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April 1, 2019

All Customers  
Other Interested Parties:

Re. 2018 Annual Plan Revision

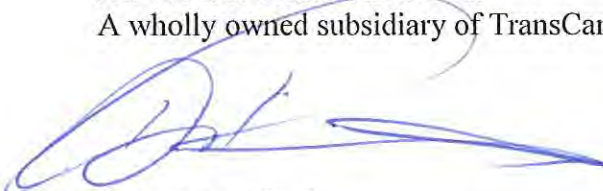
NOVA Gas Transmission Ltd (“NGTL”) has posted a revised 2018 Annual Plan on TransCanada PipeLines Limited’s website at:

<http://www.tccustomerexpress.com/5869.html>.

The revised 2018 Annual Plan replaces the previous December 12, 2018 version to correct an error on Figure 2-4. Figure 2-4 previously inadvertently included delivery design flows in segments outside of the defined Central Area. Figure 2-4 has been replaced with a corrected chart. No other revisions were made.

Customers and other interested parties can communicate their questions and comments regarding this revision to me at 403.920.6341.

Yours truly,  
NOVA Gas Transmission Ltd.  
A wholly owned subsidiary of TransCanada PipeLines Limited



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December 12, 2018

All Customers  
Other Interested Parties:

Re. 2018 Annual Plan

NOVA Gas Transmission Ltd (“NGTL”) has posted its 2018 Annual Plan on TransCanada PipeLines Limited’s website at:

<http://www.tccustomerexpress.com/5869.html>.

Customers and other interested parties are encouraged to communicate their suggestions and comments regarding the development of the NGTL System to me at 403.920.6826.

Yours truly,  
NOVA Gas Transmission Ltd.  
A wholly owned subsidiary of TransCanada PipeLines Limited



Mike Ritsch  
Director, System Design  
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## EXECUTIVE SUMMARY

The 2018 Annual Plan provides NOVA Gas Transmission Ltd.'s (NGTL's) customers and other interested parties an overview of potential NGTL System facilities that are expected to be applied for in the 2018/19 Gas Year. The 2018 Annual Plan describes NGTL's long-term outlook for receipts, deliveries, peak expected flows, proposed facilities, and design flow requirements supporting these proposed facilities. This 2018 Annual Plan is based on NGTL's June 2018 Design Forecast of receipts and deliveries.

Since the release of the 2017 Annual Plan, NGTL has identified a number of facility projects. NGTL's Tolls, Tariff, Facilities and Procedures (TTFP) Committee has been notified of these facilities, and they are summarized in *Appendix 2: Facility Status Update*.

NGTL provides commercial services under the NGTL Tariff using the combined assets of the NGTL System and the ATCO Pipelines (AP) System. NGTL follows facility planning processes to identify facilities required for the combined assets in the NGTL and AP footprints. For an overview of these processes, see the *Facilities Design Methodology* document and the *Guidelines for New Facilities* document. NGTL files facility applications with the National Energy Board (NEB) for facility additions on the NGTL System within the NGTL footprint. AP files facility applications with the Alberta Utilities Commission (AUC) for facility additions on the AP System within the AP footprint.

The facilities identified in this Annual Plan were presented to the TTFP Committee on November 14, 2018. New facilities proposed after issuance of this Annual Plan will be shown in the *2019 Facility Status Update (NGTL 2019 Update)*, which can be accessed at <http://www.tccustomerexpress.com/871.html>.

For the 9 facilities projects identified in the 2018 Annual Plan, see Table E-1.

**Table E-1: Proposed Facilities Additions**

Project Area	Proposed Facilities	Annual Plan Reference	Description	Target In-Service Date	Regulator	Capital Cost (\$ Millions)
<b>Customer Specific Facilities</b>						
Peace River	Cutbank River Lateral Expansion	Section 3	13 km NPS 16 18 km NPS 30	Q2 2021	NEB	97
<b>Aggregate System Facilities – For Central Area Demands</b>						
Peace River	Vetchland C/S Unit Addition & Coolers	Section 2	30 MW	Nov-21	NEB	137
Peace River	Edson Mainline Loop No.4 (Alford Creek)	Section 2	45 km NPS 48	Apr-22	NEB	269
Peace River	Edson Mainline Loop No.4 (Elk River)	Section 2	40 km NPS 48	Apr-22	NEB	240
Mainline	Princess C/S Unit Addition & Coolers	Section 2	30 MW	Apr-22	NEB	137
<b>Aggregate System Facilities – For North of Bens Area Demands</b>						
Peace River	Hidden Lake C/S Unit Addition	Section 2	30 MW	Apr-22	NEB	137
North & East	NCC Loop – North Star Section 2	Section 2	24 km NPS 48	Apr-22	NEB	155
North & East	NCC Loop – Red Earth Section 3	Section 2	32 km NPS 48	Apr-22	NEB	205
Peace River	NWML Loop No.2 – Bear Canyon Extension Section	Section 2	28 km NPS 36	Apr-22	NEB	134
<b>Total</b>						<b>1,511</b>

The Cutbank River Lateral Expansion is required to accommodate contract receipt requirements in the Cutbank area.

The Aggregate System Facilities for Central Area Demands are required to transport growing aggregate system supply in the Peace River Project Area to satisfy growing intra-system demands in central and southern Alberta.

The Aggregate System Facilities for North of Bens Area Demands are required to transport growing aggregate system supply in the Peace River Project Area to satisfy growing intra-system demands in the northeast Alberta.

This 2018 Annual Plan includes the following sections:

- Executive Summary
- Chapter 1: Design Forecast
- Chapter 2: Design Flow and Mainline Facilities
- Chapter 3: Extensions, Lateral Loops and Meter Stations
- Appendix 1: Glossary of Terms
- Appendix 2: Facility Status Update

- Appendix 3: System Map (expected in March 2018)
- Appendix 4: Unit Transportation Costs

Electronic versions of the Annual Plan, the *Facilities Design Methodology* document, and the *Guidelines for New Facilities* document can be accessed at

<http://www.tccustomerexpress.com/871.html>.

Customers and other interested parties are encouraged to communicate their suggestions, comments and questions to NGTL regarding the 2018 Annual Plan to:

- Darryn Rouillard, Manager, Mainline Planning West (403) 920-6341
- Murray Ferraton, Manager, Customer Solutions (403) 920-5323
- Karen Hill, Manager, Receipt and Delivery Forecasting (403) 920-5622
- Mike Ritsch, Director, System Design (403) 920-6826

## 1.0 DESIGN FORECAST

### 1.1 INTRODUCTION

This Annual Plan is based on the June 2018 Design Forecast of receipts and deliveries for the NGTL System. An overview of the June 2018 Design Forecast was presented at the November 14, 2018 TTFP meeting.

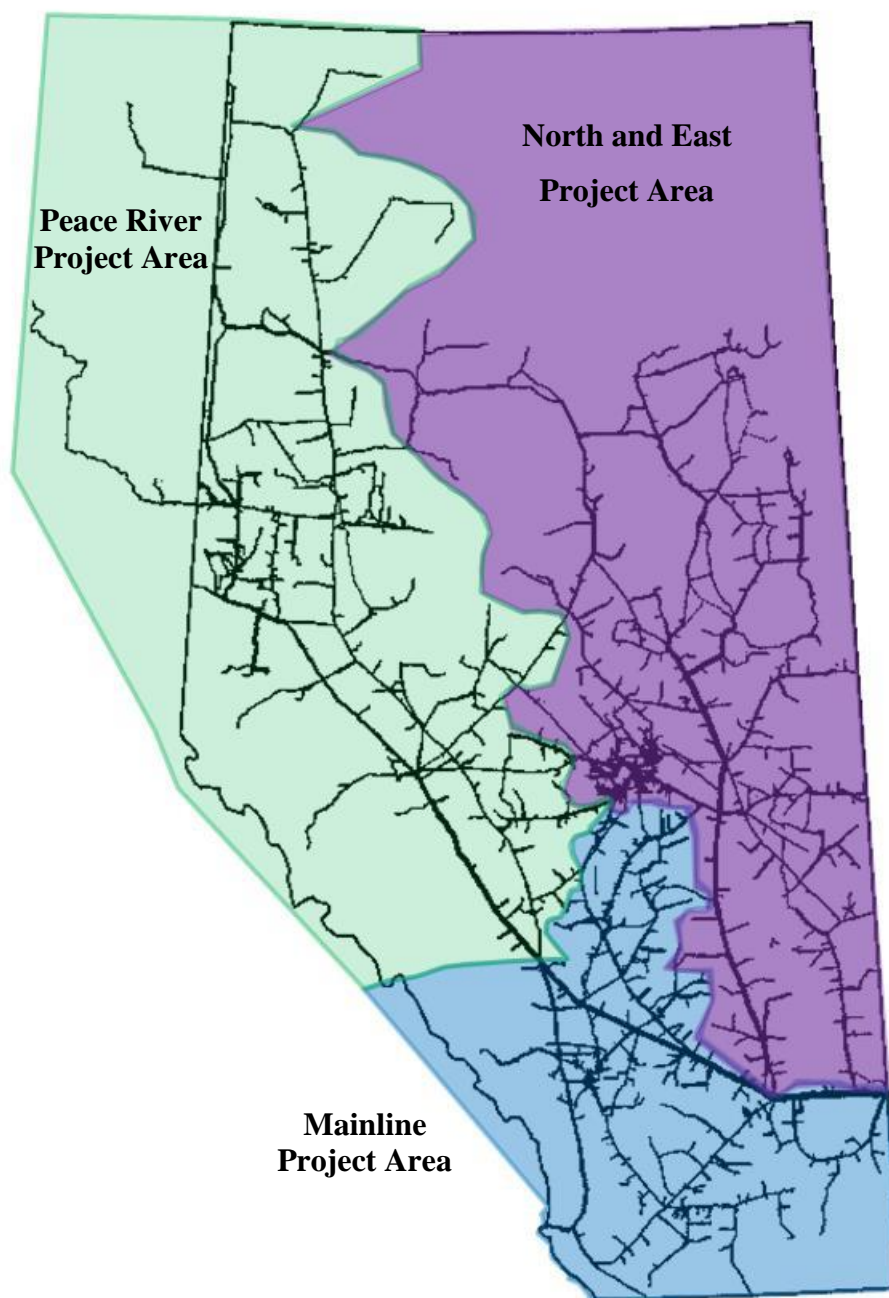
This section describes:

- economic assumptions used in developing the 2018 Design Forecast
- receipt and delivery forecasts for the NGTL System
- supply contribution, including winter withdrawal from storage facilities, used in the design process

For further information on forecasting methodology, see *Facilities Design Methodology*, Section 4.4: Design Forecast Methodology, which can be accessed at <http://www.tccustomerexpress.com/871.html>

In order to highlight the regional forecast differences on the NGTL System, this section references the three Project Areas as per the NGTL tariff. Figure 1-1 depicts the three Project Areas.

**Figure 1-1: NGTL Project Areas**



## 1.2 ECONOMIC ASSUMPTIONS

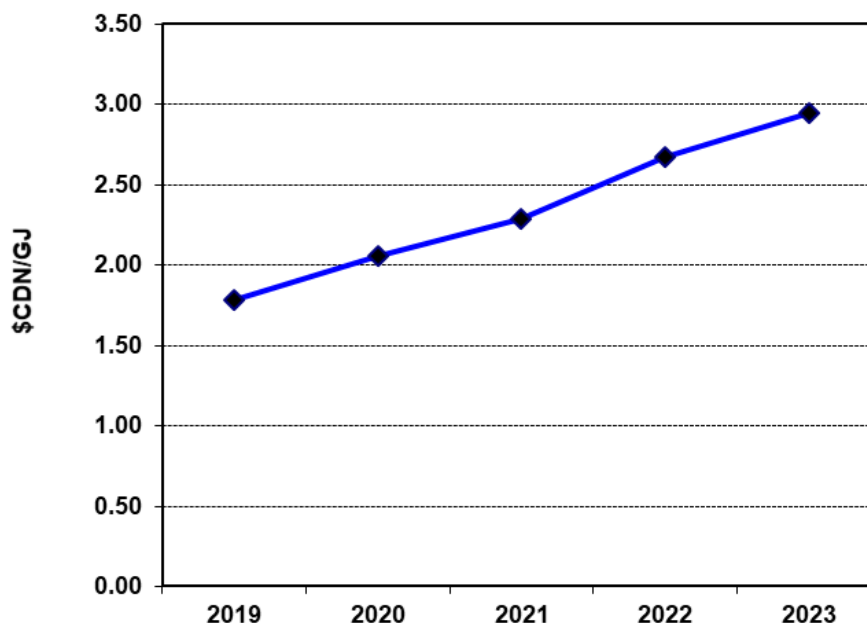
### 1.2.1 General Assumptions

The following assumptions, developed in early 2018, reflect broader trends in the North American economy and energy markets, and underlie the forecast of receipts and deliveries:

- Over the next several years, North American natural gas demand will increase, led by the electrical generation and industrial sectors as well as U.S. LNG (Liquified Natural Gas) exports.
- In the US, industrial growth is broadly based, while the oil sands and electrical generation lead the sector's growth in Western Canada.
- A number of policy drivers at the provincial and federal level, in combination with low natural gas prices, are influencing an acceleration of gas-fired electricity generation growth relative to previous forecasts.
- LNG export projects are being developed in both the U.S. and Canada. Those in the US started exporting in 2016 and will continue to grow. Canada LNG exports are expected to begin in 2022 with Woodfibre LNG followed by LNG Canada in 2024.
- Low cost Appalachian supplies are exerting more influence on North American prices, and NIT continues to price below Henry Hub as traditional markets for Western Canadian supplies are challenged by short-term availability of egress capacity and competing basins.
- New supply must continually be developed to maintain and/or grow the supply in the basin due to the natural declines of existing supply. In 2018, existing raw gas supply in the basin declined nearly 3 Bcf/d. NGTL receives roughly 75% of production the basin.
- NIT/AECO prices are expected to grow to \$2.95Cdn/GJ by 2023.

### 1.2.2 Average Natural Gas Price Forecast

TransCanada considers commodity pricing to determine the economic viability of future production. The 2018 natural gas price forecast developed by TransCanada is shown in Figure 1-2.

**Figure 1-2: Average Nominal NIT Price**

### 1.3 GAS DELIVERY FORECAST

Several sources of information were considered in developing the gas delivery forecast. First, operators of downstream facilities such as connecting pipelines, local distribution companies (LDCs), and industrial plants were requested to provide a forecast of their maximum, average, and minimum requirements for deliveries from the NGTL System over the next 10 years. The forecasts were analyzed and compared with historical flow patterns at NGTL Delivery Points. In cases where NGTL's analysis differed substantially from the operator's forecast, NGTL contacted the operator and either the operator's forecast was revised or NGTL adjusted its analysis. In cases where the operator did not provide a forecast, NGTL based its forecast on historical flows and growth rates for specific demand sectors.

Deliveries to intra markets on the NGTL System are forecasted to rise, primarily due to industrial demand in the oil sands sector and gas-fired electrical generation. At major Export Points, throughput increases compared to recent years.

**1.3.1 Average Annual Delivery Forecast**

Forecast deliveries are expressed as an average daily flow. The Average Annual Delivery Forecast is the aggregate forecast deliveries for the NGTL System. The Average Annual Delivery Forecast, for Gas Years 2019 through 2023 are listed by Delivery Type in Table 1-1 and further detailed by Project Area in Table 1-2.

**Table 1-1: System Average Annual Delivery Forecast by Delivery Type**

Delivery Type	June 2018 Design Forecast (10 <sup>6</sup> m <sup>3</sup> /d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Export	191.7	192.3	203.4	206.8	210.2
Intra System	161.8	164.6	172.5	174.0	177.2
<b>Total System</b>	<b>353.6</b>	<b>356.8</b>	<b>375.9</b>	<b>380.8</b>	<b>387.4</b>
Delivery Type	June 2018 Design Forecast (Bcf/d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Export	6.8	6.8	7.2	7.3	7.4
Intra System	5.7	5.8	6.1	6.1	6.3
<b>Total System</b>	<b>12.5</b>	<b>12.6</b>	<b>13.3</b>	<b>13.4</b>	<b>13.7</b>
Note: Totals for Receipt & Delivery may not align due to rounding. Volumes expressed as an average daily flow for each gas year, at 101.325 kPa and 15°C.					

**Table 1-2: Intra System Deliveries – Average Annual Delivery Forecast by Project Area**

Project Area	June 2018 Design Forecast (10 <sup>6</sup> m <sup>3</sup> /d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Peace River	5.6	6.0	6.1	6.2	7.4
North and East	112.3	114.5	121.4	122.5	124.4
Mainline	43.9	44.1	45.0	45.3	45.4
<b>Total</b>	<b>161.8</b>	<b>164.6</b>	<b>172.5</b>	<b>174.0</b>	<b>177.2</b>
Project Area	June 2018 Design Forecast (Bcf/d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Peace River	0.2	0.2	0.2	0.2	0.3
North and East	4.0	4.0	4.3	4.3	4.4
Mainline	1.6	1.6	1.6	1.6	1.6
<b>Total</b>	<b>5.7</b>	<b>5.8</b>	<b>6.1</b>	<b>6.1</b>	<b>6.3</b>
Note: Totals for Receipt & Delivery may not align due to rounding. Volumes expressed as an average daily flow for each Gas Year.					

**1.3.2 Maximum Day Delivery Forecast**

Peak deliveries (Maximum Day Delivery) are also forecast for the NGTL Delivery Points and are based on customer input, market conditions, firm transportation contracts, and historical flows.

A summary of the June 2018 Design Forecast winter and summer Maximum Day Delivery by Project Area for Intra System Deliveries is provided in Table 1-3 for winter and Table 1-4 for summer.

**Table 1-3: Winter Maximum Day Intra System Delivery Forecast**

Project Area	June 2018 Design Forecast (10 <sup>6</sup> m <sup>3</sup> /d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Peace River	19.2	17.7	16.8	24.8	27.4
North and East	170.3	174.4	185.0	188.5	191.7
Mainline	85.2	86.8	87.9	88.5	89.4
<b>Total</b>	<b>274.7</b>	<b>278.9</b>	<b>289.6</b>	<b>301.8</b>	<b>308.5</b>
Project Area	June 2018 Design Forecast (Bcf/d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Peace River	0.7	0.6	0.6	0.9	1.0
North and East	6.0	6.2	6.5	6.7	6.8
Mainline	3.0	3.1	3.1	3.1	3.2
<b>Total</b>	<b>9.7</b>	<b>9.8</b>	<b>10.2</b>	<b>10.7</b>	<b>10.9</b>
Note: Totals for Receipt & Delivery may not align due to rounding					

**Table 1-4: Summer Maximum Day Intra System Delivery Forecast**

Project Area	June 2018 Design Forecast (10 <sup>6</sup> m <sup>3</sup> /d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Peace River	18.4	14.8	13.9	21.9	24.5
North and East	153.2	155.3	168.0	169.0	170.7
Mainline	64.2	65.6	66.5	67.4	67.5
<b>Total</b>	<b>235.8</b>	<b>235.8</b>	<b>248.4</b>	<b>258.3</b>	<b>262.7</b>
Project Area	June 2018 Design Forecast (Bcf/d)				

	2018/19	2019/20	2020/21	2021/22	2022/23
Peace River	0.6	0.5	0.5	0.8	0.9
North and East	5.4	5.5	5.9	6.0	6.0
Mainline	2.3	2.3	2.3	2.4	2.4
<b>Total</b>	<b>8.3</b>	<b>8.3</b>	<b>8.8</b>	<b>9.1</b>	<b>9.3</b>
Note: Totals for Receipt & Delivery may not align due to rounding					

## 1.4 RECEIPT FORECAST

NGTL develops a Receipt Forecast on an average annual basis using information collected from several sources, including upstream information from customers, industry publications and government agencies.

- For unconventional resources such as shale and tight gas, NGTL uses well based forecasting methods and models to generate forecasts of future production. Factors such as total number of drilling locations available, well production profiles, pace of development, material and equipment availability, potential capital requirements, and access constraints when developing a forecast of supply are considered.
- For conventional production, there has been little to no activity in the last few years. NGTL anticipates that conventional supply will continue to decline.

Exploration activity focused on unconventional gas has resulted in increasing Montney and Deep Basin gas volumes entering the NGTL System primarily through the Peace River Project Area. The incremental shale and tight gas supply is expected to more than offset existing production declines, and will gradually increase system supply to nearly 13.7 Bcf/d in 2022/23.

Gas supplied from storage facilities was not included in the data presented in this section. For information pertaining to gas supply from Commercial Storage Facilities, see Section 1.6.

**1.4.1 Average Receipt Forecast**

The Average Receipt Forecast is the forecast aggregate receipts for the NGTL System for the 2019 through 2023 Gas Years. A summary of System Average Receipts by Gas Year and Project Area is expressed as an average daily flow and shown in Table 1-5.

**Table 1-5: System Average Receipts**

Project Area	June 2018 Design Forecast (10 <sup>6</sup> m <sup>3</sup> /d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Peace River	291.6	302.9	321.7	329.9	338.8
North and East	13.9	13.1	12.4	11.8	11.3
Mainline	48.3	45.0	41.9	39.5	37.6
<b>Total</b>	<b>353.8</b>	<b>361.0</b>	<b>376.0</b>	<b>381.2</b>	<b>387.7</b>
Project Area	June 2018 Design Forecast (Bcf/d)				
	2018/19	2019/20	2020/21	2021/22	2022/23
Peace River	10.3	10.7	11.4	11.6	12.0
North and East	0.5	0.5	0.4	0.4	0.4
Mainline	1.7	1.6	1.5	1.4	1.3
<b>Total</b>	<b>12.5</b>	<b>12.7</b>	<b>13.3</b>	<b>13.5</b>	<b>13.7</b>
Note: Totals for Receipt & Delivery may not align due to rounding.					

**1.5 SUPPLY DEMAND BALANCE**

Supply received on to the NGTL System is balanced with System deliveries (net of gas in storage). System deliveries by destination are shown in Figure 1-3, while System receipts by Project Area are shown in Figure 1-4.

Figure 1-3: System Deliveries by Destination

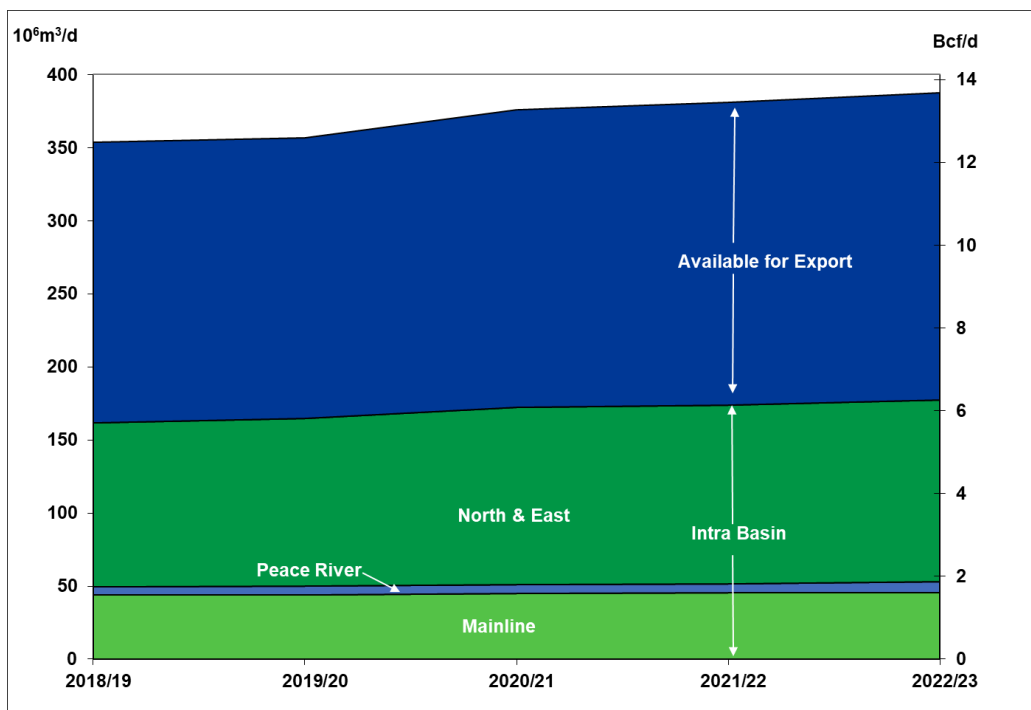
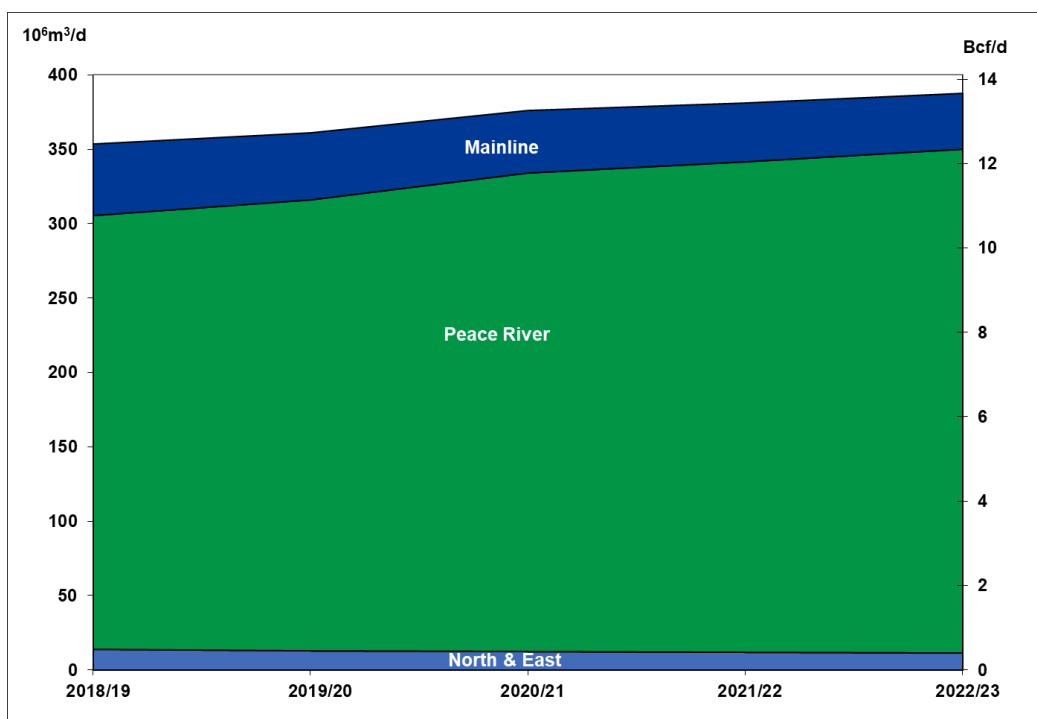


Figure 1-4: System Receipts by Project Area



## 1.6 STORAGE FACILITIES

### 1.6.1 Commercial Storage

There are eight commercial storage facilities connected to the NGTL System (AECO ‘C’, Big Eddy, Carbon, Chancellor, Crossfield East #2, January Creek, Severn Creek and Warwick Southeast Meter Stations). The total deliverability from Storage Facilities is significant, but actual maximum day receipts from storage are dependent on a number of factors, including market conditions, level of working gas in each storage facility, compression power at each storage facility, and NGTL System operations.

For design purposes, a supply contribution from Storage Facilities is used to meet peak day winter delivery requirements and provide for a better correlation between forecast design flow requirements and historical actual flows for the winter period. Historical withdrawals during recent winter periods for each Storage Facility were used to determine a reasonable expected rate of withdrawal for future winter seasons.

For the receipt meter capacity for each of the connected commercial storage facilities, see Table 1-6.

**Table 1-6: Receipt Meter Capacity from Commercial Storage Facilities**

Storage Facility	Receipt Meter Capacity from Commercial Storage Facilities – 2017/18	
	10 <sup>6</sup> m <sup>3</sup> /d	Bcf/d
AECO C	45.2	1.6
Big Eddy	41.0	1.4
Carbon	12.2	0.4
Chancellor	35.8	1.3
Crossfield East 2	16.4	0.6
January Creek	19.3	0.7
Severn Creek	11.6	0.4
Warwick Southeast	9.6	0.3

Total	191.1	6.7
Note: Storage is considered an interruptible supply source. Totals have been rounded.		

### 1.6.2 Peak Shaving Storage

The Fort Saskatchewan Salt Caverns are a peak shaving storage facility in the greater Edmonton area within the ATCO Pipeline footprint, in North of Bens Lake Design Area of the NGTL System. Similar to Commercial Storage Facilities, the total deliverability from the peak shaving Storage Facility is significant, but the actual maximum day receipt from storage depends on a number of factors, including market conditions, level of working gas, compression power at the storage facility and NGTL System operations.

For design purposes, a supply contribution from the peak shaving Storage Facility is used to meet peak day winter delivery requirements and provide for a better correlation between forecast design flow requirements and historical actual flows for the winter period. The maximum withdrawal rate and the maximum working inventory of the Storage Facility are used as the upper limits for the supply contribution provided.

## 2.0 DESIGN FLOWS AND MAINLINE FACILITIES

### 2.1 INTRODUCTION

This section contains the proposed natural gas transportation mainline facilities that may be applied for on the NGTL System in the 2018/19 Gas Year to meet the design flow requirements. Included is information regarding size, routes, locations and cost estimates.

The design flows are presented for design areas where new mainline facilities are required. Design flows are based on the June 2018 design forecast presented in Section 1, and were determined using the methodology described in *Facilities Design Methodology*, Section 3.5: Mainline Facilities Flow Determination. This document can be accessed at <http://www.tccustomerexpress.com/871.html>.

This section includes a comparison of historical flows to the design flows. Additionally, the expected design capability is shown for the Gas Year when facilities are required in each applicable design area. Where there is a shortfall between design flow and the design capability, a facility solution has been proposed. A facility application to the regulator for construction and operation is triggered by Firm Transportation (FT) contracts in excess of design capability and submitted to ensure the facility is in place in time to meet the FT requirements. Aggregated FT contract levels are also presented to indicate commercial underpinning of the proposed facilities.

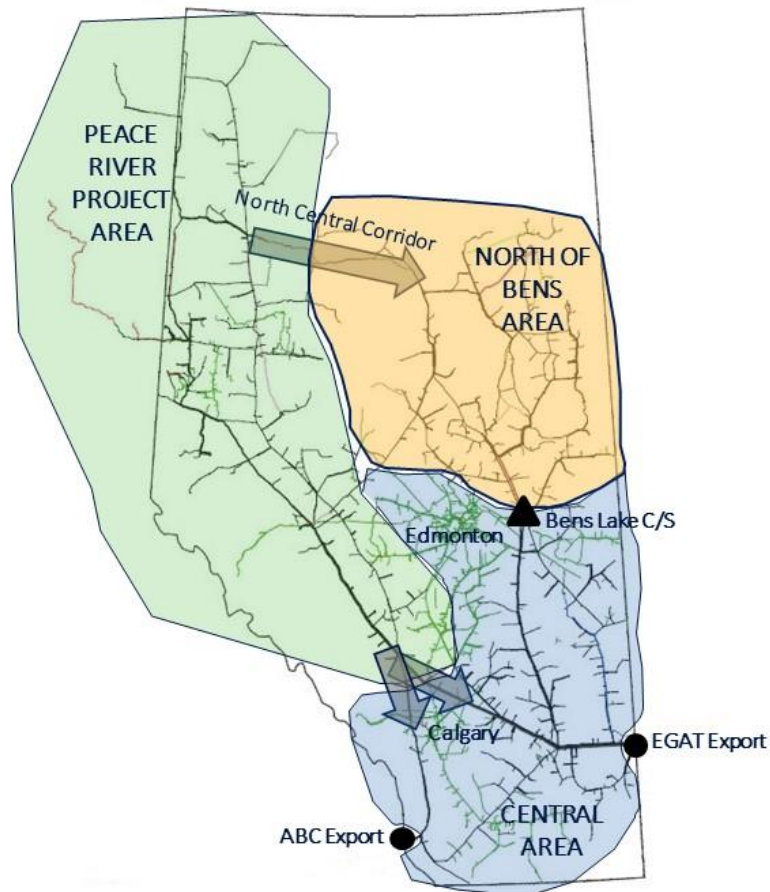
This section of the Annual Plan presents facilities grouped by common purpose. Facilities that serve the requirement to transport gas receipts in the Peace River Project Area south to meet aggregate system demands in central and southern Alberta are first presented. This is followed by facilities that serve the requirement to transport gas receipts in the Peace River Project Area across the North Central Corridor (NCC), to meet aggregate system demands in northeast Alberta. Presentation of the proposed facilities in this manner is intended to improve the clarity of their requirement and commercial underpinning.

An overview of the design flows and proposed facilities resulting from the June 2018 design forecast was presented to the TTFP on November 14, 2018.

For a summary of the status of mainline facilities that have been proposed, applied for, under construction or placed in-service since the December 2017 Annual Plan, see *Appendix 2: Facility Status Update*.

## **2.2 AGGREGATE SYSTEM REQUIREMENTS**

To provide clarity to the aggregate system requirements driving the proposed facilities, the portions of the NGTL System outside of the Peace River Project Area can be divided into the two different design areas depicted in Figure 2-1 below. This division is different than the Project Areas previously depicted in Figure 1-1 and better distinguishes the unique requirements driving the proposed facilities. The North of Bens Area is a subset of the North and East Project Area that excludes the portions of the system that are south of the Bens Lake compressor station and excludes the Edmonton area. The Central Area is the remainder of the NGTL System, outside of the Peace River Project Area and the North of Bens Area, that includes the Edmonton and Calgary areas, and excludes the Eastern Gate export point (EGAT – comprised of the Empress and McNeill export points) as well as the Alberta-BC (ABC) export point.

**Figure 2-1: Map of Design Areas**

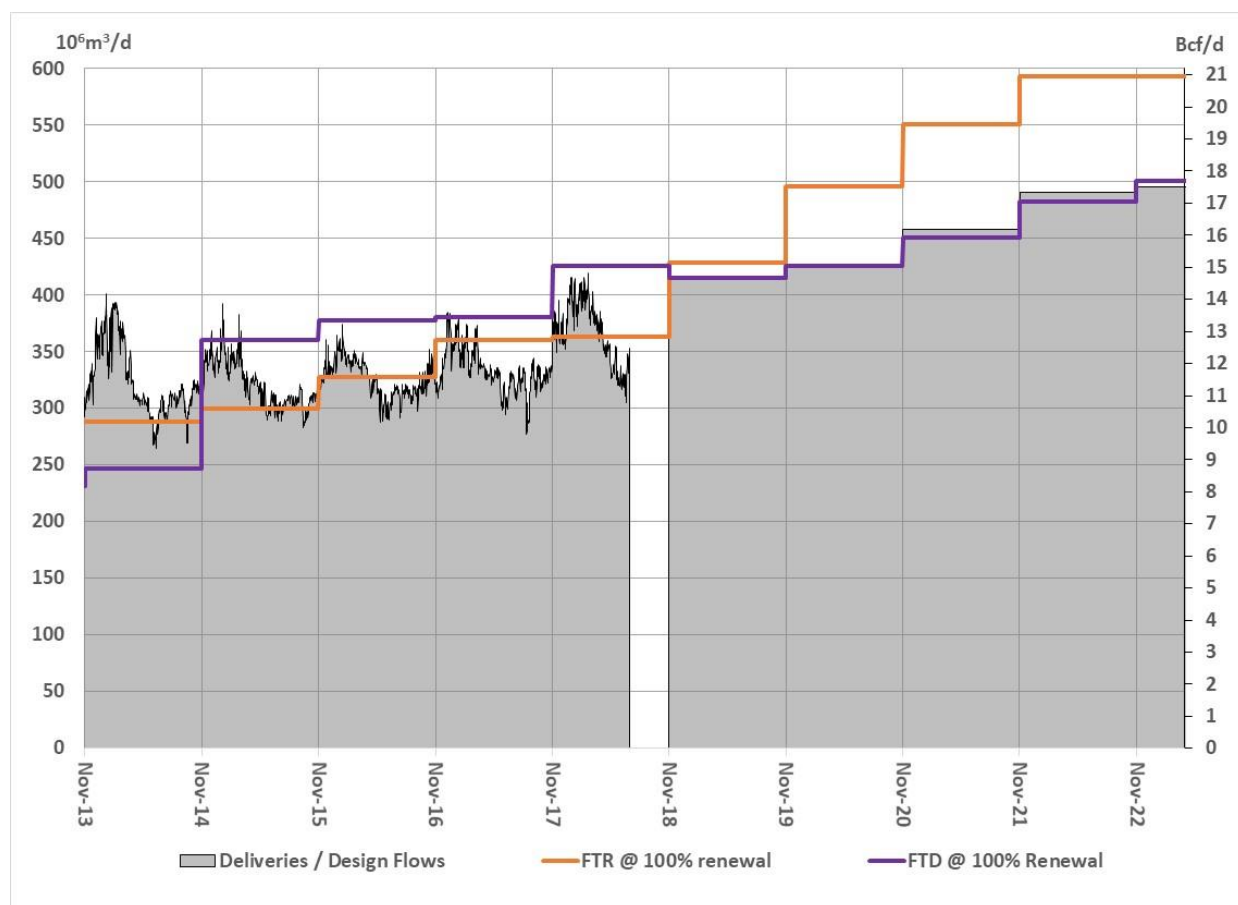
As described in Section 1, aggregate system supply continues to grow and shift towards the Peace River Project Area. Increasing supply in the Peace River Area will serve to offset supply declines in other areas of the system and increase the total system supply. Supply in the Peace River Area was ~78% of the total system supply in 2017/18 and it is the only region in the system where supply is growing. From the figures provided in Table 1-5, supply in the Peace River Area grows from 82% of the total system supply to 87% of the total system supply from 2018/19 to 2022/23, commensurate with an 10% increase in total system supply over the same period.

Also described in Section 1 is the continued increase in system demand corresponding with the increasing system supply. From the figures provided in Table 1-1, system demand grows from 12.5 Bcf/d to 13.7 Bcf/d from 2018/19 to 2022/23 to match the

growing supply. The proposed facilities will serve the demand increase from 13.4 Bcf/d in 2021/22 to 13.7 Bcf/d in 2022/23.

The design flows for the system reflect these forecasted increases in average annual total system supply and demand. Figure 2-2 shows how the system design flows at the beginning of each gas year grow from 14.7 Bcf/d to 17.5 Bcf/d from 2018/19 to 2022/23. Figure 2-2 also shows the aggregate system FT-R and FT-D levels as of November 1 annually. As can be seen, the increasing design flows are supported by increasing system FT -R and FT-D contract levels.

**Figure 2-2: Aggregate System Flows, Design Flows, and Contracts**



The proposed facilities are grouped under two different purposes:

1. Facilities that serve the requirement to transport growing gas receipts in the Peace River Project Area to growing intra-system demands in the Central Area.
2. Facilities that serve the requirement to transport growing gas receipts in the Peace River Project Area to growing intra-system demands in the North of Bens Area.

### **2.3 FACILITIES FOR CENTRAL AREA DEMANDS**

As described in Section 2.2, increasing supply in the Peace River Area will serve to increasing demands in the Central Area.

Since it represents such a large portion of total system supply, the design condition for the Peace River Area is very interdependent with total system conditions. The prevailing design condition for the Peace River Area is therefore best represented by a Total System Flow-Within condition: When total system deliveries, including deliveries in the Central Area, are at their maximum and total system receipts, a vast majority of which are from the Peace River Area, are at their peak as well. System facilities must be capable of transporting enough gas out of the Peace River Project Area to meet expected peak deliveries in the Central Area and throughout the rest of the system.

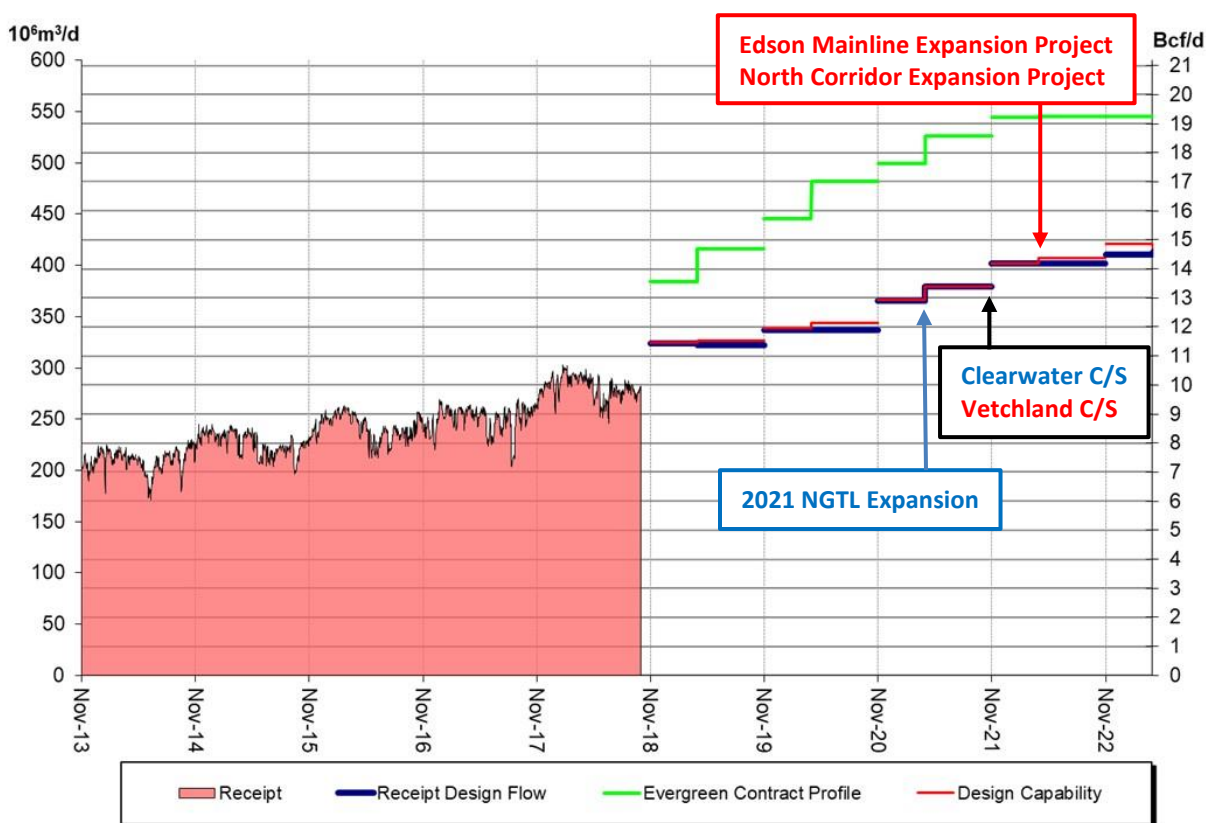
#### **2.3.1 Design Flows - Peace River Project Area**

The design flows for the Total System Flow-Within design condition in the Peace River Project Area are the maximum expected local receipts in the area. The continued receipt growth in the area will be accommodated by four proposed facilities that increase southbound capability (Vetchland Unit Addition and three facilities constituting the Edson Mainline Expansion) and four proposed facilities that increase capability across the NCC (North Corridor Expansion Project).

Figure 2-1 shows historical receipts, receipt design flow, contract levels and design capability for the Peace River Project Area. Receipt design flow rises throughout this forecast period, attributable to increasing supply in the Peace River Project Area. To

provide a correlation to the increasing design capability, in Figure 2-3 the applied-for 2021 NGTL System Expansion Project and the previously presented Clearwater Compressor Station Unit Addition are highlighted blue while the proposed facilities are highlighted red. Further details on the proposed facilities are provided in Sections 2.3.4 and 2.4.3.

**Figure 2-3: Peace River Project Area Design Chart**

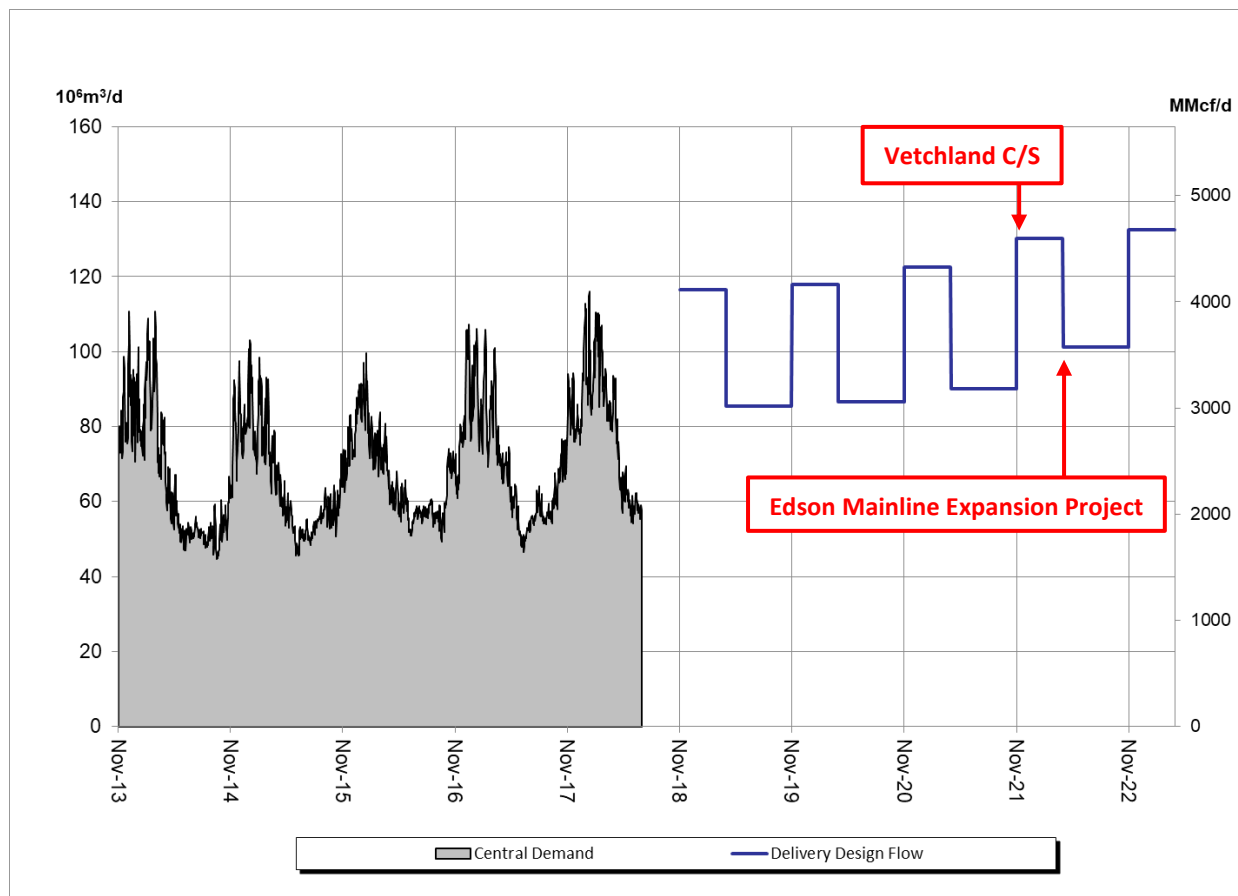


### 2.3.2 Design Flows – Central Area

As described in Section 2.3, the prevailing design condition for the Peace River Area is the Total System Flow-Within condition: When total system deliveries are at their maximum. All system deliveries, intra-system and exports alike, constitute total system deliveries. However, the purpose of the proposed facilities for Central Area demands is to serve intra-system demand increases in the Central Area. As such, a design chart for the Central Area is provided here to highlight its relationship with these proposed facilities.

Figure 2-4 shows historical demands and delivery design flows for the Central Area. Delivery design flow rises throughout this forecast period, attributable to increasing intra-system demand in the Central Area. The proposed facilities are highlighted red in Figure 2-4 to provide a correlation to the increases in design flows on November 2021 and April 2022, thereby indicating their requirement.

**Figure 2-4: Central Area Design Chart**



### 2.3.3 Design Capability – Eastern Gate and ABC Export Points

As described in Section 2.3.2, all system deliveries, intra-system and exports alike, constitute total system deliveries. The proposed facilities for Central Area demands will satisfy the intra-system demand increases in the Central Area as well as maintain the export capability required satisfy export FT. As such, the design charts for the EGAT and

ABC export points are provided here to highlight their relationship with these proposed facilities.

Figures 2-5 and 2-6 show historical exports, contract levels and design capabilities at EGAT and ABC respectively. The design capabilities for EGAT and ABC represent the system's capability to transport system supply to exports when all intra-system deliveries, including those in the Central Area, are at their maximum. As can be seen from Figures 2-5 and 2-6, export capabilities rise during the forecast period to match the contracted export FT levels. The proposed facilities for Central Area demands are required to maintain these contracted exports as well as meet the increasing Central Area delivery design flows shown in Figure 2-4.

**Figure 2-5: Eastern Gate Design Chart**

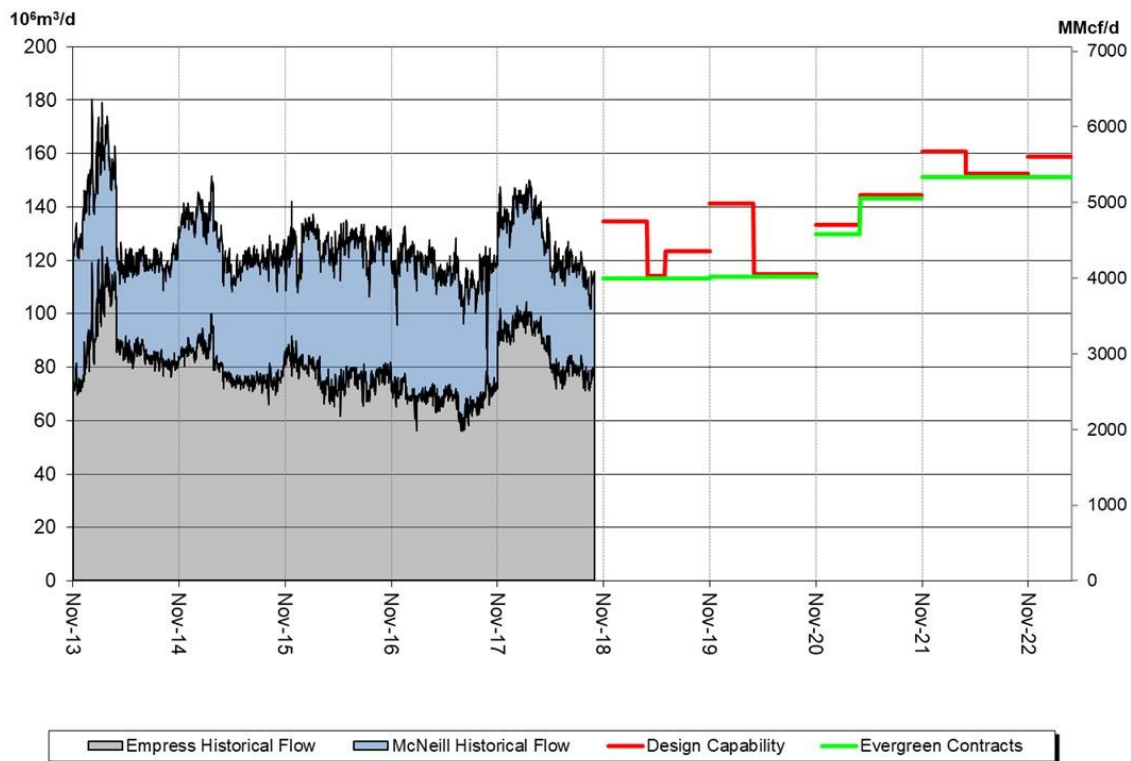
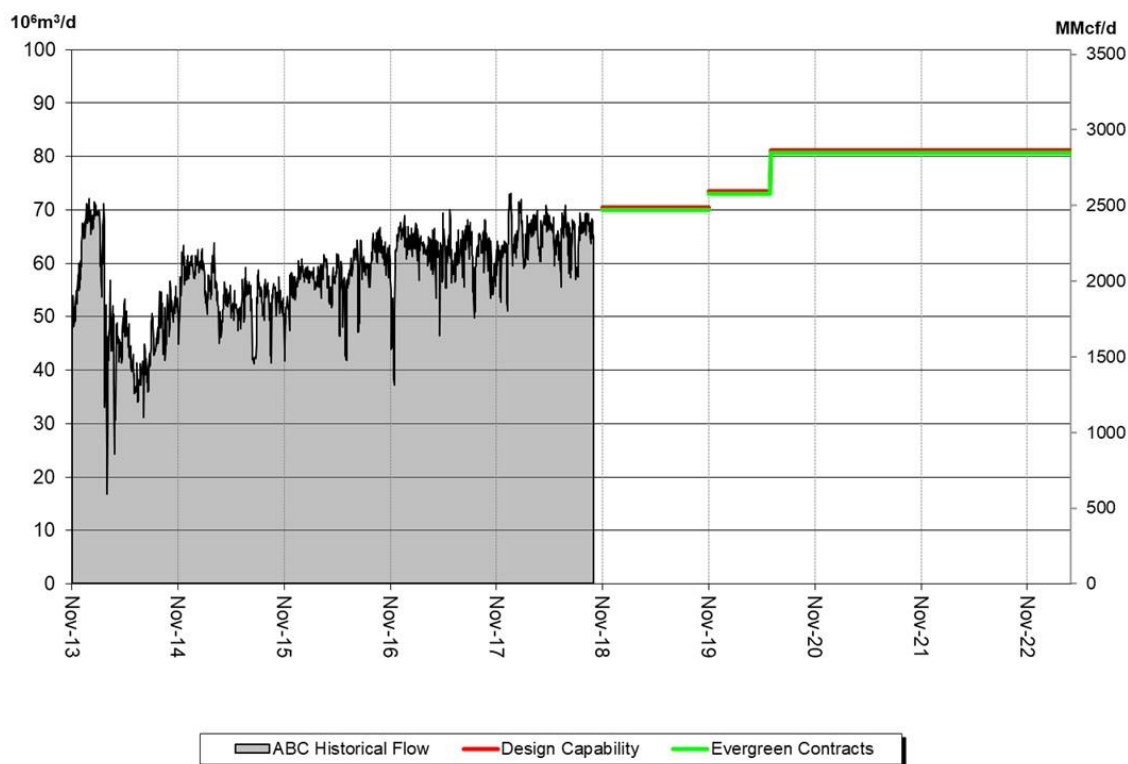
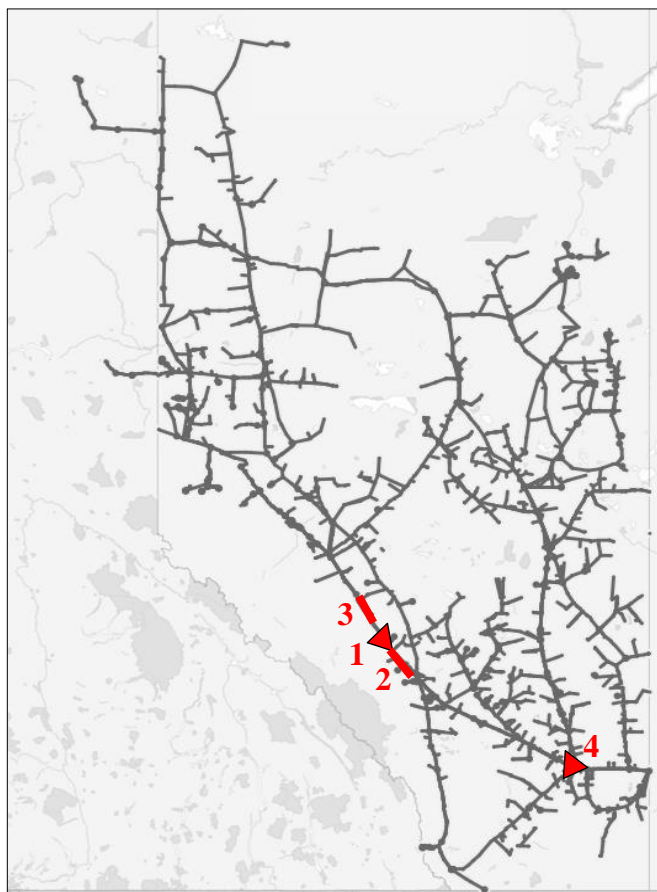


Figure 2-6: ABC Design Chart



### 2.3.4 Proposed Facilities for Central Area Demands

Figure 2-7 shows the locations of the proposed facilities required to meet Central Area Demands resulting from the Total System Flow-Within design condition.

**Figure 2-7: Proposed Facilities for Central Area Demands**

Applications for the proposed facilities are expected to be filed with the NEB in gas year 2018/2019 and the facilities are proposed to be in-service in 2021 and 2022. The three facilities proposed for April 2022 are expected to be applied for as the single Edson Mainline Expansion Project. For details on each of the proposed facilities, see Table 2-1.

**Table 2-1: Proposed Facilities for Central Area Demands**

Map Location	Applied-For Facility	Description	Target In-Service Date	Forecast Cost (\$Millions)
1	Vetchland C/S Unit Addition & Coolers	30 MW	Nov 2021	137
<b>Edson Mainline Expansion Project</b>				
2	Edson Mainline Loop No.4 (Alford Creek)	45 km NPS 48	Apr 2022	269
3	Edson Mainline Loop No.4 (Elk River)	40 km NPS 48	Apr 2022	240
4	Princess C/S Unit Addition & Coolers	30 MW	Apr 2022	117
			<b>Total</b>	<b>783</b>

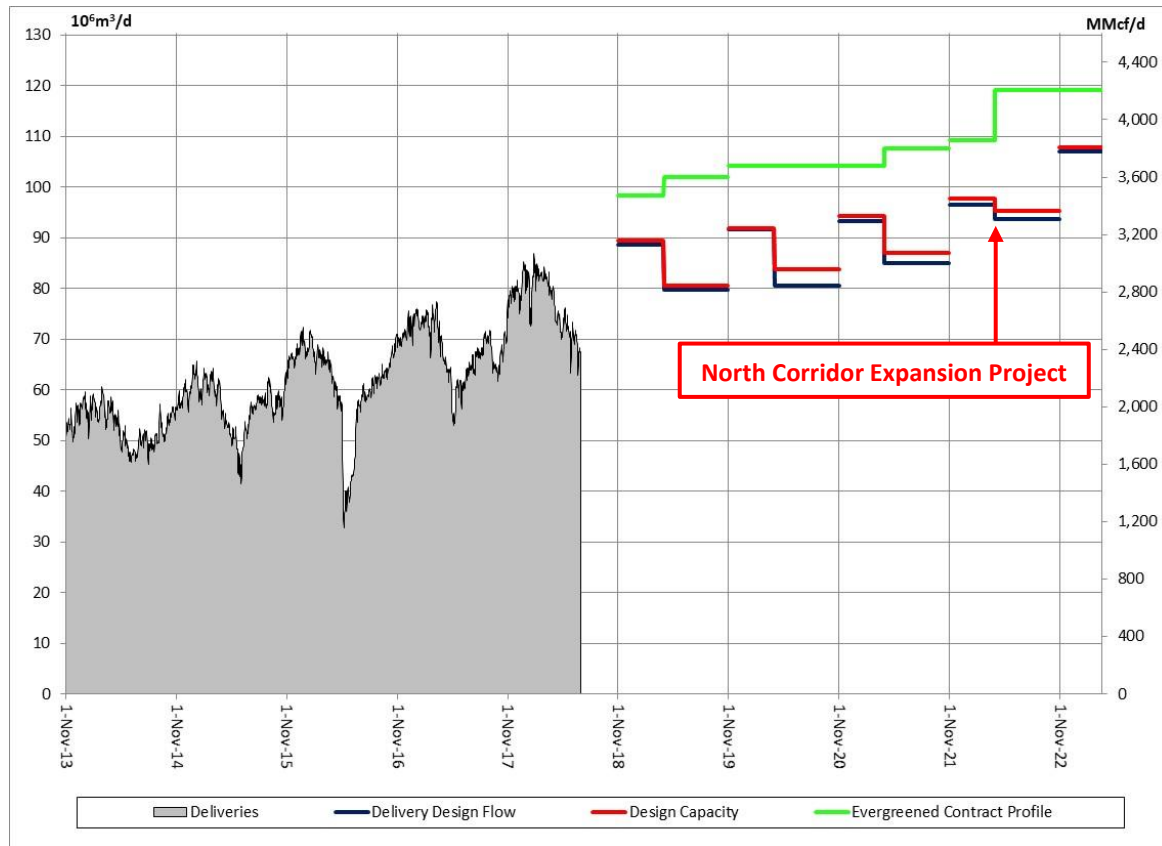
## **2.4 FACILITIES FOR NORTH OF BENS AREA DEMANDS**

As explained in Section 2.3.1, part of the receipt growth in the Peace River Project Area will be transported across the NCC to satisfy the demand growth in the North of Bens Area. As such, the same Peace River Project Area design chart (Figure 2.3) is applicable to the proposed facilities for North of Bens Area demands. The continued receipt growth in the Peace River area will be accommodated by the four proposed facilities for Central Area demands listed in Table 2-1, as well as four proposed facilities that increase capability across the NCC.

### **2.4.1 Design Flows – North of Bens Area**

Figure 2-8 shows historical flows, design flows, contract levels and design capability for the North of Bens Area. Delivery design flow rises throughout this forecast period, attributable primarily to increasing oilsands deliveries. The proposed facilities are highlighted red in Figure 2-8 to provide a correlation to the increase in design capability and indicate their requirement.

Figure 2-8: North of Bens Area Design Chart



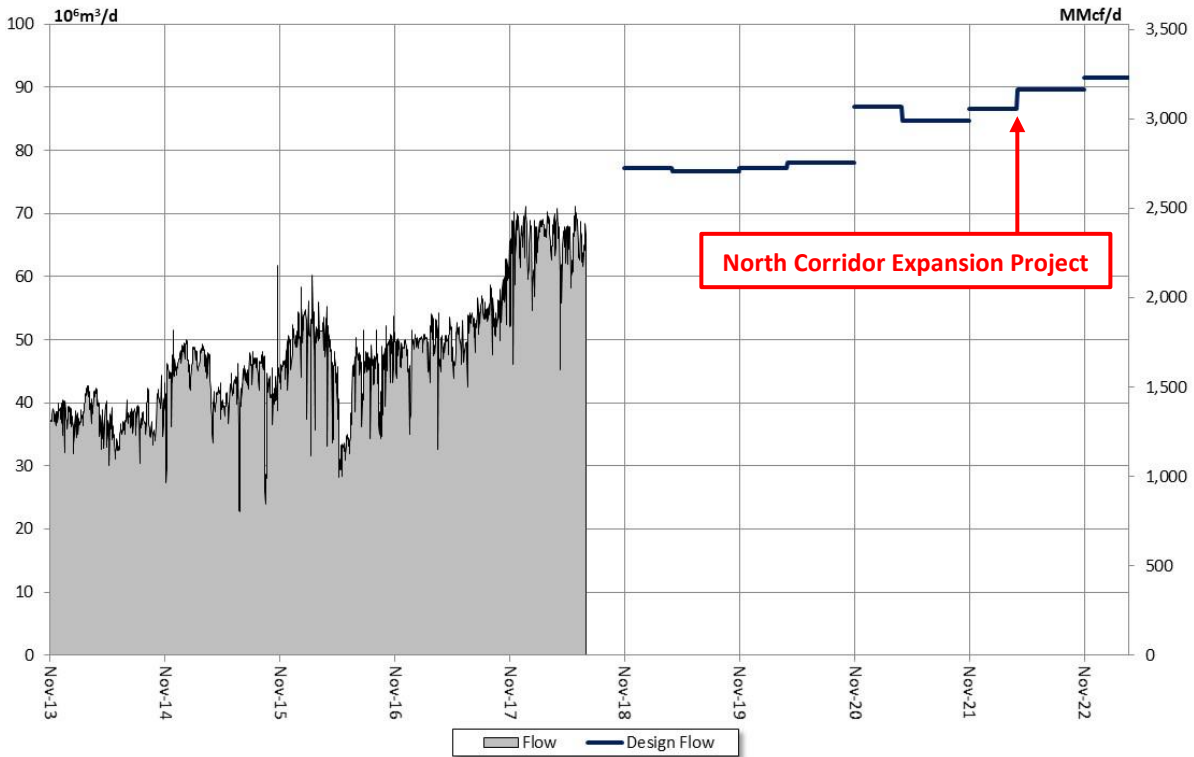
## 2.4.2 Design Flows – North Central Corridor

Demands in the North of Bens Area are primarily met through gas transported through the North Central Corridor (NCC). The NCC is a pipeline corridor that starts at the Meikle River compressor station and ends at the Buffalo Creek compressor station (see Figure 2-1). This section is intended to provide further clarity for the proposed facilities for North of Bens Area demands presenting design flows through the NCC.

Figure 2-9 shows historical and design flows through the NCC. Design flow rises throughout this forecast period, attributable to increasing deliveries in the North of Bens Area. The proposed facilities are highlighted red in Figure 2-9 to provide a correlation to the increasing design flows. The increase in NCC design flow in April 2022 is enabled by two facilities that increase the capability for gas to be transported to the start of the

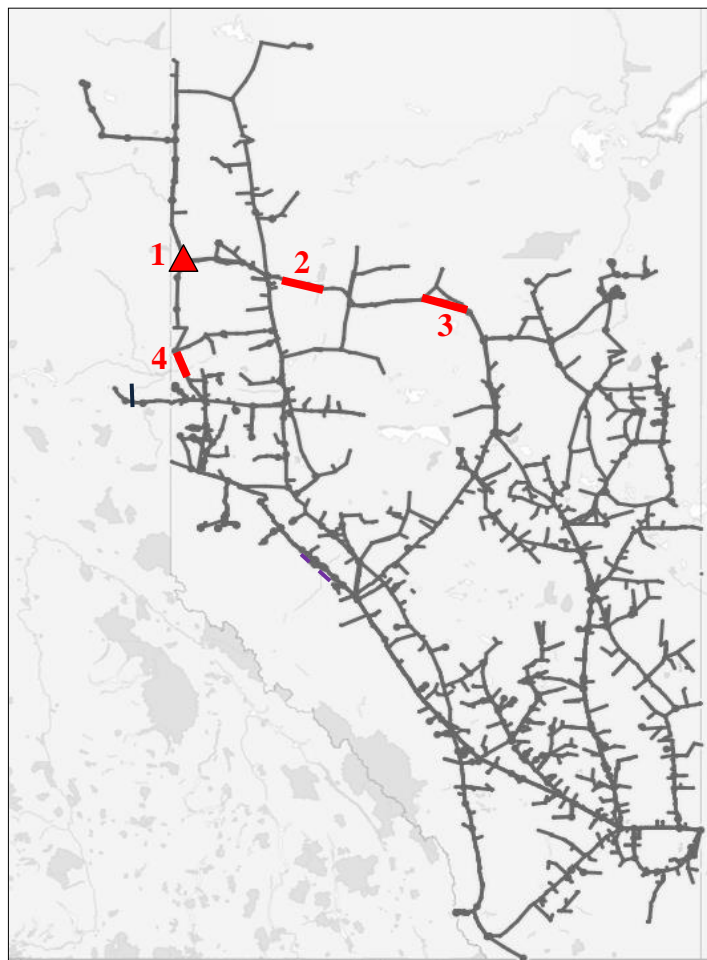
NCC (a loop of the Northwest Mainline and a unit addition at the Hidden Lake Compressor Station) as well two sections of loop on the NCC itself.

**Figure 2-9: North Central Corridor Design Chart**



### 2.4.3 Proposed Facilities for North of Bens Area Demands

Figure 2-9 shows the location of the proposed facilities required for North of Bens Area demands.

**Figure 2-9: Proposed Facilities for North of Bens Area Demands**

Applications for the proposed facilities are expected to be filed with the NEB in gas year 2018/2019 and are proposed to be in-service in 2022. For details on each of the proposed facilities, see Table 2-2.

**Table 2-2: Proposed Facilities for North of Bens Area Demands**

Map Location	Proposed Facility	Description	Target In-Service Date	Forecast Cost (\$Millions)
<b>North Corridor Expansion Project</b>				
1	Hidden Lake CS Unit Addition	30 MW	Apr 2022	137
2	NCC Loop – North Star Section 2	24 km NPS 48	Apr 2022	155
3	NCC Loop – Red Earth Section 3	32 km NPS 48	Apr 2022	205
4	NWML Loop No.2 – Bear Canyon Extension	28 km NPS 36	Apr 2022	134
			<b>Total</b>	<b>631</b>

### 3.0 EXTENSION FACILITIES, LATERAL LOOPS AND METER STATIONS

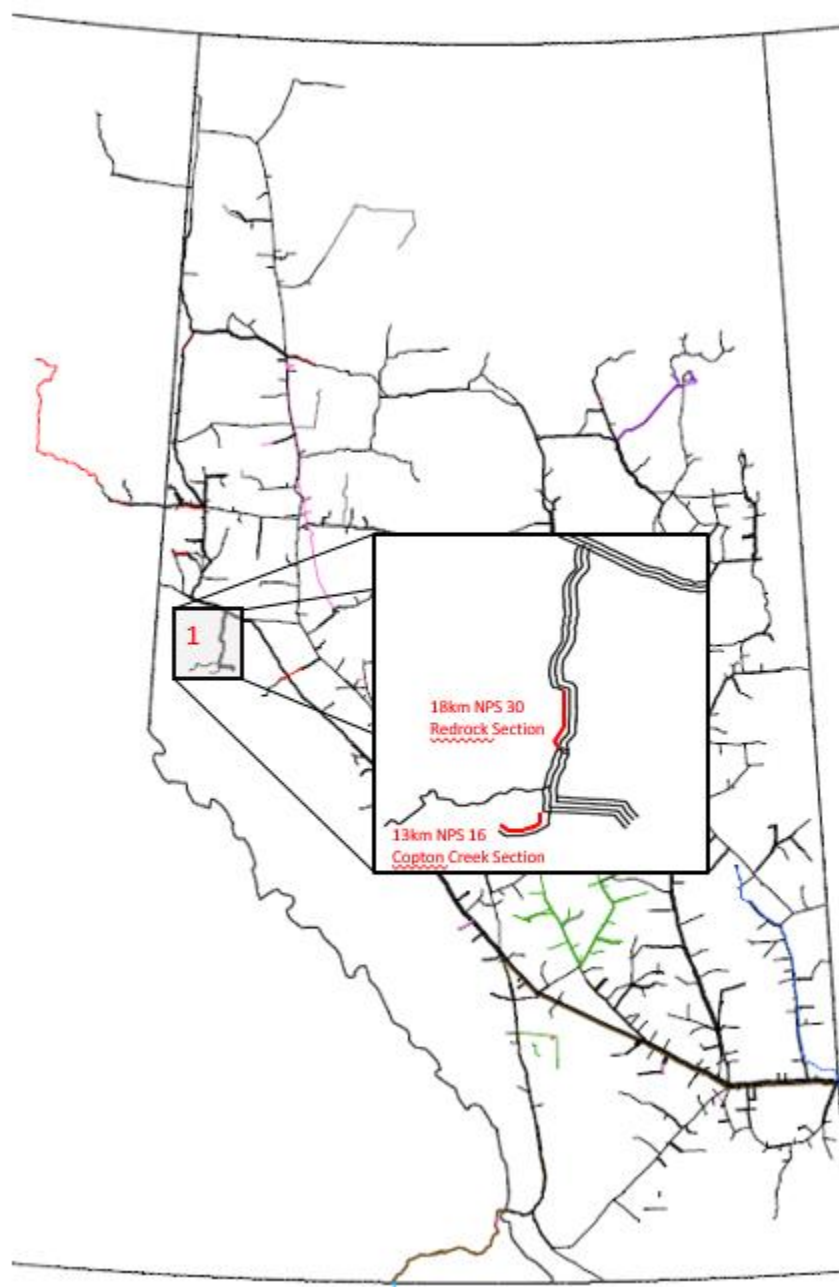
#### 3.1 INTRODUCTION

This section presents an overview of the extension facilities, lateral loops and receipt and delivery meter stations that are required to meet customer requests for firm service.

If mainline facilities are required, transportation service may be provided to customers on an interruptible basis until the required mainline facilities are in service. If a customer's request for service results in the addition of new or modified receipt meter stations, the minimum term and minimum contractual obligation are determined in accordance with the economic criteria described in the *Gas Transportation Tariff of NOVA Gas Transmission Ltd., Appendix E: Criteria for Determining Primary Term*.

For locations of the proposed extension facilities, lateral loops and meter stations, see Figure 3-1 and for facility details, see Table 3-1. These proposed facilities were presented at the TTFP meeting on November 14, 2018.

For a summary of the status of facilities that have been proposed, applied for, under construction or placed in-service since the 2017 Annual Plan, see *Appendix 2: Facility Status Update*.

**Figure 3-1: Proposed Extensions, Lateral Loops and Meter Stations****Table 3-1: Proposed Extensions, Lateral Loops and Meter Stations**

Map Location	Proposed Facilities	Description	Target In-Service Date	Forecast Cost (\$Millions)
1	Cutbank River Lateral Expansion	13 km NPS 16 (Copton Creek Section) 18 km NPS 30 (Redrock Section)	Q2 2021	97
			<b>TOTAL</b>	<b>97</b>

### 3.2 FACILITY DESCRIPTION

#### Cutbank River Lateral Expansion

The 13 km NPS 16 Cutbank River Lateral Loop (Copton Creek Section) and the 18 km (up to NPS 30) Cutbank River Lateral Loop No. 2 (Redrock Section) are required to maintain lateral system capacity to accommodate existing firm service obligations.

The target in-service date for the facilities is Q2, 2021. The facility application is scheduled to be filed by NGTL with the NEB in Q4 2019.

#### Planned Meter Stations

Meter station projects are identified and planned to meet customer requests for service on an ongoing basis throughout the year. As new meter station projects are identified the TTFP will be informed and the new meter station projects will be included in the *2019 Facility Status Update (NGTL 2019 Update)*, which can be accessed at <http://www.tccustomerexpress.com/871.html>

**Appendix 1: Glossary of Terms**

The following definitions are provided to help the reader understand the Annual Plan. The definitions are not intended to be precise or exhaustive and have been simplified for ease of reference. These definitions should not be relied on to interpret NGTL's Gas Transportation Tariff or any Service Agreement. Capitalized terms not defined here are defined in NGTL's Gas Transportation Tariff.

**Allowance for Funds Used During Construction (AFUDC)**

The capitalization of financing costs incurred during construction of new facilities before the facilities are included in rate base.

**Annual Plan**

A document outlining NGTL's planned facility additions and major modifications.

**Average Annual Delivery**

The average day delivery determined for the period of one Gas Year. All forecast years are assumed to have 365 days.

**Average Day Delivery**

The average day delivery over a given period, determined by summing the total volumes delivered divided by the number of days in that period. It is determined for either a Delivery Point or an aggregation of Delivery Points.

**Average Receipt Forecast**

The forecast of average flows expected to be received onto the NGTL System at each receipt point.

**Coincidental**

Occurring at the same time.

**Delivery Meter Station**

A facility that measures gas volumes leaving the NGTL System.

**Delivery Point**

The point where gas might be delivered to customer by company under a Schedule of Service, which shall include but not be limited to Group 1 Delivery Point, Group 2 Delivery Point, Group 3 Delivery Point, Extraction Delivery Point and Storage Delivery Point.

**Delivery Design Area**

The NGTL System is divided into five delivery design areas used to facilitate delivery service within or between Delivery Design Areas:

- Northwest Alberta and Northeast BC Delivery Area
- Northeast Delivery Area
- Southwest Delivery Area
- Southeast Delivery Area
- Edmonton and Area Delivery Area

**Demand Coincidence Factor**

A factor applied to adjust the system maximum and minimum day deliveries in a design area to a value more indicative of the expected actual peak day deliveries.

**Design Area**

The NGTL System is divided into three project areas – Peace River Project Area, North and East Project Area and Mainline Project Area. These project areas are subdivided into design and sub design areas. This subdivision allows the system to be modelled in a way that best reflects the pattern of flows in each area of the system.

**Design Capability**

The maximum volume of gas that can be transported in a pipeline system considering design assumptions. Usually presented as a percentage of design flow requirements.

**Design Flows**

Forecast of Peak Expected Flow required to be transported in a pipeline system considering design assumptions.

**Design Forecast**

Forecast of the most current projection of receipts and deliveries over a five-year design horizon.

**Expansion Facilities**

Facilities that will expand the existing NGTL System to/from the point of customer connection, including any pipeline loop of the existing system, metering and associated connection piping and system compression.

**Extension Facilities**

Facilities that connect new or incremental supply or markets to the NGTL System.

**Firm Transportation**

Service offered to customers to receive gas onto the NGTL System at Receipt Points or deliver gas off the NGTL System at Delivery Points with a high degree of reliability.

**Flow-Through Design Condition**

For the purposes of facility design, a condition for a specified area when deliveries are at their minimum and receipts are at their maximum in that area.

**Flow-Within Design Condition**

For the purposes of facility design, a condition for a specified area when deliveries are at their maximum and receipts are at their minimum in that area.

**Gas Year**

A period beginning at 800 hours (08:00) Mountain Standard Time on the first day of November in any year and ending at 800 (08:00) Mountain Standard Time on the first day of November of the next year.

**Interruptible Transportation**

Service offered to customers to receive gas onto the NGTL System at Receipt Points or deliver gas off the NGTL System at Delivery Points, provided capacity exists in the facilities, that is not required to provide firm transportation.

**Lateral**

A section of pipe that connects one or more Receipt or Delivery Points to the mainline.

**Liquefied Natural Gas (LNG)**

Natural gas that has been cooled down to liquid form for ease of transport.

**Loop**

The paralleling of an existing pipeline by another pipeline.

**Mainline**

A section of pipe, identified through application of the mainline system design assumptions, necessary to meet the aggregate requirements of all customers.

**Maximum Day Delivery**

The forecast maximum volume, included in the design, to be delivered to a Delivery Point.

**Maximum Operating Pressure**

The maximum operating pressure at which a pipeline is operated.

**Minimum Day Delivery**

The forecast minimum volume, included in the design, to be delivered to a Delivery Point.

**NPS**

Nominal pipe size, in inches.

**Non-coincidental**

Non-simultaneous occurrence.

**Peak Expected Flow**

The peak flow expected to occur at a point or points on the NGTL System. For a design area or subdesign area, this is the coincidental peak of the aggregate flow. For a single receipt point, it is equivalent to field deliverability.

**Project Area**

For design purposes, the NGTL System is divided into three project areas – Peace River Project Area, North and East Project Area and Mainline Project Area.

Dividing the system this way allows the system to be modelled in a way that best reflects the pattern of flows in each area of the system.

**Receipt Meter Station**

A facility that measures gas volumes entering the NGTL System.

**Receipt Point**

The point on the NGTL System at which gas may be received from customer by company under a Schedule of Service.

**Storage Facility**

Any commercial facility where gas is stored, that is connected to the NGTL System, and that is available to all customers.

**Summer Season**

The period starting April 1 and ending on October 31 of any calendar year.

**System Average Receipts**

The forecast of aggregate average receipts at all Receipt Points.

**Transportation Design Process**

The process that includes qualifying a customer's applications for service, designing additions to the system, sourcing all required facilities and installing facilities to meet firm transportation requests.

**Winter Season**

The period starting November 1 of any year and ending on March 31 of the following year.

**Appendix 2: 2018 Facility Status Update**

The current format of Appendix 2 requires an 8.5"x14" page size in landscape orientation. As such, it is now maintained as a separate document which can be accessed at

<http://www.tccustomerexpress.com/5869.html>.

### **Appendix 3: System Map**

The System Map, including the 2018 Annual Plan facilities, is expected to be available in March 2019 and can be accessed at <http://www.tccustomerexpress.com/5869.html>.

**Appendix 4: Unit Transportation Cost Data**

This appendix has been added to the 2018 Annual Plan pursuant to the NEB's direction contained in Order TG-004-2018 at page 3 through which the Board approved the NGTL 2018-2019 Revenue Requirement Settlement Application. It provides unit transportation cost data for three historical years and the five years covered in the 2018 Annual Plan.

The unit transportation cost data for each year was calculated by dividing revenue requirement by annual throughput.

**Unit Transportation Cost Data**  
**(2016 to 2023)**

	2016	2017	2018	2019	2020	2021	2022	2023
<b>A: Revenue Requirement</b> [\$ millions]	1,822 <sup>1</sup>	1,866 <sup>1</sup>	1,969 <sup>2</sup>	2,306 <sup>3</sup>	2,748 <sup>4</sup>	2,958 <sup>4</sup>	3,135 <sup>4</sup>	3,162 <sup>4</sup>
<b>B: Throughput</b> [10 <sup>9</sup> m <sup>3</sup> ]	116 <sup>5</sup>	119 <sup>5</sup>	122 <sup>2</sup>	130 <sup>3</sup>	132 <sup>6</sup>	138 <sup>6</sup>	139 <sup>6</sup>	142 <sup>6</sup>
<b>C: = A/B</b> <b>Unit Cost</b> [ \$ million/10 <sup>9</sup> m <sup>3</sup> ]	15.7	15.7	16.2	17.7	20.9	21.5	22.5	22.3

## Sources:

1. From NGTL's Quarterly Surveillance Reports for the period ending December 31.
2. From NGTL's 2018 Final Rates Application.
3. From NGTL's 2019 Interim Tolls Application.
4. Based on an illustrative escalation of NGTL's 2019 Revenue Requirement using simplifying assumptions for Rate Base additions and Revenue Requirement line items.
5. Based on the sum of all NGTL deliveries excluding storage injections.
6. Based on NGTL's Design Forecast prepared in June 2018.