

NWT Business Opportunities Forecast 2012 - 2021

March 2012

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Industry Tourism & Investment**

Submitted by:



Integrated Environments
Planning • Integration • Management

Integrated Environments (2006) Ltd.
www.integrated-environments.com



**Northwest
Territories** Industry, Tourism and Investment

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1. Summary and Approach

This business opportunity report assesses the magnitude and scope of business opportunities created by forecast levels of oil and gas industry in the Northwest Territories during the period from 2012 – 2021 (see Section 3). It is a companion document to the NWT Oil and Gas Activity Forecast 2012 – 2021 (Activity Forecast).

Business opportunities are assessed for the magnitude of estimated expenditure for each activity identified in the Activity Forecast. Opportunities for nine different types of ‘activity’ are forecast:

- 2D seismic
- 3D seismic
- exploration wells
- delineation wells
- production (including injection) wells
- pipeline (kilometres)
- gas conditioning facilities
- gas processing facilities
- site closure activity.

The assessment also reviews the types of business opportunities available, their commercial characteristics (Section 4.0) and, the characteristics of the competitive business environment in the Northwest Territories (Section 5.0).

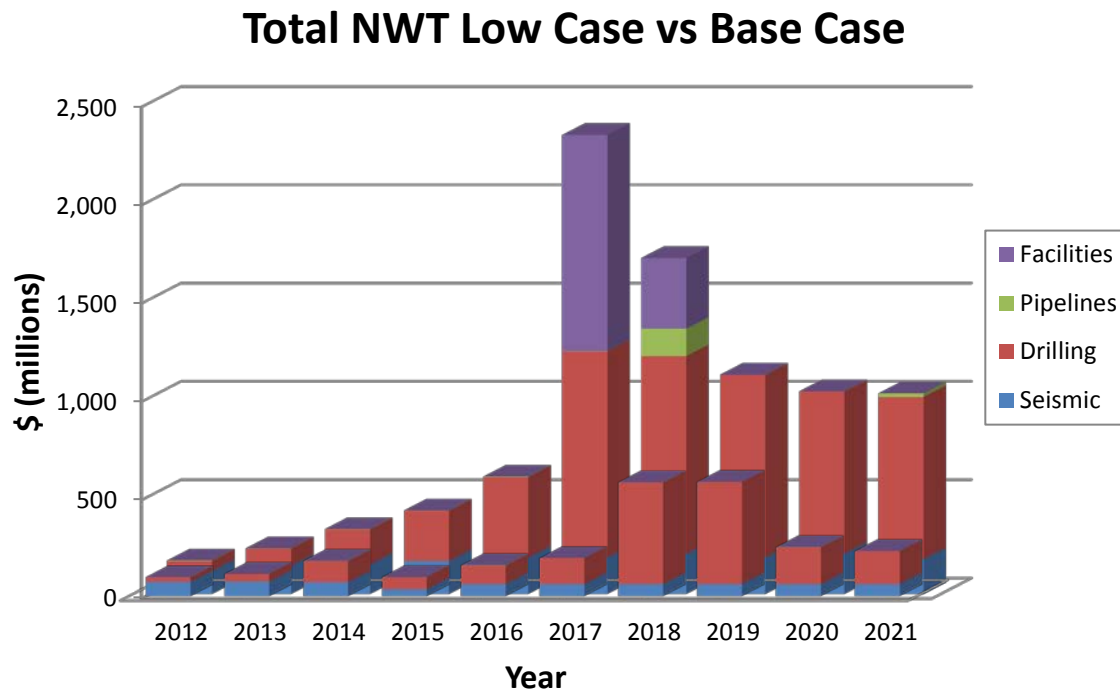
Business opportunities are based on two scenarios – a Low Case where Mackenzie Gas Project (MGP) activity is not forecast to proceed during the forecasted period and a Base Case where Mackenzie Gas Project activity is anticipated to begin in 2015. Actual opportunity is influenced by many factors and assumptions discussed in the 2012 - 2021 Forecast including energy prices, permitting processes, corporate budgets and availability of corporate resources to name a few.

Low Case Forecast

The Low Case is driven by the following key assumptions:

- No MGP Decision to Construct during the forecast period
- No substantive policy, regulatory or land jurisdictional changes that affect industry activity; and,
- No substantive movement on Land Claims in the Dehcho region
- Shut down of current operations at the Norman Wells Proven Area in 2018

On an NWT-wide basis Low Case activity is driven in three main areas. Beaufort Sea activity will pick up in 2017; exploration activity will be focused on potential oil resources in the Central Mackenzie Valley; and ongoing activity is anticipated at the Cameron Hills field. The Northwest Territories Low Case scenario assumes construction of the Mackenzie Gas Pipeline does not occur between 2012 and 2021. In the Low Case, ongoing onshore seismic and drilling activity will range between \$100-150 million in most years, increasing slightly (to approximately \$225 million per year) by 2020 due to a small increase in the number of exploration wells drilled as a result of seismic programs completed in the Central Mackenzie region. Significant business opportunities related to offshore oil and gas activity and the Central Mackenzie are expected in the Low Case forecast. Offshore activities are expected to initiate between 2018 and 2019 be approximately \$400 million per year.



Base Case Forecast

The Base Case forecast is driven by several key assumptions:

- MGP Decision to Construct in 2014 and in-service date of December 2019
- The NEB Arctic Review Report filed December 2011 does not significantly alter costs and timelines for Beaufort Sea development
- No substantive policy, regulatory or land jurisdictional changes that affect industry activity
- Natural gas distribution to the community ceases at the Norman Wells Proven Area in 2014 and oil production ceases in 2020

On an NWT-wide basis Base Case activity is driven by four main areas; Beaufort Sea activity is expected to pick up in 2016 after regulatory filings and drill rig preparation; Mackenzie Delta activity will begin in 2015 following the MGP Decision to Construct; development activity will occur in the Central Mackenzie Valley to feed the MGP and to look for oil to meet the distribution opportunity in the Norman Wells pipeline; and steady drilling and development is expected at the Cameron Hills area of the Southern Mackenzie region.

In the Base Case scenario, ongoing business opportunities related to onshore oil and gas activity are expected to exceed \$200 million per year. Ongoing onshore oil and gas business opportunities will be driven primarily by the exploration and development activities (mainly seismic and drilling programs) that are expected to take place each year. These opportunities are expected to be augmented by significant offshore activity between 2017 and 2021. Offshore activity will be driven by large scale exploration licenses in the Beaufort Sea awarded to major oil and gas companies.

In addition, a one-time business opportunity of approximately \$4 billion is expected between 2014 and 2019 in respect of the exploration for and drilling of production wells, the installation of gathering pipelines, and the installation of additional gas conditioning facilities and gas processing facilities, built to supplement the production of the Mackenzie Gas Project Anchor fields. These wells, pipelines and facilities are required to bring the Mackenzie Gas Pipeline to its forecast initial operating capacity of 1.2 Bcfd. The facilities involved are illustrated in the Appendix.

The assessment does not include direct MGP activity: it focuses on industry activity incremental to the Mackenzie Gas Project and is intended to provide an indication of oil and gas industry business opportunities induced by and incremental to the activity proposed in the regulatory filings for the Mackenzie Gas Project. Activity estimates are based on the initial MGP design capacity of 1.2 Bcfd, with no expansion anticipated during the forecast period.

The assessment also reviews the types of business opportunities available, their commercial characteristics (Section 4.0) and, the characteristics of the competitive business environment in the Northwest Territories (Section 5.0).

Approach

The GNWT engaged Integrated Environments to help review long-term business opportunities, stemming from its NWT Oil and Gas Activity Forecast 2012 – 2021. These reviews are aimed to provide background information to assist business and organizations undertaking plans. The industry activity forecast and the business opportunities assessment can also be used to inform strategic investment planning activities to assist local and Aboriginal business groups.

To assess oil and gas business opportunities, the Integrated Environments' team estimated the value of different types of oil and gas activity on a regional basis, for the Mackenzie Delta/Beaufort Sea (Inuvialuit) , Southern Mackenzie Delta (Gwich'in), Central Mackenzie Valley (Sahtu) and the Southern Mackenzie (Dehcho) regions of the Northwest Territories. The results of the estimate are presented on a regional basis in Section 3.0. The basis for these estimates is detailed in the Appendix.

The magnitude (cost estimates) of each activity was determined using regulatory application filing documents, interviews with industry experts and proponents and, secondary sources (see References in the Appendix).

The information and forecasts presented in this report are estimates, accuracy of which is a function of the quality of the available data, and the circumstances at the time of its production. It is presented with the understanding that subsequent developments and new data may necessitate revision of the forecasts and any other data presented herein. A variety of sources provide general information on establishing new businesses. This report is not intended to provide any such guidance and readers that need this assistance should refer to the other sources that are available.

All magnitude estimates are drafted in 2012 (real) values and there has been no cost adjustment for inflation.

The characteristics, NWT context, lessons learned and strategies for undertaking business were informed by 10 anonymous industry experts who provided insight and feedback for this report.

Content and opinions expressed in this report are the responsibility of Integrated Environments and do not represent an official position or view of the Government of the Northwest Territories. Use of the information contained herein is understood to be at the risk of the user.

2. Magnitude of Oil and Gas Business Opportunities 2012 - 2021

Estimates of the magnitude of the oil and business opportunities in the Northwest Territories during the period 2012 through 2021 are presented below, followed by estimates of the magnitude of oil and gas activity expected in the Mackenzie Delta/Beaufort Sea (Inuvialuit), Southern Mackenzie Delta (Gwich'in), Central Mackenzie Valley (Sahtu) and the Southern Mackenzie (Dehcho) regions of the Northwest Territories.

2.1. Northwest Territories

This section outlines the overall magnitude of the oil and gas business opportunity in the Northwest Territories during the period from 2012 – 2021, as shown in graphical form in Figures 1 and 2 and in tabular form in Tables 1 and 2, for the Base and Low cases respectively.

Low Case

The Northwest Territories Low Case scenario assumes construction of the Mackenzie Gas Pipeline does not occur between 2012 and 2021. In the Low Case, ongoing onshore seismic and drilling activity will range between \$100-150 million in most years, increasing slightly (to approximately \$225 million per year) by 2020 due to a small increase in the number of exploration wells drilled as a result of seismic programs completed in the Sahtu region. Significant business opportunities related to offshore oil and gas activity and the Sahtu are expected in the Low Case forecast. Offshore activities are expected to initiate between 2018 and 2019 be approximately \$400 million per year.

Base Case

In the Northwest Territories Base Case scenario, ongoing business opportunities related to onshore oil and gas activity are expected to exceed \$200 million per year (see Figure 1 and Table 1). Ongoing onshore oil and gas business opportunities will be driven primarily by the exploration and development activities (mainly seismic and drilling programs) that are expected to take place each year. These opportunities are expected to be augmented by significant offshore activity between 2017 and 2021. Offshore activity will be driven by large scale exploration licenses in the Beaufort Sea awarded to major oil and gas companies.

In addition, a one-time business opportunity of approximately \$4 billion is expected between 2014 and 2019 in respect of the exploration for and drilling of production wells, the installation of gathering pipelines, and the installation of additional gas conditioning facilities and gas processing facilities, built to supplement the production of the Mackenzie Gas Project Anchor fields. These wells, pipelines and facilities are required to bring the Mackenzie Gas Pipeline to its forecast initial operating capacity of 1.2 Bcfd. The facilities involved are illustrated in the Appendix.

The magnitude of the annual and one-time business opportunities for the Northwest Territories Base Case is presented in Figure 2 and Table 2 below. Note that the Base case does not include spending related to the cost of the MGP or its expansion (to 1.8 bcfd) which would involve the installation of 10 additional compressor stations.

Figure 1

Northwest Territories Low Case

Magnitude of Oil and Gas Business Opportunity (\$ Million)

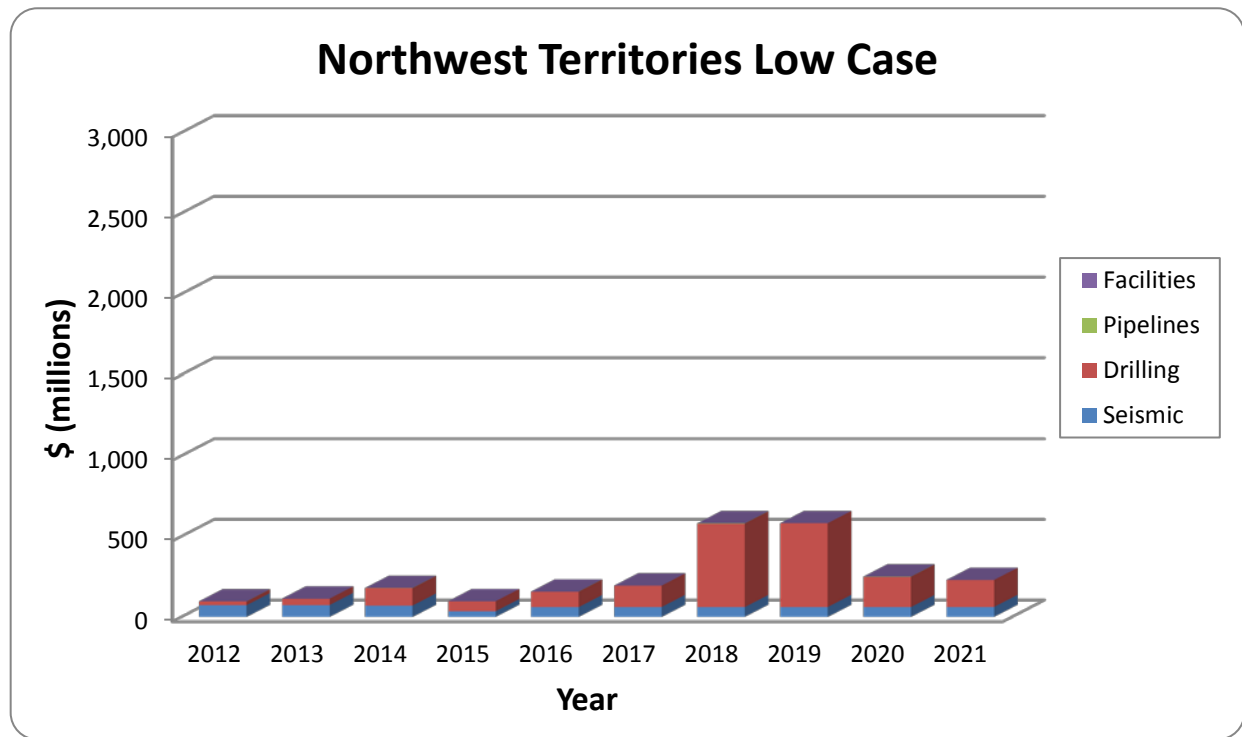


Table 1

Northwest Territories Low Case

Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	73	23	1	0	97
2013	74	40	0	0	114
2014	71	108	1	0	180
2015	35	63	0	0	98
2016	61	96	1	0	157
2017	62	133	0	0	194
2018	61	519	1	0	580
2019	62	520	0	0	582
2020	61	188	1	0	250
2021	62	168	0	0	229

Figure 2

Northwest Territories Base Case

Magnitude of Oil and Gas Business Opportunity (\$ Million)

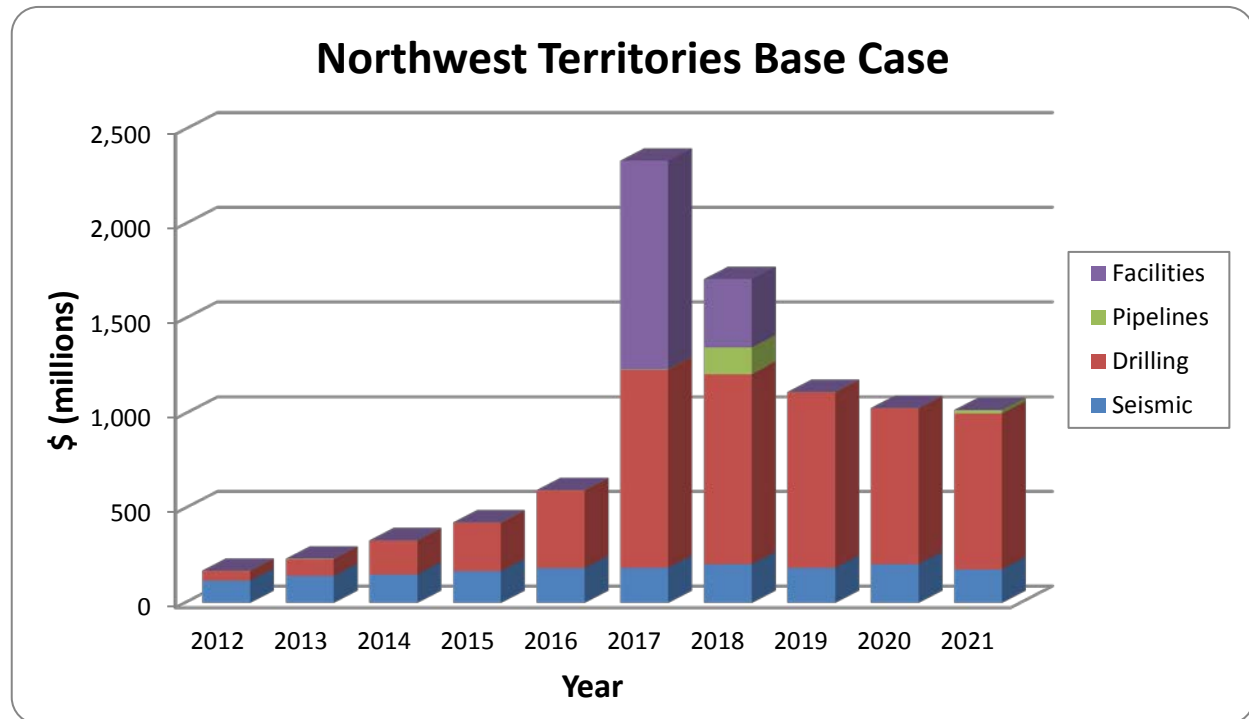


Table 2

Northwest Territories Base Case

Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	118	51	2	0	171
2013	144	89	2	0	234
2014	151	178	2	0	331
2015	168	256	2	0	426
2016	185	411	2	0	597
2017	186	1049	2	1100	2336
2018	206	1004	140	360	1710
2019	186	929	2	0	1116
2020	206	824	2	0	1031
2021	178	824	19	0	1021

2.2. Beaufort / Mackenzie (Inuvialuit) Region

Based on the Oil and Gas Exploration and Development Activity Forecast for the Northwest Territories, the magnitude of the business opportunities for the Beaufort / Mackenzie Base Case Scenario, where the Mackenzie Valley Pipeline is constructed, and for the Low Case Scenario where the Mackenzie Valley Pipeline is not constructed prior to 2021, were evaluated.

The results of this evaluation are presented in graphical form in Figures 3 and 4 below and in tabular form in Tables 3 and 4 in Appendix 1

Low Case

In the Beaufort / Mackenzie Low Case scenario, a lower onshore ongoing oil and gas exploration business opportunity of \$35 million per year is expected on the assumption that exploration interest will fall in the absence of construction the Mackenzie Gas Pipeline. The ongoing onshore opportunity in the Low Case is split in a ratio of approximately 30% seismic to 70% drilling.

In addition, a one-time business opportunity of approximately \$820 million is expected between 2014 and 2019 in respect of offshore exploration and drilling in the Beaufort Sea. Due to the base costs associated with deepwater drilling these opportunities are split in a weighted ratio of 3% seismic to 97% drilling.

The magnitude of the annual and one time business opportunities for the Beaufort / Mackenzie Region Low Case are presented in Figure 3 below and Table 3 in Appendix 1.

Base Case

In the Beaufort / Mackenzie Base Case scenario an ongoing onshore oil and gas exploration business opportunity of approximately \$250 million per year is expected, split between seismic and drilling activities in a ratio of approximately 25% seismic and 75% drilling. Additionally, an ongoing offshore oil and gas exploration opportunity of approximately \$420 million per year is expected in the Beaufort Sea between 2017 and 2021. The offshore costs are split in a ratio of approximately 5% seismic and 95% drilling. The reason for this skewed ratio is the anticipated base costs of deepwater drilling equipment in the Beaufort.

The magnitude of the annual and one time business opportunity for the Beaufort /Mackenzie Base Case are presented in Figure 4 below and Table 4 in Appendix 1. The facilities involved are illustrated in Figure A in Appendix 1.

Note that the Beaufort / Mackenzie Base Case scenario does not include expansion of the MGP's Inuvik gas processing plant which is located in the Southern Mackenzie Delta (Gwich'in) region.

2.2.1. Offshore - Beaufort Sea

Low Case

In the Offshore – Beaufort Sea Low Case scenario, it is anticipated that fewer seismic and drilling programs are completed in the Beaufort Sea as oil and gas companies dedicate capital to activities in other regions. In the Low Case scenario, it is anticipated that approximately \$820 million of offshore business opportunities occurs during the forecast period. The bulk of these opportunities are expected to arise from two exploration wells drilled at a cost of \$400 million each. The first of these wells is forecasted to be drilled in 2018 with the second following in 2019.

The magnitude of the annual and one time business opportunities for the Offshore – Beaufort Sea Low Case are presented in Figure 3a below and Table 3a in Appendix 1.

Base Case

Due to the high levels of capital expenditure required for offshore exploration and development in the Beaufort Sea, oil and gas activity in the region is difficult to predict. In the Offshore – Beaufort Sea Base Case scenario approximately \$2.1 billion in related business opportunities are forecast between 2012 and 2021. Ninety-three percent of these opportunities are expected to occur from 2017-2021 when one exploration well at an average cost of \$400 million is expected to be drilled in each year. The estimated Base Case offshore activity is based on industry sources and the large exploration licenses awarded to two major oil and gas companies which will require activity during the forecast period.

The magnitude of the annual and one-time business opportunities for the Offshore – Beaufort Sea Base Case are presented in Figure 4a below and Table 4a in Appendix 1.

2.2.2. Onshore - Mackenzie Delta

Low Case

In the Onshore – Mackenzie Delta Low Case scenario, a lower onshore oil and gas exploration business opportunity of about \$35 million per year is expected on the assumption that exploration interest and development would decline in the absence of the transportation efficiencies associated with the construction of the Mackenzie Gas Pipeline. Additionally, planned anchor fields for the pipeline would no longer be required.

The magnitude of the annual and one time business opportunities for the Onshore – Mackenzie Delta Low Case are presented in Figure 3b below and Table 3b in Appendix 1.

Base Case

In the Onshore – Mackenzie Delta Base Case scenario an ongoing oil and gas exploration business opportunity of approximately \$250 million per year is expected as the anchor field for the Mackenzie Gas Pipeline is developed. The level of activity is minimal through 2015 but expected to steadily increase as the period progresses, growing to an average of \$400 million per year for 2017-2021.

The magnitude of the annual and one time business opportunities for the Onshore – Mackenzie Delta Base Case are presented in Figure 4b below and Table 4b in Appendix 1.

Figure 3
Beaufort / Mackenzie Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

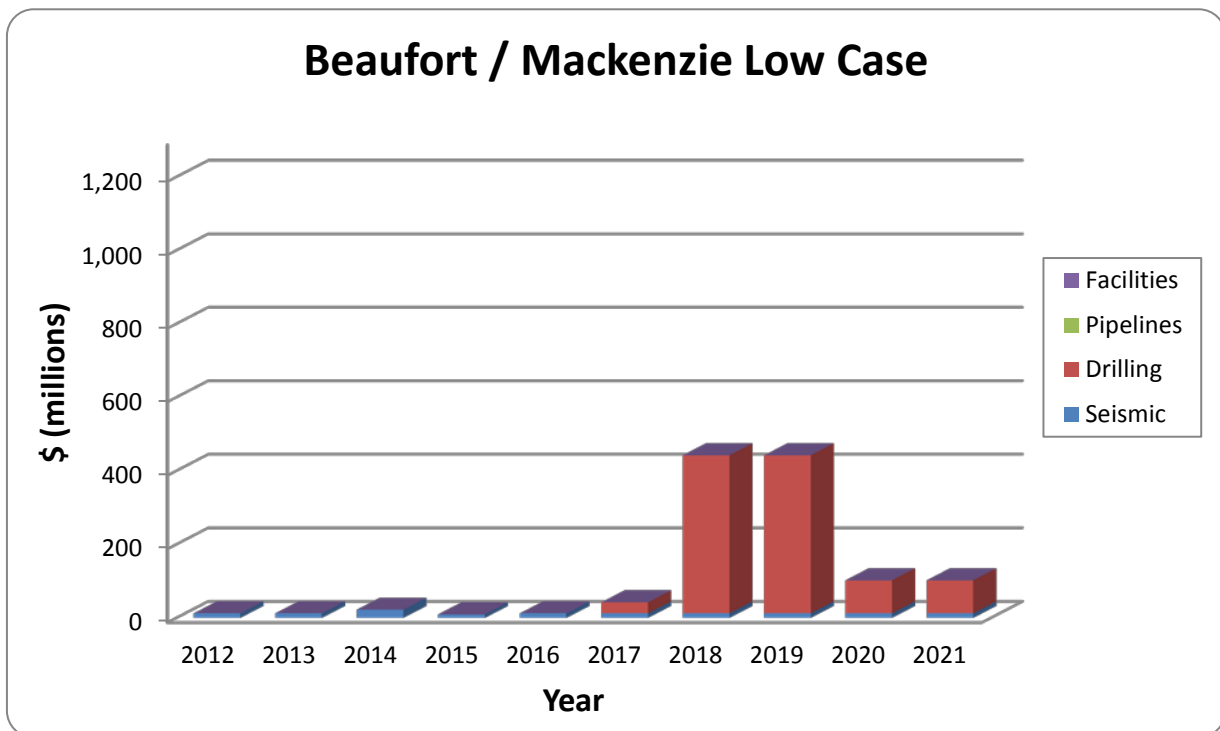


Figure 3a
Offshore – Beaufort Sea Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

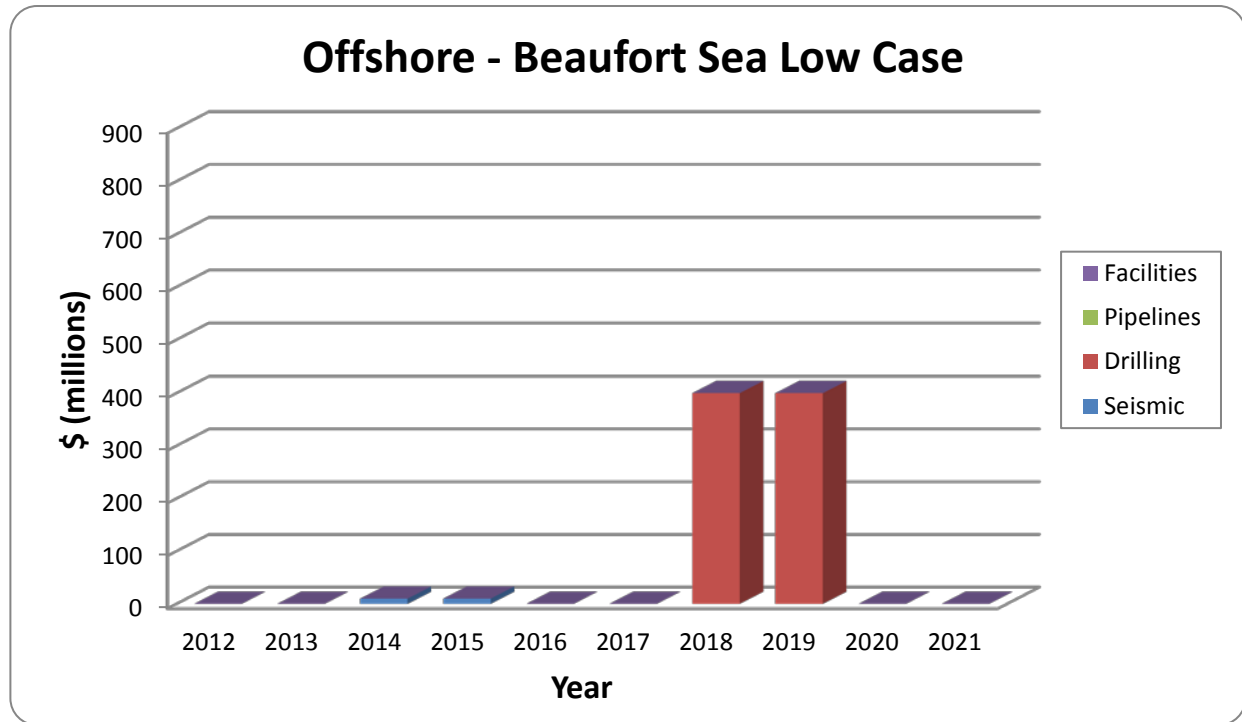


Figure 3b
Onshore – Mackenzie Delta Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

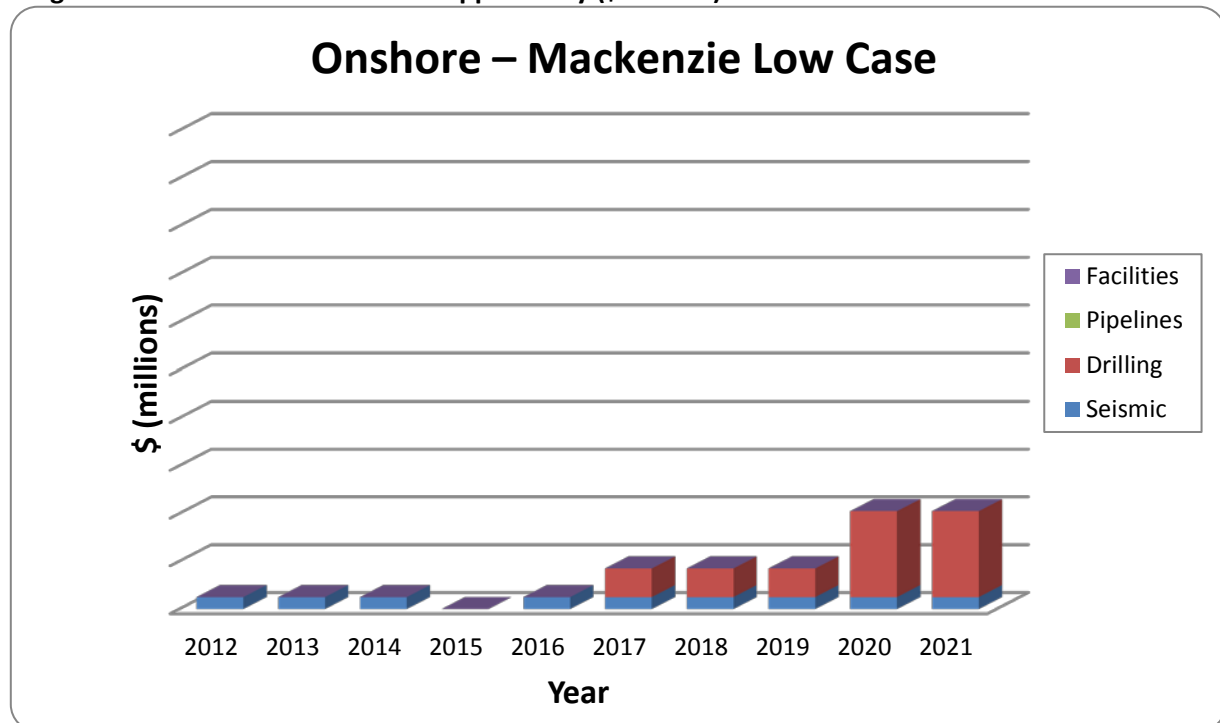


Figure 4

Beaufort/Mackenzie Base Case

Magnitude of Oil and Gas Business Opportunity (\$ Million)

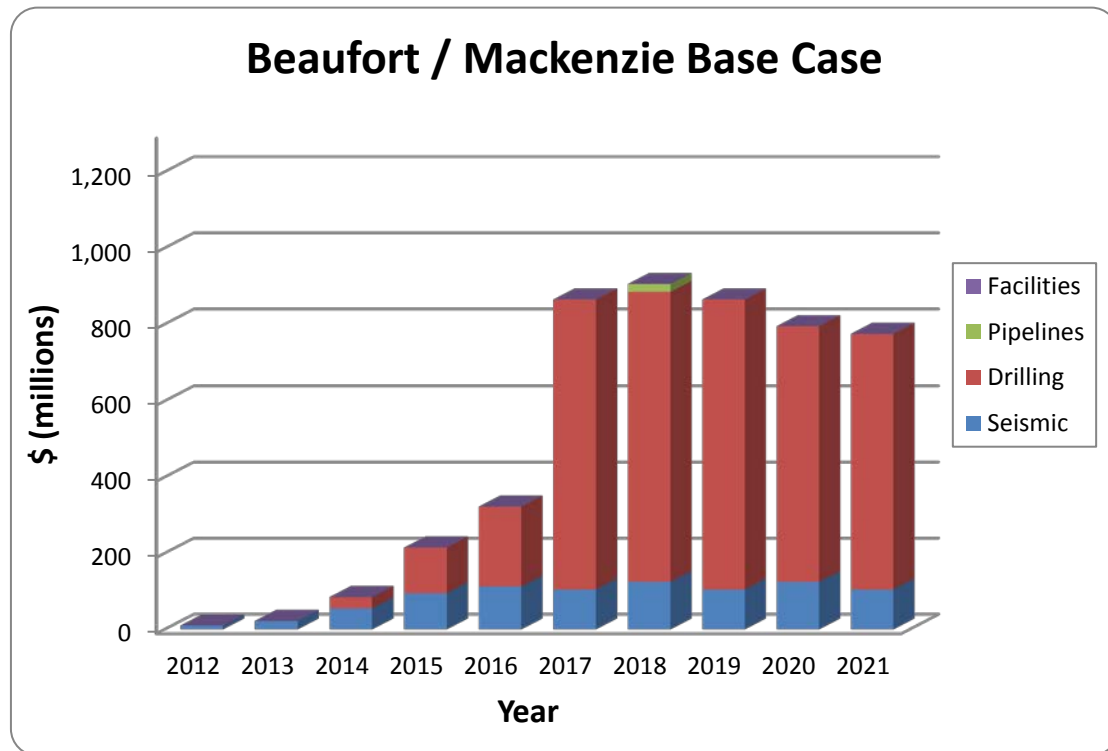


Figure 4a

Offshore – Beaufort Sea Base Case

Magnitude of Oil and Gas Business Opportunity (\$ Million)

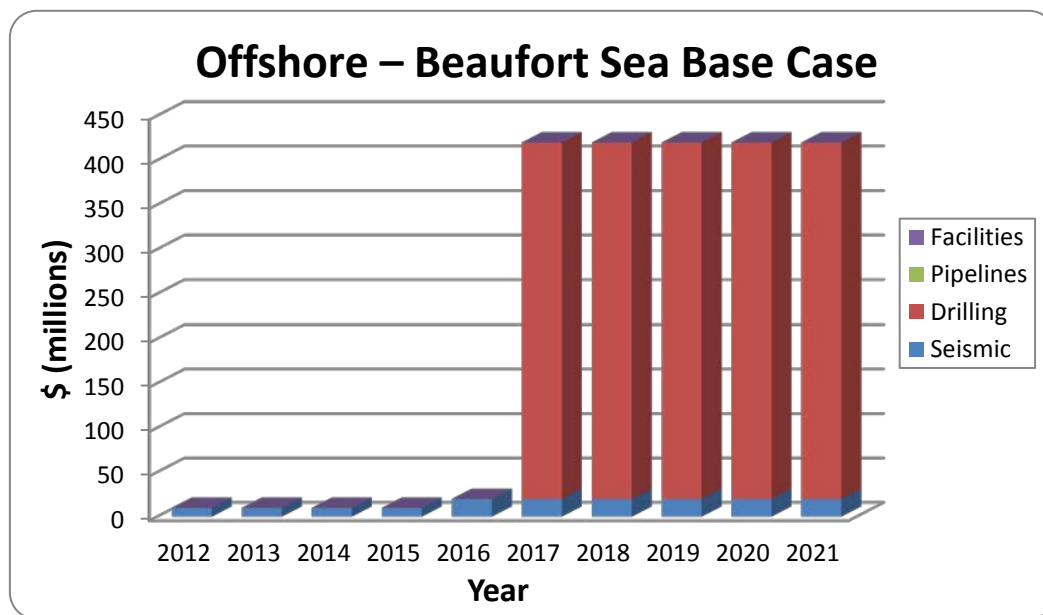
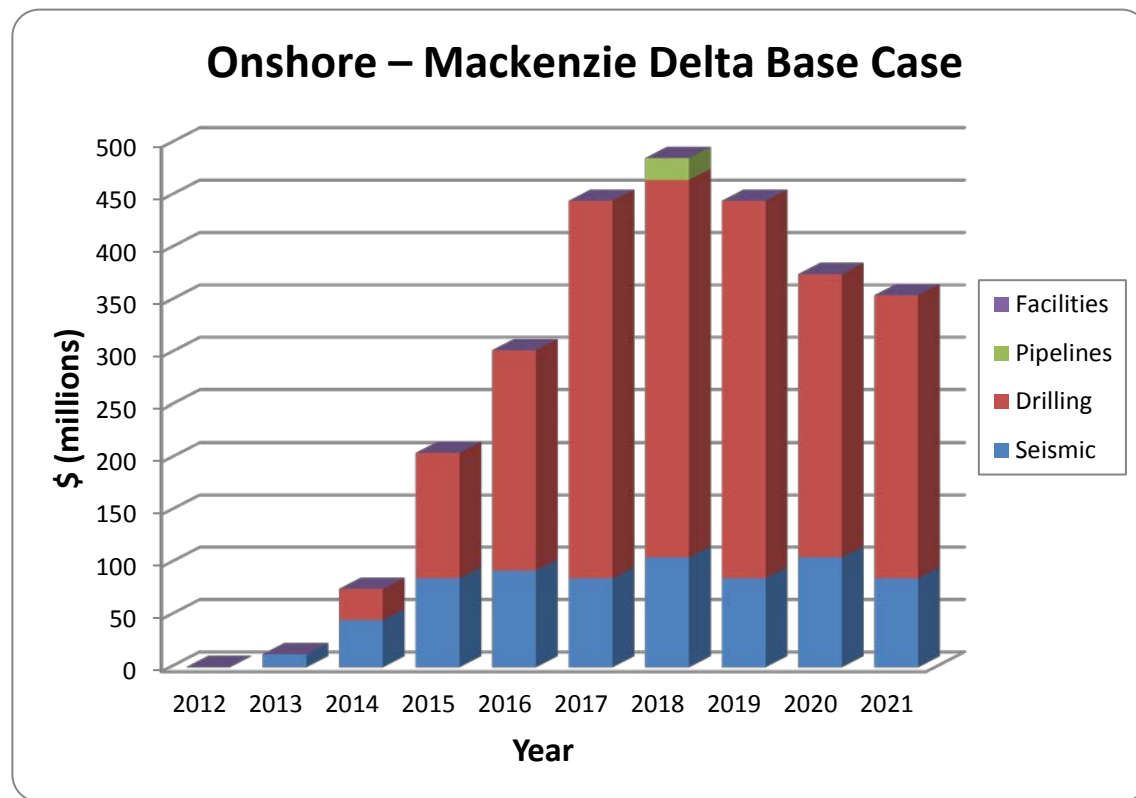


Figure 4b
Onshore – Mackenzie Delta Base Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)



2.3. Southern Mackenzie Delta (Gwich'in) Region

There are limited oil and gas findings and related exploration and development activity in the Southern Mackenzie Delta Region as no reported discoveries have resulted from the drilling activities conducted in the area to date. However, the shale oil trend currently being pursued in the Central Mackenzie Valley region may range into the southern end of the Southern Mackenzie Delta region. The potential activity in the region will revolve around the (Base Case) creation of the Mackenzie Gas Pipeline which will require an expansion of the Inuvik Gas Processing Plant. (See Figure A in Appendix).

A key opportunity for the Gwich'in will be service sector business opportunities within their Settlement Region in Inuvik. Service sector opportunities ranging from travel and accommodation services to logistics, warehousing and construction should be significant. Estimating service opportunities are outside the scope of this assessment.

Low Case

In the absence of the development of the Mackenzie Gas Pipeline there is little reason to expect any oil and gas activity in the Southern Mackenzie Delta region, until the current resource play in the Central Mackenzie Valley tells whether the resource trends into the southern end of the region. As stated above, exploration activities in the region in the past have not resulted in discoveries. Without the Mackenzie Gas Pipeline further exploration in the region is unlikely to be attractive for exploration companies. For these reasons, the Southern Mackenzie Low Case scenario, the magnitude of the business opportunity is expected to be negligible. The magnitude of the business opportunity for the Southern Mackenzie Delta Region Low Case scenario is presented in Figure 5 below and Table 5 in Appendix 1.

Base Case

In the Southern Mackenzie Delta Base Case scenario, the magnitude of the business opportunity is directly tied to the creation of the Mackenzie Gas Pipeline. The Southern Mackenzie Delta Base Case forecasts a business opportunity related to oil and gas exploration activity of \$56 million between 2017 and 2020 as opportunities to tie-in to the Mackenzie Gas Pipeline are evaluated. These opportunities are anticipated to be in the ratio of 55% seismic to 45% drilling.

In addition, a one-time business opportunity of approximately \$1.1 billion is expected in 2017 in respect of the installation of a gas processing facility near Inuvik within the region. This facility is needed to support the Mackenzie Gas Pipeline. The magnitude of the business opportunity for the Southern Mackenzie Delta Region Base Case scenario is presented in Figure 6 below and Table 6 in Appendix 1.

Note that in the event the Mackenzie Gas Pipeline is expanded to 1.8 Bcfd two compressor stations will also be expected to be built in the region. The business opportunity represented by the construction of these compressor stations is not included in this forecast.

Figure 5 Southern Mackenzie Delta Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

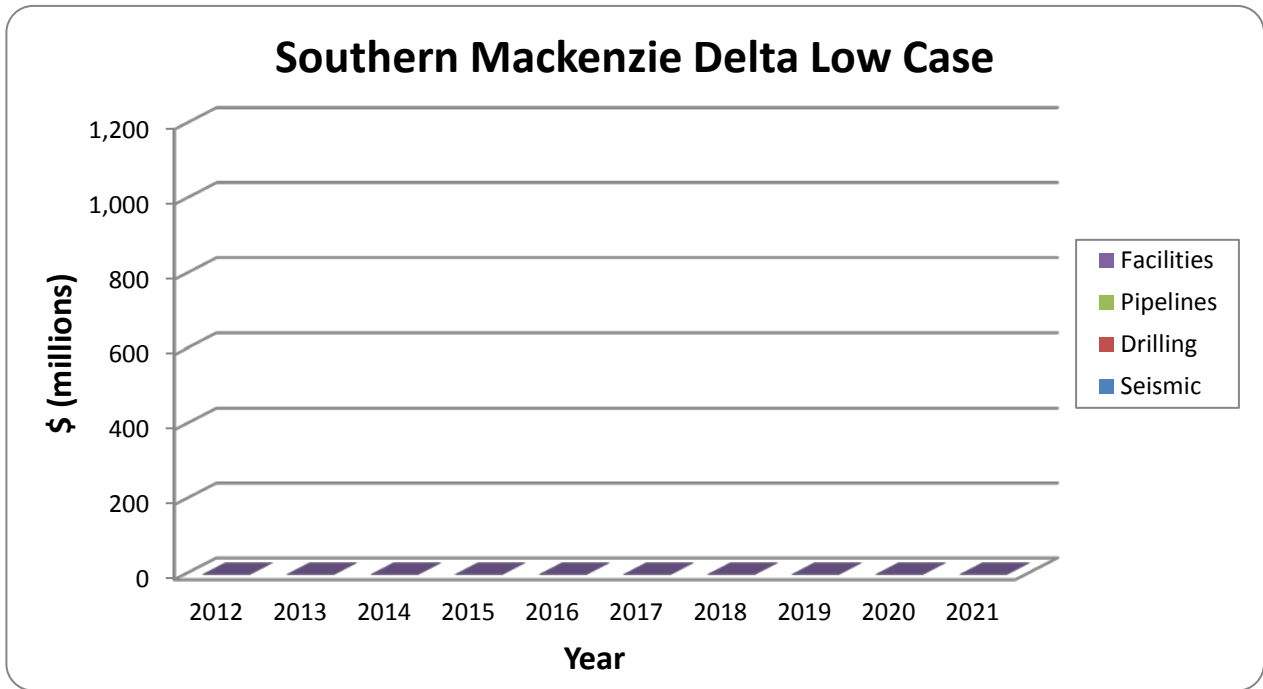
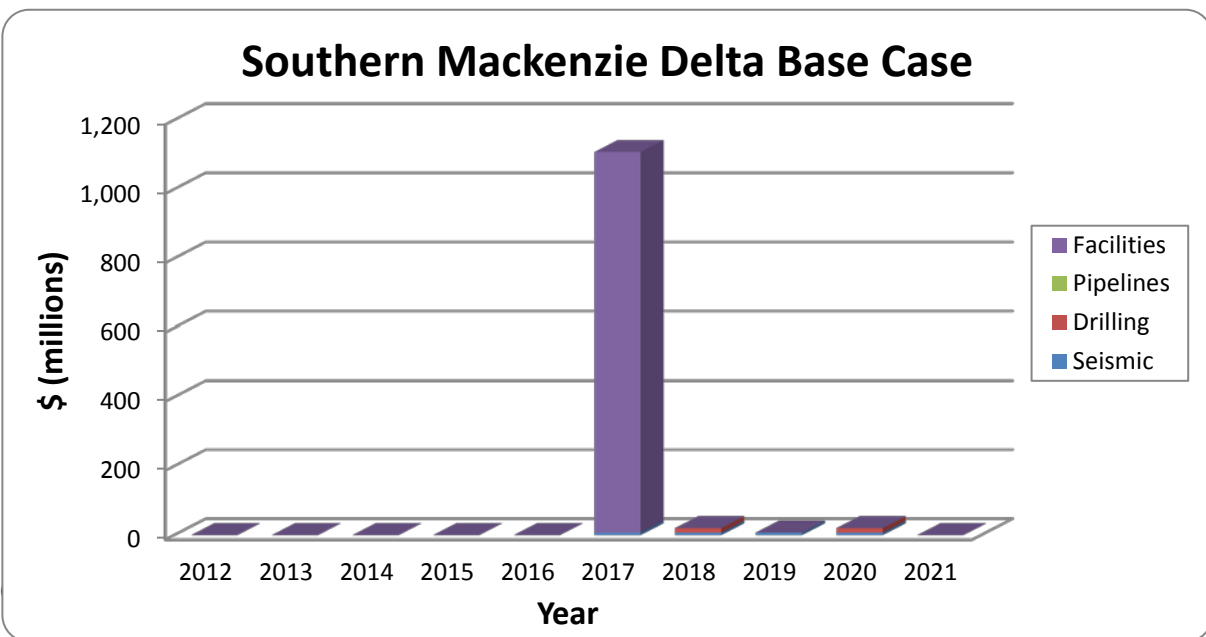


Figure 6
Southern Mackenzie Delta
Base Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)



Based on the Activity Forecast, the magnitude of the business opportunities for a Base Case Scenario, where the Mackenzie Valley Pipeline is constructed, and a Low Case Scenario where the Mackenzie Gas Pipeline is not constructed by 2021, Central Mackenzie Valley Region business opportunities were evaluated. The results of this evaluation are contained in graphical form in Figures 7 and 8 and in tabular form in Tables 7 and 8 which follows.

While the ongoing activity levels are shown as regular amounts of annual activity, it should be noted that actual activity is influenced by many factors (the permitting process, corporate budgets and availability of corporate resources to name a few). The actual annual activity levels and the timing of particular activities are expected to vary.

Low Case

In the Central Mackenzie Valley Low Case Scenario an ongoing exploration business opportunity of approximately \$130 million per year is expected, capitalizing on the newly developing (potential oil shale) regional play. These opportunities are expected to be split in a ratio of approximately 35% seismic to 65% drilling.

For the Low Case it is assumed that there are no substantive changes to the draft Sahtu Land Use Plan and that existing land restrictions apply.

The magnitude of the business opportunities for the Central Mackenzie Valley Low Case is presented in Figure 7 below and Table 7 in Appendix 1.

Base Case

In the Central Mackenzie Valley Base Case scenario an ongoing exploration business opportunity of approximately \$200 million per year is expected, split in a ratio of approximately 30% seismic and 70% drilling.

A one-time business opportunity of approximately \$550 million between 2017 and 2018 is also forecast related to the development of gas production from the Colville Hills (seismic, production wells, gas conditioning facilities and pipelines in the Colville Hills, a pipeline to move gas and natural gas liquids to the Fort Good Hope area, and a new gas processing facility near Fort Good Hope) to provide a portion of the natural gas required at the start-up of the Mackenzie Gas Pipeline. The facilities involved are illustrated in Figure A in Appendix 1.

The magnitude of the business opportunity for the Central Mackenzie Valley Region Base Case is presented in Figure 8 below and Table 8 in Appendix 1. Note that in the event the Mackenzie Gas Pipeline is expanded to 1.8 Bcfd four compressor stations will also be built along the Pipeline in the Sahtu region. The business opportunity represented by the construction of these compressor stations is not included in this forecast.

Figure 7 Central Mackenzie Valley Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

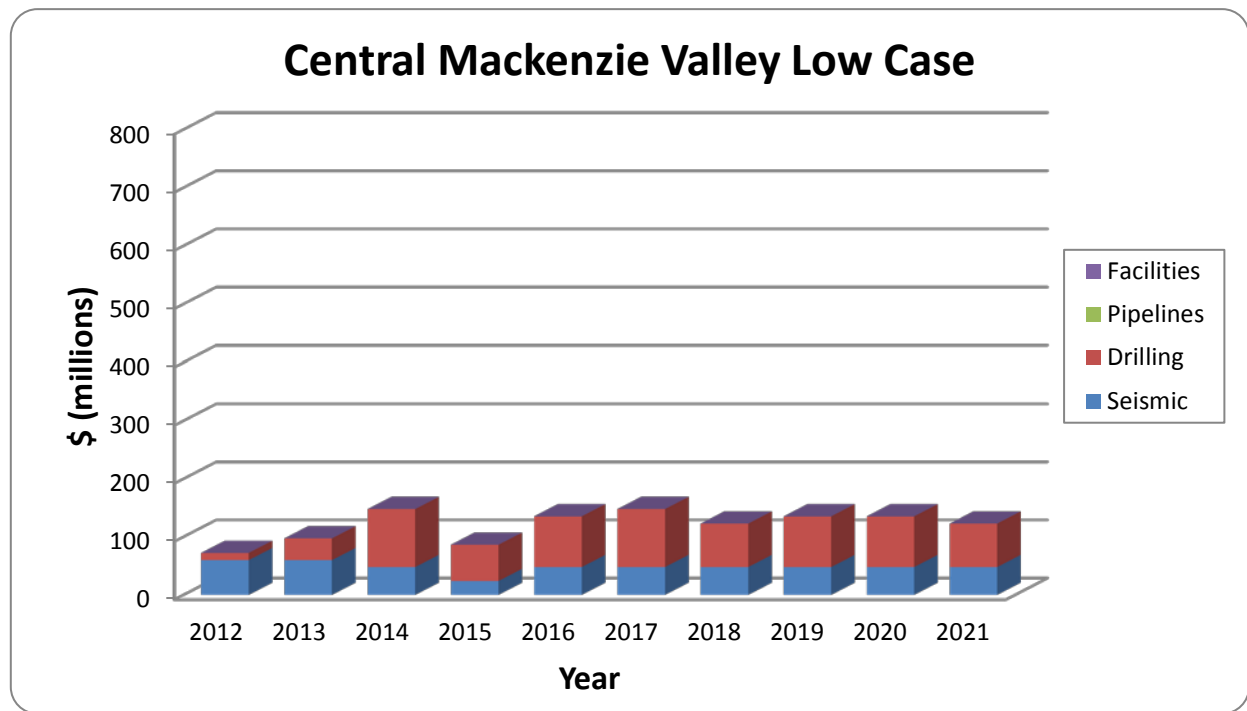
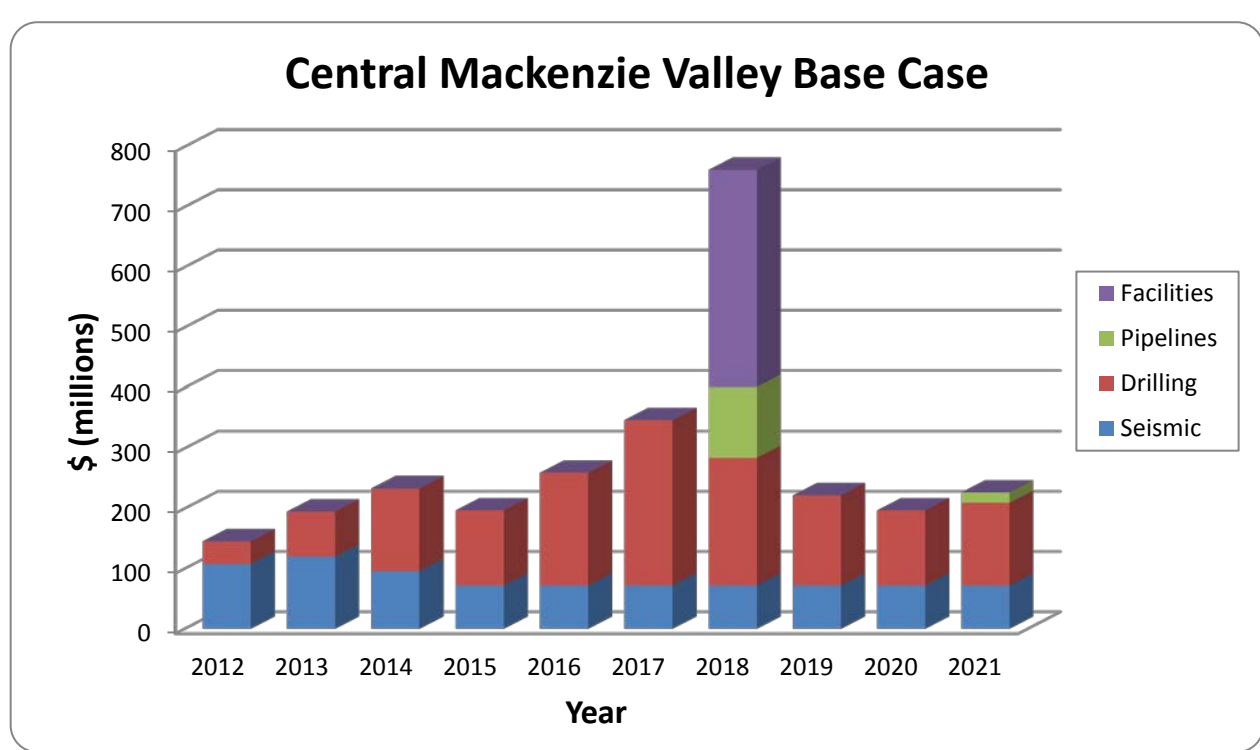


Figure 8 Central Mackenzie Valley Base Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)



Oil and gas resources in the Southern Mackenzie Valley region have direct access to existing pipeline distribution networks in Alberta and British Columbia. The South Mackenzie Valley region has no planned tie-ins to the MGP. In the Southern Mackenzie Valley region, oil and gas exploration and development activity is driven by the progress and status of land claim negotiations.

Low Case

Low Case scenario for the Southern Mackenzie Valley region assumes that there is no construction of a Mackenzie Gas Pipeline between 2012-2021. In the Low Case scenario, it is expected that no new land is made available for development in the Southern Mackenzie Valley region.

In the Southern Mackenzie Valley Low Case Scenario, oil and gas business opportunities are less regular, ranging from \$1-\$15 million annually, consisting of seismic and development activities on existing leases as operators work to maintain oil and gas production levels through existing pipeline and processing infrastructure in Cameron Hills. The annual expected average business opportunity in the region is approximately \$7 million.

The magnitude of the business opportunity for the Southern Mackenzie Valley Low Case scenario is presented in Figure 9 below and Table 9 in Appendix 1. While the ongoing activity levels are shown as fairly regular amounts of annual activity in the forecast, it should be noted that the actual activity is influenced by many factors (the permitting process, corporate budgets and availability of corporate resources to name a few). Actual activity is expected to vary from year to year, from zero to two or more times the indicated activity level shown in any given year.

Base Case

The Base Case scenario for the Southern Mackenzie Valley region assumes that the Mackenzie Gas Pipeline is constructed during the forecast period and that specific and periodic land sales are held. In the Southern Mackenzie Valley Base Case scenario, the magnitude of the oil and gas business opportunity ranges from about \$15 - \$20 million per year, based on new land becoming available for exploration.

Seismic and drilling activity is expected in most years ranging from about \$15 million per year in the early part of the forecast period to about \$20 million per year toward the end of the period, split about 10% seismic and 90% drilling. A low level of pipeline expenditure is also expected each year as discoveries are hooked up (\$1.5 million per year).

The magnitude of the business opportunities for the Southern Mackenzie Valley Base Case scenario is presented in Figure 10 below and Table 10 in Appendix 1. While the activity levels are shown as a fairly regular amounts of annual activity in the forecast it should be noted that the actual activity is influenced by many factors (the permitting process, corporate budgets and availability of corporate resources to name a few). The actual annual activity levels and the timing of particular activities are expected to vary.

Figure 9 Southern Mackenzie Valley Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

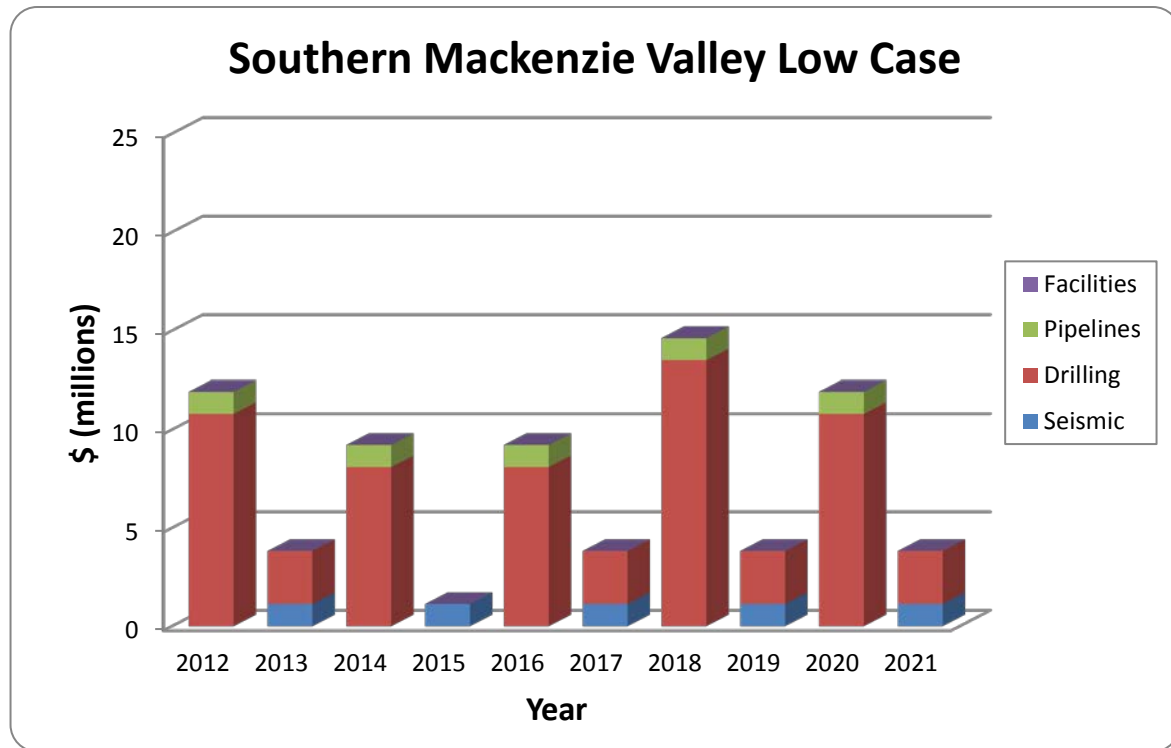
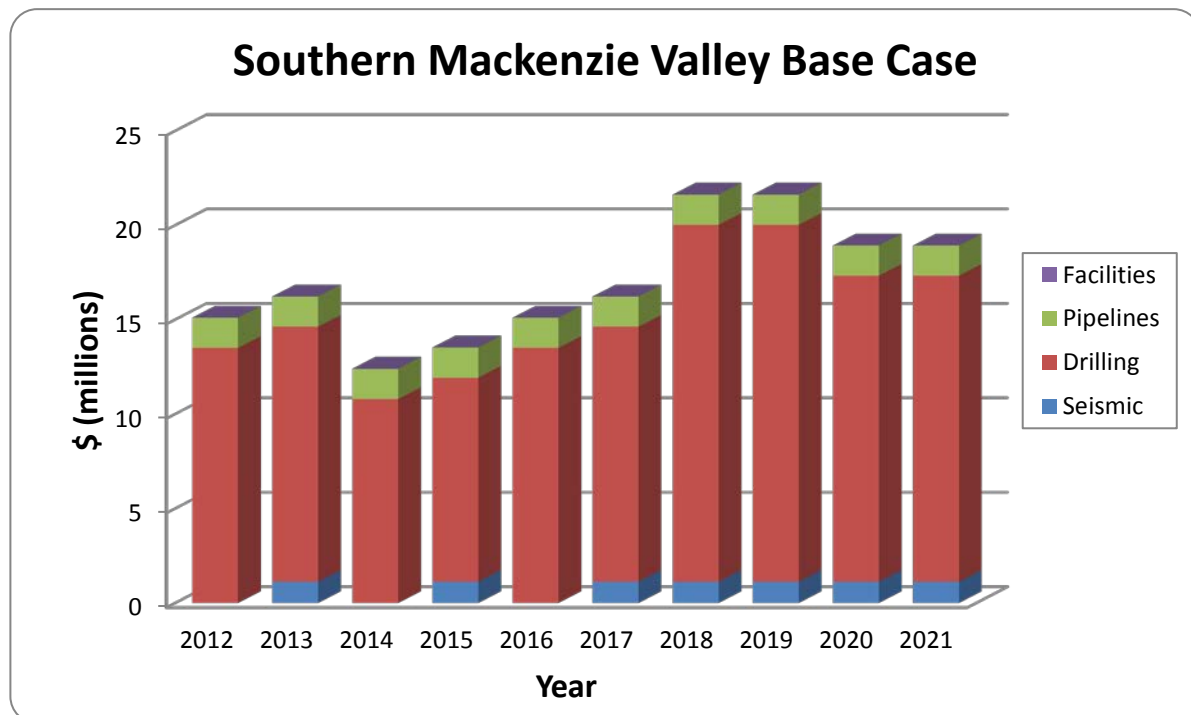


Figure 10 Southern Mackenzie Valley Base Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)



3. Business Characteristics of Oil and Gas Contracting

The types of commercial opportunities normally associated with oil and gas activity are outlined below, starting with a description of opportunities by oil and gas activity followed by a listing of the overall types of contracting needs of industry.

3.1. Characteristics of Business Opportunities by Type of Activity

Seismic Programs

Although large year-to-year swings in seismic survey activity can be expected, it is anticipated that seismic survey work will be ongoing as companies (with explore leases) continue to explore for oil and gas. Ongoing seismic activity will provide a basis for sustainable northern businesses, provided the swings in revenue from year to year are effectively managed.

Business opportunities related to seismic services are attractive to local enterprises as the local content of seismic programs can be relatively Base:

- Programs need a large amount of manpower (75 to 90 people) to undertake, and opportunities exist in regard to contracts for labour supply; prescouting; surveying; cutting and clearing to establish new seismic lines; seismic services, drilling, equipment supply, operation and maintenance; environmental monitoring; health and safety services; and supply of communication, lighting and electrical services;
- Supply of portable camps and camp and catering services to look after seismic crews;
- Medical and safety services;
- Winter road construction is required to move equipment people and supplies to the survey area (involves contracts for slashing and harvesting, and supply and operation of cats, graders, water trucks and other equipment);
- Winter road maintenance and heavy equipment maintenance services are required.
- Helicopter and land transportation services are required to move equipment and supplies to survey areas (supply, operation and maintenance of transportation equipment including skidoos, Nodwells, 4-wheel drive vehicles);
- Fuel supply services.

Seismic activities will generally take place during the winter construction season, involving program schedules of 60 to 90 days.

Drilling Programs

It is expected that drilling will be an ongoing activity in the Northwest Territories as companies explore for and develop new oil and gas reserves. While drilling activity will vary from year to year (much less year to year variation is expected for drilling activities than is expected for seismic activity), it will still provide a basis for sustainable northern businesses. To be successful, businesses will have to be managed to cope with swings in revenue from variations in drilling activity.

Business opportunities related to drilling activities will be attractive as the local content of drilling programs can also be relatively Base:

- Drilling contract (drilling contractor supplies rig, rig transportation, drilling crew and crew transportation)
- Fracing equipment for horizontal and shale plays
- Bit, mud, chemical and cement supply contracts (contractors generally package the material supply with the required transportation services)
- Casing supply contract
- Trucking contract for casing transportation
- Well-site Shack supply contract (drill site office and part-time accommodation for the engineer, geologist, and drilling specialists)
- Camp supply contract
- Catering contract
- Medical/Safety services
- Winter road building contract (winter road building is the largest opportunity for local supply)
- in addition to the manpower required for the drilling program itself (30 to 40 people), a large amount of manpower is required for clearing and building winter roads, and for driving supply and service vehicles; supply requirement for fuels, lubricants and consumables is considerable
- Communications equipment and services supply (secure communications are a key requirement)
- Environmental monitoring
- Hotshot services are not generally used in regard to drilling activities in the NWT

Drilling activities are generally short duration and generally take place during the winter construction season.

Pipeline Construction

Pipeline construction is expected to be an intermittent activity, involving large projects with several years between projects (except for a lower level of ongoing activity in the Southern Mackenzie Valley Region).

The local content of pipeline programs can be expected to be fairly low, as the intermittent demand for pipeline construction will make it difficult to maintain the skilled workforce required (qualified welders, etc.) and will preclude making the large capital investments necessary to maintain the inventory of specialized equipment required for pipelining.

Pipeline programs will require granular supply (borrow pit development, excavation, crushing, screening, drying and hauling), trucking services, barging services, construction of barge landings and pipe lay down areas, winter road building services, right of way clearing, camp and catering services, medical and safety services, communications services and fuels supply services all of which can be supplied by northern companies that have capacity available during periods of pipeline construction.

Large pipeline projects will generally take place during the winter construction season and occur around the same time period as facilities construction, creating large demands for labour and services, and making it difficult to take advantage of pipeline business opportunities while servicing other regular work.

Facilities Construction

Facility construction will occur only intermittently during the forecast period, with large levels of activity during periods of oil and gas production expansion, followed by long periods where no facilities are built. Most of the cost of new facilities (gas conditioning and processing facilities) will consist of the costs of prefabricated equipment and equipment modules fabricated by specialist contractors in Alberta, British Columbia, and elsewhere, which will be assembled and placed on foundations on site.

Local business opportunities will occur mainly in regard to the transportation of materials and equipment modules to site by barge and winter road, construction of winter and seasonal roads, gravel pit development and operation, gravel hauling, construction of permanent gravel pads and equipment foundations (including pile driving), drilling of production wells, installation of modular equipment, pipeline construction, provision of camp and catering services, medical/safety services, instrumentation and electrical services, welding services, fuel supply (gas, diesel and propane), methanol supply, food supply and transport, helicopter services for personnel movement ,

Construction of foundations and access roads will occur primarily in the winter. Assembly of prefabricated modules and placement and installation of equipment may take place throughout the year after winter delivery to site.

Because pipeline construction and facilities installations will generally be one-time activities which will

occur at infrequent intervals, they do not create the possibility of the regular revenues needed to build and maintain a local business.

However, it should be possible for northern businesses and contractors to pursue facilities construction contracts by leasing equipment, hiring temporary workers and subcontracting services from southern suppliers for the period of the project. Local companies may also be able to pursue portions of pipeline and facilities projects by joint venturing with specialist companies to draw on the capabilities, experience and equipment available from of southern suppliers (though this may remove much of the profit potential).

3.2. Typical Goods and Service Contract Opportunities

A list of the typical types of goods and services contracted for oil and gas projects is presented below. Opportunities may exist to provide these (and other services) directly to oil and gas companies, and through their contractors and to subcontractors.

Typical Goods and Services Required

Communications

- Telecommunications, radio, satellite & cellular phones (secure communications is a key requirement for oil and gas customers)
- Base-speed internet and cable TV

Office Services

- Security and janitorial services
- Office space, supplies, furniture, computers and other equipment

Business Support Services

- Secretarial, clerical, word processing,
- Accounting, bookkeeping and payroll services
- Travel services
- Banking services

Environmental / Geotechnical / Engineering

- Permitting
- Regulatory Services

-
- Consultation
 - Engineering
 - Lab services
 - Environmental field surveys
 - Granular resources surveys
 - Route and site surveys
 - Environmental monitoring and mitigation

Seismic Program

- Survey
- Line Clearing and slashing
- Winter road construction
- Seismic Drilling and data recording
- Camp services (catering, operations and maintenance)
- Medical and Safety Services
- Freight and transport services (truck, barge, aircraft and helicopter)
- Communications equipment supply (radios, satellite phones)
- Consumables supply (drill bits, explosives and caps, magnetic tapes, recording paper, fuel and lubricants, survey lathe)
- Equipment supply (4-wheel drive and tracked vehicles, fuel and supply trucks, crew truck, portable camp units)
- Equipment repair and maintenance

Drilling Programs

- Survey
- Winter road construction
- Clearing and slashing
- Site Preparation

-
- Camp services (catering, operations and maintenance)
 - Medical and safety services
 - Drilling rig rental
 - Equipment rental (power tongs, down hole tools, four-wheel drive and tracked vehicles, fuel and supply trucks, crew truck, portable camp units)
 - Equipment supply (wellhead equipment)
 - Drill Shack Supply
 - Drilling Services (coring, wireline logging, mud logging, well testing)
 - Freight and transport services (truck, barge, aircraft and helicopter) – moving rig to site typically involves 100 to 120 truck loads of material
 - Water trucking
 - Environmental Monitoring
 - Expediting services
 - Communications equipment (radios, satellite phones – secure communications required)
 - Consumables supply (drill bits, mud/drilling fluids, cement, fuel and lubricants, casing)
 - Rig repair and maintenance services (mechanical, electrical, welding)

Construction, Materials and Fabrication

- Surveying
- Brushing and right of way clearing
- Building supplies, hardware, paint, lumber and plywood
- Electrical contracting and supplies
- Plumbing contracting and supplies
- Carpentry and finishing
- Heating, ventilation and air conditioning supply, installation and maintenance
- Electrical power generation and supply
- Concrete, crushed rock, sand, gravel and ready-mix products supply

-
- Forms, rebar, cribbing, cement finishing and masonry products
 - General contracting
 - Timber for pipeline skids and survey laths
 - Welding services, specialty welding, welding supplies, electrode, equipment, gases
 - Instrument and electrical services

Logistics and Transportation

- Bus and Taxi
- Retail and wholesale grocery supply
- Materials handling, expediting, freight transport, light delivery and courier services
- Air transport, aircraft charters and maintenance
- Helicopter services
- Vehicle sales, rentals, repairs and service (skidoos, tracked vehicles, 4x4s, large trucks, cats, hoes, graders, dump trucks, etc)
- Barging and boat charter

Equipment, Services and Supplies

- Industrial supplies, steam and Base-pressure water
- Small engine repair, small equipment supply and rental
- Heavy-duty equipment rental, repairs and service
- Drilling equipment for core samples

Utility and Fuel Services

- Bulk fuel, propane, diesel fuel, aircraft fuel, gasoline, fuel oil, grease, lubricating oil, glycol, methanol, and chemicals
- Propane and fuel storage tanks, oil and diesel fuel tanks, fuel delivery and storage
- Water delivery,
- Sewage treatment,
- Snow removal and garbage disposal.

Accommodation and Camp Services

- Apartments, hotels and motels
- Camps, camp catering, camp supplies
- Laundry and dry-cleaning services
- Restaurants

Safety and Medical

- Medical facilities, supplies, services,
- Air and ground ambulance,
- Dentistry, optometry and prescription drugs
- Safety equipment, supplies and training

4. NWT Commercial Environments for Oil and Gas Contracting

4.1. Factors Affecting the Competitive Environment

Northern participation in oil and gas business contracting is irregular and affected by many factors (oil and gas prices, changes in government regulations, company policies, types of agreements struck with Aboriginal interests, company perceptions of competing opportunities in other locations, development of new technologies, and many other factors). Business challenges, government and company policies are discussed below.

In recent years, oil and gas companies have made good progress in adapting their business practices to maximize opportunities for northern businesses. Some of the measures taken to increase northern participation in oil and gas activities include:

- Division of project activities into packages of appropriate scope and size to allow northern businesses to bid on oil and gas work;
- Organizing and running workshops and information sessions explaining job requirements and bidding and contracting practices; and,
- Improvement of communications with potential contractors and increasing lead times available for contractors to prepare bids.

A review of past projects shows that northern participation has varied over the years and continues to be an issue for northern residents. The seasonal nature of the exploration stage of the industry has made it difficult to provide consistent contract and employment opportunities that allow people to gain job experience and contractors to develop capable work forces.

Local content is a concept that is much discussed and difficult to quantify as it appears to have very different definitions when used by different groups in different contexts. For example it is obvious that local content of a supply contract involving the supply of local labour by a local contractor would be 100% local content. But what is the local content of an equipment supply contract? If a local contractor rents equipment from southern suppliers the local content is very low, and if he buys the equipment and uses it on the contract the local content again approaches 100%. If a local contractor joint ventures with a southern company, for example a helicopter company that supplies helicopters and pilots, what is the local content of the contract to supply the helicopter services? Is it 100% local content or is it a much smaller number in proportion to the actual amount of local involvement? There don't appear to be any rules for defining what is, and what are not, local content and the numbers are reported differently by different information sources. Consequently, little useful information can be obtained about expected local content for future oil and gas activities from published statistics showing the percent local content of particular contracts.

4.2. Challenges for Northern Businesses

It is a different challenge being competitive in business in a region with 10 to 15 highly specialized exploration wells and associated activity a year as compared to being competitive while working in the Alberta Region where the market is over 10,000 wells a year.

In areas with Base levels of activity, like Alberta, a large number of oil and gas companies can work continuously throughout the year on a multitude of different projects and activities. This results in fairly steady work for suppliers and contractors providing goods and services to the oil and gas industry. This was not the case when oil and gas development was just beginning in Alberta more than 75 years ago and it is a much different situation than exists in the Northwest Territories today.

The situation at this early stage of development in Canada's Northwest Territories is much more challenging for companies wishing to pursue oil and gas business opportunities. In particular northern businesses must successfully deal with a number of key challenges in order to succeed:

- Availability of capital to fund start-up businesses (new companies);
- Availability of support (management capabilities) for start-up business and for expansion of existing businesses;
- Availability of capital to finance involvement in large projects;
- Availability of trained employees;
- Availability of specialized support expertise needed to deal with health safety and environmental regulations and other regulatory requirements;
- Qualifying for inclusion on oil and gas company approved contractor lists;
- Short notice periods to respond to opportunities due to the typically short lead time from oil and gas company project approvals to the project start date;
- Short project schedules (typically one winter season) making mobilization of personnel and equipment difficult;
- Regional restrictions limiting work in a particular region to businesses located in the region (one example would be the provision of helicopter services, where different joint venture helicopter businesses exist in each community);
- Access and Benefits Agreements that may restrict activity in particular regions to suppliers and contractors from the region and/or that provide for selection of bidders based on payment of premiums for local content;
- Competition for labour and other resources during periods of Base activity (i.e. during the initial development of the Mackenzie Gas Project and during the expansion of the capacity of the Mackenzie Gas Pipeline several years later);

-
- Competition from established companies outside the NWT;
 - A limited work season; and,
 - Irregular levels of oil and gas project activity.

Each region is uniquely different, both geographically and politically:

- The Inuvialuit Settlement Region is characterised by a 'participation' style claim that set out clear access to business opportunities over revenue sharing. The region has year round road access to a point with required air and winter road access to most operating theatres.
- The Gwich'in Settlement region is characterised by both a revenue sharing and benefits style claim. The region has year round access and has similar land-based requirements as the Inuvialuit Settlement Region.
- The Sahtu is characterised by both a revenue sharing and benefits style claim. The region is hard to access, and working in the area requires careful access planning.
- The Dehcho has not yet settled its land claim. The region is mostly accessible by road and is physically similar to the far north of Alberta.

4.3. Government and Corporate Policies and Conditions

Federal

Development proponents are required by the terms and conditions of the federal Canada Benefits Plans to provide full and fair access to local suppliers and employ local people as much as possible throughout the north as a condition of their Exploration License.

The Northern Oil and Gas Branch of Aboriginal Affairs and Northern Development Canada have the lead responsibility for the administration of benefits plans for exploration activities in the Northwest Territories. The Division maintains communications with the Inuvialuit, First Nations and northern communities and works to understand better their benefits issues and concerns, and to increase public understanding of benefits plan requirements.

GNWT Policy

The GNWT Business Incentive Policy was put in place to encourage growth and competitiveness of NWT registered businesses and to promote reinvestment in the NWT economy, to create northern employment and training opportunities. This reflects a general sentiment in the NWT to work with and assist business development. The policy applies to GNWT expenditures and contracting.

The GNWT takes a leadership role on social and economic related issues with major project developments and has negotiated a socio-economic follow-up program in the form of a contractual

Socio-economic Agreement (SEA) based on company commitments and regulator recommendations.

Company Policies and Agreements

Oil and gas companies have their own corporate policies on working with local and regional businesses in general, and take specific approaches depending on the nature of government policy and the types of Agreements they reach with local interests.

Local Land Access and Benefits Agreements in the NWT have had a significant influence over the scope and scale of contracting. A review of a number of agreements (Macleod Institute 2003) prominent reasons for establishing and signing agreements include:

- To address concerns of Aboriginal people and local residents regarding adverse effects of large-scale developments on community, culture, ways of life, environment and land-based activities;
- To ensure local people and communities have the opportunity to benefit from short and long-term development in their region;
- Provision for an effective and ongoing working relationship between parties, on matters covered in the agreement, in the spirit of cooperation and mutual respect for each party's goals;
- To secure support of Aboriginal parties for the development and operation of the project;
- Land Access and Benefit Agreements are starting to be viewed by developers as one of many other considerations (regulatory, community relations, technical and economic) that must be addressed before proceeding with a large development project.

A current example of corporate commitments to local business contracting is the intent shown by the Mackenzie Gas Project:

To support the fair and full participation of northern suppliers and contractors in the Project, we will:

- seek business opportunities for northern suppliers of goods and services
- communicate opportunities in a timely way to enable effective competition by local and northern contractors and suppliers
- structure contracts, where practical, in sizes that can be effectively managed by northern businesses
- where appropriate, contract locally in cases where the supply or services by contractors and northern businesses
- meet safety and environmental standards
- meet technical and quality standards

-
- are cost-competitive at the location where the goods and services are required
 - Meet the Project's timing needs.

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Appendix One – Forecast Data

Table 3

Beaufort / Mackenzie Low Case

Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	13	0	0	0	13
2013	13	0	0	0	13
2014	23	0	0	0	23
2015	10	0	0	0	10
2016	13	0	0	0	13
2017	13	30	0	0	43
2018	13	430	0	0	443
2019	13	430	0	0	443
2020	13	90	0	0	103
2021	13	90	0	0	103

Table 3a

Offshore – Beaufort Sea Low Case

Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	0	0	0	0	0
2013	0	0	0	0	0
2014	10	0	0	0	10
2015	10	0	0	0	10
2016	0	0	0	0	0
2017	0	0	0	0	0
2018	0	400	0	0	400
2019	0	400	0	0	400
2020	0	0	0	0	0
2021	0	0	0	0	0

Table 3b**Onshore – Mackenzie Delta Low Case****Magnitude of Oil and Gas Business Opportunity (\$ Million)**

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	13	0	0	0	13
2013	13	0	0	0	13
2014	13	0	0	0	13
2015	0	0	0	0	0
2016	13	0	0	0	13
2017	13	30	0	0	43
2018	13	30	0	0	43
2019	13	30	0	0	43
2020	13	90	0	0	103
2021	13	90	0	0	103

Table 4**Beaufort / Mackenzie****Base Case****Magnitude of Oil and Gas Business Opportunity (\$ Million)**

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	10	0	0	0	10
2013	23	0	0	0	23
2014	55	30	0	0	85
2015	95	120	0	0	215
2016	113	210	0	0	323
2017	105	760	0	0	865
2018	125	760	21	0	906
2019	105	760	0	0	865
2020	125	670	0	0	795
2021	105	670	0	0	775

Table 4a**Offshore – Beaufort Sea Base Case****Magnitude of Oil and Gas Business Opportunity (\$ Million)**

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	10	0	0	0	10
2013	10	0	0	0	10
2014	10	0	0	0	10
2015	10	0	0	0	10
2016	20	0	0	0	20
2017	20	400	0	0	420
2018	20	400	0	0	420
2019	20	400	0	0	420
2020	20	400	0	0	420
2021	20	400	0	0	420

Table 4b**Onshore Mackenzie Delta Base Case****Magnitude of Oil and Gas Business Opportunity (\$ Million)**

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	0	0	0	0	0
2013	13	0	0	0	13
2014	45	30	0	0	75
2015	85	120	0	0	205
2016	93	210	0	0	303
2017	85	360	0	0	445
2018	105	360	21	0	486
2019	85	360	0	0	445
2020	105	270	0	0	375
2021	85	270	0	0	355

Table 5
Southern Mackenzie Delta
Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	0	0	0	0	0
2013	0	0	0	0	0
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	0	0	0	0	0
2017	0	0	0	0	0
2018	0	0	0	0	0
2019	0	0	0	0	0
2020	0	0	0	0	0
2021	0	0	0	0	0

Table 6
Southern Mackenzie
Delta Base Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	0	0	0	0	0
2013	0	0	0	0	0
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	0	0	0	0	0
2017	8	0	0	1100	1108
2018	8	13	0	0	21
2019	8	0	0	0	8
2020	8	13	0	0	21
2021	0	0	0	0	0

Table 7
Central Mackenzie
Valley Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	60	13	0	0	73
2013	60	38	0	0	98
2014	48	100	0	0	148
2015	24	63	0	0	87
2016	48	88	0	0	136
2017	48	100	0	0	148
2018	48	75	0	0	123
2019	48	88	0	0	136
2020	48	88	0	0	136
2021	48	75	0	0	123

Table 8
Central Mackenzie
Valley Base Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	108	38	0	0	146
2013	120	75	0	0	195
2014	96	138	0	0	234
2015	72	125	0	0	197
2016	72	188	0	0	260
2017	72	275	0	0	347
2018	72	213	117	360	762
2019	72	150	0	0	222
2020	72	125	0	0	197
2021	72	138	17	0	227

Table 9
Southern Mackenzie Valley
Low Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	0	11	1	0	12
2013	1	3	0	0	4
2014	0	8	1	0	9
2015	1	0	0	0	1
2016	0	8	1	0	9
2017	1	3	0	0	4
2018	0	14	1	0	15
2019	1	3	0	0	4
2020	0	11	1	0	12
2021	1	3	0	0	4

Table 10
Southern Mackenzie
Valley Base Case
Magnitude of Oil and Gas Business Opportunity (\$ Million)

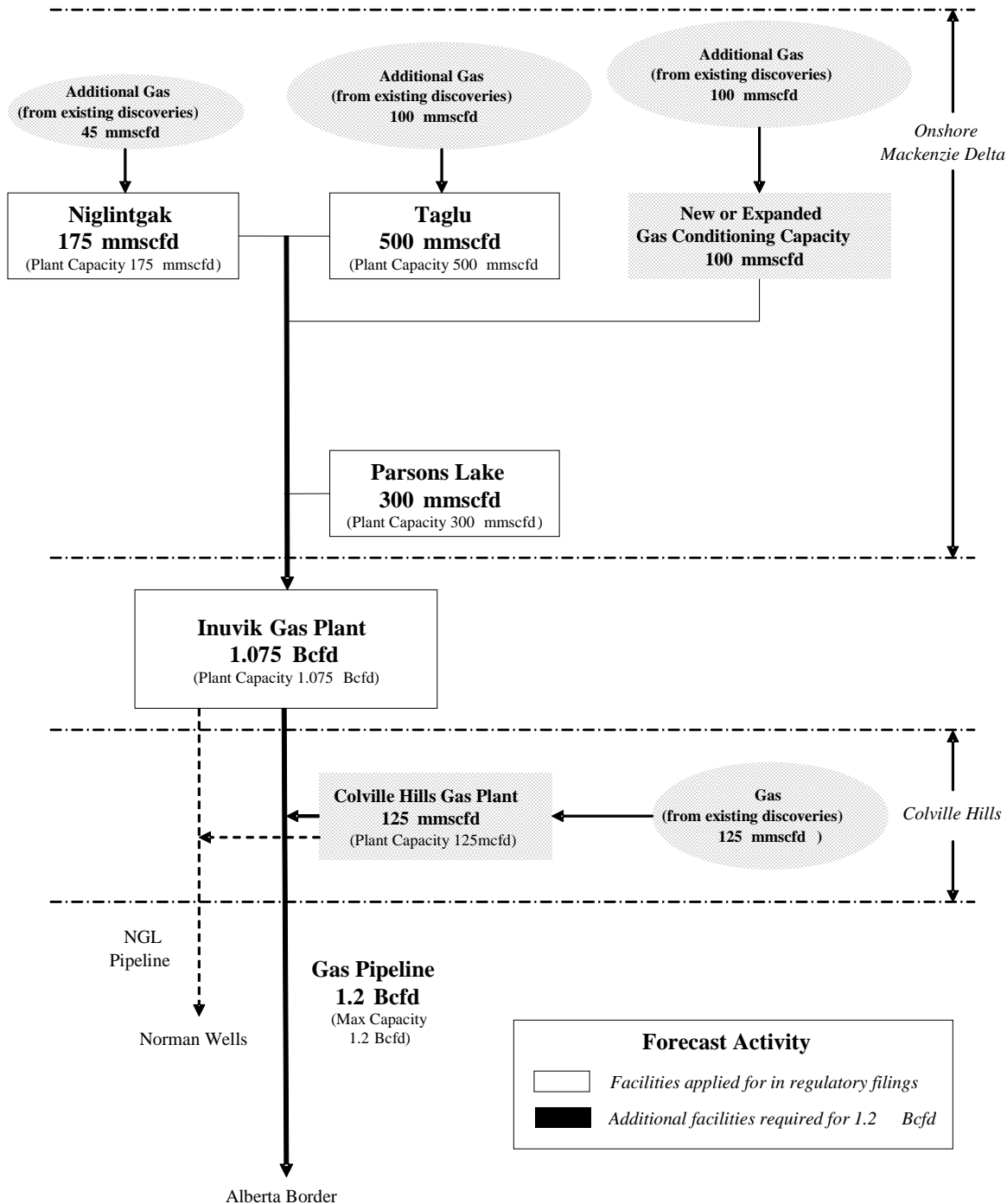
Year	Activity				Total
	Seismic	Drilling	Pipelines	Facilities	
2012	0	14	2	0	15
2013	1	14	2	0	16
2014	0	11	2	0	12
2015	1	11	2	0	14
2016	0	14	2	0	15
2017	1	14	2	0	16
2018	1	19	2	0	22
2019	1	19	2	0	22
2020	1	16	2	0	19
2021	1	16	2	0	19

Appendix Two - Facilities

Figure A: Base Case - 1.2 Bcfd (2019)

Gas Sources and Sales Gas Rates

(inferred from regulatory filings)



Appendix Three - Cost Estimating Basis

The following cost information was used to estimate the magnitude of the oil and gas business opportunities in the Northwest Territories during the period 2012 to 2021, based on Integrated Environment's Northwest Territories Oil and Gas Activity Forecast 2012 – 2021 (IEL 2011). The cost estimating data comes from a variety of sources as noted below.

Appendix 2, Table 1

Costs Used to Estimate Magnitude of Oil and Gas Business Opportunity

Beaufort / Mackenzie Region - Offshore	
Cost per 2D Seismic Program - 4000 km (millions)	10
Cost per 3D Seismic Program - 1500 km ² (millions)	27
Cost per Deepwater Well (millions)	400
Beaufort / Mackenzie Region - Onshore	
Cost per 2D Seismic Program - 250 km (millions)	12.5
Cost per 3D Seismic Program - 200 km ² (millions)	20
Cost per Well (millions)	30
Cost of Pipelines per km (thousands)	320
Southern Mackenzie Delta Region	
Cost per 2D Program - 150 km (millions)	7.5
Cost per Well (millions)	13
Cost of Pipelines per km (thousands)	320
Cost of Gas Processing Plant (millions)	1100
Central Mackenzie Valley Region	
Cost of 2D Seismic Program - 150 km (millions)	12
Cost per Vertical Well (millions)	7.5
Cost per Horizontal Well (millions)	17.5
Cost of Pipelines per km (thousands)	320
Cost of Gas Conditioning Plant (millions)	70
Cost of Gas Processing Plant (millions)	150
Southern Mackenzie Valley Region	
Cost per 2D Seismic Program - 150 km (millions)	1.125
Cost per Well (millions)	2.7
Cost of Pipelines per km (thousands)	160
Cost per Gas Conditioning Plant	45

Seismic cost estimates are based on:

- Seismic costs differ significantly by region due to variance in associated shipping, transportation and labour costs and are based on published data from various sources as well as on conversations with industry experts.

Drilling cost estimates are based on:

- Current costs experienced by industry participants as published in corporate documents as well as disclosed in press articles.
- Conversations with confidential industry experts.
- The Petroleum Services Association of Canada produces an Annual Well Cost Study that can be purchased from them for details on a breakdown of well costs. A full breakdown of well costs is published annually by the Petroleum Services Association of Canada. Information can be found at www.psac.ca/publications/wcs.html.

Pipeline cost estimates are based on:

- The length of pipelines forecast in the Integrated Environments' Northwest Territories Oil and Gas Activity Forecast 2012 – 2021 (IEL 2011), combined with a rough assessment of the probable average pipe diameters involved and a rule of thumb cost estimate of \$80,000 per diameter-inch-kilometre of pipe in the more northern Inuvialuit, Gwich'in and Sahtu regions, and \$40,000 per diameter-inch-kilometre of pipe in the Decho region.

Gas conditioning and processing estimates are based on:

- Assessment of the cost estimates filed as part of the Mackenzie Gas Project regulatory applications particularly those in the Niglintgak documentation (see Example section below) and the Mackenzie Gathering System.
- Use of professional judgment to adjust available cost information to reflect the size and circumstances of the developments detailed in the NWT Oil and Gas Exploration and Development Activity Forecast Northwest Territories 2012 - 2021.

Example

To provide an example of the type of information used to develop the cost estimates needed to assess the magnitude of the oil and gas business opportunity in the Northwest Territories, some of the cost information contained in the October 2004 regulatory filing for the Niglintgak development is reviewed below.

Niglintgak Capital Cost Estimate

Historical costs categorized and adjusted to constant 2003\$, based on annual average Consumer Price Index (CPI) information.

The Cost estimate includes costs for:

-
- regulatory application preparation
 - well drilling and completions
 - project management
 - design, procurement and construction of production facilities and flow lines
 - procurement of materials and services
 - pre-commissioning

Drilling and completion cost estimates are based on:

- drilling six production wells and one disposal well.
- drilling operations conducted over three winters, using two drilling rigs
- drilling time estimates, based on the proposed well designs, considering Niglintgak's drilling conditions and recent exploration well drilling performance for the Mackenzie Delta
- material and time estimates for well completion and testing, based on conceptual well designs, and considering arctic conditions
- material and services costs that are based on vendor quotes and include transportation from the source to Niglintgak

The costs estimates also include:

- modification of existing drilling equipment for arctic conditions
- transportation and standby costs for equipment and personnel
- mobilization and demobilization of drilling equipment and camps

Facilities

The Niglintgak capital cost estimates were factored from major equipment requirements to estimate the installed cost of production facility units. These estimates were based on:

- The conceptual process design
- Shell's and contractor's historical cost databases containing information on similar projects or similar locations
- Budgetary quotes for specific major equipment acquired from vendors
- Historically derived factors for major equipment bulks
- Experience of labour productivity in different construction locations

- Transportation, infrastructure and logistics costs estimated from combined vendor and historical cost information
- Average gas conditioning facility fabrication costs associated with international construction
- 2003 estimates of construction equipment and labour costs

Preliminary Cost Estimate

The estimate for Niglintgak is based on:

- an accuracy level of +25/-15% with an equal chance of overrun and under run
- an assumption that adequate labour and construction resources are available to complete the development as planned
- contingencies of 15 to 20% for different elements of the development
- the exclusion of goods and services tax and provincial sales tax for any materials, equipment or services
- constant 2003 \$CDN subject to the annual inflation rate when capital costs are incurred
- an assumption that goods and services will be acquired on an internationally competitive basis

Based on the Niglintgak data reviewed above the cost of development drilling and an indication of the costs of gas conditioning facilities can be estimated as follows (actual costs will depend on a variety of factors such as the site location and the composition of the gas being processed). While this approach is understood to be somewhat crude it will give reasonable data for rough assessment of the costs of the facilities being assessed in this report. A more detailed approach is beyond the scope and budget of this paper:

- Development drilling at Niglintgak is \$111.8 million for 7 wells which implies a cost of approximately \$16 million per development well.
- Facilities costs of \$233.4 million for a 175 mmcf/d sales gas conditioning capacity imply a cost of \$1.33 million per mmcf/d of gas conditioning capacity.
- The facility cost for the Inuvik Gas Processing Plant cost is approximately 1.1 billion dollars for a capacity of 1.075 Bcfd, implying a processing cost of \$1 million per mmcf/d of gas processing capacity (Based on the cost estimate filed as part of the Mackenzie Gathering System Development Estimate).

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