
TITLE	GSA Crown Lands Application for a Type A Land Use Permit
SECTION	6: Pipeline Segments
SUBJECT	1: Summary

INTRODUCTION

This section supports an application for the land use activities and operations associated with the four pipeline segments on Crown lands in the GSA (see [Figure 6-1](#)). It includes:

- an estimate of personnel requirements
- a summary of the operations
- a description of potential environmental and resource effects
- construction equipment estimates
- information about the four pipeline segments, including:
 - pipeline rights-of-way
 - watercourse crossings
 - access roads
 - appurtenances

The pipeline segments in this section are numbered from north to south and are determined by the boundaries between the settlement regions and between private settlement land, Crown land and Commissioner's land. This results in six pipeline segments in the GSA, four on Crown land and two on Gwich'in private land. The site boundaries for the Inuvik area facility separate the pipeline through the most northerly section of Crown land into two segments (C1 and C2). There are no pipeline segments through Commissioner's land in the GSA.

Site-specific maps showing the location of individual pipeline segments are provided in the subjects included in this section.

PERSONNEL (PART 3)

Parts of two pipeline construction spreads will be built across Crown lands during the winters of 2006-2007 through 2009-2010. About 76.4 km of pipelines will be constructed on Crown lands.

Beginning at the boundary of the ISR and the GSA (KP-S051.6), there will be a single NPS 30 gas pipeline in a 40 m right-of-way, terminating at the Inuvik area facility. From the Inuvik area facility (KP-0.0), there will be two parallel pipelines sharing the same 50 m right-of-way, an NPS 10 NGL pipeline and an NPS 30 gas pipeline. The construction spread configuration for the entire pipeline is shown in the foldout maps in [Appendix C](#).

The northern crew will operate out of the Campbell Lake infrastructure site and the southern crew from the Little Chicago infrastructure site. The personnel in these spreads will consist of up to 1,350 people to manage, support and execute all elements of the construction process.

SUMMARY OF OPERATIONS (PART 5)

The land use activities and operations described in this section include:

- developing and maintaining about 0.1 km of 40 m wide pipeline right-of-way for the NPS 30 raw gas gathering pipeline
- developing and maintaining about 76.3 km of 50 m wide pipeline right-of-way that will contain:
 - 76.3 km of NPS 30 gas pipeline
 - 76.3 km of NPS 10 NGL pipeline
 - pipeline appurtenances such as valves, cathodic protection devices, signs and markers
 - watercourse crossings, where required, along the pipeline right-of-way
- developing and maintaining about 18 access roads with a total length of about 28.1 km (for cross-sections, see [Section 3](#)) connecting the pipeline right-of-way, existing transportation routes, water sources, infrastructure sites and roads near watercourse crossings
- using additional temporary workspace in support of construction activities

[Figure 6-1](#) is an overview map of the pipeline segments. The following subjects describe the proposed alignment of these pipeline segments:

- [Subject 6.2 Pipeline Segment C1](#)
- [Subject 6.3 Pipeline Segment C2](#)
- [Subject 6.4 Pipeline Segment C3](#)
- [Subject 6.5 Pipeline Segment C4](#)

Preconstruction Activities

Before construction activities begin on the right-of-way:

- a preconstruction survey will be conducted to finalize the alignment

Figure 6.1 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

- detailed planning will be conducted to locate temporary construction access from the pipeline right-of-way to existing transportation routes, water sources, borrow sites and near watercourse crossings
- geotechnical evaluations will be conducted, as required

Development Activities

Pipeline Right-of-Way

The segments of the pipelines on Crown lands in the GSA are included in [Table 6-1](#).

Table 6-1: Pipeline Segments within Gwich'in Crown Lands

Segment	Starting Kilometre Post (KP)	Ending Kilometre Post (KP)	Length (km)
C1	S51.6	S51.7	0.1
C2	0.0	11.8	11.8
C3	15.2	48.1	32.9
C4	154.7	186.3	31.6

On either side of the Crown land segments, the pipeline traverses either ISR or SSA Crown land, GSA private land or the Inuvik area facility. The right-of-way segments are the subject of the GSA private land use permit application and the ISR and Sahtu Crown land use permit applications for the project.

The right-of-way width provides for most pipeline construction activities, including storage of snow, spoil and slash, workspace for trenching, welding and stringing activities, and a travel lane for moving personnel and equipment. Section 3 contains typical schematics of the pipeline right-of-way configurations.

Additional temporary workspace will be required in certain areas such as watercourse crossings, pipeline appurtenances, cross slopes and truck turnarounds during the construction period, as shown in [Section 3](#). The temporary workspace requirement for watercourse crossings and pipeline appurtenances is listed in the pipeline subjects that follow. Temporary workspace requirements for pipeline construction activities are shown in [Table 6-2](#).

Table 6-2: Estimated Temporary Workspace Requirements

Use of Temporary Workspace	Description of Use	Approximate Site Size	Number of Locations	Total Area (ha)
Truck turnarounds	Area for trucks and buses to turn around	20 m x 50 m	5	0.5
Cross slopes	Area required for working on right-of-way where cross slopes are excessive	8 m x length of cross slope	80	8.7
Watercourse crossings	Area required for crossing activities and to lay down pipe	6,000 m ²	18	10.8
Block valves/CP sites	Extra space required for construction of a valve/CP site on the right-of-way	3,500 m ²	6	2.1
Total:				22.1

This space is necessary for construction activities and is incremental to the right-of-way itself. The need, exact location and size of any additional temporary workspaces will be determined in the field and will be based on, among other things, geographic conditions encountered during construction (see Section 3).

Access Roads

About 18 temporary access roads will be required on Crown lands in the GSA. These roads will provide access to the pipeline right-of-way, existing transportation routes, water sources, borrow sites and watercourse crossings (see [Table 6-3](#)). The alignment will be finalized as engineering design progresses.

Table 6-3: Access Roads for Water Sources and Pipeline Construction

Segment	Number of Access Roads	Land Use			Estimated Length (km)
		Municipal Length (km)	Private Length (km)	Crown Length (km)	
C1	0	-	-	0.0	0.0
C2	6	-	1.7	8.3	10.0
C3	5	-	2.6	12.8	15.4
C4	7	-	-	7.0	7.0
Totals	18	0.0	4.3	28.1	32.4

Watercourse Crossings

Access Roads and Right-of-Way Travel Lanes

Watercourses and ravines encountered during the construction of access roads and right-of-way travel lanes, both between sites and at crossing locations, will be crossed using one of six main techniques – permanent bridges, temporary bridges, culvert crossings, timber fill crossings, ice bridges and snow fill crossings. Descriptions of each crossing type are provided in [Section 3](#).

Crossing locations are listed in [Subject 6.2 \(C1\)](#), [Subject 6.3 \(C2\)](#), [Subject 6.4 \(C3\)](#) and [Subject 6.5 \(C4\)](#).

Pipelines

Watercourses encountered along the right-of-way will be crossed using one of three main techniques – trenchless horizontal directional drilling, isolated crossings or open cut crossings. Descriptions of these techniques are contained in [Section 3](#). No trenchless or aerial crossings are presently planned for watercourse crossings on Crown lands within the GSA.

A summary of the crossings for each pipeline segment is shown in [Table 6-4](#).

Table 6-4: Watercourse Crossings Along the Pipeline Right-of-Way

Segment	Horizontal Directional Drill (HDD)	Isolated	Large Open Cut	Open Cut	Number of Crossings
C1	-	-	-	-	-
C2	-	1	-	8	9
C3	-	2	6	13	21
C4	-	1	7	24	32
Totals	0	4	13	45	62

Pipeline Appurtenances

Various appurtenances will be installed on the right-of-way for pipeline operations and maintenance. These include cathodic protection devices, block valves, pigging facilities, signs and markers (see [Section 3](#)).

A summary of the pipeline appurtenances is provided in [Table 6-5](#). Most appurtenances will be located in shared sites to reduce disturbance and to facilitate operations and maintenance activities. For appurtenance locations, see [Section 3](#) and the individual pipeline segment descriptions in this section.

Table 6-5: Pipeline Appurtenances Summary

Segment	Block Valve Sites	Gas Block Valve Sites	NGL Block Valve Sites	Cathodic Protection Sites
C1	1	-	-	1
C2	-	1	1	1
C3	-	-	2	-
C4	-	1	3	1

SUMMARY OF POTENTIAL ENVIRONMENTAL AND RESOURCE EFFECTS (PART 6)

Individual pipeline segments in the GSA might cover different ecological regions with significant variations in the terrestrial environment including vegetation types, soils and landforms, and wildlife habitat. This makes the prediction of specific effects and mitigation on a segment-specific basis difficult to quantify at this stage of the project. Therefore, information addressing potential environmental and resource effects is presented for the region in [Section 8](#).

EQUIPMENT (PART 10)

[Table 6-6](#) shows an estimate of the equipment that might be required for a typical pipeline construction spread. An exact list and numbers will not be known until immediately before construction.

Table 6-6: Estimate of Typical Pipeline Construction Equipment

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
Trucks – 32	Tandem tractor	Hauling
Trucks – 7	Tandem crane	Lifting
Trucks – 164	4x4 Pick-up and crew cab	Personnel transport
Trucks – 110	Mechanic rig	Field mechanic
Ambulances – 14	4x4	First aid, med-evac
Trucks – 7	Tandem fuel	Equipment fuelling
Trucks – 7	Tandem service	Equipment servicing
Trucks – 37	1 and 3 ton flat bed	Hauling
Trucks – 2	SA picker	Loading and hauling
Trucks – 8	Tandem water	Water hauling
Trailers – 10	Low-boy	Hauling

Table 6-6: Estimate of Typical Pipeline Construction Equipment (cont'd)

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
Jeeps – 3	4x4	Personnel transport
Trailers – 19	Pole, tri-axle	Hauling
Trailers – 32	High-boy	Hauling
Trailers – 23	Warehouse van	Parts and supplies
Trailers – 11	Office skid	Administration
Buses – 55	36, 24, 12 passenger 4x2	Personnel transport
Athey tracks – 13	As required	Hauling
Sidebooms – 63	Standard medium to large sized sidebooms	Pipe work
Sidebooms – 18	Auto-weld	Carry welding shelters
Bulldozers – 64	Medium and large sized dozers (310-400 HP)	Earth moving
Tractors – 5	Medium sized tractor	Pipe crews, early work
Mechanical welding equipment – 1	As required	Weld pipe
Quad welders – 8	As required	Weld pipe
Mechanical welding shelters – 18	As required	Shelter welders
Welding sleds – 8	As required	Transport welders
Ditchers – 3	Bucket	Trenching
Ditchers – 4	Chain	Trenching
Clamshell mechanical ditchers – 4	Medium sized excavator	Excavation
Tracked mechanical ditchers – 45	Large sized excavator	Excavation
Dump trucks – 48	Articulated	Hauling earth
Snowmobiles – 13	As required	Transport
Nodwells – 4	As required	Hauling
Graders – 6	Large sized grader (4.3 m blade)	Road grading
Loaders – 8	Large sized loader (3.0 m ³ bucket loader)	Loading granular dump trucks
Cranes – 5	100 tonne tracked	Lifting and loading
Bending machines (comes with dies and mandrels) – 2	As required	Pipe bending
Internal clamps – 4	As required	Pipe work

Table 6-6: Estimate of Typical Pipeline Construction Equipment (cont'd)

Type and Approximate Number per Site	Size, Model or Equivalent	Proposed Use
Skid sleds – 64	As required	Pipe work
External clamps – 10 to 20	As required	Pipe work
Bevelling machines – 5 to 10	As required	Pipe work
Sand blasting units – 13	As required	Cleaning pipe
Lower-in belts – 10	As required	Pipe work
Pumps – 72	Assorted sizes	Ditch dewatering and testing
Testing trailers – 2	As required	Monitoring and pressure testing
Compressors – 21	150 through 1,600 cfm	Pipe work, dewatering and testing
Generators – 4	Assorted sizes	Power for hand tools and pumps
Radios – 54	Base (4) and mobile (50)	Communications
Propane tanks – 5	1,890 L	Propane storage
Holiday detectors – 15	As required	Testing pipe coating
Light towers – 92	Assorted sizes	Work area lighting
Pipe cradles – 13	Assorted sizes	Pipe work
Hydraulic rock drills – 5	Assorted sizes	Drilling rock
Trench boxes – 8	Assorted sizes	Store safety equipment
Skid stackers – 4	As required	Collecting and bundling skids
Fuel tanks – 15	Assorted sizes	Fuel storage

PERIOD OF OPERATION (PART 14)

The right-of-way and pipeline through Crown lands within the GSA are scheduled for development during the winters of 2006-2007 through 2009-2010 (see [Section 3](#)).

LOCATION OF ACTIVITIES BY MAP COORDINATES (PART 16)

Map coordinates of pipeline segments are listed in [Table 6-7](#).

Kilometre post markers are approximate and shown for relative placement purposes only. Final KP markers will depend on the final pipeline route.

Table 6-7: Map Coordinates of Pipeline Segments

Segment	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
C1 Begin	S51.6	68.4166	-133.3118	569298	7950284	8
C1 End	S51.7	68.4162	-133.3118	569300	7590212	8
C2 Begin	0.0	68.4090	-133.3144	569217	7589416	8
C2 End	11.8	68.3249	-133.1661	575579	7580219	8
C3 Begin	15.2	68.2963	-133.1441	576584	7577061	8
C3 End	48.1	68.0498	-132.7363	594413	7550151	8
C4 Begin	154.7	67.5353	-130.8565	420843	7492245	9
C4 End	186.3	67.3251	-130.4019	439687	7468305	9

FEES (PART 18)

The total land area required for activities contained in this section is 438.1 ha.

The land requirements are shown in [Appendix A](#).

DESCRIPTION

The first segment of pipeline right-of-way on Crown lands in the GSA starts at KP-S051.6, at the ISR boundary on the Storm Hills lateral. This segment is about 0.1 km long and ends at KP-S051.7 at the boundary of the Inuvik area facility (see [Figure 6-2](#) for KP-S49 to KP-7). [Table 6-8](#) lists map coordinates of this pipeline segment.

Table 6-8: Pipeline Segment C1 (Map Coordinates)

Segment	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
C1 Begin	S51.6	68.4166	-133.3118	569298	7590284	8
C1 End	S51.7	68.4162	-133.3118	569300	7590212	8

There are no watercourse crossings in this segment of the right-of-way. This segment contains valve and cathodic protection facilities within the Inuvik area facility.

PIPELINE RIGHT-OF-WAY

The pipeline route through this segment of Crown land runs in a southeast direction. The crew involved in construction of the spread (E2) in which this segment is located, will be working between the ISR boundary and Crossing Creek Lake. Construction of this segment is currently planned primarily for the winters of 2006-2007 through 2009-2010.

The right-of-way will be 40 m wide. In some areas, construction activities might require temporary workspace during the construction period (see [Summary of Operations](#) in [Subject 6.1](#) and [Section 3](#)).

ACCESS

There are no access roads required for this segment of the pipeline.

Access to this segment is through the Inuvik area facility.

Appropriate portable bridges and ice bridges will be built along the right-of-way travel lane and winter access roads to accommodate the construction traffic. [Section 3](#) contains descriptions of bridges that might be installed.

WATERCOURSE CROSSINGS

There are no watercourse crossings along the right-of-way in this segment.

OTHER CROSSINGS

There are no third-party pipeline or road crossings along the right-of-way in this segment of Crown land.

APPURTENANCES

Along the right-of-way within the GSA, there are gathering, gas and NGL valve sites and cathodic protection sites. All of these sites will be accessed through the pipeline right-of-way. Temporary workspace might be required for valve locations along the right-of-way.

Table 6-9 shows the appurtenances in this segment on Crown lands (see also Figure 6-2).

Block Valve Site

There is one block valve site within this segment of right-of-way. It is located at KP-S051.7 and is shown in Figure 6-2. This block valve site is located within the Inuvik area facility site and will not require any additional permanent lands.

Cathodic Protection Site

There is one cathodic protection site within this segment. The site is located at KP-S051.7 and is labelled CP-03. It is located within the Inuvik area facility (see Figure 6-2) and will not require any additional permanent lands.

Table 6-9: Appurtenances within Pipeline Segment C1

Appurtenance/ Facility ID	Name and Location	Kilometre Post (KP)	Temporary Workspace (ha)
BV-010	Inuvik area facility – Storm Hills Pig Receiver (Automated Block Valve No. 10)	SO51.7	-
CP-03	Cathodic Protection Site No. 3 (within facility footprint)	SO51.7	-

PUBLIC INVOLVEMENT

No concerns regarding this pipeline segment have been expressed by the local GSA communities in meetings or discussions with Imperial. The public involvement activities are documented in Section 10 of this application.

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DESCRIPTION

The second segment of pipeline right-of-way on GSA Crown lands starts at KP-0.0, at the Inuvik area facility. This segment ends at KP-11.8. It is shown in [Figure 6-3](#) for KP-S49 to KP-7 and [Figure 6-4](#) for KP-5 to KP-18. [Table 6-10](#) lists map coordinates of this pipeline segment.

Table 6-10: Pipeline Segment C2 (Map Coordinates)

Segment	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
C2 Begin	0.0	68.4090	-133.3144	569217	7589416	8
C2 End	11.8	68.3249	-133.1661	575579	7580219	8

Several watercourse crossings occur in this pipeline segment. Some watercourses will have detailed crossing plans. This segment also contains valve and cathodic protection facilities within the Inuvik area facility site.

PIPELINE RIGHT-OF-WAY

The pipeline route through this segment of Crown land runs in a southeast direction. The crew involved in construction of the spread (E2) in which this segment is located, will be working between the ISR boundary and Crossing Creek Lake. Construction of this segment is currently planned primarily for the winters of 2006-2007 through 2009-2010.

The right-of-way will be 50 m wide. In some areas, construction activities will require a temporary workspace during the construction period (see [Summary of Operations](#) in [Subject 6.1](#) and [Section 3](#)).

ACCESS

About 8.3 km of access roads will be required on this segment. [Table 6-11](#) contains access road details. [Figure 6-3](#) and [Figure 6-4](#) show the alignment of these roads.

Table 6-11: Access Roads within Pipeline Segment C2

Access Road Name	Kilometre Post (KP)	Land Use			Estimated Length (km)
		Municipal Length (km)	Private Length (km)	Crown Length (km)	
G-WS-W-48	6.3	-	-	0.4	0.4
G-PL-W-8.1	8.1	-	-	4.0	4.0
G-WS-W-50	9.5	-	-	0.2	0.2
G-WS-W-49	9.7	-	-	0.9	0.9
G-WS-W-51	10.4	-	-	0.2	0.2
G-WS-W-53	12.6	-	1.7	2.6	4.3

Currently, the defined temporary access to the right-of-way is through a winter road starting about 4.6 km north of the Dempster Highway from the all-weather access road to the Inuvik area facility (see [Section 7](#)). This access road enters the right-of-way at about KP-8.1 and is identified in [Table 6-11](#) as G-PL-W-8.1.

Appropriate portable bridges and ice bridges will be built along the right-of-way travel lane and winter access roads to accommodate the construction traffic. [Section 3](#) contains descriptions of bridges that might be installed.

WATERCOURSE CROSSINGS

There are nine watercourse crossings along the right-of-way in this segment of Crown land. These crossings will be completed by one of two different watercourse crossing methods – open cut or isolated. Designs for the crossings will be done as part of the detailed pipeline design before construction begins.

Temporary workspace for larger crossings is required for crossing activities and to lay down pipe before trenching. About 1.2 ha of temporary workspace will be required. [Table 6-12](#) identifies the watercourse crossings in this segment.

Table 6-12: Watercourse Crossings within Pipeline Segment C2

Crossing Class	Crossing ID	Crossing Name	Kilometre Post (KP)	Proposed Crossing Method	Proposed Temporary Workspace (ha)
Active II	RPR-058.6	Unnamed	1.1	Open Cut	0.6
Vegetated	RPR-058.7	Unnamed	1.6	Open Cut	-
Vegetated	RPR-058.8	Unnamed	2.5	Open Cut	-
Vegetated	RPR-058.9	Unnamed	2.7	Open Cut	-

Table 6-12: Watercourse Crossings within Pipeline Segment C2 (cont'd)

Crossing Class	Crossing ID	Crossing Name	Kilometre Post (KP)	Proposed Crossing Method	Proposed Temporary Workspace (ha)
Vegetated	RPR-058.10	Unnamed	3.1	Open Cut	-
Active I	RPR-058.12	Unnamed	4.3	Isolated	0.6
Vegetated	RPR-062-A	Unnamed	4.9	Open Cut	-
Vegetated	RPR-063	Unnamed	10.3	Open Cut	-
Vegetated	RPR-064	Unnamed	11.0	Open Cut	-

OTHER CROSSINGS

There are no third party pipeline or road crossings along the right-of-way in this segment of Crown land.

APPURTENANCES

Along the right-of-way within the GSA, there are gathering, gas and NGL valve sites and cathodic protection sites. There is one gathering pipeline valve within the Inuvik area facility. All of these sites will be accessed through the pipeline right-of-way. Temporary workspace might be required for valve locations along the right-of-way.

[Table 6-13](#) shows the appurtenances in this segment of Crown lands (see also [Figure 6-3](#)).

NGL Valve Site

One NGL valve site occurs within this segment of right-of-way. It is located at KP-0.0 and is shown in [Figure 6-3](#). This NGL valve site is located within the Inuvik area facility footprint and will not require any additional permanent lands.

Gas Valve Site

One gas valve site occurs within this segment of right-of-way. This gas block valve site is located within the Inuvik area facility site and will not require any additional permanent lands (see [Figure 6-3](#)).

Cathodic Protection Sites

There is one cathodic protection site within this segment. The site is located at KP-0.0 within the Inuvik area facility footprint (see [Figure 6-3](#)). It will not require any additional permanent lands.

Table 6-13 shows the appurtenances in this segment of Crown lands (see also Figure 6-3).

Table 6-13: Appurtenances within Pipeline Segment C2

Appurtenance/ Facility ID	Name and Location	Kilometre Post (KP)	Temporary Workspace (ha)
GAS BV-001	Inuvik area facility - C/S No. 1 (Automated Gas Block Valve No. 1)	0.0	-
NGL BV-001	Inuvik area facility - P/S No. 1 (Automated Block Valve No. 1)	0.0	-
CP-04	Cathodic Protection Site No. 4 (within facility footprint)	0.0	-

PUBLIC INVOLVEMENT

No concerns regarding this pipeline segment have been expressed by the local GSA communities in meetings or discussions with Imperial. The public involvement activities are documented in [Section 10](#) of this application.

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Figure 6.4 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

TITLE	GSA Crown Lands Application for a Type A Land Use Permit
SECTION	6: Pipeline Segments
SUBJECT	4: Pipeline Segment C3

DESCRIPTION

The third segment of pipeline right-of-way on Crown lands within the GSA starts at KP-15.2. This segment is about 32.9 km long and ends at KP-48.1. The following figures depict this segment of the right-of-way:

- [Figure 6-5: GSA Crown Lands Pipeline Segment C3 Map 1 \(KP-6 to KP-17\)](#)
- [Figure 6-6: GSA Crown Lands Pipeline Segment C3 Map 2 \(KP-16 to KP-27\)](#)
- [Figure 6-7: GSA Crown Lands Pipeline Segment C3 Map 3 \(KP-27 to KP-37\)](#)
- [Figure 6-8: GSA Crown Lands Pipeline Segment C3 Map 4 \(KP-37 to KP-48\)](#)

[Table 6-14](#) lists map coordinates of this pipeline segment.

Table 6-14: Pipeline Segment C3 (Map Coordinates)

Segment	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
C3 Begin	15.2	68.2963	-133.1441	576584	7577061	8
C3 End	48.1	68.0498	-132.7363	594413	7550151	8

Several watercourse crossings occur in this pipeline segment. Some watercourses will have detailed crossing plans. This segment also contains block valve sites.

PIPELINE RIGHT-OF-WAY

The pipeline route through this segment of Crown land runs in a southeast direction. The crew involved in construction of the spread (E2) in which this segment is located, will be working between the ISR boundary and Crossing Creek Lake. Construction of this segment is currently planned for the winters of 2006-2007 through 2009-2010.

The right-of-way will be 50 m wide. In some areas, construction activities will require a temporary workspace during the construction period (see [Summary of Operations](#) in [Subject 6.1](#) and [Section 3](#)).

ACCESS

About 12.8 km of access roads will be required on this segment. [Table 6-15](#) contains access road details. [Figure 6-5](#), [Figure 6-6](#), [Figure 6-7](#) and [Figure 6-8](#) show the alignment of these roads.

Table 6-15: Access Roads within Pipeline Segment C3

Access Road Name	Kilometre Post (KP)	Land Use			Estimated Length (km)
		Municipal Length (km)	Private Length (km)	Crown Length (km)	
G-PL-W-18.0	18.0	-	2.6	4.4	7.0
G-WS-W-54	18.0	-	-	0.7	0.7
G-WS-W-58	35.5	-	-	3.8	3.8
G-WS-W-GSA4	42.7	-	-	3.2	3.2
G-WS-W-59	45.9	-	-	0.7	0.7

Currently, the defined direct winter access road to the right-of-way in this segment of Crown land will start at the Dempster Highway about 22 km east southeast of Inuvik. This access road connects to the right-of-way at about KP-18.0 and traverses about 2.6 km of private lands.

Appropriate portable bridges and ice bridges will be built along the right-of-way travel lane and winter access roads to accommodate the construction traffic. [Section 3](#) contains descriptions of bridges that might be installed.

WATERCOURSE CROSSINGS

There are 21 watercourse crossings along the right-of-way in this segment of Crown land. These crossings will be completed by one of two different watercourse crossing methods – open cut or isolated. Designs for these crossings will be part of the detailed pipeline design.

Temporary workspace for larger crossings is required for crossing activities and to lay down pipe before trenching. About 4.8 ha of temporary workspace is required. [Table 6-16](#) identifies watercourse crossings in this segment.

OTHER CROSSINGS

There are no third party pipeline or road crossings along the right-of-way in this segment of Crown land.

Table 6-16: Watercourse Crossings within Pipeline Segment C3

Crossing Class	Crossing ID	Crossing Name	Kilometre Post (KP)	Proposed Crossing Method	Proposed Temporary Workspace (ha)
Vegetated	RPR-066	Unnamed	17.9	Open Cut	-
Vegetated	RPR-067	Unnamed	21.8	Open Cut	-
Vegetated	RPR-068	Unnamed	23.3	Open Cut	-
Active I	RPR-069	Unnamed	27.1	Isolated	0.6
Active I	RPR-070	North Caribou Lake Drainage	31.6	Isolated	0.6
Vegetated	RPR-071	Unnamed	33.2	Open Cut	0.6
Vegetated	RPR-071.2	Unnamed	36.7	Open Cut	-
Vegetated	RPR-072	Unnamed	37.6	Open Cut	0.6
Vegetated	RPR-072.1	Unnamed	38.7	Open Cut	-
Vegetated	RPR-073	Unnamed	39.7	Open Cut	-
Vegetated	RPR-074	Unnamed	39.9	Open Cut	0.6
Active II	RPR-075	North Caribou Lake Drainage	41.6	Open Cut	0.6
Vegetated	RPR-076	Unnamed	42.0	Open Cut	-
Vegetated	RPR-077	Unnamed	43.8	Open Cut	-
Vegetated	RPR-078	Unnamed	44.8	Open Cut	0.6
Vegetated	RPR-079	Unnamed	45.5	Open Cut	0.6
Vegetated	RPR-080	Unnamed	45.9	Open Cut	-
Vegetated	RPR-081	Unnamed	46.7	Open Cut	-
Vegetated	RPR-082	Unnamed	47.6	Open Cut	-
Vegetated	RPR-083	Unnamed	48.0	Open Cut	-
Vegetated	RPR-083.1	Unnamed	48.1	Open Cut	-

APPURTENANCES

Along the right-of-way within the GSA, there are gathering, gas and NGL valve sites and cathodic protection sites. All of these sites will be accessed through the pipeline right-of-way. Temporary workspace is required for valve locations along the right-of-way.

[Table 6-17](#) shows the appurtenances and temporary workspace in this segment of Crown lands (see also [Figure 6-5](#) and [Figure 6-7](#)).

NGL Valve Sites

Two NGL valve sites occur in this segment of right-of-way. (see [Table 6-17](#), [Figure 6-5](#) and [Figure 6-7](#)). These NGL valve sites are located within the pipeline right-of-way and will not require any additional permanent lands.

Table 6-17: Appurtenances within Pipeline Segment C3

Appurtenance/ Facility ID	Name and Location	Kilometre Post (KP)	Temporary Workspace (ha)
NGL BV-002 / NGL CV-001	Block Valve No. 2 and Check Valve No. 1 (Manual)	16.0	0.35
NGL BV-003 / NGL CV-002	Block Valve No. 3 and Check Valve No. 2 (Manual)	32.0	0.35

PUBLIC INVOLVEMENT

No concerns regarding this pipeline segment have been expressed by the local GSA communities in meetings or discussions with Imperial. The public involvement activities are documented in [Section 10](#) of this application.

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Figure 6.8 has been moved to reduce file size. To view it, click on the link to the figure in the web page List of Figures for this document.

DESCRIPTION

The fourth segment of pipeline right-of-way on GSA Crown lands starts at KP-154.7, near Thunder River. This segment is about 31.6 km long and ends at KP-186.3, at the GSA-SSA boundary. The following figures depict this segment of the right-of-way:

- [Figure 6-9: GSA Crown Lands Pipeline Segment C4 Map 1 \(KP-148 to KP-158\)](#)
- [Figure 6-10: GSA Crown Lands Pipeline Segment C4 Map 2 \(KP-159 to KP-170\)](#)
- [Figure 6-11: GSA Crown Lands Pipeline Segment C4 Map 3 \(KP-168 to KP-178\)](#)
- [Figure 6-12: GSA Crown Lands Pipeline Segment C4 Map 4 \(KP-177 to KP-189\)](#)

Table 6-18 lists map coordinates of this pipeline segment.

Table 6-18: Pipeline Segment C4 (Map Coordinates)

Segment	Kilometre Post (KP)	Latitude (DD)	Longitude (DD)	UTM Easting (m)	UTM Northing (m)	UTM Zone
C4 Begin	154.7	67.5353	-130.8565	420843	7492245	9
C4 End	186.3	67.3251	-130.4019	439687	7468305	9

Several watercourse crossings occur in this pipeline segment. Some watercourses will have detailed crossing plans. This segment also contains block valve and cathodic protection sites.

PIPELINE RIGHT-OF-WAY

The pipeline route through this segment of Crown land runs in a southeast direction. The crew involved in construction of the spread (D1) in which this segment is located, will be working between the SSA boundary and Crossing Creek Lake. Construction of this segment is currently planned for the winters of 2006-2007 through 2009-2010.

The right-of-way will be 50 m wide. In some areas, construction activities will require a temporary workspace during the construction period (see the [Summary of Operations](#) in [Subject 6.1](#) and [Section 3](#)).

ACCESS

About 7.0 km of access roads will be required for this segment. [Table 6-19](#) contains access road details. [Figure 6-9](#), [Figure 6-10](#), [Figure 6-11](#) and [Figure 6-12](#) show the alignment of these roads.

Table 6-19: Access Roads within Pipeline Segment C4

Access Road Name	Kilometre Post (KP)	Land Use			Estimated Length (km)
		Municipal Length (km)	Private Length (km)	Crown Length (km)	
G-WS-W-96	161.7	-	-	0.6	0.6
G-WS-W-98	166.2	-	-	0.3	0.3
G-WS-W-GSA16	166.2	-	-	1.1	1.1
G-WS-W-100	169.8	-	-	2.3	2.3
G-WS-W-101	175.7	-	-	1.4	1.4
G-WS-W-102	180.4	-	-	0.4	0.4
G-WS-W-103	186.2	-	-	0.9	0.9

Appropriate portable bridges and ice bridges will be built along the right-of-way and winter access roads to accommodate the construction traffic. [Section 3](#) contains descriptions of typical bridges that might be installed.

WATERCOURSE CROSSINGS

There are 32 watercourse crossings along the right-of-way in this segment of Crown land. These crossings will be completed by one of two different watercourse crossing methods – open cut or isolated. Designs for the crossings will be done as part of the detailed pipeline design before construction begins.

Temporary workspace for larger crossings is required for crossing activities and to lay down pipe before trenching. About 4.8 ha of temporary workspace will be required. [Table 6-20](#) identifies watercourse crossings in this segment.

OTHER CROSSINGS

There are no third party pipeline or road crossings along the right-of-way in this segment of Crown land.

Table 6-20: Watercourse Crossings within Pipeline Segment C4

Crossing Class	Crossing ID	Crossing Name	Kilometre Post (KP)	Proposed Crossing Method	Proposed Temporary Workspace (ha)
Active I	RPR-141	Thunder River	155.1	Isolated	0.6
Vegetated	RPR-142	Unnamed	156.8	Open Cut	-
Vegetated	RPR-143	Unnamed	157.4	Open Cut	-
Vegetated	RPR-144	Unnamed	158.7	Open Cut	-
Vegetated	RPR-145	Unnamed	159.4	Open Cut	-
Active II	RPR-146	Unnamed	159.8	Open Cut	0.6
Vegetated	RPR-147	Unnamed	162.3	Open Cut	-
Vegetated	RPR-148	Unnamed	163.3	Open Cut	-
Active II	RPR-149	Unnamed	164.7	Open Cut	0.6
Vegetated	RPR-150	Unnamed	165.7	Open Cut	-
Vegetated	RPR-151	Unnamed	166.5	Open Cut	-
Vegetated	RPR-152	Unnamed	167.5	Open Cut	0.6
Vegetated	RPR-153	Unnamed	168.3	Open Cut	-
Vegetated	RPR-154	Unnamed	169.3	Open Cut	-
Vegetated	RPR-155	Unnamed	171.2	Open Cut	0.6
Vegetated	RPR-156	Unnamed	171.3	Open Cut	-
Vegetated	RPR-157	Unnamed	172.6	Open Cut	-
Vegetated	RPR-158	Unnamed	173.7	Open Cut	-
Vegetated	RPR-159	Unnamed	174.2	Open Cut	-
Vegetated	RPR-160	Unnamed	174.3	Open Cut	-
Vegetated	RPR-161	Unnamed	174.9	Open Cut	-
Vegetated	RPR-162	Unnamed	176.1	Open Cut	-
Vegetated	RPR-163	Unnamed	177.7	Open Cut	-
Vegetated	RPR-164	Unnamed	178.4	Open Cut	0.6
Vegetated	RPR-165	Unnamed	178.7	Open Cut	-
Vegetated	RPR-166	Unnamed	179.5	Open Cut	-
Vegetated	RPR-167	Unnamed	180.8	Open Cut	-
Vegetated	RPR-168	Unnamed	182.1	Open Cut	-
Vegetated	RPR-169	Unnamed	183.7	Open Cut	-
Vegetated	RPR-170	Unnamed	184.7	Open Cut	0.6

Table 6-20: Watercourse Crossings within Pipeline Segment C4 (cont'd)

Crossing Class	Crossing ID	Crossing Name	Kilometre Post (KP)	Proposed Crossing Method	Proposed Temporary Workspace (ha)
Vegetated	RPR-171	Unnamed	185.2	Open Cut	-
Vegetated	RPR-172	Unnamed	186.1	Open Cut	0.6

APPURTENANCES

Along the right-of-way within the GSA, there are gathering, gas and NGL valve sites and cathodic protection sites. All of these sites will be accessed by the pipeline right-of-way. Temporary workspace is required for valve locations along the right-of-way.

[Table 6-21](#) shows the appurtenances and temporary workspace in this segment of Crown land (see also [Figure 6-9](#) and [Figure 6-11](#)).

NGL Valve Sites

Three NGL valve sites occur in this segment of right-of-way (see [Table 6-21](#), [Figure 6-9](#) and [Figure 6-11](#)). These valve sites are located within the pipeline right-of-way and will not require any additional permanent lands.

Gas Valve Site

One gas valve site occurs within this segment of right-of-way. The gas valve site is located within the pipeline right-of-way at KP-156.5. It will not require any additional permanent lands (see [Figure 6-9](#)).

Cathodic Protection Sites

There is one cathodic protection site within this segment. The site is located at KP-156.5 and is labelled CP-6. It is located at a valve site within the pipeline right-of-way and will not require any additional permanent lands (see [Figure 6-9](#)).

Table 6-21: Appurtenances within Pipeline Segment C4

Appurtenance/ Facility ID	Name and Location	Kilometre Post (KP)	Temporary Workspace (ha)
NGL BV-008A	Thunder River future pump station (Automated Liquid Block Valve No. 8A)	156.4	0.35
NGL BV-008B	Thunder River future pump station (Automated Liquid Block Valve No. 8B)	156.5	0.35
GAS BV-003	Thunder River future compressor station (Automated Gas Block Valve No. 3)	156.5	0.35
CP-6	Cathodic Protection site No. 6 (within block valve footprint)	156.5	-
NGL BV-009	Liquid Block Valve No. 9 (Automated Liquid Block Valve No. 9)	176.7	0.35

PUBLIC INVOLVEMENT

No concerns regarding this pipeline segment have been expressed by the local GSA communities in meetings or discussions with Imperial. The public involvement activities are documented in [Section 10](#) of this application.

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