522142	7347828	9
142	341.0	66.2272	-128.4856	523137	7345325	9
Mackenzie River	341.9	-	-	-	-	-
143	342.7	66.2013	-128.5278	521262	7342428	9
144	344.1	66.1935	-128.5041	522335	7341564	9
145	347.0	66.1845	-128.3815	527870	7340612	9
146	367.3	65.9973	-128.4007	527201	7319739	9
147	371.8	65.9560	-128.3080	531460	7315176	9
148	384.8	65.8693	-128.1091	540641	7305629	9
150	397.2	65.7686	-127.9407	548511	7294529	9
151	411.9	65.6695	-127.8782	551571	7283537	9
ST1	418.7	65.6190	-127.7848	555973	7277989	9
152	424.1	65.5795	-127.7304	558565	7273638	9
153	432.9	65.5143	-127.5912	565152	7266501	9
155	439.7	65.4667	-127.5061	569212	7261289	9
Mackenzie River	444.0	-	-	-	-	-
Oscar Creek	445.7	-	-	-	-	-
Mackenzie River	447.2	-	-	-	-	-
156	453.2	65.4168	-127.2897	579387	7255986	9
157	459.3	65.3783	-127.1880	584228	7251827	9
159	464.6	65.3429	-127.0934	588746	7248010	9
Mackenzie River	466.6	-	-	-	-	-
Mackenzie River	476.3	-	-	-	-	-
Mackenzie River	499.7	-	-	-	-	-
Mackenzie River	512.2	-	-	-	-	-
163	528.1	65.0381	-125.9753	359937	7216004	10
Mackenzie River	538.4	-	-	-	-	-

**Table 5-1: Proposed Water Source Centroid Coordinates (cont'd)**

Water Source Name	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	Easting (m)	Northing (m)	UTM Zone
ST11	538.6	64.9929	-125.7558	370042	7210498	10
Great Bear River	556.0	-	-	-	-	-
Mackenzie River	570.0	-	-	-	-	-
163A	581.1	64.8608	-125.0328	403654	7194487	10
ST15	587.1	64.8053	-124.9822	405860	7188230	10
Mackenzie River	588.9	-	-	-	-	-
ST17	609.6	64.6317	-124.7977	414070	7168633	10
Big Smith Creek	613.1	-	-	-	-	-
164	620.4	64.5181	-124.8150	412881	7155994	10
Little Smith Creek	631.7	-	-	-	-	-
Mackenzie River	632.0	-	-	-	-	-
Saline River	653.3	-	-	-	-	-
Mackenzie River	665.8	-	-	-	-	-
164A	683.7	64.0864	-124.3054	436351	7107300	10
ST24	685.5	64.0376	-124.2933	436832	7101845	10
I-10	692.9	63.9980	-124.1802	442271	7097327	10

## DESCRIPTION OF UNDERTAKING (PART 4)

### Pipeline Travel Lane Construction

The total length of the pipeline travel lane will be about 513.9 km in the SSA. This includes 1.9 km of 30 m wide right-of-way for the single pipeline immediately west of the town of Norman Wells, 223.8 km of 40 m wide right-of-way for the single pipeline and 288.2 km of 50 m wide right-of-way for the dual pipelines.

The travel lane will provide access for trucks, buses and construction equipment. This travel lane will be about 17 m wide inside the right-of-way, and will be used to accommodate construction traffic. Potential water sources for the pipeline travel lane and temporary workspace are shown in [Table 5-1](#).

### Construction Methodology

All or portions of the travel lane will be installed in the rights-of-way during the winter construction seasons to enable the construction activities required for pipeline installation. These include clearing rights-of-way and temporary

workspace, preparing the right-of-way, installing the pipelines, construction cleanup, pipeline testing, commissioning and reclamation.

The right-of-way will be prepared as described in [Section 3](#). Travel lane preparation will start as soon as the ground is frozen and is able to support the weight of construction equipment. In locations where the ground is partially frozen, the snow along the right-of-way will be compacted with light tracked equipment to accelerate frost penetration.

Once the ground is frozen, a bulldozer will push the excess snow to each side of the right-of-way, to create a level, hard surface. The hard frozen surface organic layer will be left intact to the extent practical, except for localized high points that will be graded to create a level surface. In graded areas, loose surface materials will also be pushed to the side.

Snow will be compacted and water might be applied to the travel lane, if necessary, to create a smooth, hard-wearing working surface. Work areas will be prepared at locations, such as watercourse crossings, where a larger working area is required.

Maintenance will be required throughout the construction season due to the high axle loads of the vehicles and equipment and due to high traffic volumes. A maintenance crew will be assigned to grade the travel lane and apply water, as necessary. Refer to [Section 3](#) for figures that show standard travel lanes along the pipeline right-of-way.

## **QUANTITY OF WATER INVOLVED (PART 7)**

The quantity of water required for the construction of the temporary workspace and travel lane on sections of the 513.9 km of pipeline right-of-way in the SSA will depend on the available snowfall. Estimates of water requirements have been calculated and are based on the following assumptions:

- normal snowfall during the winter construction season
- travel surface width along the pipeline right-of-way of 17 m

Water will be used during the winter construction season, which normally begins in late November or early December and continues until late March or early April. The heaviest water use will occur early in each construction season in order to build a road base. A reduced level of water use will be required later in the winter construction season as water is applied to maintain travel surface conditions.

An estimate of the water required for the pipeline travel lane, based on the assumptions presented above, is shown in [Table 5-2](#).

**Table 5-2: Pipeline Right-of-Way Travel Lane Water Requirements – SSA**

Description	Approximate Water Requirements	
	Total Annual Volume (m <sup>3</sup> )	Average Daily Volume <sup>a</sup> (m <sup>3</sup> )
Right-of-way travel lane water requirements	332,000	5,533
Total water requirements over 3 years	996,000	-

NOTE:  
<sup>a</sup>Average daily volume is total annual volume averaged over a 60-day winter construction period and reflects heaviest water use early in the construction season.

**WASTE DEPOSITED (PART 8)**

No water treatment or wastewater deposit activities are associated with this work. Water will be trucked to the required locations and applied, where needed, to help freeze and form the road base and temporary workspace. In spring, the ice and snow on the travel lane and work areas will melt and flow into the surrounding natural drainage system.

**SCHEDULE (PART 13)**

The right-of-way travel lane in the SSA will be developed and maintained during the winters of 2006-2007 through 2009-2010 (see [Section 3](#)).

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TITLE	<b>SSA Application for a Type A Water Licence</b>
SECTION	5: Water Use for Pipeline Right-of-Way Travel Lane
SUBJECT	2: HDD Water Requirements

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## INTRODUCTION

This subject supports an application for approval to obtain and use water required to install certain pipeline watercourse crossings using horizontal directional drilling (HDD) methods within the SSA. It describes the proposed undertaking, provides an estimate of the quantities of water involved, outlines the plan for handling waste, and summarizes the schedule of activities.

## LOCATION OF UNDERTAKING (PART 3)

The pipeline will cross numerous watercourses inside the SSA and will generally be installed by open cut and isolated crossing methods. The locations where HDD methods are being considered for the installation of the pipelines are shown in [Table 5-3](#).

**Table 5-3: Proposed Pipeline HDD Watercourse Crossing Coordinates – SSA**

Crossing Name	Crossing ID	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	Easting (m)	Northing (m)	UTM Zone
Hare Indian (Rabbitskin) River	RPR-249	330.2	66.3172	-128.5392	520652	7355345	9
Great Bear River	RPR-330	556.0	64.9516	-125.4857	382596	7205366	10
Saline River	RPR-358	653.4	64.2913	-124.5053	427147	7130337	10

The location of the pipeline watercourse crossings that are being considered in the SSA using HDD crossing methods are also shown on the following alignment maps:

- [Figure 5-54: SSA Map 1 of 3 – Hare Indian \(Rabbitskin\) River HDD Crossing](#)
- [Figure 5-55: SSA Map 2 of 3 – Great Bear River HDD Crossing](#)
- [Figure 5-56: SSA Map 3 of 3 – Saline River HDD Crossing](#)

## DESCRIPTION OF UNDERTAKING (PART 4)

### Pipeline HDD Watercourse Crossing

The feasibility of undertaking pipeline watercourse crossings using horizontal directional drilling methods at the locations indicated depends on an analysis of results from geotechnical and hydrological investigations. If the soil conditions at a crossing site are found to be unsuitable for HDD, an open cut crossing at the same location might be used as an alternative.

Water is required to prepare a bentonite-based mud to be used for drilling the subterranean hole for the pipe. Mud with entrained cuttings is circulated through shaker screens, which remove the cuttings and return the mud to a tank for reuse. This method is a continuous process and the mud supply must be supplemented as the size of the hole is increased. Drilling fluid and solids from HDD activities requiring disposal might include water, bentonite-based mud and cuttings. The need for chemical additives is currently under review by the project.

A description of the HDD method of performing a pipeline watercourse crossing and a schematic drawing of this crossing method are shown in [Section 3](#).

## QUANTITY OF WATER INVOLVED (PART 7)

The quantity of water required for performing a pipeline watercourse crossing using the HDD method depends on the crossing width and the success realized during the drilling operation. Estimates of water requirements have been calculated and are based on the following assumptions:

- normal hole progress
- loss of drilling fluid within estimated values during the drilling process

Water used during an HDD operation to prepare the bentonite-based drilling mud will likely be sourced from the watercourse being crossed. However, this will depend on the quality of the water.

An estimate of the water required for the HDD operations in the SSA, based on the assumptions above, is shown in [Table 5-4](#).

**Table 5-4: Pipeline HDD Watercourse Crossing Water Requirements**

Region	Watercourse Name	Kilometre Post (KP)	Water Requirement (m <sup>3</sup> )
Sahtu Settlement Area K'ahsho Got'ine District	Hare Indian (Rabbitskin) River	330.2	7,200
Sahtu Settlement Area Tulita District	Great Bear River	556.0	5,600
	Saline River	653.4	4,800
Total			17,600

**WASTE DEPOSITED (PART 8)**

Upon completion of each crossing, disposal options currently being considered for the fluids and solids from HDD watercourse crossings include distribution along the pipeline right-of-way and disposal to borrow sites. Disposal procedures and locations will be selected to reduce any potential impacts from the HDD materials on local water supply and quality, or future use of borrow sites.

Reclamation measures for the disposed drilling fluids and solids are being developed and will be included in the project's reclamation plans. Any incidental spills during construction will be properly handled immediately in accordance with the project Spill Contingency Plan. Collected materials will be managed in compliance with the applicable regulatory requirements (see [Section 11](#)).

**SCHEDULE (PART 13)**

The pipeline watercourse crossings in the SSA will be performed during the winters of 2006-2007 through 2008-2009.