

## INTRODUCTION

This section supports an application for approval to obtain the water required to construct and maintain winter access roads within the Dehcho Region. It contains site-specific maps ([Figure 4-1](#) to [Figure 4-4](#)), 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)

All-weather and winter access roads that will be constructed to access water sources, infrastructure sites, borrow sites, pipeline right-of-way and facility sites are shown in [Figure 4-1](#) through [Figure 4-4](#).

[Table 4-1](#) contains a summary of access roads in the DCR.

**Table 4-1: Access Road Summary**

Access Road Type	Number of All-Weather Roads	Length of All-Weather Roads (km)	Number of Winter Access Roads	Length of Winter Access Roads (km)	Annual Winter Access Road Water Requirements (m <sup>3</sup> )
Infrastructure	4	3.4	3	7.5	2,100
Borrow Sites	1	0.4	39	167.0	47,500
Pipeline Construction	0	0	27	53.0	12,900
Facility	1	0.9	1	24.9	7,100
Total Water Required for Access Roads within the DCR (m <sup>3</sup> /yr):					69,600

Information on the access road types presented in [Table 4-1](#) is detailed in [Subject 4.2](#) for infrastructure access, [Subject 4.3](#) for borrow site access, [Subject 4.4](#) for pipeline construction and water source access, and [Subject 4.5](#) for facility access.

The quantities of water required for approaches to the pipeline right-of-way, watersources, and infrastructure, borrow, and facility sites are included in the access road estimates in [Table 4-1](#).

## DESCRIPTION OF UNDERTAKING (PART 4)

### Winter Road Construction

About 252.4 km of temporary winter access roads will be constructed to a standard that will accommodate transporting line pipe, construction equipment, personnel, borrow materials, water and other materials to support construction. These roads will be used to access camps, borrow sites, water sources and the pipeline right-of-way during construction. The construction of these roads might require the use of water in conjunction with natural snowfall to provide a level and durable travel surface. Potential water sources for winter road construction are listed in [Section 2](#). In most cases, water will be pumped from the listed water sources through holes drilled in the ice by self-contained pump trucks.

### Construction Methodology

Winter access roads will be built to accommodate the activities required to develop the pipeline, borrow sites, infrastructure, and water sources in the DCR. These roads will generally be used for three of the four years over which construction, clean up and remediation activities will occur in the region.

Winter road alignments will be selected to reduce disturbance by using existing cut lines, frozen lakes, other waterbodies and previously disturbed areas to the extent practical. The access roads will be cleared of all brush and timber, as required. The cleared width of the access road will be about 20 m wide, to accommodate the width of the largest equipment or vehicles that will be transported on the road and to provide room for snow windrows on each side. A travel surface of about 8.0 m wide will be required for borrow sites, infrastructure sites and pipeline construction access roads. Water source access roads will require a 6.0 m travel surface.

Winter road construction could start as soon as the ground is frozen and can support the weight of construction equipment. In locations where the ground is partially frozen, the snow on the access roads 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 the 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.

Most of the snow that accumulates along the access roads during the construction season will be ploughed to the side of the travel surface.

Maintenance will be required throughout the construction seasons due to the high axle loads of the vehicles and equipment, and to high traffic volumes. A maintenance crew will be assigned to grade each road and apply water, as necessary, to maintain the travel surface. A sketch showing a typical winter road cross-section is shown in [Section 3](#).

## QUANTITY OF WATER INVOLVED (PART 7)

The quantity of water required for the construction and maintenance of about 252.4 km of temporary access roads, which includes 42.8 km of 6.0 m wide road and 209.6 km of 8.0 m wide road, will depend on the available snowfall. Estimates of water requirements for winter access road construction have been calculated and are based on the following assumptions:

- normal snowfall during the winter construction season
- 8.0 m wide roads for borrow sites and pipeline construction and 6.0 m for water sources

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 to build the road base. A reduced level of water use would be required later in the winter construction season for road maintenance.

An estimate of the water that will be required for the proposed winter access roads, based on the assumptions previously presented, is shown in [Table 4-2](#). This estimate is based on a three-year program, with clearing in the first year, pipeline construction in the second year, and clean up and remediation in the third year. Although pipeline construction across the region has been scheduled to occur over a four-year period, it will generally be limited to three years at any particular location. Individual access roads will generally be in use for three years.

**Table 4-2: Winter Access Road Water Requirements**

Description	Approximate Water Requirements	
	Total Annual Volume	Average Daily Volume <sup>a</sup>
Winter road construction water requirements	69,600 m <sup>3</sup> /year	1,160 m <sup>3</sup> /day
Total water requirements over 3 years	208,800 m <sup>3</sup>	-
NOTE: <sup>a</sup> Average daily volume is total annual volume averaged over a 60-day winter road construction period.		

### **WASTE DEPOSITED (PART 8)**

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

### **SCHEDULE (PART 13)**

The winter roads used to access infrastructure sites, borrow sites, water sources, and the pipeline right-of-way are currently scheduled to be developed and maintained during the winters of 2006-2007 through 2009-2010.

TITLE	<b>DCR Application for a Type A Water Licence</b>
SECTION	4: Access Roads
SUBJECT	2: Infrastructure

### LOCATION OF UNDERTAKING (PART 3)

Water will be required to construct winter access roads to the infrastructure sites within the DCR. These are shown in the following figures:

- [Figure 4-1: DCR Road Access to Blackwater River Infrastructure Site](#)
- [Figure 4-2: DCR Road Access to Ochre River Infrastructure](#)
- [Figure 4-3: DCR Road Access to River Between Two Mountains Infrastructure Site](#)
- [Figure 4-4: DCR Road Access to Camsell Bend Infrastructure](#)

Table 4-3 lists the winter access roads for infrastructure sites within the DCR and the proposed water sources for those roads.

**Table 4-3: Infrastructure Site Access Roads within the DCR**

Access Road Name	Kilometre Post (KP)	Land Use		Estimated Length (km) <sup>a,b,c</sup>	Proposed Water Source
		Private Length (km)	Crown Length (km)		
D-PS-W-702.1	702.1	-	0.6	0.6	Mackenzie River
D-BL-A-757.2	757.2	-	0.9	0.9	-
D-C-W-757.2	757.2	-	5.5	5.5	Mackenzie River
D-BL-A-830.2	830.2	-	1.1	1.1	-
D-PS-A-830.2	830.2	-	0.8	0.8	-
D-PS-W-830.2	830.2	-	1.4	1.4	Mackenzie River
D-BL-A-927.8	927.8	-	0.6	0.6	-

NOTES:  
<sup>a</sup>Total length of infrastructure winter (W) access roads within the DCR – 7.5 km  
<sup>b</sup>Total length of infrastructure all-weather (A) access roads within the DCR – 3.4 km  
<sup>c</sup>Total length of infrastructure access roads within the DCR – 10.9 km

### QUANTITY OF WATER INVOLVED (PART 7)

The quantity of water required to build and maintain about 7.5 km of winter road to the infrastructure sites is estimated in [Table 4-4](#).

**Table 4-4: Infrastructure Site Winter Access Road Water Requirements**

Description	Estimated Water Requirements	
	Total Annual Volume	Average Daily Volume <sup>a</sup>
Winter road construction water requirements	2,100 m <sup>3</sup> /year	35 m <sup>3</sup> /day
Total water requirements over three years	6,300 m <sup>3</sup>	
NOTE: <sup>a</sup> Average daily volume is total annual volume averaged over a 60-day winter road construction period.		

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TITLE	<b>DCR Application for a Type A Water Licence</b>
SECTION	4: Access Roads
SUBJECT	3: Borrow Sites

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### LOCATION OF UNDERTAKING (PART 3)

Water will be required to construct winter access roads to the borrow sites within the DCR. These are shown in the following figures:

- [Figure 4-5: DCR Road Access to Borrow Sites 9.044PA, 9.044PB, 9.091P and 10.001P](#)
- [Figure 4-6: DCR Road Access to Borrow Sites 10.003P and 10.004P](#)
- [Figure 4-7: DCR Road Access to Borrow Site 10.007P](#)
- [Figure 4-8: DCR Road Access to Borrow Sites 10.013P and 10.014AP](#)
- [Figure 4-9: DCR Road Access to Borrow Sites 10.020P and 10.022P](#)
- [Figure 4-10: DCR Road Access to Borrow Site 10.030P](#)
- [Figure 4-11: DCR Road Access to Borrow Site 10.033P](#)
- [Figure 4-12: DCR Road Access to Borrow Sites 10.037P, 10.038PA and 10.120P](#)
- [Figure 4-13: DCR Road Access to Borrow Sites 10.043P and 10.044BP](#)
- [Figure 4-14: DCR Road Access to Borrow Site 10.055P](#)
- [Figure 4-15: DCR Road Access to Borrow Sites 10.071P and 10.072P](#)
- [Figure 4-16: DCR Road Access to Borrow Site 20.015P](#)
- [Figure 4-17: DCR Road Access to Borrow Sites 11.019P and 11.021P](#)
- [Figure 4-18: DCR Road Access to Borrow Site 11.033P](#)
- [Figure 4-19: DCR Road Access to Borrow Sites 11.055PA and 11.055PB](#)
- [Figure 4-20: DCR Road Access to Borrow Site 20.018P](#)
- [Figure 4-21: DCR Road Access to Borrow Site 11.067P](#)
- [Figure 4-22: DCR Road Access to Borrow Site 11.071P](#)

- [Figure 4-23: DCR Road Access to Borrow Site 11.174P](#)
- [Figure 4-24: DCR Road Access to Borrow Sites 11.192P](#)
- [Figure 4-25: DCR Road Access to Borrow Sites 11.204PA and 11.204PB](#)
- [Figure 4-26: DCR Road Access to Borrow Site 20.057P](#)
- [Figure 4-27: DCR Road Access to Borrow Site 20.002P](#)
- [Figure 4-28: DCR Road Access to Borrow Site 20.064P](#)
- [Figure 4-29: DCR Road Access to Borrow Sites 20.004PA and 20.004PC](#)
- [Figure 4-30: DCR Road Access to Borrow Site 20.006P](#)
- [Figure 4-31: DCR Road Access to Borrow Site 20.008P](#)
- [Figure 4-32: DCR Road Access to Borrow Site 20.068P](#)

Table 4-5 lists the winter access roads for borrow sites within the DCR and the proposed water sources for those roads.

**Table 4-5: Winter Access Roads for Borrow Sites within the DCR**

Access Road Name	Kilometre Post (KP)	Land Use		Estimated Length (km) <sup>a,b,c</sup>	Proposed Water Source
		Private Length (km)	Crown Length (km)		
D-B1-W-9.037PB	688.7	1.6 (SSA)	0.9	2.5	Mackenzie River
D-B2-W-9.038PBb	689.8	0.9 (SSA)	0.3	1.2	Mackenzie River
D-B1-W-9.044PA	700.4	-	2.4	2.4	Mackenzie River
D-B1-W-9.044PB	700.4	-	1.6	1.6	Mackenzie River
D-B2-W-9.091P	702.1	-	4.2	4.2	Mackenzie River
D-B2-W-10.001P	704.1	-	0.7	0.7	Mackenzie River
D-B2-W-10.003P	710.4	-	0.6	0.6	Mackenzie River
D-B2-W-10.004P	712.1	-	2.7	2.7	Mackenzie River
D-B1-W-10.007P	728.0	-	7.7	7.7	Mackenzie River
D-B2-W-10.013P	747.4	-	5.4	5.4	DCN2
D-B2-W-10.014AP	750.2	-	4.3	4.3	DCN2
D-B1-W-10.020P	757.2	-	0.6	0.6	Mackenzie River
D-B2-W-10.022Pa	759.6	-	4.8	4.8	Mackenzie River

**Table 4-5: Winter Access Roads for Borrow Sites within the DCR (cont'd)**

Access Road Name	Kilometre Post (KP)	Land Use		Estimated Length (km) <sup>a,b,c</sup>	Proposed Water Source
		Private Length (km)	Crown Length (km)		
D-B2-W-10.022Pb	759.6	-	0.4	0.4	Mackenzie River
D-B2-W-10.037P	790.3	-	8.0	8.0	Mackenzie River
D-B2-W-10.120P	790.3	-	13.6	13.6	Mackenzie River
D-B1-W-10.043P	796.4	-	1.5	1.5	Mackenzie River
D-B2-W-10.044PB	798.1	-	1.2	1.2	Mackenzie River
D-B2-W-10.055P	810.7	-	0.3	0.3	Mackenzie River
D-B2-W-10.071P	826.7	-	5.9	5.9	Mackenzie River
D-B1-W-10.072P	834.3	-	0.1	0.1	Mackenzie River
D-B1-W-20.015P	855.9	-	0.3	0.3	Mackenzie River
D-B1-W-11.019Pa	880.0	-	12.8	12.8	167, DCN7A
D-B1-W-11.019Pb	880.0	-	1.1	1.1	167, DCN7A
D-B1-W-11.021P	880.0	-	2.0	2.0	DCN7A
D-B1-W-11.033P	895.5	-	12.9	12.9	168
D-B1-A-11.055PB	928.1	-	0.4	0.4	-
D-B2-W-20.018P	947.9	-	13.5	13.5	Mackenzie River
D-B2-W-11.067P	954.2	-	12.4	12.4	Mackenzie River
D-B1-W-11.071P	982.9	-	0.5	0.5	Mackenzie River
D-B1-W-11.174Pa	1010.3	-	8.2	8.2	Mackenzie River
D-B1-W-11.174Pb	1010.3	-	0.3	0.3	Mackenzie River
D-B1-W-11.192P	1056.1	-	0.2	0.2	171
D-B1-W-20.064P	1121.1	-	8.6	8.6	173
D-B2-W-20.002P	1121.1	-	1.5	1.5	173
D-B1-W-20.004PC	1167.9	-	5.6	5.6	173
D-B1-W-20.004PA	1168.5	-	5.4	5.4	173
D-B2-W-20.006P	1185.7	-	2.0	2.0	173
D-B2-W-20.008P	1202.0	-	7.9	7.9	173
D-B2-W-20.068P	1208.8	-	4.6	4.6	173
NOTES:					
<sup>a</sup> Total length of borrow source winter access roads within the DCR – 167.0 km					
<sup>b</sup> Total length of borrow source all-weather (AW) access roads within the DCR – 0.4 km					
<sup>c</sup> Total length of borrow source access roads within the DCR – 167.4 km					

### QUANTITY OF WATER INVOLVED (PART 7)

The quantity of water required to build and maintain about 167 km of winter access road to 42 potential borrow sites is estimated in [Table 4-6](#).

**Table 4-6: Borrow Site Winter Access Road Water Requirements - DCR**

Description	Estimated Water Requirements	
	Total Annual Volume	Average Daily Volume <sup>a</sup>
Winter road construction water requirements	47,500 m <sup>3</sup> /year	792 m <sup>3</sup> /day
Total water requirements over three years	142,500 m <sup>3</sup>	
NOTE: <sup>a</sup> Average daily volume is total annual volume averaged over a 60-day winter road construction period.		

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TITLE	<b>DCR Application for a Type A Water Licence</b>
SECTION	4: Access Roads
SUBJECT	4: Pipeline Construction

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### LOCATION OF UNDERTAKING (PART 3)

Water will be required to construct winter access roads to water sources and the pipeline right-of-way within the DCR. These are shown in the following figures:

- [Figure 4-33: DCR Road Access to Pipeline D-PL-W](#)
- [Figure 4-34: DCR Road Access to Water Source DCN2](#)
- [Figure 4-35: DCR Road Access to Water Source 165](#)
- [Figure 4-36: DCR Road Access to Pipeline D-PL-W and Water Source I-12](#)
- [Figure 4-37: DCR Road Access to Water Source DCN3](#)
- [Figure 4-38: DCR Road Access to Water Sources 166 and DCN5](#)
- [Figure 4-39: DCR Road Access to Water Source DCN7](#)
- [Figure 4-40: DCR Road Access to Water Sources 167 and DCN7A](#)
- [Figure 4-41: DCR Road Access to Water Source 168](#)
- [Figure 4-42: DCR Road Access to Water Source I-13](#)
- [Figure 4-43: DCR Road Access to Water Source 169](#)
- [Figure 4-44: DCR Road Access to Water Source 170](#)
- [Figure 4-45: DCR Road Access to Water Sources 171 and DCS9](#)
- [Figure 4-46: DCR Road Access to Water Source 171A](#)
- [Figure 4-47: DCR Road Access to Water Source 173](#)

[Table 4-7](#) is a list of the pipeline construction and water source access roads within the DCR and the proposed water sources for those roads.

**Table 4-7: Pipeline Construction Winter Access Roads within the DCR**

<b>Access Road Name</b>	<b>Kilometre Post (KP)</b>	<b>Estimated Length (km)</b>	<b>Proposed Water Source</b>
D-WS-W-MR-688.8	688.8	4.2	Mackenzie River
D-WS-W-MR-704.1	704.1	0.4	Mackenzie River
D-WS-W-MR-709.9	709.9	2.4	Mackenzie River
D-WS-W-MR-712.1	712.1	1.1	Mackenzie River
D-WS-W-MR-728	728.0	0.5	Mackenzie River
D-PL-W-739.6	739.6	7.5	Mackenzie River
D-WS-W-DCN2	750.2	0.2	DCN2
D-WS-W-165	754.6	0.2	165
D-WS-W-I-12	766.4	1.5	I-12
D-PL-W-767.4	767.4	2.7	Mackenzie River
D-WS-W-166	790.3	3.4	166
D-WS-W-DCN5	798.1	0.2	DCN5
D-WS-W-MR-798.1	798.1	1.9	Mackenzie River
D-WS-W-MR-803	803.0	0.1	Mackenzie River
D-WS-W-DCN6	804.9	0.4	DCN6
D-WS-W-DCN7	839.8	0.4	DCN7
D-WS-W-DCN7A	880.0	0.4	DCN7A
D-WS-W-167	885.9	0.9	167
D-WS-W-168	901.4	4.3	168
D-WS-W-169	943.4	4.0	169
D-WS-W-170	947.9	1.4	170
D-WS-W-MR-948	948.0	4.5	Mackenzie River
D-WS-W-MR-954.2	954.2	0.1	Mackenzie River
D-WS-W-MR-982.9	982.9	2.6	Mackenzie River
D-WS-W-171	1039.4	4.6	171
D-WS-W-171A	1056.1	4.8	171A
D-WS-W-173	1168.2	2.1	173
Total Length of Pipeline Construction Access Roads within the DCR – 53.0			

## QUANTITY OF WATER INVOLVED (PART 7)

The quantity of water required to build and maintain about 53 km of winter access roads to support pipeline construction, which includes 42.8 km of access roads to 44 water sources and 10.2 km of direct pipeline right-of-way access roads (shooflies), is estimated in [Table 4-8](#).

**Table 4-8: Pipeline Construction Winter Access Road Water Requirements**

Description	Water Requirements – Cubic Metres per Season	
	Total Annual Volume	Average Daily Volume <sup>a</sup>
Winter road construction water requirements	12,900 m <sup>3</sup> /year	215 m <sup>3</sup> /day
Total water requirements over three years	38,700 m <sup>3</sup>	
NOTE: <sup>a</sup> Average daily volume is total annual volume averaged over a 60-day winter road construction period.		

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TITLE	<b>DCR Application for a Type A Water Licence</b>
SECTION	4: Access Roads
SUBJECT	5: Facilities

### LOCATION OF UNDERTAKING (PART 3)

Water will be required to construct winter access roads to the facility sites within the DCR. These are shown in the following figures:

Figure 4-48: DCR Road Access to the Trail River Facility Site – Map 1 of 3

Figure 4-49: DCR Road Access to the Trail River Facility Site – Map 2 of 3

Figure 4-50: DCR Road Access to the Trail River Facility Site – Map 3 of 3

Table 4-9 lists the winter access roads for infrastructure sites within the DCR and the proposed water sources for those roads.

**Table 4-9: Facility Site Access Roads within the DCR**

Access Road Name	Kilometre Post (KP)	Land Use		Estimated Length (km) <sup>a,b,c</sup>	Proposed Water Source
		Private Length (km)	Crown Length (km)		
D-F-A-702.1	702.1	-	0.9	0.9	-
D-F-W-727.8	727.8	-	24.9	24.9	Mackenzie River

NOTES:  
<sup>a</sup>Total length of facility winter (W) access roads within the DCR – 24.9 km  
<sup>b</sup>Total length of facility all-weather (A) access roads within the DCR – 0.9 km  
<sup>c</sup>Total length of facility access roads within the DCR – 25.8 km

### QUANTITY OF WATER INVOLVED (PART 7)

The quantity of water required to build and maintain about 24.9 km of winter road to the facility sites is estimated in Table 4-10.

**Table 4-10: Facility Site Access Roads Water Requirements**

Infrastructure Access Road Water Requirements		
Description	Estimated Water Requirements	
	Total Annual Volume	Average Daily Volume <sup>a</sup>
Winter road construction water requirements	7,100 m <sup>3</sup> /year	118 m <sup>3</sup> /day
Total water requirements over three years	21,300 m <sup>3</sup>	

NOTE:  
<sup>a</sup>Average daily volume is total annual volume averaged over a 60-day winter road construction period.

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