APPENDIX IR45-4 ASSESSMENT OF POTENTIAL EFFECTS OF THE MC1 OPTION ON INDIGENOUS HEALTH AND SOCIO-ECONOMIC CONDITIONS, CULTURAL HERITAGE AND CURRENT USE FOR LANDS AND RESOURCES FOR TRADITIONAL PURPOSES AND PHYSICAL HERITAGE

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT
RESPONSE TO CEAA INFORMATION REQUEST PACKAGE 3, AUGUST 31, 2018

Appendix IR45-4 Assessment of Potential Effects of the MC1 Option on Indigenous Health and Socio-Economic Conditions, Cultural Heritage and Current Use for Lands and Resources for Traditional Purposes and Physical Heritage
May 2019

Stantec

Assessment of Potential Effects of the MC1 Option on Indigenous Health and Socio-Economic Conditions, Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes, and Physical Heritage

Prepared for:

Alberta Transportation

Project No. 989369-01

Prepared by:

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April 22, 2019

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1.0 INTRODUCTION

In August of 2018, the Canadian Environmental Assessment Agency (CEA Agency) provided an Information Request (IR 3-45) to Alberta Transportation as part of the review of the Springbank Off-stream Reservoir (SR1) Project Environmental Impact Assessment (EIA). This report has been prepared to respond to IR 3-45 (b):

> Describe how changes to the environment from the MC1 Option would affect Indigenous health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

The response to IR 3-45 (b) includes an assessment of potential effects of the MC1 Option on Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values. The information to support this assessment includes:

- Background on the Elbow River Dam at McLean Creek Option (**the MC1 Option**)
- Information on the Indigenous groups identified by the CEA Agency (2016) and considered within the assessment
- An overview of the methodology used to support the assessment of valued components (VCs) presented in the Elbow River at McLean Creek Dam Environmental Impact Screening Report (MC1 Option Screening Report), and also applied to the assessment of VCs considered in this report (Hemmera 2017)
- Assessments of potential effects of the MC1 Option on Indigenous health and socio-economic conditions, current use and cultural heritage, and physical heritage.

2.0 BACKGROUND ON MC1 OPTION

As part of the planning of the SR1 Project, Alberta Transportation investigated the MC1 Option as an alternative to the SR1 Project. The following section provides background information on the MC1 Option to provide context for the assessment presented in the report.

2.1 MC1 Option Area

The MC1 Option Area (see **Figure 1**) includes the area directly affected by the proposed works, related relocations and new construction of the MC1 Option. Physical works associated with construction and operation of the MC1 Option that define the MC1 Option Area include:

- The reservoir at probable maximum flood (PMF) level
- Embankment and excavation areas plus a 100-m buffer
- Spillways and outlet works plus a 100-m buffer
- Any areas of road relocation plus a 100-m buffer
- Areas affected by the decommissioning and relocation of recreational or other facilities
- Borrow and spoil areas
- Areas of temporary construction disturbance (e.g., laydowns, stockpile locations).

The MC1 Option footprint is situated within the MC1 Option Area and is the area directly disturbed by construction and operation activities (excluding buffers).

2.2 MC1 Option Setting and Land Use

The MC1 Option is located on the Elbow River, in the Kananaskis Improvement District (KID) (Government of Alberta 2012). The MC1 Option is situated on Crown land within the provincial Green Zone. The majority (95.0%) of the MC1 Option is on Crown land in Kananaskis Country, an area designated to encourage recreational use of lands while allowing for multiple resource uses.

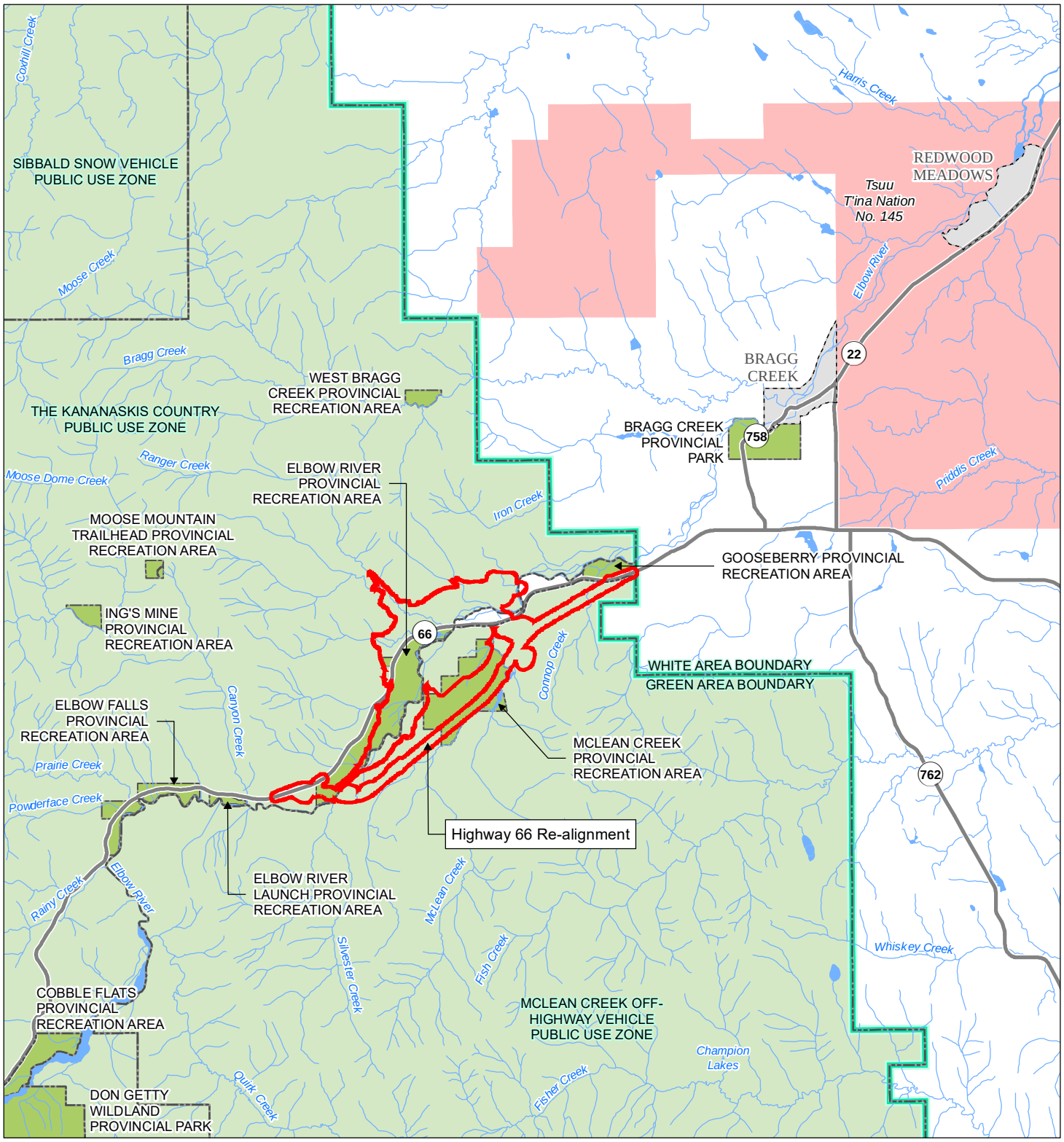
Land use management direction in Kananaskis Country is provided at a strategic level in the South Saskatchewan Regional Plan (SSRP), which encompasses the MC1 Option Area. The SSRP is developed under the *Alberta Land Stewardship Act,* SA 2009*,* c. A-26.8. The SSRP provides direction to activities on Crown lands, through existing legislation (e.g., the *Public Lands Act*, RSA 2000, c. P-40; the *Forests Act,* RSA 2000, c.F-22; and provincial park legislation. Sub-regional plans including the Kananaskis Country Recreation Policy (Government of Alberta 1999) provide direction for recreational use of public lands. The park system in the region includes provincial parks, provincial recreation areas (PRAs), wildland provincial parks, and an ecological reserve.

The Elbow River Valley is a major access point to Kananaskis Country. The southern portion of the MC1 Option Area (i.e., south of the Elbow River) is within the McLean Creek Off-highway Vehicle Public Land Use Zone (PLUZ) which has an extensive network of OHV trails, while the area north of the river is in the Kananaskis Country PLUZ, which is managed for non-motorized uses. An extensive network of trails throughout the valley on the north side of the Elbow River are used year-round for mountain biking, skiing, snowshoeing, hiking, and horse riding. The MC1 Option also overlaps with four Provincial Recreation Areas: Elbow River, McLean Creek, Gooseberry, and a portion of Elbow River Boat Launch.

Current land and resource uses include forestry, agriculture (i.e., cattle grazing), recreation, hunting and fishing, trapping, oil and gas development activities, and sand and gravel quarrying. Existing dispositions that overlap with the MC1 Option Area (i.e., permits, licenses or leases that allow a specific activity on a specific area of land) are provided in **Appendix 4**.

Existing infrastructure within the MC1 Option Area includes the Elbow Valley Ranger Station (EVRS) complex and firefighting base camp. The EVRS is located on the north side of Highway 66 along both sides of Ranger Creek, and serves staff from Alberta Forestry Protection Services, Alberta Parks and Recreation, and Alberta Fish and Wildlife. Other physical infrastructure in the MC1 Option Area includes campgrounds and other facilities at four PRAs, Highway 66, electrical transmission lines owned by Fortis Alberta, one pipeline owned by Atco Gas and Pipelines Ltd, an access road owned by Husky Oil Corporation and two abandoned well-sites owned by Shell Canada.

The MC1 Option Area is located in the Treaty 7 area. There are no First Nation reserves within the MC1 Option Area and no Métis settlements under the *Metis Settlements Act,* R.S.A. 2000, c. M-14. The Tsuut'ina Nation Indian Reserve No. 145 is located approximately 15 km downstream of the MC1 Option (**Figure 1**).



Legend

- Highway
- MC1 Option Area
- Crown Land
- Green White Area Boundary
- Park or Protected Area
- Reserve
- Urban Area

Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

Sources

- Contains information licensed under the Open Government Licence(s) - Government of Alberta
- Dam and flood details: Opus International Consultants Limited, 2017

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MC1 Option Setting

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2.3 Treaty Rights and Traditional Use Activities

In Alberta, the treaty right to hunt, fish and trap has been modified by the Natural Resources Transfer Agreement (NRTA), which forms part of the *Constitution Act, 1930*. The NRTA secures the right of First Nations to hunt, fish and trap for food on unoccupied Crown lands or other lands to which the First Nations have a right of access for the purposes of hunting, fishing or trapping.

The MC1 Option is primarily located on Crown land. As such and based on the nature of existing land use in the MC1 Option Area, the area is likely to support the exercise of treaty rights and traditional use activities. For the purposes of the assessments presented in this report, it has been assumed that Indigenous groups are exercising rights and practicing traditional uses in the MC1 Option Area.

3.0 IDENTIFIED INDIGENOUS GROUPS

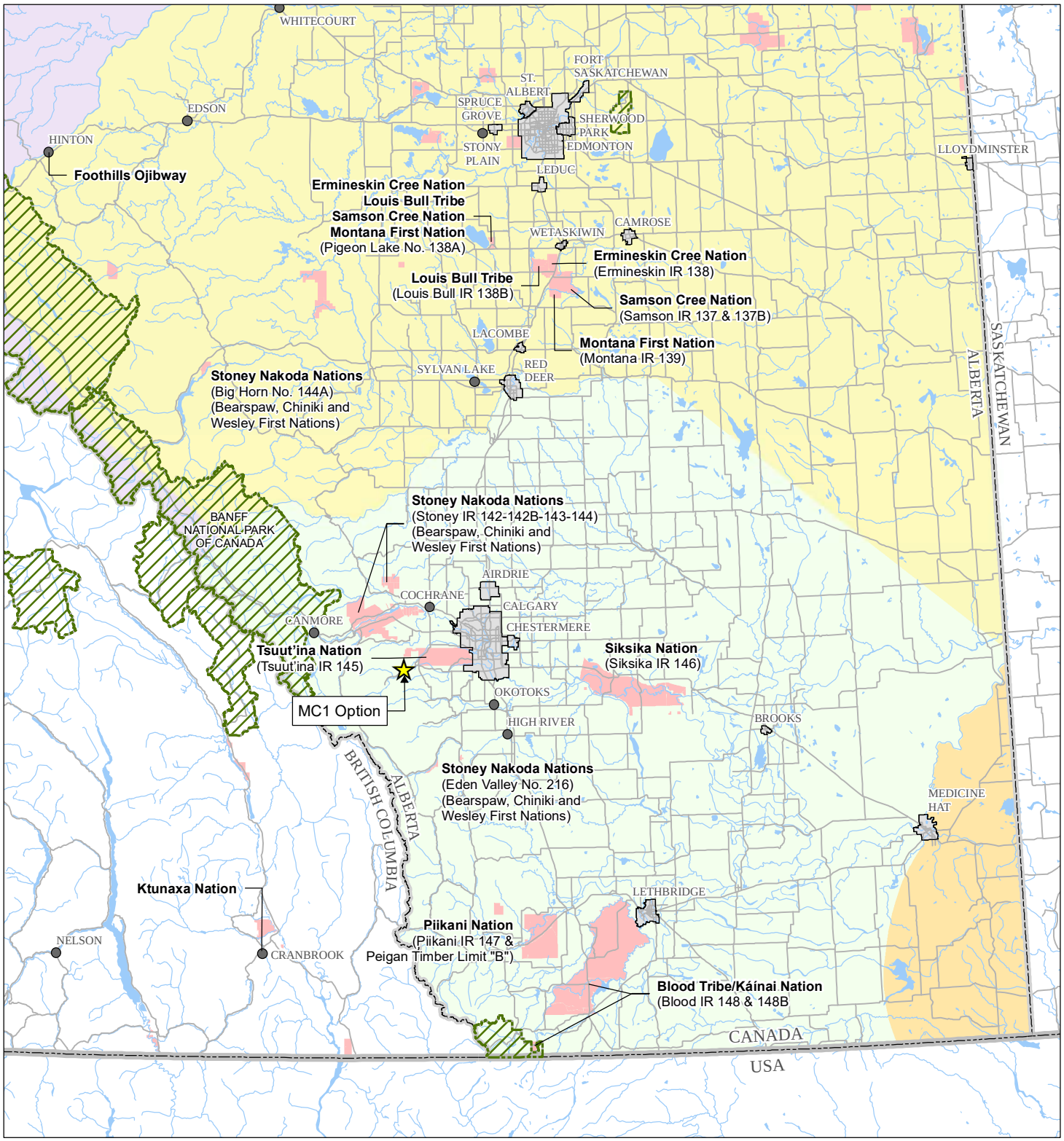
The MC1 Option Screening Report identified the Treaty 7 Nations in **Table 1** as having the potential to be affected and/or have interests in the MC1 Option Area (Table 2.1-4 in Volume 1 of the MC1 Option Screening Report) (Hemmera 2017). The location of the MC1 Option and Treaty area boundaries are shown in **Figure 2**.

In the context of the SR1 Project, the CEA Agency directed Indigenous engagement with eight additional Indigenous groups in the "Guidelines for the Preparation of an Environmental Impact Statement, Springbank Off-Stream Reservoir Project" (2016). This assessment considers the same Indigenous groups.

Table 1 Indigenous Groups Considered in the MC1 Option Indigenous Interests Effects Assessment

Indigenous Group	Approximate Distance from MC1 Option Area (km) (Administrative Centre)
Treaty 7 Nations	
Tsuut'ina Nation (Tsuut'ina IR 145)	East 36 km (Tsuut'ina Nation, AB)
Stoney Nakoda Nations (Stoney IR 142-143-144, Bighorn 144A, Eden Valley 216) (Bearspaw, Chiniki and Wesley First Nations)	North 31 km (Morley, AB)
Siksika Nation (Siksika IR 146)	East 112 km (Siksika Nation, AB)
Piikani Nation (Piikani IR 147)	South 169 km (Brocket, AB)
Blood Tribe/Káínai Nation (Blood IR 148)	South 200 km (Stand Off, AB)
Treaty 6 Nations	
Ermineskin Cree Nation (Ermineskin IR 138, Pigeon Lake 138A)	North 221 km (Maskwacis, AB)
Louis Bull Tribe (Louis Bull IR 138B, Pigeon Lake 138A)	
Montana First Nation (Montana IR 139, Pigeon Lake 138A)	
Samson Cree Nation (Samson IR 137, Pigeon Lake 138A)	
Other	
Foothills Ojibway Society	Northwest 338 km (Hinton, AB)
Ktunaxa Nation Council	Southwest 179 km (Cranbrook, BC)
Métis Nation British Columbia	Surrey, BC
Métis Nation of Alberta (Region 3)	Calgary, AB

Sources: CEA Agency 2016, Government of Canada 2017



Legend

- MC1 Option
- Community
- International Border
- Provincial Boundary
- Highway
- Watercourse
- National Park
- Reserve
- Urban Area
- Waterbody

Treaty Areas

- Treaty 4 (1874)
- Treaty 6 (1876)
- Treaty 7 (1877)
- Treaty 8 (1899)

Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

Sources

- Contains information licensed under the Open Government Licences - Alberta, British Columbia, and Canada

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Location of MC1 Option and Treaty Areas

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4.0 ASSESSMENT METHODOLOGY

This section describes the methodology that was used to support the MC1 Option Screening Report and that has been applied to the assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values considered in this report (Hemmera 2017). The MC1 Option Screening Report was filed as part of the March 2018 EIA for the SR1 Project (Hemmera 2017).

4.1 MC1 Option Screening Report

In support of investigating the MC1 Option, as an alternative to the SR1 Project, a screening report was undertaken to identify the potential environmental effects of the MC1 Option and mitigation strategies to eliminate or reduce potential environmental effects.

The MC1 Option Screening Report was undertaken to facilitate a comparison of this alternative option with the SR1 Project. The methods used to support the assessment presented in the MC1 Option Screening Report were developed to comply with the requirements of *Addressing "Purpose of" and "Alternative Means" under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2015a), and provide an assessment of potential environmental effects and proposed mitigation in a manner that aligns as much as practical with the SR1 Project EIA (Hemmera 2017).

The following sections provide a description of the specific methods used to assess potential effects on VCs associated with construction and operation of the MC1 Option, and which have also been used to support this assessment. The information presented in this section draws from **Section 4.0 Environmental Impact Screening Methodology** of the MC1 Option Screening Report and identifies VC-specific differences in methods that may apply to the assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values (Hemmera 2017).

This section also provides an overview of information sources used to support the assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values.

4.2 Information Sources

A focused secondary literature review was conducted, using publicly available sources, to describe the Indigenous health and socio-economic conditions, cultural heritage, and the current use of lands and resources in the context of the Indigenous groups identified in **Table 1.**

Sources for the socio-economic baseline included the MC1 Option Screening Report (Hemmera 2017), other MC1 Option-specific data, government databases (e.g., Statistics Canada 2016 Census and Aboriginal Population Profiles, Indigenous and Northern Affairs First Nation Profiles), government planning documents and reports (e.g., South Saskatchewan Regional Plan: 2014 – 2024 (Government of Alberta 2017)), Indigenous group community websites and other websites, and other publicly available literature.

Key sources reviewed for the baseline sections on cultural heritage and the current use of lands and resources are listed in **Table 2**. Publicly available traditional use studies completed for the SR1 Project and other relevant projects in the region were used, for this assessment.

Table 2 Summary of Key References Reviewed as Part of the Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes

#	Reference
1	O'Connor, Dermot. 2018. Blood Tribe/Káínai Traditional Knowledge, Land, and Resource Use Study Springbank Off-Stream Reservoir Project. Oak Road Concepts Inc.
2	Mandell Pinder LLP (Tsuut'ina Nation). 2018. Springbank Off-Stream Reservoir Project: Technical Review of Revised Environmental Impact Statement. Letter dated June 20, 2018 from Mandell Pinder LLP (Tsuut'ina Nation) to CEA Agency.
3	Tsuut'ina Nation and Trailmark Systems. 2018. Tsuut'ina Traditional Land Use Report for the Proposed Springbank Off-Stream Reservoir Project.
4	Stantec Consulting Inc. 2018. Workshop to Obtain Feedback from Samson Cree on the Draft Traditional Land and Resource Use (TLRU) Sections of the Environmental Impact Assessment (EIA): Springbank Off-Stream Reservoir Project.
5	Big Bull, William. n.d. Piikani Report on Proposed Springbank Reservoir and Dam. Prepared for Piikani Consultation.
6	Louis Bull Tribe. 2018. Louis Bull Tribe: Traditional Land Use Assessment for the Proposed Springbank Off-Stream Reservoir Project.
7	MNA. 2018. Nova Gas Transmission Ltd. West Path Delivery Project: Metis Nation of Alberta Region 3 – Technical Review. Hearing Order GH-002-2018.
8	Stantec Consulting Inc. 2018. Springbank Off-Stream Reservoir Project: Environmental Impact Assessment: Volume 3A: Effects Assessment (Construction and Dry Operations): 13.0 Historical Resources; 12.0 Land Use and Management; and, 14.0 Traditional Land and Resource Use.

The physical heritage baseline was informed by an Historical Resources Overview Assessment (HROA) for the MC1 Option that was completed by Arrow Archaeology Ltd. (2017). The overview examined the general biogeophysical setting of the proposed MC1 Option Area, including surficial and bedrock geology, topography, geomorphology, vegetation, and the area's historical resource record including past research in the area. The HROA also recorded archaeological sites, paleontological locales, and related information.

4.2.1 Data Limitations

Statistical data, used to support the assessments presented in this report, are provided by the Statistics Canada Census Program. Population and demographics data for Indigenous groups are provided in the 2016 Aboriginal Population Profiles. Although limitations to the data exist, the data product is one of the few available sources of published statistical data at the community level, and thus provides an indication of existing conditions and trends.

4.3 Screening Methodology

The methodology supporting the assessment of VCs associated with the MC1 Option was developed with consideration of the following sources:

- Final Guidelines for the Preparation of an Environmental Impact Assessment for the Springbank Off-stream Reservoir Project (EIA Guidelines; CEA Agency 2016); and,

- Addressing “Purpose of” and “Alternative Means” under the Canadian Environmental Assessment Act, 2012 (CEA Agency 2015a).
- Guide to Preparing Environmental Impact Assessment Reports in Alberta *(*EIA Guide) (AEP 2013);
- Cumulative Effects Assessment in Environmental Impact Assessment Reports Required under the Alberta Environmental Protection and Enhancement Act (AEP et al. n.d.);

Building on methods presented in **Sections 4.1** to **4.7**, the assessment presented in this report identifies and considers potential effects on Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values. The assessment of potential effects is based on the conceptual design of the MC1 Option (Opus 2017a; Opus 2017b).

The basic methodology that supports the assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values, follows five main steps, as described in detail in **Sections 4.4** to **4.7** including:

- Issues scoping
- Describing baseline conditions (**Baseline Case**)
- Assessing potential MC1 Option related effects (**Application Case**)
- Follow-up monitoring for Application Case
- Assessing cumulative effects (**Planned Development Case**)

4.4 Issues Scoping

The following section describes the process that has been followed to support the selection of VCs, and establishment of assessment boundaries and measurable parameters, to support the assessment of VCs presented in the MC1 Option Screening Report (Hemmera 2017). This methodology has been applied to the assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values, presented in this report.

4.4.1 Selected Value Components

The VCs, selected to support the assessment presented in this report, and the rationale for their selection, is presented in the respective sections of this report (i.e., **5.0 Indigenous Health and Socio-economic Conditions**, **Section 6.0 Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes, Section 7.0 Physical Heritage or Historical, Archaeological, Paleontological or Architectural Values**).

Appendix 1 presents the full range of VCs considered in the MC1 Option Screening Report, along with the rationale for the selection of the VCs, and candidate VCs that were considered but ultimately not selected for consideration in the MC1 Option Screening Report are listed in **Appendix 2** (Hemmera 2017).

VCs specifically considered in the assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values include those summarized in **Table 3**. The rationale for the selection for each of the VCs is presented in the relevant section of this report along with study specific information related to the establishment of assessment boundaries.

Table 3 VCs supporting the assessment of Indigenous Health and Socio-economic Conditions, Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes, and Physical Heritage or Historical, Archaeological, Paleontological or Architectural Values.

Topic/Study	Valued Component
Indigenous Health and Socio-economic Conditions	· Non-traditional Land and Resource Use · Indigenous Socio-economic Resources · Indigenous Health and Safety
Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes	· Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes
Physical Heritage or Historical, Archaeological, Paleontological or Architectural Values	· Archaeological Sites · Paleontological Resources

4.4.2 Assessment Boundaries

Assessment boundaries define the maximum limit within which effects assessments are conducted. Spatial and temporal boundaries encompass the areas and times within which the MC1 Option would be likely to interact with specific VCs.

Each discipline section of the MC1 Option Screening Report, and the assessments presented in this report, describes spatial and temporal boundaries and the rationale for their selection (Hemmera 2017). Administrative (i.e., political, economic, fiscal or social constraints that may not align with the assessment boundaries) and technical boundaries (i.e., constraints imposed on the MC1 Option Screening Report by limitations in the ability to predict the effects of the MC1 Option) are also described, if applicable (Hemmera 2017).

4.4.2.1 Spatial Boundaries

Local and regional assessment boundaries are identified for each discipline based on the spatial characteristics of the MC1 Option and the VCs identified for the discipline, as well as for additional areas within which MC1 Option VC interactions and effects are expected to occur. Each discipline section in the MC1 Option Screening Report, and the assessments presented in this report, describe how scientific and other information influenced the establishment of spatial boundaries, and indicates how consideration of technical or administrative boundaries, as applicable, were factored into the selection of the spatial boundaries (Hemmera 2017).

Definitions for the spatial boundaries established for the assessment of potential MC1 Option-related effects are defined in **Table 4**, and the spatial boundaries for the VCs are presented in **Appendix 3.**

Table 4 Spatial Boundary Definitions

Spatial Boundary	Description of Assessment Area
MC1 Option footprint	Area in which MC1 Option-related physical disturbance is anticipated to occur. Located within the MC1 Option Area.
MC1 Option Area	Area in which MC1 Option-related physical disturbance is anticipated to occur, plus a 100-m buffer around the: · embankment and excavation areas, · spillways and outlet works, and · road relocation. Identified on Figure 1.
Local Assessment Area	Encompasses the area within which the MC1 Option would be likely to interact with and potentially result in effects to the VCs. Based on the design flood of the 2013 flood event, and includes the downstream area of influence, where applicable.
Regional Assessment Area	Provides the regional context for the assessment of potential MC1 Option-related effects within the LAA; unless otherwise indicated, the RAA also encompasses the area within which MC1 Option-related residual effects on the VCs are likely to combine with the residual effects of other projects and activities to result in a cumulative effect on the VCs.

The Local Assessment Area (LAA) for each discipline encompasses the maximum geographical area within which the MC1 Option would be likely to interact with and potentially have a direct or indirect effect on the VCs identified for that discipline. In determining LAA boundaries, the nature and characteristics of each VC, and its potential exposure or susceptibility to various influences (e.g., changes caused by the MC1 Option or along the pathways of effects) are considered. The downstream area of influence (AOI) is included as part of the LAA for the relevant VCs. The downstream AOI includes natural and manmade features within the riparian zone that would be affected by the attenuation of flooding by the MC1 Option, up to the point where the effects on river flows would be considered insubstantial.

The regional assessment area (RAA), which encompasses the LAA, is established to provide a regional context for the assessment of MC1 Option-related effects. The RAA also encompasses the area within which the residual effects of the MC1 Option are likely to interact with the residual effects of other past, present, or future projects or activities to result in a cumulative effect or effects. As a result, the RAA also defines the spatial boundaries for the cumulative effects assessment.

As the LAAs and RAAs supporting the assessment of all VCs considered in the MC1 Option Screening Report, informed the assessment of cultural heritage and current use of lands and resources for traditional purposes (**Section 6.0**), they are provided for context in **Appendix 3** (Hemmera 2017).

4.4.2.2 Temporal Boundaries

The temporal boundaries identified for the VC assessments encompass periods during which the MC1 Option may affect VCs. These boundaries were determined based on the timing and duration of MC1 Option phases and related activities. Potential effects are considered for each phase of the MC1 Option as described in **Table 5.** Temporal characteristics of the VCs, relevant to the effects assessment, are documented in each discipline section.

Table 5 Temporal Boundaries for the Effects Assessment

MC1 Option Phase	Length of Phase
Construction	4 years
Operation and Maintenance	Assumed to operate in perpetuity

There is no decommissioning phase, as it is assumed the MC1 Option infrastructure would operate in perpetuity.

4.4.2.3 Administrative and Technical Boundaries

Administrative boundaries arise when political, economic, or social issues, as well as fiscal or other resourcing issues constrain the assessment of potential MC1 Option-related effects.

Technical boundaries arise when there are limitations to the ability to predict project effects; this may occur when sampling is constrained by legal restrictions, when large geographical settings limit the ability to sample properly, or when modelling constraints impose limitations on the analysis.

4.5 Baseline Case

Alberta Environment and Parks (AEP) defines the Baseline Case as: “the Baseline Case establishes the conditions that exist or would exist prior to development of the project or the conditions that would exist if the project were not developed” (AEP 2013).

Baseline conditions, with respect to Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values, and the information sources used to support the development of discipline specific baseline conditions are presented in **Section 5.2**, **Section 6.2** , and **Section 7.2** of this report.

Section 5.2, Section 6.2, and **Section 7.2** also include information on the quality and reliability of the baseline data including any uncertainty or gaps.

4.6 Application Case

The Application Case describes the effects of the MC1 Option added to Baseline Case (i.e., assesses the potential MC1 Option-related effects). **Section 5.3**, **Section 6.3,** and **Section 7.3** provide the Application Case for each of the assessments (Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values) presented in this report.

Potential interactions between the disciplines considered in this assessment and MC1 Option components and activities during construction and operation phases, as identified in the MC1 Option Screening Report, are identified in **Table 6** (Hemmera 2017). A preliminary evaluation of the potential effects associated with these interactions on the VC was carried out to focus the assessment on only those interactions likely to result in an adverse effect. When no interaction has been identified, or when a negligible interaction has been identified that is undetectable or unmeasurable, the effect has not been carried forward for this assessment.

Table 6 Preliminary MC1 Option Interactions List by Discipline

Discipline																
Phase	Activity	Indigenous Health and Socio-Economic Conditions	Cultural Heritage and Current Use of Lands and Resources	Physical Heritage	Atmospheric Environment	Terrain and Soils	Hydrogeology	Surface Water	Water Quality	Vegetation and Wetlands	Wildlife and Wildlife Habitat	Aquatic Environment	Land Use and Management	Historical Resources	Socio-economic	Public Health and Safety
Construction	Clearing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Road construction	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X
	Decommissioning and removal of existing provincial parks infrastructure and ranger station	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
	Dam (cofferdam and earth fill) construction	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Spillway construction	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
	Rock groin and diversion tunnels construction	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X
	Laydown areas construction and use	X	X	X	X	X	-	-	X	X	X	-	X	X	X	X
	Stockpile development and use	X	X	X	X	X	-	-	X	X	X	-	X	X	X	X
	Borrow and spoil areas development and use	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
	Realignment of McLean Creek and other small waterbodies	X	X	X	X	X	-	X	X	X	X	X	X	X	-	X
	Realignment of Highway 66	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X
	Storage of water in permanent pond	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Reclamation	-	-	-	X	X	-	X	X	X	X	X	-	X	X	X

Discipline																
Phase	Activity	Indigenous Health and Socio-Economic Conditions	Cultural Heritage and Current Use of Lands and Resources	Physical Heritage	Atmospheric Environment	Terrain and Soils	Hydrogeology	Surface Water	Water Quality	Vegetation and Wetlands	Wildlife and Wildlife Habitat	Aquatic Environment	Land Use and Management	Historical Resources	Socio-economic	Public Health and Safety
Operation and Maintenance	Routine and Flood Operations and Maintenance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Note: 'X' indicates interaction; '-' indicates no interaction

Each discipline section assesses potential MC1 Option-related effects by:

1. Identifying potential MC1 Option interactions with the VC(s).
2. Describing potential MC1 Option-related effects to the VC(s).
3. Describing proposed mitigation measures.
4. Characterizing the residual effects to the VC(s).

These four steps are described in the following subsections.

4.6.1 Potential MC1 Option-related Effects and Measurable Parameters

Each identified MC1 Option-related effect on a VC is described in comparison to the baseline conditions, along with the cause, type, and nature of the potential effect and its direction (positive or adverse).

Measurable parameters were selected that generate data to inform an understanding of the potential effects of the MC1 Option on each VC. The measurable parameters supporting the assessment of VCs related to Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values, are included in each discipline section.

4.6.2 Mitigation Measures

The assessment of VCs presented in the MC1 Option Screening Report, includes a consideration of mitigation measures proposed to avoid or minimize potential effects, restore on-site conditions, or offset potential adverse environmental effects (Hemmera 2017).

Identified as any practical means taken to manage potential adverse effects, mitigation measures can be used alone or in combination. These measures are described and summarized in table format in each discipline section in the MC1 Option Screening Report (Hemmera 2017). The expected performance standard of the mitigation measures (i.e., how the mitigation would reduce the effect) is also described.

The assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values, presented in this report, indirectly takes into account mitigation proposed in the MC1 Option Screening Report, to the extent that mitigation to address potential effects on biophysical and physical VCs serves to indirectly avoid or minimize a potential effect on one of the VCs considered in this assessment (Hemmera 2017). However, as no MC1 Option specific Indigenous engagement was undertaken to support this assessment, no additional mitigation, specific to the assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values, is presented in this report.

4.6.3 Residual Effects

Potential residual effects of the MC1 Option, for each of the VCs considered in this assessment, are described in terms of effects criteria definitions and descriptions of context in **Section 5.3.4**, **Section 6.3.4** and **Section 7.3.4**. Definitions for each residual effect characteristic and rating were derived according to the following hierarchy:

- A published regulatory or industry standard or criterion that establishes a threshold
- A range of values or standards that, while not regulated, are widely recognized and accepted
- Professional judgment (with a rationale given) (CEA Agency 2018).

Definitions for each residual effect characteristic, accompanied by supporting rationales, are provided in each VC assessment section. Consistent with the assessment of VCs presented in the MC1 Option Screening Report, residual effects for each VC have been characterized in terms of the following criteria: direction, extent, magnitude, duration, reversibility, frequency of occurrence, and confidence (**Table 7**) (Hemmera 2017).

Table 7 Residual Effects Characteristics for MC1 Option

Residual Effect Characteristic	Rating	Definition
Direction	Positive	Net benefit
	Adverse	Net loss
Extent	Local	Confined to the area directly disturbed by MC1 Option facilities
	Sub-regional	Limited to one natural region and within the LAA
	Regional	Within the RAA
Magnitude	Negligible	No detectable change in the receptor quality, quantity, or other attribute from background conditions (defined for each VC).
	Minor	Within acceptable protective standards and/or causes no detectable change to the resource (defined for each VC).
	Moderate	Within acceptable protective standards and/or causes a detectable change to the resource (defined for each VC).
	Major	Exceeds protective standards and/or causes a detectable change to the resource beyond the range of tolerance (defined for each VC).

Residual Effect Characteristic	Rating	Definition
Duration	Short-term	Defined for each VC.
	Long-term	Defined for each VC.
Reversibility	Reversible	Effect would be reversed once the activity causing the residual effect ceases.
	Not reversible	Effect would be permanent
Frequency	Isolated	Defined for each VC.
	Rare	Defined for each VC.
	Frequent	Defined for each VC.
	Continuous	Effect would occur continuously over the life of the MC1 Option.
Confidence	High	Rating predictions are based on a good understanding of cause-effect relationships and/or using data specific to the MC1 Option Area.
	Moderate	Rating predictions are based on a good understanding of cause-effect relationships relying on data from elsewhere, or incomplete understanding of cause-effect relationships from data specific to the MC1 Option.
	Low	Rating predictions are based on an incomplete understanding of cause-effect relationships and incomplete data.

Because baseline data was less detailed for the MC1 Option Screening Report and the assessments presented in this report than an environmental impact assessment that meets Project-specific regulatory requirements, the significance of the residual effects has not been determined as described in the EIA Guide (AEP 2013; Hemmera 2017).

Rather, the assessments presented in the MC1 Option Screening Report, and this report, are supported by the delineation of potential residual effects as follows (Hemmera 2017):

- Non-substantive residual effect – mitigation measures have not fully eliminated the effects, but have reduced the magnitude, extent, and/or duration to such a degree as to avoid any substantive effect on the VC. This characterization is based on the definitions and rating of effects characteristics defined in each discipline section.
- Substantive residual effect – adverse effects are likely to be high in magnitude, regional in extent, and long term in duration after implementation of mitigation.

4.6.4 Follow-up Monitoring

The assessment of biophysical and physical VCs presented in the MC1 Option Screening Report includes the identification of monitoring required during implementation of the MC1 Option (i.e., the Application Case) to verify effect predictions, ensure compliance with regulatory requirements and approval conditions, and evaluate the effectiveness of mitigation measures (Hemmera 2017). Such monitoring is proposed to support the development and implementation of alternate or additional mitigation, where monitoring determines that potential effects of the MC1 Option are greater than anticipated and/or proposed mitigation is not avoiding or reducing potential effects to the extent assumed in the assessment.

As the assessments presented in this assessment do not include proposed mitigation specific to the assessment of Indigenous health and socio-economic conditions, cultural heritage and current use of lands and resources for traditional purposes, and physical heritage or historical, archaeological, paleontological or architectural values, no follow-up monitoring is proposed in the context of such assessments.

4.7 Planned Development Case

The Planned Development Case describes the environmental conditions that may occur as a result of the interaction of the MC1 Option with other existing projects and other planned projects that can be reasonably expected to occur (i.e., cumulative effects assessment) (AEP 2013). Cumulative effects are defined as: “the changes to the environment caused by an activity in combination with other past, present, and reasonably foreseeable human activities” (AEP et al. n.d.). This definition is considered generally consistent with that included in federal guidance (CEA Agency 2015b) which defines a cumulative effect as “environmental effects likely to result from a designated project in combination with other physical activities that have been or will be carried out”.

Due to underlying data limitations for the assessment of VCs presented in the MC1 Option Screening Report, it was determined that a Planned Development Case for all residual effects (i.e., non-substantive and substantive) would not result in meaningful conclusions for some disciplines (Hemmera 2017). As such, the Planned Development Case presented in the MC1 Option Screening Report, examines how the substantive adverse effects of the MC1 Option may interact spatially and temporally with the residual effects of other past, present, or future projects (Hemmera 2017).

In the context of the assessment of the biophysical and physical VCs considered in the MC1 Option Screening Report, cumulative effects were assessed through the following steps (Hemmera 2017):

1. Identify past, existing, and reasonably foreseeable projects and activities.
2. Identify substantive MC1 Option-related residual effects for consideration in the cumulative effects assessment.
3. Determine potential MC1 Option-related adverse effects that would interact cumulatively with the residual effects of the identified projects and activities.
4. Describe suitable mitigation measures to address the cumulative effects.
5. Determine the residual cumulative effects and the contribution of the MC1 Option to these effects.

The Planned Development Case presented in **Section 9.0** of the MC1 Option Screening Report considered substantive residual adverse effects to the following VCs:

- Fluvial Geomorphology: changes to channel morphology
- Vegetation and Wetlands: reduction in biodiversity due to loss of tracked plant species
- Wetlands: reduction in wetland area and function
- Fish and Fish Habitat: increased risk of fish mortality and reduced productivity for bull trout
- Land and Resource Use: reduction to recreational use

Additionally, it was determined that the MC1 Option was would be likely to have the following positive substantive residual effects:

- Socio-economic Resources: an increase in provincial and regional economies
- Health and Safety: improved emergency preparedness / response and reduced health and safety risk during a flood event

All substantive adverse residual effects were brought forward into the Planned Development Case, and screened against past, present, and reasonably foreseeable projects and activities to determine if a substantive adverse cumulative effect could occur. No potential for substantive cumulative effects was identified.

With respect to the VCs considered in this assessment, the Planned Development Case has not been assessed. The rationale for not undertaking an assessment of the Planned Development Case for each of the VCs considered in this assessment is presented in the respective sections.

5.0 INDIGENOUS HEALTH AND SOCIO-ECONOMIC CONDITIONS

This section presents a discussion of potential effects on Indigenous health and socio-economic conditions associated with the construction and operation of the MC1 Option. For the purposes of this assessment, socio-economics is defined as the interactions between social and economic factors and the construction and operation of the MC1 Option.

5.1 Scope of Assessment

This section presents a summary of the scope of the assessment for Indigenous health and socio-economic conditions, and includes Valued Components (VCs), measurable parameters, and assessment boundaries. The assessment of MC1 Option-related effects on Indigenous health and socio-economic conditions relies on information compiled through a review of publicly available literature as well as the MC1 Option Screening Report (Hemmera 2017).

5.1.1 Valued Components and Measurable Parameters

The MC1 Option has the potential to interact with Indigenous health and socio-economic conditions. The VCs selected to characterize potential effects on Indigenous health and socio-economic conditions are provided in **Table 8**.

Table 8 Valued Components for Indigenous Health and Socio-economic Conditions

Valued Component	Rationale
Non-traditional Land and Resource Use	Construction and Operation of the MC1 Option may result in changes to non-traditional (e.g., forestry, agriculture, mining, oil and gas) use of lands and resources by Indigenous groups.
Indigenous Socio-economic Resources	Indigenous Socio-economic Resources was selected as a VC to assess potential MC1 Option interactions with Indigenous economic activities, including potential interactions with the labour market and contracting and procurement, and the value of local spending.
Indigenous Health and Safety	MC1 Option-related changes to air quality, drinking water quality, soil quality, and noise levels may adversely affect Indigenous health. The MC1 Option would mitigate flood risks downstream of the site, which would have a positive effect on health and safety in affected communities including Tsuut'ina Nation, Siksika Nation and Stoney Nakoda Nations.

Measurable parameters were selected to inform the assessment of potential effects on Indigenous health and socio-economic conditions (**Table 9**).

Table 9 Measurable Parameters

Valued Component	Potential Effect	Measurable Parameter
Non-traditional Land and Resource Use	Changes to non-traditional land and resource use	· Overlap with resource uses
Indigenous Socio-economic Resources	Changes to Indigenous labour force	· Labour capacity, employment rate, participation rate, labour income
	Changes to Indigenous contracting and procurement opportunities	· Available contracts and procurement opportunities
	Changes to Indigenous regional economic conditions	· Value of local and regional spending and related employment
Indigenous Health and Safety	Health effects from changes in air quality, noise and drinking water quality	· Air quality parameters (Air Quality VC) · Noise parameters (Noise VC) · Water quality parameters (Water Quality VC) · Groundwater quality parameters (Groundwater Quality VC) ·
	Effects on Indigenous health services	· Capacity of existing regional health facilities · Flood risks to health and safety

5.1.2 Assessment Boundaries

5.1.2.1 Spatial Boundaries

Spatial boundaries encompass the maximum geographical areas within which the MC1 Option would be likely to interact with the VCs (**Table 10**). The Local Assessment Area (LAA) encompasses the maximum geographical area where the MC1 Option is likely to interact with and potentially have a direct or indirect effect on Indigenous health and socio-economic conditions. The Regional Assessment Area (RAA) is established to provide a regional context for the assessment of MC1 Option-related effects.

Table 10 Local and Regional Assessment Areas for the Elbow River Dam at McLean Creek Option

Valued Component	Local Assessment Area (LAA)	Regional Assessment Area (RAA)
Non-traditional Land and Resource Use	The LAA is the same as the Land Use Screening Management LAA in the MC1 Option Screening Report and encompasses an approximately 1-km buffer around the MC1 Option Area, the 2013 flood level, and the proposed realignment for Highway 66. The Land Use and Management LAA is the area with the highest potential for direct and indirect interactions with land and resource use.	The RAA is the same as the Land Use and Management RAA in the MC1 Option Screening Report. The RAA extends upstream approximately 9 km within the Elbow valley and adjacent slopes to the mouth of Quirk Creek, and downstream approximately 9 km to the Bragg Creek Area Structure Plan eastern boundary to include downstream land use.

Valued Component	Local Assessment Area (LAA)	Regional Assessment Area (RAA)
Indigenous Socio-economic Resources	No discrete LAA has been defined because the RAA is considered to encompass the maximum geographical area where the MC1 Option is expected to interact with and potentially have a direct or indirect effect on socio-economic conditions, as well as provide an overall regional context.	The RAA is the Kananaskis Improvement District and the City of Calgary Census Metropolitan Area (CMA). The Calgary CMA includes the City of Calgary as well as Rocky View County (including the Greater Bragg Creek area), and Tsuut'ina Nation 145 Indian Reserve which includes the Townsite of Redwood Meadows. In addition, the Indian Reserves (Census Subdivisions) listed in **Table 1** are included in the RAA.
Indigenous Health and Safety	The LAA is the same as the Public Health & Safety LAA in the MC1 Option Screening Report: · Atmospheric Environment: Option footprint plus 5-km buffer from the MC1 Option Area. · Water Quality: includes the Elbow River from the upstream extent of the reservoir formed by the MC1 Option dam down to the upstream extent of the Glenmore Reservoir · Health Services and Emergency Preparedness and Response: Tsuut'ina IR 145.	The RAA is the same as the Public Health & Safety RAA in the MC1 Option Screening Report: · Atmospheric Environment: Extends 20 km from the MC1 Option Area. · Water Quality: Elbow River Watershed from headwaters to the upstream extent of the Glenmore Reservoir. · Health Services and Emergency Preparedness and Response: Tsuut'ina IR 145

5.1.2.2 Temporal Boundaries

The Construction and Operation and Maintenance phases comprise the temporal boundaries. Construction is expected to take place over a four-year period, and operation is assumed to be in perpetuity; consequently, no decommissioning phase has been assessed.

5.1.2.1 Administrative Boundaries

Administrative boundaries refer to political, economic, or social issues, as well as fiscal or other resourcing issues that constrain the assessment of potential MC1 Option-related effects.

The Non-traditional Land and Resource Use LAA and RAA overlap with the municipal boundaries of the KID, Rocky View County and the Municipal District of Foothills No. 31. The RAA is also contained in the land use plan area for the South Saskatchewan Regional Plan (SSRP). Land use plans and policies for municipal and regional planning areas are publicly available and have been reviewed to inform this assessment, and it is not anticipated that any administrative boundaries in the Land Use and Management RAA will affect the assessment of land use and management.

The Indigenous Socio-economic Resources RAA is defined by the KID and Calgary CMA and the Indian Reserves listed in **Table 1**. These political and administrative boundaries are relevant to service provision and governance for communities and residents who may be affected by the MC1 Option. The use of these administrative boundaries aligns with available statistical and other forms of data used to inform this assessment.

It is not anticipated that any administrative boundaries in the Indigenous Health and Safety RAA will affect the assessment.

5.1.2.2 Technical Boundaries

Technical boundaries may be defined as the ability to accurately assess the potential effects of a proposed project on existing conditions. A desktop research approach was used to inform the potential effects of the MC1 Option on Indigenous health and socio-economic conditions. Publicly available information may not be current or complete; therefore, field verification and engagement is typically used to verify desktop information. The scope of this assessment does not include field verification or engagement; however, the desktop approach is considered to be adequate to support the key findings of the assessment.

5.2 Baseline Case

The following section describes the Baseline Case for Indigenous health and socio-economic conditions and is informed by the data compiled from the sources listed in **Section 4.2.**

The construction and operation the MC1 Option would interact with existing socio-economic conditions in the region and in local Indigenous communities. Factors that contribute to local and regional socio-economic conditions include population and demographic information for Indigenous communities, labour market characteristics, community services and infrastructure and economic development. **Sections 5.2.1** to **5.2.3** below provide brief community profiles on the Indigenous groups identified in **Table 1**.

The Canadian government recognizes 45 First Nation communities and 140 reserves across Treaty 6, 7, and 8 lands in Alberta (Government of Alberta 2013). In general, the Indigenous population in Alberta is young (with a median age of 26.9, compared to 36.4 for non-Indigenous people), a lower proportion of the Indigenous population participates in the labour force, unemployment is higher, and median income is lower than in the province overall (Health Canada 2016). However, as detailed in the following sections on individual communities, these data vary considerably across the province (Health Canada 2016).

5.2.1 Treaty 7 Nations

Treaty 7 area encompasses the MC1 Option Area, as shown in **Figure 2**. Treaty 7 is one of the 11 Numbered Treaties signed between 1871 and 1921 that were negotiated with Indigenous groups to allow for expansion of settlement and resource extraction for the Dominion of Canada. The Treaty was signed in 1877 between the Crown and Tsuut'ina Nation, Stoney Nakoda Nations (Bearspaw, Chiniki, and Wesley First Nations), Siksika Nation, Piikani Nation and Blood Tribe/Káínai Nation.

5.2.1.1 Tsuut'ina Nation

The Tsuut'ina Nation has one reserve located between Bragg Creek and the City of Calgary (Tsuut'ina Nation IR 145), with a land area of 29,417.4 hectares (INAC 2017a). In December 2018, Tsuut'ina had a registered population of 2,369 people and their governance structure comprised of an elected Chief and twelve Councilors (Indigenous and Northern Affairs Canada) (INAC 2017a).

Revised 2016 Census data shows the population of Tsuut'ina Nation IR 145 was 2,271 (Statistics Canada 2018). Many of the non-Indigenous residents of IR 145 live in the Townsite of Redwood Meadows, which is a residential community situated on IR 145 on the Elbow River, northeast of Bragg Creek (Alberta

Municipal Affairs 2018). The community is comprised of approximately 1,080 residents in single-family homes (Alberta Municipal Affairs 2018, Townsite of Redwood Meadows 2019). The townsite is leased by Canada to Sarcee Developments Ltd., a Tsuut'ina Nation company (Calgary Regional Partnership 2012). Residents of Redwood Meadows own their homes but sublease the individual lots from Sarcee Developments Ltd. (Townsite of Redwood Meadows 2019).

The initial dataset collected by Statistics Canada for Tsuut'ina IR 145 in 2016 was noted by Statistics Canada as incomplete but is provided to present select demographic characteristics. Of the Indigenous population that was enumerated, the median age was 21.2 years. The participation rate in the labour force (representing the proportion of the population actively working or looking for work) was 56.6%, with 14.0% unemployment. The median income in 2015 for full-year full-time workers was $46,287 (Statistics Canada 2018a). Approximately 18% of the dwellings on IR 145 occupied by Indigenous people were reported to be unsuitable (i.e., not enough bedrooms for the number of residents), and 21% needed major repairs (Statistics Canada 2018a).

Past development projects of the Tsuut'ina Nation include the Grey Eagle Casino and Redwood Meadows residential community (Alberta View 2017; Redwood Meadows n.d.). Redwood Meadows Golf Course is a championship 18-hole course at Redwood Meadows that was initiated as a key economic development of Tsuut'ina in the 1970s and remains a Tsuut'ina-owned company and source of revenue for the Nation (Tsuut'ina 2017).

As of 2019, Calgary's Southwest Ring Road is being constructed on reserve lands acquired from Tsuut'ina Nation. The acquisition of lands generated a multimillion-dollar payment to the Nation and provided a catalyst for future economic development on reserve lands adjacent to the ring road. Planned developments include the Taza developments, which will consist of 3 multibillion-dollar developments over 500 hectares along the edge of the Ring Road (Taza 2019).

5.2.1.2 Stoney Nakoda Nations

Stoney Nakoda Nations are comprised of Bearspaw First Nation, Chiniki First Nation and Wesley First Nation. The three Nations' main communities are located on adjacent reserves west of Cochrane, Alberta.

In December 2018, the registered population for Bearspaw members was 2,041 members, Chiniki First Nation had 1,805 members, and Wesley First Nation had 1,826 members (INAC 2017b). Each First Nation has its own governing body with Chief and Councillors (INAC 2017b). The overall population of Stoney Nakoda Nations was young (21.7), and the median income in 2015 was $25,179 (Statistics Canada 2018b). Stoney Nakoda Nations had a high unemployment rate (38.2%) and low participation rate of 45.4% in 2015 (Statistics Canada 2018b). Approximately 35% of private dwellings on reserve were reported to be not suitable, and over half required major repairs (Statistic Canada 2018b).

In 2008, Stoney Nakoda Nations opened the Stoney Nakoda Casino, and in 2009 the hotel portion of the resort was opened (Stoney Nakoda Resort n.d.).

5.2.1.3 Siksika Nation

Siksika Nation's main community is on Siksika IR 146, which has a land area of 71,087.5 hectares and is located east of Calgary (INAC 2017c). In December of 2018, the registered population was 7,497 members of which 4,093 resided on their own reserve (INAC 2017c). Siksika Nation is governed by an elected Chief and twelve Councillors.

Census data from 2016 reported a total Siksika Nation population of 3,460. The median age on Siksika IR 146 in 2015 was 25.7 (Statistics Canada 2018c). Median income was $36,352 in 2015. The participation and unemployment rates were 47.2% and 21.6%, respectively (Statistics Canada 2018c).

The Blackfoot Crossing Interpretive Centre opened in 2007 on the Siksika Nation at the site of Soyopowahko, which is an historic river crossing and meeting place along the Bow River, and the site where Treaty 7 was signed in 1877 (Adese 2017). Siksika Nation has a business group, Siksika Resource Developments Ltd. (SRDL), that is committed to establishing long term prosperity for the Nation by generating revenue from the management and development of renewable and non-renewable resources (SRDL 2018).

5.2.1.4 Piikani Nation

In December of 2018, the Piikani Nation had 3,906 registered members, with the main community located on Piikani IR No. 147, in Brocket, Alberta (INAC 2017d). Piikani Nation has an elected Chief and eight Councillors (INAC 2017d). The median age of Piikani members in 2015 was 30.7, and median income for full-year full-time workers was $34,944 (Statistics Canada 2018d). Of the registered population, roughly 36% live off reserve in the urban centers that surround Piikani IR (INAC 2017d). Piikani Nation has a participation rate of 51.1% and an unemployment rate of 27.2% (Statistics Canada 2018d).

While the major economic base on the Piikani Reserve is ranching, Nation members engage in a variety of activities within their reserve lands including ranching, agriculture, and spiritual and recreational activities (AMEC 2010). Piikani Resource Development Ltd. is an entity committed to the responsible development and management of Piikani First Nation's resources and the promotion of economic growth by supporting initiatives and individuals pursuing small business opportunities (Piikani Nation n.d.).

5.2.1.5 Blood Tribe/Káínai Nation

The Blood Tribe/Káínai reside on the largest First Nation reserve in Canada at 134,292.9 hectares, with the main community in Stand Off, Alberta, southwest of Lethbridge (INAC 2017e). The Blood Tribe/Káínai is governed by an elected Chief and twelve Councillors, and as of December 2018, the registered population was 12,524 members (INAC 2017e). Age, income and labour characteristics were similar to the neighbouring Piikani Nation, with a young population and high unemployment. The median age was 28.4 (Statistics Canada 2018e). Median income was $36,288, the participation rate was 44.6%, and unemployment rate was 22.7% (Statistics Canada 2018e). Over half of the dwellings on the Blood Tribe/Káínai reserve required major repairs in 2015 (Statistics Canada 2018e). The major economic base on the Blood Tribe/Káínai Reserve is agriculture. Farming, both irrigated and non-irrigated, and oil and gas exploration provide employment for some Blood Tribe/Káínai members (AMEC 2009).

5.2.2 Treaty 6 Nations

Treaty 6 was negotiated with the Plains and Wood Cree Indians over what is now central Alberta and Saskatchewan at Fort Carlton and Fort Pitt in 1876 (Montana First Nation n.d.).

5.2.2.1 Ermineskin Cree Nation

Ermineskin Cree Nation's main community is on Ermineskin IR 138, which has a total area of 10,295.8 hectares. The Nation has two reserves: Ermineskin 138 which is 10,295.8 hectares south of Edmonton, and Pigeon Lake 138A which is 1,921.1 hectares (shared with other Treaty 6 Nations) (INAC

2017f). The total registered population of Ermineskin Cree Nation is 4,847 members (INAC 2017f). In 2015, 47.3% of the population of Ermineskin Cree Nation participated in the labour force, and 29.1% were unemployed (Statistics Canada 2018f). The Nation has a young population: the median age was 19 and the median income for full-year full-time workers was $31,339 in 2015 (Statistics Canada 2018f). The governance structure comprised of an elected Chief and eight Councillors.

Ermineskin Cree Nation has benefited from oil and gas deposits on their lands and also has approximately 10,000 hectares of high-quality agricultural land capable of producing annual crops (Ermineskin Cree Nation 2018). Land along Pigeon Lake, the shared reserve, is currently being used for camping (Ermineskin Cree Nation 2018).

5.2.2.2 Louis Bull Tribe

In December 2018, the total registered population of Louis Bull Tribe was 2,382 members (INAC 2017g), and the median age was 19 (Statistics Canada 2018g). Louis Bull Tribe has two reserves: Louis Bull 138B that is 3,388.1 hectares between Red Deer and Edmonton, and Pigeon Lake 138A that is 1,921.1 hectares (shared with other Treaty 6 Nations) (INAC 2017g).

The governance structure of the Louis Bull Tribe includes an elected Chief and seven Councillors (INAC 2017g). The Tribe owns several businesses, including a gas bar convenience store, a golf course, RV park, and an inn with restaurant and lounge on Pigeon Lake. In 2015, the median income of Louis Bull Tribe was $28,704, and the participation and unemployment rates were 38.5% and 29.2% respectively (Statistics Canada 2018g).

5.2.2.3 Montana First Nation

Montana First Nation is governed by an elected Chief and four Councillors (INAC 2017h). As of December 2018, the Nation had 1,060 registered members (INAC 2017h). Montana First Nation has two reserves; Montana 139 IR that is 2,824.8 hectares south of Edmonton; and Pigeon Lake 138A that is 1,921.1 hectares (shared with other Treaty 6 Nations) (INAC 2017h). The median age in 2015 was 21.1 and the median income for full-year full-time workers was $35,200 (Statistics Canada 2018h). That same year, Montana First Nation's participation rate was 38.5%, and their unemployment rate was 32.0% (Statistics Canada 2018h).

The main source of income for Montana First Nation has historically come from the shared interest in Pigeon Lake Reserve located 65 kilometers northwest of Montana 139 IR. Since 1947, it has produced oil and gas and related by-products. Montana First Nation has invested in various business ventures including Trendwood (a lumber supplier), land acquisitions and related developments, oil and gas developments, and agricultural and ranch leases of on and off-reserve lands (Montana First Nation n.d.).

5.2.2.4 Samson Cree Nation

Samson Cree Nation has three reserves: Samson IR 137 and Samson IR 137A, which are located south of Edmonton and are 13,552 hectares and 134.4 hectares, respectively, and Pigeon Lake 138A (1,921.1 hectares, and shared with other Treaty 6 Nations) located west of Wetaskiwin (INAC 2017i). The leadership structure is comprised of an elected Chief and twelve Councillors (INAC 2017i). As of December 2018, Samson Cree Nation's total registered population was 8,899 members (INAC 2017i). In 2015, the median

age of Samson Cree Nation was 22.8 (Statistics Canada 2018i). The participation rate was 41.9%, the unemployment rate was 24.4%, and the median total income in 2015 $33,938 (Statistics Canada 2018i).

In May 2018, Samson Cree Nation broke ground on a $32.5-million wastewater facility upgrade meant to address issues caused by aging infrastructure (Maimann 2018). The new facility will be Samson's largest federally funded project and is meant to create jobs in the community by employing those living in Samson (Maimann 2018).

5.2.3 Other Indigenous Groups

5.2.3.1 Foothills Ojibway Society

Foothills Ojibway Society is a non-status Indigenous community that self-identifies as a First Nation. The society comprises approximately 250 individuals of Anishinabe ancestry, including Saulteaux-speaking people as well as Cree, Chippewa, and Ojibway people (Anishinabe History 2019; Stantec 2018c). The community is east of Edmonton near Hinton, Alberta; however, they are not recognised as a First Nation by Canada and have no official reserves (Anishinabe History 2019). Foothills Ojibway Society represents an amalgamation of families/individuals of descendants who refused to sign Treaty 6 in the early to mid-twentieth century (Stantec 2018c).

5.2.3.2 Ktunaxa Nation Council

Ktunaxa Nation Council is comprised of four First Nations in the south-eastern region of British Columbia with a combined total registered population of 1,119 members as of December 2018 (INAC 2017j). In 2015, the median age of the four communities was 35.1, the median income $37,504, and participation rate and unemployment rate were 64.8% and 13.0% respectively (Statistics Canada 2018j). Ktunaxa confirmed on January 9, 2017 that they were not interested in engaging on the SR1 Project (Stantec 2018b).

5.2.3.3 Métis Nation of Alberta (Region 3)

Métis are one of three recognized Indigenous peoples in Canada, along with First Nations and Inuit. The 2011 National Household Survey found that 418,380 Canadians self-identified as Métis, and that 90,850 of those individuals resided in Alberta (NHS 2017). The Métis Nation of Alberta (MNA) is governed by a Provincial Council, comprised of a Provincial President and Vice-President, and six regional Presidents and Vice-Presidents all of which are democratically elected (MNA 2018a). MNA is divided into six regions across Alberta (MNA 2019a). MNA (Region 3), whose main office is located in Calgary, encompasses the southern portion of Alberta (MNA 2019a). Within MNA (Region 3) there are no Métis settlements under the Métis Settlements Act.

5.2.3.4 Métis of British Columbia

Métis Nation British Columbia (MNBC) was established in 1996 and represents thirty-eight Métis Chartered Communities in BC. MNBC is mandated to develop and enhance opportunities for Métis communities (MNBC 2019a). MNBC is governed by a Board of Directors consisting of eleven members: the President, Vice President, Women's Provincial Chair, Youth Provincial Chair, and seven Regional Directors from across the province (MNBC 2019b).

5.3 Application Case

The Application Case describes the potential MC1 Option-related effects on Indigenous health and socio-economic conditions, which are added to the baseline case. The following section presents the VCs that have been selected as well as measurable parameters, assessment boundaries and potential interactions with existing conditions, descriptions of potential effects and mitigation measures, and descriptions of potential residual effects following the application of mitigation measures.

5.3.1 Potential Option Interactions

Potential MC1 Option-related interactions with the VCs are presented in **Table 11**.

Table 11 Potential MC1 Option Interactions with Valued Components

Project Components and Physical Activities	Valued Components		
	Non-Traditional Land and Resource Use	Indigenous Socio-economic Resources	Indigenous Health and Safety
Construction			
Clearing	Yes	Yes	Yes
Road construction	Yes	Yes	Yes
Decommissioning and removal of existing provincial parks infrastructure and ranger station	Yes	Yes	Yes
Dam (cofferdam and earth fill) construction	Yes	Yes	Yes
Spillway construction	Yes	Yes	Yes
Rock groin and diversion tunnels construction	Yes	Yes	Yes
Laydown areas construction and use	Yes	Yes	Yes
Stockpile development and use	Yes	Yes	Yes
Borrow and spoil areas development and use	Yes	Yes	Yes
Realignment of McLean Creek and other small waterbodies	Yes	Yes	Yes
Realignment of Highway 66	Yes	Yes	Yes
Storage of water in permanent pond	Yes	Yes	Yes
Reclamation	No	No	No
Operations and Maintenance			
Routine and Flood Operations and Maintenance	Yes	Yes	Yes

All Construction and Operation and Maintenance-phase activities listed in **Table 11** may potentially interact with the Non-Traditional Land Use, Indigenous Socio-economic Resources and Indigenous Health and Safety VCs, with the exception of reclamation activities which are considered to have a negligible interaction.

Identified potential effects resulting from the potential Option interactions in **Table 11** have been adapted from the MC1 Option Screening Report (Hemmera 2017), and are as follows:

- Changes to non-traditional land and resource use.
- Changes to Indigenous labour force.
- Changes to Indigenous contracting and procurement opportunities.
- Changes to Indigenous regional economic conditions.
- Health effects to Indigenous people from changes in air quality, noise and drinking water quality.
- Effects on public health and safety and emergency response.
- Effects on Indigenous health services.

5.3.2 Potential Effects

This section includes consideration of potential MC1 Option-related effects on the VCs listed in **Section 5.1.1** arising from potential interactions, as identified in **Table 11.** Mitigation measures for each potential effect are described in **Section 5.3.3.**

5.3.2.1 Non-traditional Land and Resource Use

Changes to non-traditional land and resource use

Current land and resource uses identified in the MC1 Option Screening Report, Section 8.1 Land Use and Management include forestry, cattle grazing, recreation, hunting and fishing, trapping, oil and gas development activities, and sand and gravel quarrying (Hemmera 2017). Details on leases in the Non-traditional Land and Resource Use RAA (i.e., dispositions, reservations and notations) are also provided in **Appendix 4**.

Indigenous non-traditional land and resource use refers to resource activities by Indigenous companies. No non-traditional resource uses associated with Indigenous interests have been identified to date in the Non-traditional Land and Resource Use RAA. As such, based on current information no potential adverse effects from MC1 Option construction on Indigenous non-traditional land and resource use are considered likely.

Completion of the MC1 Option would reduce downstream flood risk, which would have positive effects on non-traditional land and resource use in downstream areas, including Tsuut'ina IR 145. The reduction in flood risk would benefit Tsuut'ina Nation's future development plans.

5.3.2.2 Indigenous Socio-economic Resources

Changes to Indigenous labour force

Construction activities (e.g., site preparation, construction of access roads, the construction camp at McLean Creek campground) would have the potential to generate employment for Indigenous people, both

through direct employment by the MC1 Option and increased hiring by regional contractors and suppliers. The MC1 Option would require workers with trades or professional skills and occupational training for dam construction, as well as unskilled labourers. Local or regional contractors supplying the MC1 Option would likely hire labour from nearby communities for both skilled and unskilled positions, similar to employment initiatives of the Samson wastewater facility (Maimann 2018). The MC1 Option-related potential changes to the Indigenous labour force during the Construction phase would constitute a potential positive effect.

The effect would likely be negligible for the Operation and Maintenance phase. Operation and Maintenance activities will largely consist of inspection activities, security requirements, and general maintenance activities.

Changes to Indigenous contracting and procurement opportunities

During the Construction phase, contracting opportunities would likely be available for clearing and site preparation, tree removal, surveying, material and equipment transport, equipment rental, provision of goods and services, and other construction requirements. Additional contracting opportunities include a self-contained, on-site work camp proposed for the duration of MC1 Option Construction. It is assumed that construction contracts would be based on a competitive bidding process and that contracting opportunities may not specifically target local or Indigenous businesses. However, the contracting and procurement opportunities for the MC1 Option would be equally available to Indigenous businesses. The change in Indigenous contracting and procurement opportunities is therefore considered a positive potential effect of the MC1 Option.

Changes to Indigenous regional economic conditions

Changes to local and regional spending primarily refers to the construction workforce spending earnings on goods and services, thereby redistributing employment income in the region. This is attributable to construction workers purchasing gas, groceries, meals, and other goods and services from businesses in nearby communities.

Bragg Creek, located 10 km from the MC1 Option, is the community most likely to experience increased spending at local businesses. Workers commuting daily to the MC1 Option from Calgary and other communities would likely purchase goods and services in Bragg Creek, and workers living at the on-site work camp may choose to purchase meals and spend leisure time in Bragg Creek.

Tsuut'ina Nation IR 145 is included in the Indigenous Socio-economic Resources RAA, including the Townsite of Redwood Meadows. Redwood Meadows is approximately 20 km east of the MC1 Option. It is possible that MC1 Option workers may choose to rent or buy a home in Redwood Meadows, although the community largely consists of detached, single-family homes that are mostly owner-occupied, and availability for MC1 Option workers is considered to be minimal. There is also the potential for MC1 Option-related Indigenous workers and their families to spend a portion of their earnings in their respective communities, and at Indigenous-owned businesses. The potential change to Indigenous regional economic conditions resulting from increased spending by the MC1 Option workforce is considered a positive effect.

5.3.2.3 Indigenous Health and Safety

Health effects from changes in air quality, noise and drinking water quality

The MC1 Option may result in potential adverse effects on Indigenous health and well-being as a result of changes in air quality, noise, and water quality during construction. Indigenous people engaged in traditional activities in the vicinity of the MC1 Option may experience these potential adverse effects.

The potential adverse effects on air quality, noise and drinking water quality are detailed in **Section 6.1 Atmospheric Environment** and **Section 6.5 Water Quality** of the MC1 Option Screening Report (Hemmera 2017). A summary of effects includes the following:

- **Air quality** – Construction emission sources that may result in increased emissions of Criteria Air Contaminants (CACs) are related to stripping, bulldozing, material handling, wind erosion from stockpiles, vehicles and equipment, re-entrained road dust, and Highway 66 realignment. During construction, total 24-hour average contaminations of particulates were predicted to increase at several sites, including public campgrounds nearest the MC1 Option, with the potential for adverse health effects for people within 400 m of emissions sources. After implementation of best practices and mitigation measures specific to the MC1 Option, no detectable residual health effects were predicted in the MC1 Option Screening Report with respect to the effects of changes to air quality on respiratory health (Hemmera 2017).
- **Noise** – Increased noise from construction activities may result in increased sleep disturbances, depending on where camping would be allowed during Construction. The MC1 Screening Report concluded that no substantive health effects were predicted with respect to noise levels during construction and by extension, operation (Hemmera 2017).
- **Water quality** – Adverse health effects could result from changes in groundwater or surface water used as drinking water sources. Water quality could be adversely affected in the event that turbidity of surface water is increased through Project activities. In addition, any mishandling of fuels or other chemicals could result in surface water contamination. After implementation of best practices and mitigation measures specific to the MC1 Option, no detectable residual health effects were predicted in the MC1 Option Screening Report with respect to the effects of changes to drinking water quality (Hemmera 2017).

Effects on public health and safety and emergency response

Several aspects of MC1 Option construction activities could adversely affect public safety, including safety of Indigenous people who may be present in the MC1 Option Area during construction. For example, construction would require realignment of Highway 66, which could affect the safety of highway users during that period. A flood event during the construction phase could result in failure of partially constructed infrastructure (cofferdam) and release debris into the Elbow River and result in public safety risks associated with damaged infrastructure, including roads, highways, and trails. During the Operation Phase of the MC1 Option, use of the permanent pond may require management to protect public safety.

The MC1 Option would also have a positive effect on public safety, including safety of Indigenous people, as a result of flood reduction. The MC1 Option Screening Report noted that the health benefits of flood reduction are numerous and include the prevention of the direct and indirect health effects associated with floods, including fatality from drowning, injury caused by flood debris, disease/infections associated with flood waters, and mental health effects associated with infrastructure damage and population displacement and disruption (Hemmera 2017).

Effects on Indigenous health services

Once constructed, the MC1 Option could have a positive effect on regional health services as a result of flood reduction. While the indirect effects of floods on mental health may not appear for months or years after the event and are difficult to quantify, it is assumed the MC1 Option could yield benefits in terms of reduced demand on mental health and related community services. This general characterization of the potential effect on health services may also apply to Indigenous health services.

5.3.3 Mitigation Measures

Mitigation measures comprise any practical means taken to manage potential adverse effects, and may include applicable standards, guidelines, and best management practices (BMPs) supported by specific guidance documents. Mitigation measures for linked biophysical VCs considered in the MC1 Option Screening Report, are summarized in **Table 12,** as these measures will indirectly avoid and/or minimize potential residual effects described in **Section 5.3.4** (Hemmera 2017). As no MC1 Option-specific Indigenous engagement was undertaken to support this assessment, no mitigation specifically focused on Indigenous health and socio-economic conditions has been identified.

Table 12 Summary of Potential Effects and Mitigation Measures for Indigenous Health and Socio-economic Conditions

Potential Effect	Option Phase	Contributing Option Activities	Proposed Mitigation Measure or Enhancement Measure	Detectable / Measurable Residual Effect?
Changes to non-traditional land and resource use	Operation and Maintenance	· Flood operations	· The effect would be positive due to reduction of flood risk, and no enhancement measures are proposed.	Yes –positive
Changes to Indigenous labour force	Construction	· Clearing · Road construction · Option component construction · Construction and use of borrow, spoil, stockpile and laydown areas · Realignment of waterbodies and Highway 66	· The effect would be positive, and no enhancement measures are proposed	
Changes to Indigenous contracting and procurement opportunities				
Change to Indigenous regional economic conditions				

Potential Effect	Option Phase	Contributing Option Activities	Proposed Mitigation Measure or Enhancement Measure	Detectable / Measurable Residual Effect?
Health effects related to air quality, noise, and drinking water quality	Construction	· Clearing · Road construction · Option component construction · Construction and use of borrow, spoil, and laydown areas · Realignment of waterbodies and Highway 66	· Mitigation measures in Section 6.1 Atmospheric Environment and Section 6.5 Water Quality in the MC1 Option Screening Report, including: Fugitive dust management plan; regular inspections of vehicles and equipment; management of open burning, selection of asphalt plant; reduce exposure to elevated ambient concentrations of CACs; noise management plan · Public access restrictions · Traffic Accommodation Strategy · BMPs for spill management, soil salvage measures, reclamation and revegetation measures · Mitigation measures in Section 6.5 Water Quality MC1 Option Screening Report, including: erosion and sediment control plan, blast management measures; cementitious materials management measures; chemical contaminant measures; wastewater containment measures, contaminated soil containment measures; vegetation management measures; permanent pond operation measures	No
Risks to public safety	Construction Operation and Maintenance	· Clearing · Road construction · Option component construction · Construction and use of borrow, spoil, stockpile and laydown areas · Realignment of waterbodies and Highway 66 · Permanent storage · Routine and flood operations and maintenance	· Public access restrictions · Traffic Accommodation Strategy · Development and implementation of emergency preparedness and emergency response measures	No

Potential Effect	Option Phase	Contributing Option Activities	Proposed Mitigation Measure or Enhancement Measure	Detectable / Measurable Residual Effect?
Effects on public health and safety and emergency response	Operation and Maintenance	· Flood operations	· Flood water retention	Yes - positive
Effects on Indigenous health services	Operation and Maintenance	· Clearing · Road construction · Option component construction · Construction and use of borrow, spoil, stockpile and laydown areas · Realignment of waterbodies and Highway 66	· The effect would be neutral or positive due to reduction of flood risk, and no enhancement measures are proposed.	Yes – positive

5.3.4 Residual Effects

This section describes how the residual effects of the MC1 Option are characterized and summarized for the Indigenous health and socio-economic conditions VCs. All residual effects on Indigenous health and socio-economic conditions have been identified as positive in direction (**Table 12**). To be consistent with the approach used in the MC1 Option Screening Report (Hemmera 2017), these positive residual effects are characterized below. The determination of a substantive or non-substantive residual effect includes a characterization including magnitude, regional extent, and duration.

Potential MC1 Option-related residual effects are delineated as:

- **Non-substantive residual effect:** mitigation measures have not fully eliminated the effects, but have reduced the magnitude, extent, or duration to such a degree as to avoid a substantive effect on the VC.
- **Substantive residual effect**: adverse effects are predicted to be major in magnitude or long-term in duration even after implementation of mitigation.

Residual effects in the context of Indigenous health and socio-economic conditions are characterized based on the criteria defined in **Table 13**.

Table 13 Residual Effects Characteristics for Indigenous health and socio-economic conditions

Residual Effect Characteristic	Rating	Definition
Direction	· Positive	Net benefit - the trend of the effect is considered desirable or an improvement from baseline conditions
	· Adverse	Net loss - the trend of the effect is considered undesirable or worsening from baseline conditions
Extent	· Local	Limited to the LAA
	· Regional	Limited to the RAA

Residual Effect Characteristic	Rating	Definition
Magnitude	· Negligible	No detectable change to baseline health or socio-economic conditions
	· Minor	Change to baseline health or socio-economic conditions is detectable; however, effect would be limited to an inconvenience or nuisance change.
	· Moderate	Change is detectable and would result in a moderate change to baseline health or socio-economic conditions.
	· Major	Change is large enough to result in a severe change to baseline health or socio-economic conditions.
Duration	· Short-term	Effect would occur during Construction phase
	· Long-term	Effect would extend through the Operation and Maintenance phase
Reversibility	· Reversible	Effect could be reversed once the activity causing the residual effect ceases
	· Not reversible	Effect would be permanent
Frequency	· Isolated	Effect would occur once
	· Periodic	Effect would occur intermittently and repeatedly
	· Continuous	Effect would occur continuously
Confidence	· High	Rating predictions are based on a good understanding of cause-effect relationships and/or using data specific to the MC1 Option Area
	· Moderate	Rating predictions are based on a good understanding of cause-effect relationships relying on data from elsewhere, or incomplete understanding of cause-effect relationships from data specific to the MC1 Option.
	· Low	Rating predictions are based on an incomplete understanding of cause-effect relationships and incomplete data.

Changes to non-traditional land and resource use

The reduction of flood risk would have a positive and substantive effect on downstream development and other land and resource uses, constituting a major positive effect. The actual benefit would be commensurate with actual flood risk and would persist as long as the MC1 Option was in operation. Effects characteristics are summarized in **Table 14**.

Table 14 Summary of Effect Characteristics Ratings for Changes to Non-traditional Land and Resource Use

Residual Effects Characteristic	Rating	Rationale for Rating
Direction	· Positive	Reduction of flood risk would have a positive effect on downstream development and other land and resource uses.
Extent	· Regional	Effect would occur in the RAA.
Magnitude	· Major	Benefit would result in reduction of downstream flood risk, constituting a major positive socio-economic effect.
Duration	· Long-term	Effect would last throughout MC1 Option operation and maintenance.
Reversibility	· Not reversible	Not reversible during the life of the Option
Frequency	· Rare	Benefit would be intermittent in accordance with flood risks.
Confidence	· High	Benefits of flood reduction are well understood.

Changes to Indigenous labour force

Construction workers will be required for the MC1 Option, with the potential to generate direct and indirect employment for Indigenous people. The residual effect is positive in direction and considered to be minor in magnitude, assuming a relatively small Indigenous labour force of skilled and unskilled workers. The effect is regional in extent but short-term in duration, since any detectable increase in employment opportunities would be limited to the construction phase. Confidence in the characterization of this effect is low due to uncertainty over the size and capacity of the Indigenous labour force. The changes to Indigenous labour force are considered to be non-substantive and the effects characteristics ratings are summarized in **Table 15**.

Table 15 Summary of Effect Characteristics Ratings for Changes to Indigenous Labour Force

Residual Effects Characteristic	Rating	Rationale for Rating
Direction	· Positive	Potential for Indigenous employment constitutes a potential positive effect
Extent	· Regional	Employment opportunities would likely be available in communities throughout the RAA.
Magnitude	· Minor	The MC1 Option could generate a modest increase in employment opportunities for Indigenous people during Construction.
Duration	· Short-term	Effect would occur during Construction phase.
Reversibility	· Reversible	Employment would cease once MC1 Option was commissioned
Frequency	· Continuous	The effects on the labour force would persist through Construction.
Confidence	· Low	MC1 Option-related effect on the overall labour force is well understood and predictable; however, the actual capacity of the Indigenous labour force is not known.

Changes to Indigenous contracting and procurement opportunities

Similar to the positive effect on employment, contracting opportunities would be available to Indigenous and non-Indigenous companies for construction of the MC1 Option. The residual effect is positive in direction and considered to be minor in magnitude, assuming a relatively small number of Indigenous companies would be available and would meet contracting requirements. The effect is regional in extent but short-term in duration, since any detectable increase in contracting opportunities would be limited to the construction phase. Confidence in the characterization of this effect is low due to uncertainty over the availability and capacity of Indigenous companies to bid on and win MC1 Option related contracts. The changes to Indigenous contracting and procurement opportunities are considered to be non-substantive and the effects characteristics ratings are summarized in **Table 16**.

Table 16 Summary of Effect Characteristics Ratings for Changes to Indigenous Contracting and Procurement Opportunities

Residual Effects Characteristic	Rating	Rationale for Rating
Direction	· Positive	The effect would be an increase in contracting opportunities.
Extent	· Regional	The effect applies to businesses in the RAA.
Magnitude	· Minor	The MC1 Option could generate a modest increase in opportunities for Indigenous contractors during Construction.
Duration	· Short-term	Contracting opportunities would mainly apply to Construction phase.
Reversibility	· Reversible	Contracting opportunities would mainly apply to Construction phase.
Frequency	· Continuous	The effect would persist through Construction and Operation and Maintenance phases.
Confidence	· Low	MC1 Option-related effect on the contracting opportunities is well-understood and predictable; however, capacity of Indigenous businesses to bid on and win MC1 Option-related contracts is not known.

Change to Indigenous regional economic conditions

The residual effect of the MC1 Option on Indigenous regional economic conditions would be positive in direction, because the effect would be an increase in workers spending earnings in Indigenous communities in the RAA, representing a net benefit. The extent is regional, if workers are spending a part of their earnings in Indigenous communities and to Indigenous-owned businesses. Confidence in the characterization of this effect is low, since the potential linkages between the MC1 Option and Indigenous regional economic conditions have not been fully identified due to no engagement with Indigenous groups. The changes to Indigenous regional economic conditions are considered to be non-substantive and the effects characteristics ratings are summarized in **Table 17**.

Table 17 Summary of Effect Characteristics Ratings for Changes to Indigenous Regional Economic Conditions

Residual Effects Characteristic	Rating	Rationale for Rating
Direction	· Positive	The effect would be an increase in workers spending earnings in Indigenous communities in the RAA, representing a net benefit.
Extent	· Regional	The effect applies to Indigenous communities in the RAA.
Magnitude	· Minor	The MC1 Option could generate a modest increase in spending in Indigenous communities during Construction.
Duration	· Short-term	The effect would mainly apply to Construction phase.
Reversibility	· Reversible	The effect would mainly apply to Construction phase.
Frequency	· Continuous	The effect would persist through Construction and Operation and Maintenance phases.
Confidence	· Low	MC1 Option-related effects on the regional economy are fairly well-understood and predictable; however, linkages to Indigenous regional economic conditions have not been identified and are not known.

Effects on public health and safety and emergency response

The operation and maintenance of the MC1 Option would improve overall public health and safety, as well as emergency preparedness and emergency response during flood conditions. This residual effect of the Operation and Maintenance phase is considered to be positive and substantive, and effects characteristics ratings are summarized in **Table 18**.

Table 18 Summary of Effect Characteristics Ratings for Public Health and Safety and Emergency Response

Residual Effects Characteristic	Rating	Rationale for Rating
Direction	· Positive	Benefit to public health and safety emergency preparedness/emergency response
Extent	· Regional	Effect extends to susceptible populations located downstream of the Option, including Bragg Creek, Redwood Meadows, Tsuut'ina Nation and Calgary
Magnitude	· Major	Increased public health and safety and improvements to emergency preparedness/emergency response
Duration	· Long-term	Benefits would last the life of the Option
Reversibility	· Not reversible	Not reversible during the life of the Option
Frequency	· Rare	Benefit would be intermittent in accordance with flood risks
Confidence	· High	Health and safety benefits of flood reduction are well understood

Effects on Indigenous health services

The residual effect on health services, including Indigenous health services is considered a net benefit and is therefore positive in direction. The effect is considered to be non-substantive since magnitude is minor, reflecting a conservative assumption that the effect would be difficult to quantify but would be related to the reduction in flood risk and commensurate improvement in mental health in downstream Indigenous communities. Confidence in the effect characterization is low; the net benefit on regional health services including Indigenous health services due to flood reduction is not well understood due to no engagement with Indigenous groups. The effects characteristics ratings are summarized in **Table 19**.

Table 19 Summary of Effect Characteristics Ratings for Changes to Indigenous Health Services

Residual Effects Characteristic	Rating	Rationale for Rating
Direction	· Positive	Net benefit to health services
Extent	· Regional	Effect extends to Indigenous health services in the RAA
Magnitude	· Minor	The benefit is predicted to be minor for Indigenous health services, to be conservative.
Duration	· Long-term	Benefits would last the life of the Option
Reversibility	· Not reversible	Not reversible during the life of the Option
Frequency	· Rare	Benefit would be intermittent in accordance with flood risks
Confidence	· Low	The net benefit on regional health services including Indigenous health services due to flood reduction is not based on data from the study area and is not well understood

Based on the assessment presented in this section, no substantive adverse residual effects have been identified to be carried forward for consideration in the cumulative effects assessment (i.e., Planned Development Case).

5.4 Summary of Indigenous Health and Socio-economic Conditions Assessment

Based on available information, the residual effects to non-traditional land and resource use and Indigenous socio-economic resources are considered to be positive. Completion of the MC1 Option would reduce downstream flood risk, which would likely be a positive and substantive effect due to the benefit to non-traditional land and resource use in downstream areas.

Potential socio-economic effects including changes to the Indigenous labour force and contracting opportunities are characterized as positive, non-substantive residual effects. Confidence in the characterization of these effects is low due to uncertainty over the size and capacity of the Indigenous labour force and potential benefits to Indigenous companies.

The potential effects on Indigenous health and safety are expected to be positive and substantive, due to reduction of flood risk for downstream Indigenous communities.

6.0 CULTURAL HERITAGE AND THE CURRENT USE OF LANDS AND RESOURCES FOR TRADITIONAL PURPOSES

This section addresses potential MC1 Option-related effects to cultural heritage and current use of lands and resources for traditional purposes. For the purposes of this assessment, cultural heritage is defined by the CEAA 2012 as a "…human work or a place that gives evidence of human activity or has spiritual or cultural meaning, and that has historic values…cultural resources can be applied to a wide range of resources, including, cultural landscapes and landscape features, archaeological sites, structures, engineering works, artifacts and associated records" (Government of Canada 2016).

The current use of lands and resources for traditional purposes is defined by CEAA 2012 as "an Aboriginal group's practices, traditions or customs, which are part of an Aboriginal group's distinctive culture and fundamental to their social organization and the sustainment of present and future generations". Practices, traditions and customs are generally defined as follows:

- Practice: a way of doing something that is common, habitual or expected;
- Tradition: a custom, opinion or belief handed down primarily orally or by practice; and
- Custom: a particular, established way of behaving" (Government of Canada 2016b).

Current use also accounts for the conditions of use, seasonal cycles, intergenerational knowledge transmission, landforms and named places, and other factors that provide context, setting or understanding for the practice of current use activities. Further, CEA Agency guidelines indicate that current use of lands and resources for traditional purposes may include activities such as hunting, trapping, fishing, and plant gathering (CEA Agency 2015c). Current use encompasses various traditional activities, practices, sites, areas, and resources, including, but not limited to hunting; trapping; fishing; plant gathering; use of trails and travel ways, including navigation; use of habitation areas (e.g., cabins, campsites, temporary shelters); and, use of cultural and spiritual sites and areas.

The assessments presented in this section are supported by, or linked to, the assessments presented in the following sections of the MC1 Option Screening Report (Hemmera 2017):

- **Section 6.1: Atmospheric Environment**
- **Section 6.2: Terrain and Soils**
- **Section 6.3: Hydrogeology**
- **Section 6.4: Fluvial Geomorphology**
- **Section 6.5: Water Quality**
- **Section 7.1: Vegetation and Wetlands**
- **Section 7.2: Wildlife and Wildlife Habitat**
- **Section 7.3: Aquatic Environment**

6.1 Scope of Assessment

6.1.1 Valued Component

The Valued Component (VC), Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes has been selected for assessment as potential Project-related effects may cause direct or indirect changes to the cultural heritage and/or the current use of lands and resources for traditional purposes as a result of Construction and Operation and Maintenance Phases of the proposed MC1 Option. Given the interrelated nature of cultural heritage and current use, this assessment considers these values together as one VC with measurable parameters used to highlight potential project-related changes (**Table 20**).

6.1.2 Measurable Parameters

Measurable parameters are quantitative or qualitative measures used to describe existing conditions and evaluate potential MC1 Option-related effects to VCs. The measurable parameters selected for Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes VC are shown in **Table 20**.

Table 20 Measurable Parameters for Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes

Selected VC	Potential Effects	Measurable Parameter
Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes	· Change to land use (including waterbodies) · Changes to habitat, movement patterns, biodiversity, wildlife mortality, water quality, conditions for current use, and riparian vegetation · Changes to atmosphere and environmental conditions · Affect access to traditional resources, current use areas and/or cultural heritage sites · Affect current use sites, cultural landscapes, landscape features, archaeological sites, structures, engineering works, artifacts and/or associated records	**Cultural Heritage** Indigenous groups may have tangible and/or intangible values related to a specific place, cultural and spiritual site, or named place which holds significance to one's cultural landscape, sense of place and identity. These tangible and intangible values include those which are related to supporting the continuity of one's culture through the transmission of Traditional Knowledge and ability to access teaching areas.
		Current Use Activities, Resources, and Environmental Conditions The ability to conduct current use activities for traditional purposes (i.e. hunting, trapping, fishing, medicinal and food plant harvesting, material gathering, etc.) is influenced by: · the availability of environmental resources (i.e. fish, animals, plants, etc.), · the ability to access those resources, · surrounding atmosphere and environmental conditions (e.g., light, noise, etc.)

6.1.3 Assessment Boundaries

6.1.3.1 Spatial boundaries

The Local Assessment Area (LAA) is the area within which the MC1 Option would be likely to interact with and potentially result in direct and/or indirect effects to cultural heritage and/or the current use of lands and resources for traditional purposes. As this VC is affected by changes to surrounding biophysical conditions, the LAA boundary was delineated in consideration of the linked VC assessments listed in **Section 6.0**. Thus, the LAA for cultural heritage and the current use of lands and resources for traditional purposes is an amalgamation of the largest spatial extent of the linked VC LAAs; specifically, this boundary combines the LAAs for Air Quality and Fluvial Geomorphology (or surface water) (**Figure 3)**.

The RAA is the maximum predicted physical extent of the area where the MC1 Option is expected to interact with and potentially have effects on Indigenous cultural heritage and/or the current use of land and resources for traditional purposes. The Regional Assessment Area (RAA), which encompasses the LAA, may also provide regional context for the assessment, and is the area within which the residual effects of the MC1 Option are likely to interact with the residual effects of other past, present or future projects or activities to result in a cumulative effect or effects (**Figure 4)**. The RAA for this VC was defined by identifying the Regional Assessment Area (RAA) with the largest spatial extent of linked biophysical VCs which may influence cultural heritage and/or the current use of lands and resources for traditional purposes; therefore, this boundary is the same as the RAA for the wildlife and wildlife habitat VC (**Table 21)**.

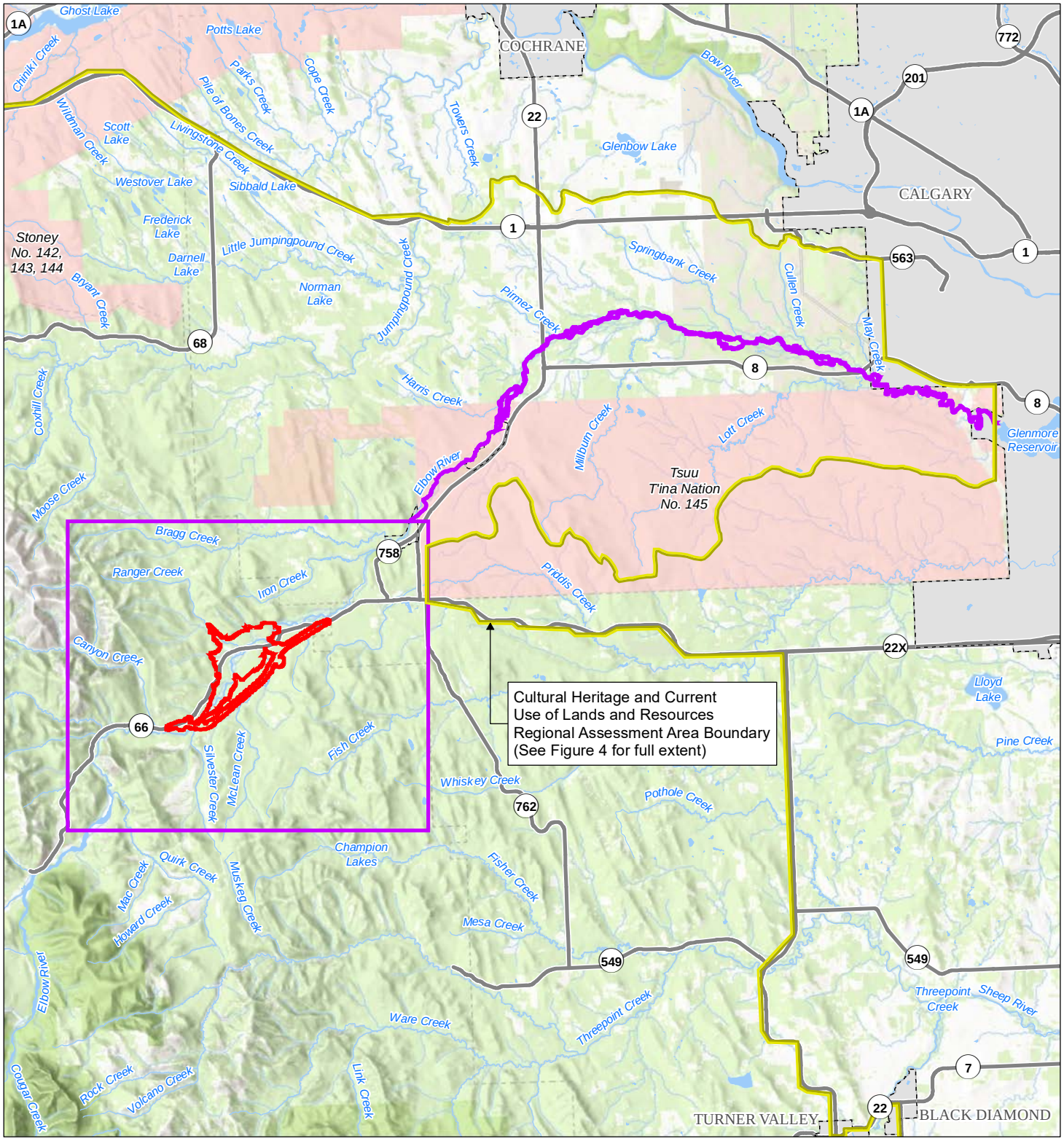
Table 21 Local and Regional Assessment Areas for Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes

Valued Component	Local Assessment Area (LAA)	Regional Assessment Area (RAA)
Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes	The LAA combines the Air Quality LAA boundary (i.e. a rectangular area extending at least 5 kilometers (km) from the Project footprint) with the Fluvial Geomorphology LAA boundary (i.e. the point where the Elbow River enters the Glenmore Reservoir (approximately 52 km downstream of the Project) and encompasses the LAA's of all the linked biophysical VCs within this area.	The RAA is defined by the boundaries of the Livingstone Grizzly Bear Management Area (BMA 5). This area is pertinent to wildlife VCs because it is sufficiently large to encompass an area where local populations of large terrestrial mammals could be affected by MC1 Option-related effects as well as undergo cumulative effects

6.1.3.2 Temporal Boundaries

The Construction and Operation and Maintenance phases comprise the temporal boundaries. Construction is expected to take place over a four-year period, and operations are assumed to continue in perpetuity; consequently, no decommissioning phase has been assessed.

It should be noted that for this assessment, current refers to the present time to within the last 25 years, or one generation. Twenty-five years is chosen because information regarding traditional practices or locales can be lost from an Indigenous group's collective knowledge if it is not used for a generation's time or passed on to younger generations (p.14.15, Stantec 2018c).



Legend

- Cultural Heritage and Current Use of Lands and Resources Local Assessment Area
- Cultural Heritage and Current Use of Lands and Resources Regional Assessment Area
- MC1 Option Area
- Highway
- Watercourse
- Reserve
- Urban Area
- Waterbody

Sources

- Contains information licensed under the Open Government Licence - Government of Alberta

Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

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Local Assessment Area (LAA) for Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes

989369-01	Production Date: Apr 8, 2019	Figure 3

Hemmera An Ausenco Company

Alberta Transportation

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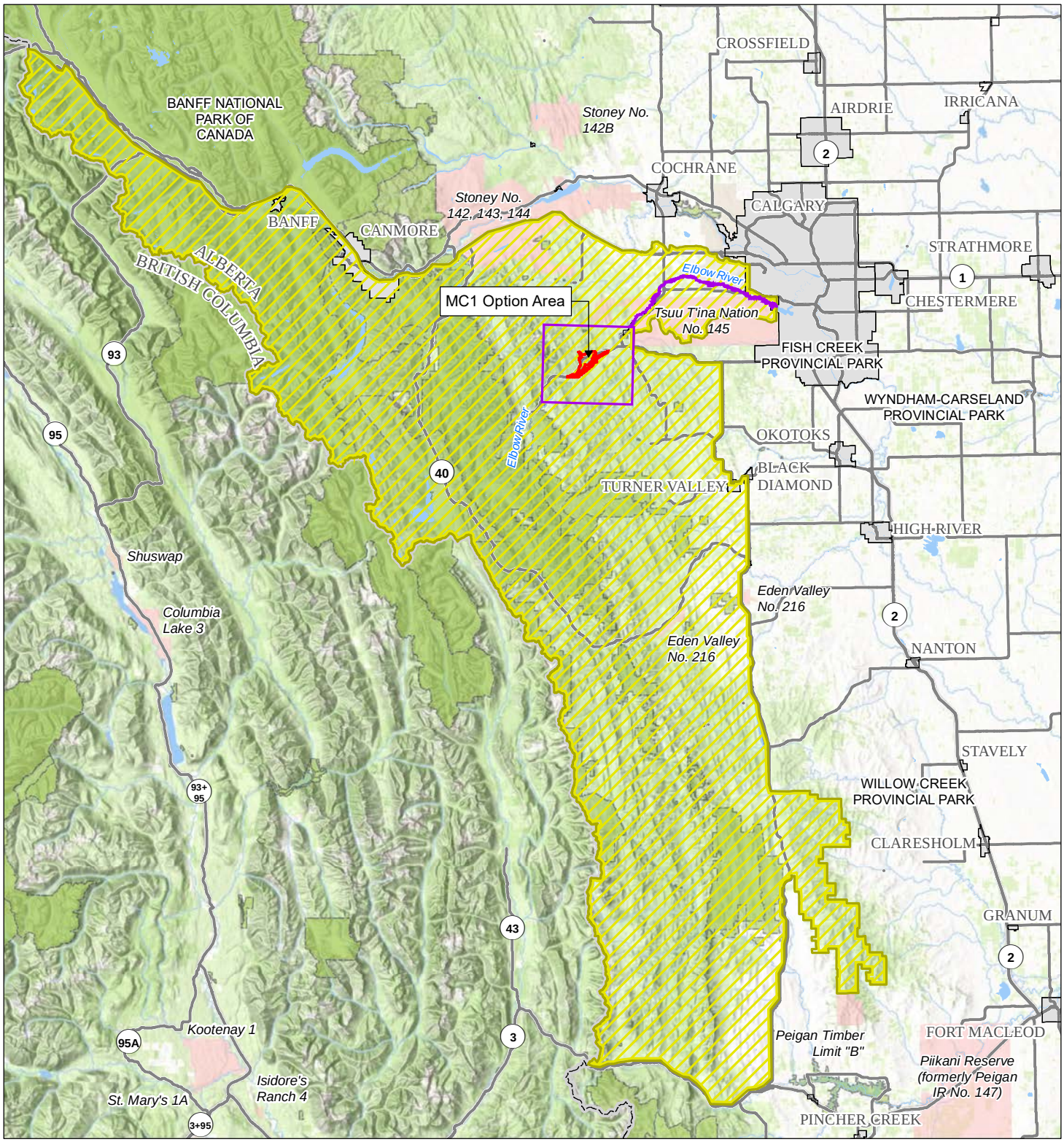

Legend

- Cultural Heritage and Current Use of Lands and Resources Local Assessment Area
- Cultural Heritage and Current Use of Lands and Resources Regional Assessment Area
- MC1 Option Area
- Highway
- Provincial Boundary
- Park or Protected Area
- Reserve
- Urban Area

Sources

- Contains information licensed under the Open Government Licences - Government of Alberta and British Columbia
- Dam and flood details: Opus International Consultants Limited, 2017

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NAD 1983 10TM AEP Resource

Page Size: 8 ½" x 11"

Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

Regional Assessment Area (RAA) for Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes

989369-01	Production Date: Apr 8, 2019	Figure 4

Hemmera An Ausenco Company

Alberta Transportation

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6.1.3.3 Administrative and Technical Boundaries

No administrative or technical boundaries were considered as part of this assessment.

6.2 Baseline Case

The following section describes the Baseline Case for the Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes VC and is informed by the data compiled from the sources listed in **Section 4.2.**

6.2.1 Hunting

Some examples of landscapes and species used for hunting in the region include the following:

- Tsuut'ina – Tsuut'ina described the importance of elk and supporting habitat including calving grounds, migration routes, water crossings, and critical habitat (Mandell Pinder LLP 2018).
- Blood Tribe/Káínai Nation identified species hunted including moose among willow trees and low-lying wetlands, elk in aspen forests, white tailed deer in meadows, and mule deer in wooded areas (O'Connor 2018). In addition to big game species, a variety of birds and other animals are hunted by Blood Tribe/Káínai Nation, and by-products of their hunting activities have many different traditional purposes including, but not limited to, social or ceremonial uses (O'Connor 2018).
- Stoney Nakoda Nations stressed the importance of wildlife crossings (Stantec 2018c).
- Ermineskin Cree Nation and Samson Cree Nation identified salt licks, where ground water comes to the surface, as areas where game are drawn and as prime hunting areas (Stantec 2018c).
- MNA (Region 3) mapped a total of 12 hunting locations where participants hunted and/or processed moose, deer, rabbit and nuisance species (e.g., gopher) (MNA 2018b).

Hunting also contributes to cultural continuity and identity. For example, the Piikani Nation and the Blood Tribe/Káínai Nation explain that hunting also remains an important element of the Blood Tribe/Káínai way of life which provides a traditional food source and contributes to cultural practices and values (AMEC 2009; AMEC 2010; O'Connor 2018). More specifically, three Blood Tribe/Káínai hunters shared how hunting and processing hunted game supports sharing practices.

6.2.2 Trapping

Trapping is a current use activity which is traditionally conducted along creeks, streams and trails by some Indigenous groups including the Piikani Nation and Blood Tribe/Káínai Nation (AMEC 2009; AMEC 2010; Stantec 2018c), while others like the MNA (Region 3) are known to trap in wooded areas, coulees, river valleys, along lake shores and shallow waterbodies (EEP 2016b).

The diversity of lands currently used for trapping likely reflects the different species being targeted by trappers at different times of year. Examples of species and landscapes supporting trapping activities in the MC1 Option Area include:

- Stoney Nakoda Nations stated that there were two different traplines in the RAA of the SR1 Project Area and noted concern that trapping may be affected by the project (Stantec 2018d).
- Blood Tribe/Káínai members did not indicate that they currently trap the SR1 Project Area or hold any commercial trapping licences; however, this does not mean that they do not currently trap in the MC1 Option Area (O'Connor 2018). Beaver, muskrat, coyote, fox, weasel, and wolf are some of the fur bearers identified by Blood Tribe/Káínai members (O'Connor 2018).

6.2.3 Fishing

Fishing is an important traditional use activity valued by Indigenous groups listed in **Table 1** for many reasons, including subsistence, cultural identity and cultural continuity. Several different species continue to be valued and fished in the region, including (but not limited to): char, burbot, suckers, pike (northern), jackfish, whitefish (mountain), cutties, and trout (rainbow, brown, cutthroat and bull) (Mandell Pinder LLP 2018; Stantec 2018c). Examples of fishing activities identified by specific Indigenous groups include the following:

- Tsuut'ina Nation explain how fish are an important traditional food served at such cultural activities as feasts and pow-wows (Mandell Pinder LLP 2018).
- Blood Tribe/Káínai and Siksika Nations indicated that the Elbow River and its associated sloughs were important habitat for fish and wildlife (Stantec 2018c).
- Blood Tribe/Káínai land users and Elders described the Elbow River as habitat for rainbow trout, cutthroat trout, brook trout, bull trout and rocky mountain whitefish (O'Connor 2018).
- Interviews with active fishers from Blood Tribe/Káínai suggest that portions of the Elbow River are currently used to fish for trout and rocky mountain whitefish (O'Connor 2018).
- Through past MNA (Region 3) consultation and engagement identified that fishing occurs in large waterways including rivers, streams, and tributaries, and mapped fishing locations are used in the Bow and Elbow rivers (Stantec 2018c; MNA 2018b). Species caught included brown trout, rainbow trout, lake whitefish, white sucker and walleye. Bull trout are a charismatic species that is of great importance to the Métis. However due to anthropogenic impacts, brown trout have taken on larger importance due to declines in bull trout (MNA 2019b).

6.2.4 Plant Gathering

Indigenous groups currently use the lands along the Elbow River to gather important traditional plants for materials (e.g., for arts, crafts, fuel and construction), medicinal, subsistence, and cultural (e.g., ceremonial use, etc.) purposes (O'Connor 2018). According to Tsuut'ina Nation, the abundance of medicinal plants that grow along the banks of the Elbow River informed the decision to choose the location of their reserve lands (Mandell Pinder LLP 2018).

Several different species of plants were identified by Indigenous groups as being valued for traditional purposes including:

- Tsuut'ina Nation identified buffalo grass (which is important for smudging), yarrow, sweetgrass, Saskatoon berries, choke cherries, medicinal flowers, mushrooms, kinnikinnick (bear berry), cedar brush, poplars, sage, red willow, diamond willow, juniper, and wild bergamot (Mandell Pinder LLP 2018).
- Stoney Nakoda Nations identified the gathering and use of cedar (including western red), cottonwood (black), poplar, spruce, and sweetgrass (Stantec 2018c).
- Blood Tribe/Káínai Nation noted the use of saskatoon berries, choke cherries, blueberries, strawberries (species of subsistence use), willow bark, spruce and pine sap, birch and poplar bark (medicinal and topical use), willow branches, birch logs, poplar trees (fuel, traditional construction materials), wild rose bush and rose hips, and common yarrow (O'Connor 2018).
- MNA (Region 3) identified gathering mint, sage, blueberries, strawberries, saskatoon berries, and others (MNA 2018b).

Historic records indicate that plants were harvested by the Piikani for their nutritional, spiritual, and medicinal significance; today, plants continued to be harvested for such traditional purposes as use in ceremonies and for medicinal purposes (AMEC 2010). Piikani Nation has indicated that development, especially near rivers and swamps, may affect plant harvesting areas (EEP 2016a). Examples of the use of plants for medicinal purposes by Indigenous groups listed in **Table 1** include:

- Blood Tribe/Káínai First Nation and Siksika Nation identified the presence of medicinal plant locations within the SR1 Project Area, including both sides of Elbow River (Stantec 2018c).
- Samson Cree Nation reported that medicinal plants can be found in mossy areas and most traditionally-harvested plants, including herbs, are found near riparian areas and regions with water (Stantec 2018c).
- Ermineskin Cree Nation indicated that "medicines are gathered throughout their asserted traditional territory and that they consider the entire region to be their pharmacy", as any site where a traditionally used plant is located has potential to be a harvesting site, and, prior to treaties, family groups shared resources throughout the region (Stantec 2018c).
- Montana First Nation reported travelling from the mountains to the prairies to harvest plants, including medicines and roots (Stantec 2018c).
- MNA (Region 3) in previous engagement activities has noted that plants gathered for food, crafts, and medicines are found along rivers and creeks, and identified locations along the Elbow River (MNA 2018b).

6.2.5 Transportation and Habitation

Trails and travel ways (such as river corridors) are valued by Indigenous groups as they facilitate access to their traditional territory and resource use areas which are central to their way of life, cultural continuity and well-being (Stantec 2018d). Trails and travel ways include rivers used in the past for canoeing. Both the Blood Tribe/Káínai Nation and Tsuut'ina Nation have specifically noted the importance of trails and travel ways to current use activities (Stantec 2018d). MNA (Region 3), via engagement on other projects in Alberta, reported that travel was at the heart of the Métis way of life: first by river in canoes and then by horse and cart on land (EEP 2016b).

Tsuut'ina Nation specifically reported using the Elbow River for transportation and emphasized the importance of the river as a transportation route (Stantec 2018c). In an interim traditional use study, Siksika Nation and Blood Tribe/Káínai Nation identified Elbow River as an important Blackfoot travel route, which is used year-round to travel between the plains and the mountains (Stantec 2018c). Past engagement activities with Blood Tribe/Káínai First Nation and Ermineskin Cree Nation reported that, in general, navigable waterways were travel routes by their people (Stantec 2018c).

Past engagement activities with Indigenous groups in the region identified a historical Blackfoot seasonal travel route between the Bow River and the Milk River (O'Connor 2018). Members of Stoney Nakoda Nations also travelled annually in the spring from the Bow River area to hunting grounds near Sheep River and Highwood River areas and further south (Stantec 2018c).

Blood Tribe/Káínai identified and marked at least two segments of historic trails and travel ways with GPS coordinates during a field verification exercise in May 2018 (O'Connor 2018). An old trail referred to as the Old Stoney Trail (Old North-South Trail) was identified during Piikani Nation and Blood Tribe/Káínai site visits near the Robinson property (Schaldemose & Associates 2018, Stantec 2018c). Additionally, the Old North-South Trail is not only a travel route for the Blood Tribe/Káínai, but a site of cultural, spiritual and historic importance and likely to have archaeological and heritage resources associated with it (O'Connor 2018).

6.2.6 Sites and Areas Used for Practices, Traditions and Customs

The Elbow River area has been identified by Indigenous groups as an area that has many different sites and areas currently used for practices, traditions and customs. For example, the Tsuut'ina Nation has identified many cultural sites in the area, including tipi rings, fire pits, rock cairns, trails, and gravesites as well as identifying that the area is good for gathering rocks for sweats (Mandell Pinder LLP 2018; Stantec 2018c). Tsuut'ina identified the potential for effects on Elbow River and indicated that Elbow River is a communal gathering and fishing area as well as where medicinal plants are harvested in wetlands and riparian areas along the river.

Stoney Nakoda Nations indicated that Elders have songs about Chiefs and sand dunes, pointing to the cultural importance of sand bars, which occur in the Elbow River (Stantec 2018c). Stoney Nakoda Nations also described having meditation sites, vision quest sites, sacred lodges, and tipis in the region (Stantec 2018c). Stoney Nakoda Nations stressed the importance of wildlife crossings, and their strong connection to oral history and transmission of knowledge between generations and noted that the loss of wildlife crossings could affect the transmission of traditional knowledge (Stantec 2018c).

Siksika Nation and Blood Tribe/Káínai, have also expressed the importance of the Elbow River (i.e., traditional camps, medicinal harvesting areas and traditional use sites, travel route) to Blackfoot traditions and culture (Stantec 2018d; O'Connor 2018). Sites or areas of current use for ceremonial, spiritual, cultural, educational or historical value, or unique ecological characteristics of interest to the Blood Tribe/Káínai include:

- Blackfoot Trail (North-South Trail) along the Elbow River, Blood Tribe/Káínai ceremonial site at winter camp along the Blackfoot Trail (contains tipi rings, stone markings and potential human remains);
- Traditional Blackfoot Winter Camps in shaded valleys near water, such as one within the proposed SR1 Project Area east of the Our Lady of Peace Mission Site;
- Elbow River Valley;
- Blackfoot winter camp and sites of historic, cultural and spiritual interest near proposed reservoir outlet on "Un-named Creek"; and,
- wetlands (Tall Grass Lakes) as nesting grounds and migratory bird habitat, and natural spring features (O'Connor 2018).

Specific sites that feature stone cairns and rock alignments, suggestive of bison jumps, continue to be frequented by Piikani Nation and Blood Tribe/Káínai members for traditional spiritual practice (AMEC 2009; AMEC 2010). Blood Tribe/Káínai Nation, Piikani Nation, and Siksika Nation have indicated that Iniskims (also known as buffalo stones, generally pieces of ammonite but can be any rock or fossil that is attributed a spiritual value) are fossils that are considered culturally significant and are incorporated into bundles; arrowheads and other ceremonially significant items are also placed in bundles (Stantec 2018c; Stantec 2018e; Schaldemose & Associates 2018).

The Piikani Nation is another Indigenous group which has declared the Great Sand Hills to be an area of spiritual and ceremonial importance (EEP 2016a). Stating it as a place where "sick people come and make a vow", where "healthy people come back the next year to give thanks", and a place where those who have died go to live out their spiritual life (EEP 2016a). Piikani Nation related that rock formations hold great historical and cultural significance (Stantec 2018b; EEP 2016a). They represent a variety of meanings: "some of them tell battles that took place of massacres or of tribes winning a battle or great chiefs being

buried on the hilltops and the markings of their stories. And the big gatherings of what is called our medicine wheel today, which we're looking at, it was a Sun Dance" (EEP 2016a). Piikani Nation explained that Sun Dance sites are sacred and require the area to have rocks, willow, poplar, and an area to set-up camp.

Ermineskin Cree Nation indicated during SR1 Project engagement that the project was in a region of cultural and historical importance (Stantec 2018c). MNA (Region 3) indicated having utilized the SR1 Project Area for traditional uses since the 1600s, and Métis Nation British Columbia noted that Métis have a long history of using the area "…from the eastern slopes of the Rocky Mountains to Jasper House, Hinton, Lac Ste. Anne, Hudson's Hope, Fort St. John, and the Mackenzie River Valley" (Stantec 2018c, p.14.28).

6.3 Application Case

6.3.1 Potential Option Interactions

Potential option interactions between MC1 Option-related activities and this VC are summarized in **Table 22** according to Project Phase.

Table 22 Potential MC1 Option Interactions with Cultural Heritage and Current Use of Lands and Resources

Potential Interactions with Cultural Heritage and Current Use of Lands and Resources	
Construction	
Clearing (temporary or permanent removal of vegetation and wetlands within the MC1 Option Area)	Yes
Road construction	Yes
Decommissioning and removal of existing provincial parks infrastructure and ranger station	Yes
Dam (cofferdam and earth fill) construction	Yes
Spillway construction	Yes
Rock groin and diversion tunnels construction	Yes
Laydown areas construction and use	Yes
Stockpile development and use	Yes
Borrow and spoil areas development and use	Yes
Realignment of McLean Creek and other small waterbodies	Yes
Realignment of Highway	Yes
Storage of water in permanent pond)	Yes
Reclamation (including revegetation, measures to restore altered habitat)66	Yes
Operation and Maintenance	
Routine and Flood Operation and Maintenance	Yes

6.3.2 Potential Effects

This section includes consideration of potential MC1 Option-related effects on the Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes VC arising from the potential interactions, listed in **Table 22.**

6.3.2.1 Change in Available Lands and Terrestrial Resources

As described in **Section 6.2,** the Elbow River area has been identified by Indigenous groups as an area which characterizes, and contributes to, their cultural heritage (e.g. sites and areas currently used for practices, traditions, customs, travel routes, traditional camps, etc.). Planned Construction activities and the anticipated flooding of the MC1 Option reservoir during the Operations Phase will change the available lands and terrestrial resources which contribute to the cultural heritage of Indigenous groups.

The MC1 Option Area and adjacent lands are also valued for the current use activities which it directly and indirectly supports. Hunting, trapping, medicinal and food plant gathering are examples of current use activities which continue to be valued by, and inherent cultural components of, Indigenous groups. As such, Construction activities, as noted above will change the available lands and terrestrial resources that support current use activities. Based on residual effects identified in the **Wildlife and Wildlife Habitat (Section 7.2)**, **Vegetation and Wetlands (Section 7.1)** and **Terrain and Soils (Section 6.2)** Sections of the MC1 Option Screening Report, linked changes to available lands and terrestrial resources may arise due to (Hemmera 2017):

- Changes to wildlife and wildlife habitat (e.g., grizzly bear, ungulates, bats, breeding birds, raptors, owls, harlequin duck, amphibians and reptiles),
- Changes in movement (e.g., grizzly bear, ungulates, amphibians and reptiles),
- Increased mortality risk (e.g., grizzly bear, ungulates, bats, breeding birds),
- Changes to vegetated areas, wetland area and function,
- Changes in species diversity, and
- Changes to terrain and soil.

6.3.2.2 Changes in Available Waterbodies and Aquatic Resources

As presented in the MC1 Option Screening Report, Construction and Operation activities (including flooding of the reservoir), would result in changes to available water bodies and aquatic resources including changes to channel morphology of the Elbow River (as a result of damming), groundwater, and surface water (Hemmera 2017). Construction activities also require the direct removal of vegetation and wetlands and the temporary or permanent disturbance/removal of soil. Anticipated project-related changes to channel morphology, soil, vegetation, and erosion have the potential to change available waterbodies and the supporting aquatic resources which support cultural heritage and/or current use activities.

As described in **Section 6.2,** available waterbodies are intrinsic components of the cultural landscape which characterize the cultural heritage for Indigenous groups and changes to waterbodies, anticipated as a result of the MC1 Option, would result in effects to cultural heritage. In addition, cultural heritage would be further affected by MC1 Option-related changes to waterbodies that change water-based transportation routes. As described in **Section 6.2.5,** the Elbow River is also an important year-round travel route for the Siksika

Nation and Blood Tribe/Káínai Nation. Current use activities may also be affected by changes in available waterbodies and aquatic resources.

Based on residual effects identified in the **Aquatic Environment (Section 7.3)**, **Fluvial Geomorphology (Section 6.4)**, and **Hydrogeology (Section 6.2)** sections of the MC1 Option Screening Report, linked changes to available waterbodies and aquatic resources may arise due to (Hemmera 2017):

- Changes in water quality (i.e., increased sediment),
- The permanent alteration or destruction of fish habitat (i.e., char, burbot, suckers, northern pike, jackfish, mountain whitefish, cutties, rainbow trout, brown trout, bull trout and cutthroat),
- Changes in fish mortality and productivity,
- Changes in fish migration and movement,
- Changes in fish assemblages due to habitat change,
- Changes in surface water due to sediment retention in the reservoir, and
- Changes to the amount of groundwater available downstream of the dam embankment.

Other current use activities which could be affected by changes in available waterbodies and aquatic resources include plant gathering, habitation, medicinal uses, transportation, and sites and areas used for practices, traditions and customs.

6.3.2.3 Changes in Access to Cultural Heritage and/or Current Use Activities, Conditions, and Resources

The MC1 Option may change where, how, and if Indigenous groups are able to access the lands, waters, and resources that contribute to their culture heritage and/or support their current use activities for traditional purposes, as a result of the MC1 Option, its components and activities anticipated to occur during the Construction, Operation, and Maintenance phases. As described in the MC1 Option Description of the MC1 Option Screening Report, the Construction and Operation of the MC1 Option dam would include an earth fill dam across the Elbow River and several components (Hemmera 2017). One of these components, the Highway 66 relocation, will require approximately 10 km of Highway 66 to be relocated due to it being inundated by the permanent pond. In addition to this particular change in road access, changes to trails and travel corridors used by Indigenous groups may also result from the MC1 Option. Further, in **Section 6.2.6,** several Indigenous groups describe how trails and travel ways (such as river corridors) are important and valued.

Project related Construction and Operation activities have the potential to cause direct and/or indirect changes to access of lands, waters, and resources by affecting the regional terrain (i.e., channel morphology, permanent ponds, etc.) thereby requiring Indigenous groups to change where, how, and if they can access current use areas and sites, travel corridors and/or cultural heritage use and sites in and around the MC1 Option footprint.

6.3.2.4 Changes to the Quality of Cultural Heritage and/or the Current Use Activities, Conditions, and Resources

The lands, waters and resources that characterize each Indigenous group's traditional territories (including sensory conditions (such as noise, light, air quality, etc.), productive areas, etc.), are valued, in part, for their unique qualities. Though how 'quality' is defined may differ between Indigenous groups and the specific resource being characterized (e.g. quality of an area, quality of a species, etc.), the MC1 Option activities have the potential to directly and/or indirectly affect the quality of biophysical resources and sensory conditions which affect one's experience. More specifically, based on residual effects identified in the **Wildlife and Wildlife Habitat (Section 7.2)**, **Vegetation and Wetlands (Section 7.1)**, **Atmospheric Environment (Section 6.1)**, and **Terrain and Soils (Section 6.2)** sections of the MC1 Option Screening Report, linked changes to the quality of cultural heritage and/or the current use activities, conditions, and resources may arise due to (Hemmera 2017):

- Changes to noise levels
- Changes to air quality
- Changes to wildlife and wildlife habitat (e.g., grizzly bear, ungulates, bats, breeding birds, raptors, owls, harlequin duck, amphibians and reptiles),
- Changes to wildlife movement (e.g., grizzly bear, ungulates, amphibians and reptiles) and mortality risk (e.g., grizzly bear, ungulates, bats, breeding birds),
- Changes to vegetated areas, wetland area and function,
- Changes in species diversity, and
- Changes to terrain and soils.

Project-related effects to sensory conditions (i.e. noise, increased emissions and ambient concentrations of criteria air contaminants; increased emissions of greenhouse gases, etc.) may change the indicators used by Indigenous groups to assess quality. For example, a change in quality could be experienced as a reduction in the productivity or abundance of a specific species, area, or natural resource. As a result, changes quality may require Indigenous groups to adjust their cultural heritage and/or current use activities (e.g., find new areas to conduct activities, increase the amount of time and effort associated with such activities.

Project-related changes to sensory conditions can also reduce the quality of current use activities by changing the land use characteristics which contribute to the areas and/or sites where current use activities may be undertaken. As an example, changes in sensory conditions (i.e., increased noise) may result in areas being no longer suitable for use as a spiritual site, even if related biophysical studies identify no significant adverse effect, and resources required for the current use remain present.

In addition to the linked residual biophysical effects identified above, it is assumed that Indigenous groups will also apply their Traditional Knowledge, worldview, values and beliefs to assess and characterize quality with respect to specific cultural heritage and current use areas and resources.

6.3.2.5 Changes to the Tangible and Intangible Aspects of Cultural Heritage and the Current Use of Lands and Resource for Traditional Purposes

Project activities may cause physical changes (e.g. landscape clearing, permanent pond, changes to channel morphology, vegetation, and regional wildlife, etc.) within the LAA which may cause changes to the tangible and intangible aspects of cultural heritage and the current use of lands and resources for traditional purposes.

Tangible components include specific resources, (e.g., wildlife, plants, etc.), physical sites (e.g., cultural and spiritual sites, trapping areas, etc.), and observable activities (e.g. hunting, fishing, plant harvesting, trapping, etc.) that be readily considered in an effects assessment. Linkages between tangible components and biophysical VCs are often described. Tangible components are included as part of a conventional environmental assessment methodology, including the characterization of residual effects (p.14.12, Stantec 2018c).

Intangible components are related to beliefs, perceptions, values and qualitative experience (p.14.12, Stantec 2018c). These components are typically more challenging to understand and describe, as well as present a demonstratable linkage too. As described by Stantec 2018c, “potential effects on experiential values – such as cultural transmission, language retention, governance systems, and patterns of cultural behaviour – can only be meaningfully evaluated by individuals and communities experiencing these values in their cultural context” (p.14.12 Stantec 2018c).

While the intangible aspects of cultural heritage and current use are challenging to articulate due to the personal and sensitive nature of such information, the authors of this assessment have identified this as a potential Project related change as they conservatively assume that each of the Indigenous groups share an intrinsic relationship with their respective traditional territory and the natural resources which characterize it.

6.3.3 Mitigation Measures

Mitigation measures comprise any practical means taken to manage potential adverse effects, and may include applicable standards, guidelines, and best management practices (BMPs) supported by specific guidance documents. Mitigation measures for linked biophysical VCs presented in the MC1 Option Screening Report, are summarized in **Table 23,** as these measures will indirectly avoid and/or minimize potential residual effects described in **Section 6.3.4** (Hemmera 2017). As no MC1 Option specific Indigenous engagement was undertaken to support this assessment, no mitigation specifically focused on Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes VC have been identified. In addition to the mitigation currently presented in the MC1 Option Screening Report (**Table 23)**, it is recommended that Indigenous groups be engaged to review the potential changes identified in this IR response, to help ensure that respective mitigation measures are appropriate and effective.

Table 23 Summary of Potential Effects and Mitigation Measures for Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes

Potential Effect	Option Phase	Contributing Option Activities	Proposed Mitigation Measure or Enhancement Measure	Detectable / Measurable Residual Effect?
Change in Available Lands and Terrestrial Resources	Construction, Operation and Maintenance	Clearing; road construction; dam option component construction; use of borrow, spoil, and laydown areas; realignment of utilities, waterbodies, highway; permanent storage; routine and flood operations and maintenance	Mitigation measures in the MC1 Option Screening Report include measures for the following VCs: · Section 6.1: Atmospheric Environment · Section 6.2: Terrain and Soils · Section 6.3: Hydrogeology · Section 6.4: Fluvial Geomorphology · Section 6.5: Water Quality · Section 7.1: Vegetation and Wetlands · Section 7.2: Wildlife and Wildlife Habitat · Section 7.3: Aquatic Environment	Yes
Changes in Available Waterbodies and Aquatic Resources				Yes
Changes to Access to Cultural Heritage and/or the Current Use Activities, Conditions, and Resources				Yes
Changes to the Quality of Cultural Heritage and/or the Current Use Activities, Conditions, and Resources				Yes
Changes to Tangible and Intangible Aspects of Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes				Yes

6.3.4 Residual Effects

Potential residual effects of the MC1 Option and the VC-specific context for these effects are described in terms of effects criteria definitions and descriptions of context. Definitions for each residual effect characteristic and rating are derived according to the following hierarchy:

- A published regulatory or industry standard or criterion that establishes a threshold;
- A range of values or standards that, while not regulated, are widely recognized and accepted; and
- Professional judgment (with a rationale given).

It should be noted that there are not published regulatory or industry standards which establish thresholds for cultural heritage or the current use of lands and resources; every Indigenous groups will define residual effects in accordance with their individual culture, beliefs and worldview. In addition, there are no widely recognized and accepted values or standards to support the measure effects to cultural heritage or the current use of lands and resources. Thus, professional judgment has been used to characterize the identified residual effects in this assessment, in consideration of the information presented and limitations noted (**Section 4.2**).

Residual effects are potential MC1 Option related effects that are anticipated to remain after the application of mitigation measures. This section describes how the residual effects of the MC1 Option are characterized for this VC. The determination of a substantive or non-substantive residual effect includes a characterization including magnitude, regional extent, and duration.

Potential Option-related residual effects are defined as follows:

- **Non-substantive residual effect** – where mitigation measures have not fully eliminated the effects but have reduced the magnitude, extent, or duration to such a degree as to avoid a long-term loss of availability of traditional use resources or access to lands relied on for i) current use practices; ii) current use sites and areas; iii) cultural heritage sites and areas. This characterization is based on the definitions and rating of effects characteristics outlined in **Table 24**.
- **Substantive residual effect** – where adverse effects are predicted to persist despite mitigation measures and be experienced as a long-term loss of availability of traditional use resources or access to lands relied on for i) current use practices; ii) current use sites and areas; iii) cultural heritage sites and areas, such that current use is critically reduced or eliminated from the RAA. This may include disruption to current use activities and practices where biological resources or physical sites are not significantly affected in the RAA.

Residual effects on Cultural Heritage and Current Use of Lands and Resources for Traditional Purposes VC are anticipated to remain following the application of mitigation cited in the MC1 Option Screening Report as noted in **Table 23**. Residual effects are characterized based on the criteria defined in **Table 24** (Hemmera 2017).

Table 24 Residual Effects Characteristics for Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes

Residual Effect Characteristic	Rating	Definition
Direction	· Positive	Net Benefit: The trend of the effect is considered desirable or an improvement from baseline condition.
	· Adverse	Net Loss: The trend of the effect is considered undesirable or worsening from baseline conditions.
Extent	· Local	Within the LAA.
	· Regional	Within the RAA.
Magnitude	· Negligible	No detectable change from baseline conditions.
	· Minor	Detectable changes from baseline conditions; changes within range of natural variability; effect would increase the effort necessary to engage in one's cultural heritage and/or conduct cultural use activities, but not prevent one from engaging in cultural heritage and/or currently using the lands and resources for traditional purposes (considered to be an inconvenience or nuisance change).
	· Moderate	Detectable changes from baseline conditions; changes beyond range of natural variability; a moderate change in one's ability to engage in cultural heritage and/or conduct cultural use activities, but not completely preventing one from engaging in cultural heritage and/or currently using the lands and resources for traditional purposes.
	· Major	Detectable changes from baseline conditions; changes beyond range of natural variability tolerance; a severe change in one's ability to engage in cultural heritage and/or conduct cultural use activities, which completely preventing one from engaging in cultural heritage and/or currently using the lands and resources for traditional purposes in a specific area or location.
Duration	· Short-term	Restricted to the Construction phase.
	· Long-term	Extends through the Operation and Maintenance phase.
Reversibility	· Reversible	Effect can be reversed once the activity causing the residual effect ceases.
	· Not reversible	Effect is permanent.
Frequency	· Isolated	Residual effect occurs once throughout all project phases.
	· Frequent	Residual effect occurs multiple times throughout all project phases
	· Continuous	Residual effect occurs continuously throughout all project phases.
Confidence	· High	Rating predictions are based on a good understanding of cause-effect relationships, using data specific to the Option area, and/or information received through engagement with potentially affected Indigenous groups.
	· Moderate	Rating predictions are based on a good understanding of cause-effect relationships relying on data from elsewhere, incomplete understanding of cause-effect relationships from data specific to MC1 Option, and/or with some engagement with potentially affected Indigenous groups.
	· Low	Rating predictions are based on an incomplete understanding of cause-effect relationships and incomplete data, without MC1 Option specific data and/or engagement with potentially affected Indigenous groups.

The effect characteristics ratings are summarized below in **Table 25**.

Table 25 Summary of Effect Characteristics Ratings for Residual Effects of Potential Changes to Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes

Potential Effect	Detectable / Measurable Residual Effect?	Direction	Extent	Magnitude	Duration	Reversibility	Frequency	Confidence
Change in Available Lands and Terrestrial Resources	Yes	Adverse	Local to Regional	Negligible to Major	Long-term	Not Reversible	Continuous	Low
Changes in Available Waterbodies and Aquatic Resources	Yes	Adverse	Local	Negligible to Major	Long-term	Not Reversible	Continuous	Low
Changes to the Quality of Current Use Activities, Conditions, and Resources	Yes	Adverse	Local to Regional	Negligible to Major	Short-term to Long-term	Reversible to Not Reversible	Frequent to Continuous	Low
Changes to Access to Current Use Activities, Conditions, and Resources	Yes	Adverse	Local	Negligible to Major	Long-term	Not Reversible	Continuous	Low
Changes to the Tangible and Intangible Aspects of Cultural Heritage and the Current Use of Lands and Resource for Traditional Purposes	Yes							

6.3.4.1 Change in Available Lands and Terrestrial Resources

Residual effects of the MC1 Option to Changes in Available Lands and Terrestrial Resources are characterized as adverse as the following linked adverse residual effects from the MC1 Option Screening Report are assumed to contribute to how changes to available lands and terrestrial resources are experienced (Hemmera 2017):

- Change in vegetated area (Section 7.1 Vegetation and Wetlands);
- Change in wetland area and function (Section 7.1 Vegetation and Wetlands);
- Change in wildlife species diversity (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for grizzly bear and ungulates (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for bats (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for breeding birds, raptors, and owls (Section 7.2 Wildlife and Wildlife Habitat);

- Change in habitat for Harlequin Duck (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for amphibians and reptiles (Section 7. Wildlife and Wildlife Habitat);
- Change in movement for grizzly bear and ungulates (Section 7.2 Wildlife and Wildlife Habitat);
- Change in movement for amphibians and reptiles (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for grizzly bear and ungulates (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for bats (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for breeding birds, raptors, and owls (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for breeding birds (ground-nesting) (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for amphibians and reptiles (Section 7.2 Wildlife and Wildlife Habitat);
- Change in soil quantity (Section 6.2 Terrain and Soils);
- Change in topography (Section 6.2 Terrain and Soils);
- Decrease in slope stability (Section 6.2 Terrain and Soils); and,
- Change to the quality and/or quantity of soil due to the inundation and sediment deposition (Section 6.2 Terrain and Soils).

It is assumed that Indigenous groups will consider the linked adverse residual effects listed above to be a net loss of available lands and terrestrial resources, and/or an undesirable change or worsening from baseline conditions.

This effect has been characterized as being local and/or regional since the MC1 Option Area and anticipated changes may be experienced in the LAA or RAA, depending on the lands and terrestrial resources that are used and valued by each individual Indigenous group.

The magnitude of this effect is expected to range from negligible to major depending on the traditional territories, cultural heritage, and/or current use activity areas identified, valued and/or currently used by each individual Indigenous group.

As the MC1 Option footprint and changes to channel morphology are expected to persist in the long-term, related changes in available lands and terrestrial resources are also assumed to be long-term.

This residual effect is characterized as not reversible as the MC1 Option is expected to operate for an undetermined number of years, and related changes to channel morphology are also anticipated to not be reversible.

The frequency of this effect is expected to be continuous as the effect is expected to remain throughout all Project phases.

Confidence in this residual effect characterization is low due to: an incomplete understanding of how Indigenous groups value, use, and access the MC1 Option Area and resources in the LAA and RAA; the nature of the sites, areas and resources which may be a fixture of their cultural heritage and/or current use of lands and resources for traditional purposes; a lack of MC1 Option specific data related to cultural heritage and the current use of lands and resources for traditional purposes.

Based on the residual effect characteristics assigned above, changes in available lands and terrestrial resources may be a non-substantive or substantive residual effect depending on the specific characteristics assigned by each individual Indigenous group.

6.3.4.2 Changes in Available Waterbodies and Aquatic Resources

Residual effects of the MC1 Option to Changes in Available Waterbodies and Aquatic Resources are characterized as adverse and a net loss, as the following residual effects from the MC1 Option Screening Report are anticipated despite mitigation measures (Hemmera 2017):

- a permanent alteration or destruction of habitat (Section 7.3 Aquatic Environment);
- an adverse change in fish mortality and productivity (Section 7.3 Aquatic Environment);
- an adverse change to the migration and movement of fish (Section 7.3 Aquatic Environment);
- an adverse change to fish assemblages due to habitat changes (Section 7.3 Aquatic Environment);
- an adverse change to sediment retention in the reservoir (Section 6.4 Fluvial Geomorphology); and,
- a negative change to the amount of groundwater available downstream of the dam embankment (Section 6.2 Hydrogeology).

It is assumed that potentially affected Indigenous groups will consider the residual effects listed above to be a net loss of available waterbodies and/or aquatic resources, and that this is undesirable or a worsening relative to baseline conditions.

This effect has been characterized as local as project-related changes in available waterbodies and aquatic resources are anticipated to occur within the LAA.

The magnitude of this effect is expected to range from negligible to major depending on the traditional territories, cultural heritage, and/or current use activity areas identified, valued and/or currently used by each individual Indigenous group.

The duration of the changes are expected to be long-term as the MC1 Option footprint would be a permanent fixture on the landscape.

This residual effect is characterized as not reversible as the direct loss or alteration of fish habitat resulting from the MC1 Option are assumed to be permanent.

The frequency of this effect is expected to be continuous as the effect is expected to remain throughout all Project phases.

Confidence in this residual effect characterization is low due to: an incomplete understanding of how Indigenous groups value, use, and access the MC1 Option Area and resources in the LAA and RAA; the nature of the sites, areas and resources which may be a fixture of their cultural heritage and/or current use of lands and resources for traditional purposes; a lack of MC1 Option specific data related to cultural heritage and the current use of lands and resources for traditional purposes.

Based on the residual effect characteristics assigned above, changes in available waterbodies and aquatic resources may be a non-substantive or substantive residual effect depending on the specific characteristics assigned by each individual Indigenous group.

6.3.4.3 Changes in the Quality of Cultural Heritage and/or Current Use Activities, Conditions, and Resources

Residual effects of the MC1 Option to changes to the quality of cultural heritage and/or current use activities, conditions, and resources considers the following linked adverse residual effects from the MC1 Option Screening Report which are assumed to contribute to how changes are experienced (Hemmera 2017):

- Increased Emissions and Ambient Concentrations of Criteria Air Contaminants during Construction (Section 6.1 Atmospheric Environment);
- Increased Emissions of Greenhouse Gases during Construction (Section 6.1, Atmospheric Environment);
- Increased Noise Levels during Construction (Section 6.1 Atmospheric Environment);
- Change in vegetated area (Section 7.1 Vegetation and Wetlands);
- Change in wetland area and function (Section 7.1 Vegetation and Wetlands);
- Change in wildlife species diversity (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for grizzly bear and ungulates (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for bats (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for breeding birds, raptors, and owls (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for Harlequin Duck (Section 7.2 Wildlife and Wildlife Habitat);
- Change in habitat for amphibians and reptiles (Section 7.2 Wildlife and Wildlife Habitat);
- Change in movement for grizzly bear and ungulates (Section 7.2 Wildlife and Wildlife Habitat);
- Change in movement for amphibians and reptiles (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for grizzly bear and ungulates (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for bats (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for breeding birds, raptors, and owls (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for breeding birds (ground-nesting) (Section 7.2 Wildlife and Wildlife Habitat);
- Change in mortality risk for amphibians and reptiles (Section 7.2 Wildlife and Wildlife Habitat);
- Change in soil quantity (Section 6.2 Terrain and Soils);
- Change in topography (Section 6.2 Terrain and Soils);
- Decrease in slope stability (Section 6.2 Terrain and Soils); and,
- Change to the quality and/or quantity of soil due to the inundation and sediment deposition (Section 6.2 Terrain and Soils).

The linked adverse effects listed above are assumed to affect quality by adversely affecting:

- Desirable sensory conditions (i.e., noise, air quality, etc.);
- Quality and/or quantity of a resource (e.g. quality of soil); and,
- The amount of effort required to experience, engage and/or practice cultural heritage and/or current use activities due to changes in availability, quantity, and condition.

It is assumed that as a result of the direct and indirect adverse effects or changes listed above, Indigenous groups will consider this change to be undesirable or worsening relative to baseline conditions.

This effect has been characterized as local to regional depending on what aspect of quality is being considered (i.e. changes in habitat for grizzly bear and ungulates may be experienced in the RAA, whereas increased noise levels are expected to be experienced within the LAA).

The magnitude of this effect is expected to range from negligible to major depending on the traditional territories, cultural heritage, and/or current use activity areas identified, valued and/or currently used by each individual Indigenous group.

Project-related effects to changes in quality are expected to range from short-term to long-term, with respect the specific aspect of quality being considered. For example, increased noise levels during Construction are not expected to persist throughout Operations. However, some habitat-related changes to wildlife are expected to be experienced in the long-term or throughout Operations.

Reversibility for this change ranges from reversible (e.g. increased noise levels during Construction which are anticipated to existing conditions once the effect ceases) to non-reversible (e.g. change to grizzly bear mortality) depending on what aspect of quality is being considered.

The frequency of this effect is expected to range from frequent to continuous depending on what aspect of quality is being considered.

Confidence in this residual effect characterization is low due to: an incomplete understanding of how Indigenous groups value, use, and access the MC1 Option Area and resources in the LAA and RAA; the nature of the sites, areas and resources which may be a fixture of their cultural heritage and/or current use of lands and resources for traditional purposes; a lack of MC1 Option specific data related to cultural heritage and the current use of lands and resources for traditional purposes.

Based on the residual effect characteristics assigned above, changes to the quality of cultural heritage and/or current use activities, conditions, and resources may be a non-substantive or substantive residual effect depending on the specific characteristics assigned by each individual Indigenous group.

6.3.4.4 Changes in Access to Cultural Heritage and/or Current Use Activities, Conditions, and Resources

Residual effects of the MC1 Option to changes in access to cultural heritage and/or current use activities, conditions, and resources are characterized as adverse since the MC1 Option components and changes channel morphology will cause a net loss in the availability of lands and terrestrial resources. It is assumed that Indigenous groups will consider this to be undesirable or worsening from baseline conditions.

This effect has been characterized as local since the MC1 Option and anticipated changes to channel morphology are expected to be experienced within the LAA.

The magnitude of this effect is expected to range from negligible to major depending on the traditional territories, cultural heritage, and/or current use activity areas identified, valued and/or currently used by each individual Indigenous group.

As the MC1 Option footprint and changes to channel morphology are expected to persist in the long-term, related changes to access to cultural heritage and/or current use activities, conditions, and resources have been assumed.

This residual effect is characterized as not reversible as the MC1 Option is expected to operate for an undetermined number of years, and related changes to channel morphology are also anticipated to not be reversible.

The frequency of this effect is expected to be continuous as the effect is expected to remain throughout all Project phases.

Confidence in this residual effect characterization is low due to: an incomplete understanding of how Indigenous groups value, use, and access the MC1 Option Area and resources in the LAA and RAA; the nature of the sites, areas and resources which may be a fixture of their cultural heritage and/or current use of lands and resources for traditional purposes; a lack of MC1 Option specific data related to cultural heritage and the current use of lands and resources for traditional purposes.

Based on the residual effect characteristics assigned above, changes to access to cultural heritage and/or current use activities, conditions, and resources may be a non-substantive or substantive residual effect depending on the specific characteristics assigned by each individual Indigenous group.

6.3.4.5 Changes to the Tangible and Intangible Aspects of Cultural Heritage and the Current Use of Lands and Resources for Traditional Purpose

As described in Section 6.3.2.5, describing potential changes to the tangible and intangible aspects of cultural heritage and current use is methodologically challenging. Consistent with the approach established in the SR1 EIA, the authors of this assessment have not characterized these residual effects.

“Alberta Transportation recognizes the importance of cultural transmission and the spiritual connection to ancestors as components of [cultural heritage and the current use of lands and resources], as explained by Káínai First Nation, Piikani Nation, Siksika Nation, and Stoney Nakoda Nations in relate to the [SR1] Project. Alberta Transportation is unable to determine the weight of these intangible components for this environmental assessment, as experiential values can only be meaningfully evaluated by individuals and communities experiencing them. Similarly, any mitigation measure that could lessen effects on intangible components should be identified by those individuals and communities” (p.14.69, Stantec 2018c).

6.4 Summary of Cultural Heritage and the Current Use of Lands and Resources for Traditional Purposes Assessment

Based on available information, the residual effects to cultural heritage and current use of lands and resources for traditional purposes are expected to be adverse, since it is assumed that Indigenous groups will consider linked adverse residual effects to be a net loss and/or an undesirable or worsening from baseline conditions. While changes in available waterbodies and aquatic resources, and access to cultural heritage and/or current use activities, conditions, and resources are expected to be experienced locally, all other changes may range from a local to regional extent depending on the specific areas and/or resources used and valued by each individual Indigenous group.

The magnitude of residual effects on measurable parameters is expected to range from negligible to major, depending on the traditional territories, cultural heritage, and/or current use activity areas identified, valued and/or currently used by each individual Indigenous group. The duration, frequency, and reversibility of residual effects have been characterized to be consistent with how linked biophysical residual effects were assessed.

Confidence in all residual effect characterizations is low due to:

- an incomplete understanding of how Indigenous groups value, use, and access the MC1 Option Area and resources; in the LAA and RAA;
- the nature of the sites, areas and resources which may be a fixture of their cultural heritage and/or current use of lands and resources for traditional purposes; and,
- a lack of MC1 Option specific data related to cultural heritage and the current use of lands and resources for traditional purposes.

Based on the residual effect characteristics assigned they may be non-substantive or substantive depending on the specific characteristics assigned to each effect by each individual potentially affected Indigenous group.

7.0 PHYSICAL HERITAGE OR HISTORICAL, ARCHAEOLOGICAL, PALEONTOLOGICAL OR ARCHITECTURAL VALUES

This section presents a discussion of potential effects on physical heritage or historical, archaeological, paleontological or architectural values from MC1 Option-related disturbances.

7.1 Scope of Assessment

This section presents a summary of the scope of the assessment for physical heritage or historical, archaeological, paleontological or architectural values, and includes Valued Components (VC), measurable parameters, and assessment boundaries.

The assessment of MC1 Option-related effects on physical heritage or historical, archaeological, paleontological or architectural values was informed by an Historical Resources Overview Assessment (HROA) for the MC1 Option that was completed by Arrow Archaeology Ltd. (2017). The overview examined the general biogeophysical setting of the proposed MC1 Option Area, including surficial and bedrock geology, topography, geomorphology, vegetation, and the area's historical resource record including past research in the area. The HROA also recorded archaeological sites, paleontological locales, and related information.

7.1.1 Valued Components and Measurable Parameters

The VCs selected for physical heritage are provided in **Table 26.**

Table 26 Valued Components and Selection Rationale

Valued Component	Rationale for Selection
Archaeological Sites	Construction of the MC1 Option has the potential to affect archaeological sites and areas of potential for containing intact archaeological sites (Arrow Archaeology Ltd. 2017).
Paleontological Resources	Although no paleontological sites are recorded for the assessment area, construction of the MC1 Option has the potential to affect areas of potential for containing intact paleontological resources (Arrow Archaeology Ltd. 2017).

Historical and architectural values (structures, sites or things of historical or architectural significance) were not selected as VCs because the HROA (Arrow Archaeology Ltd. 2017) concluded that no notable historical or architectural values are present in the assessment area.

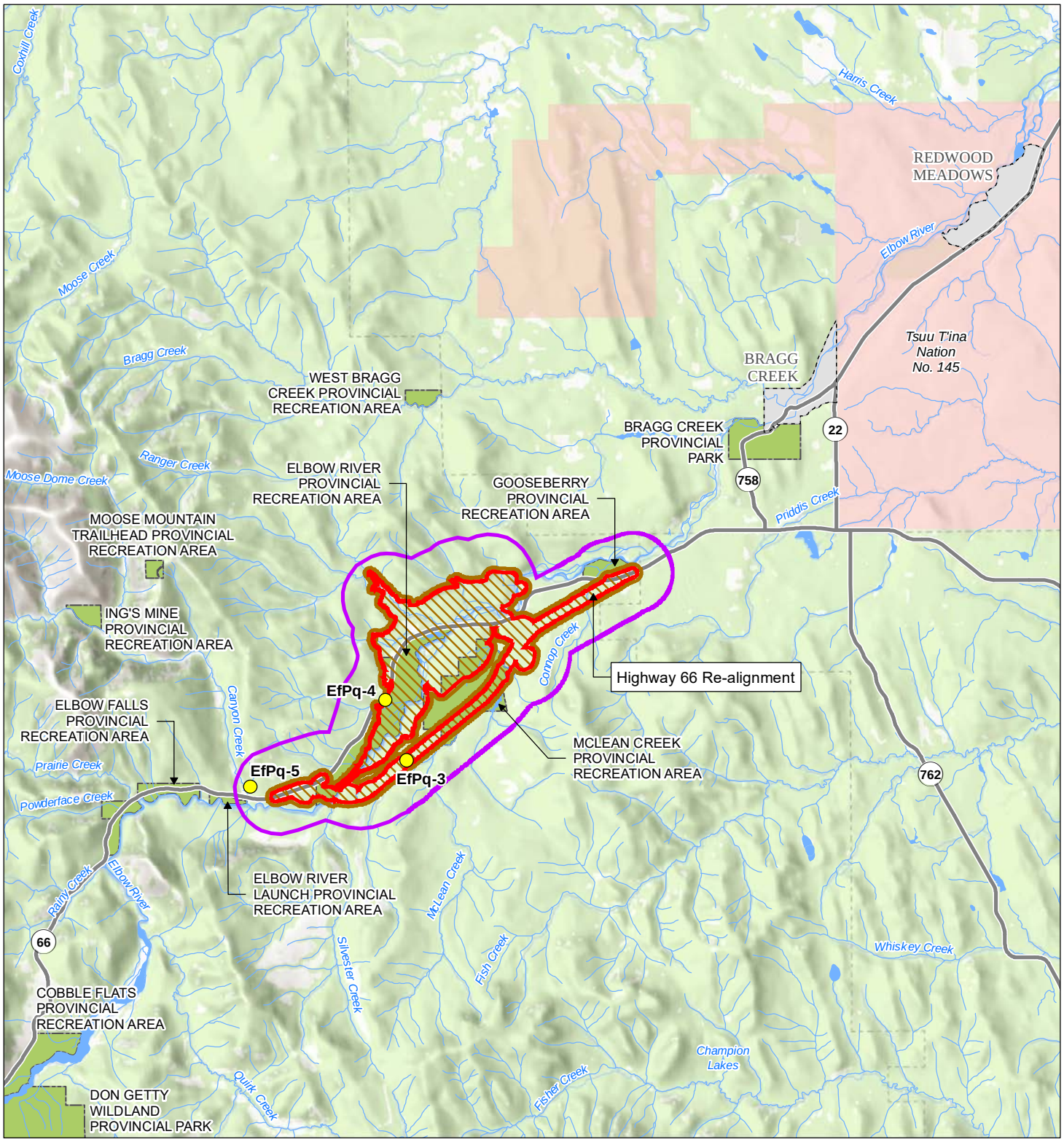
Measurable parameters used to describe existing conditions and trends and evaluate potential MC1 Option-related effects to archaeological sites and paleontological resources are identified in **Table 27**.

Table 27 Measurable Parameters for Physical Heritage

Selected VC	Potential MC1 Option-related Effects	Measurable Parameter
Archaeological Sites	Loss or alteration to archaeological site contents or site contexts during surface or subsurface disturbance (e.g. vegetation/topsoil removal, excavation, construction, roadwork and covering of sites rendering them unavailable for future study).	Area and depth of disturbance to archaeological site(s) or areas of potential for intact archaeological site(s). Sites are individually evaluated and ranked based on their heritage value.
Paleontological Resources	Loss or alteration to paleontological resources during surface or subsurface disturbance (e.g. vegetation/topsoil removal, excavation, construction, roadwork and covering of sites rendering them unavailable for future study).	Area and depth of disturbance to areas of potential for paleontological resources.

7.1.2 Assessment Boundaries

The LAA boundary for the physical heritage VC is defined by the footprint of the anticipated MC1 Option infrastructure and physical works (i.e., the MC1 Option Area: including the main dam and related components, the highway realignment corridor and borrow and laydown areas) and the maximum anticipated height of water in the reservoir during Operations (i.e., the most severe flooding considered in the project description presented in the MC1 Option Screening Report) (Hemmera 2017). The RAA boundary is defined to include the original study area considered in the HROA by Arrow Archaeology (2017). The RAA encompasses the area around the proposed highway realignment and adjacent heritage sites identified in the HROA. These boundaries are shown in **Figure 5.**



Legend

- Recorded Archaeological Site
- MC1 Option Area
- Physical Heritage Local Assessment Area
- Physical Heritage Regional Assessment Area
- Highway
- Park or Protected Area
- Reserve
- Urban Area

Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

Sources

- Contains information licensed under the Open Government Licence(s) - Government of Alberta
- Dam and flood details: Opus International Consultants Limited, 2017
- Recorded Archaeological Sites: Arrow Archaeology, 2017

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Physical Heritage Local and Regional Assessment Areas

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7.2 Baseline Case

The following sections identify baseline information associated with the MC1 Option Area, relating to physical heritage resources; that is, sites or things that may have historical, archaeological, paleontological or architectural significance.

In Alberta, legally described lands (legal subdivisions, quarter sections, etc.) are classified by the Province based on the heritage resources (referred to collectively as "historical resources" in Alberta[1]) or areas of heritage potential that are present. Each parcel of land is given a rank from 1 (highest value) to 5 (lowest value) and lands with no assigned value are considered to have no potential for heritage resources or to have not been adequately assessed.

The only parcels of land in the MC1 Option Area to be assigned these heritage values are legal subdivisions 13 (Sec 18, Twp 22, Rge 5), which is assigned a value of 5A, and legal subdivisions 1 and 8 (Sec 15, Twp 22, Rge 6) which are assigned values of 4A and 5A respectively (Arrow Archaeology Ltd. 2017).

A ranking of 4 indicates there is a known and recorded historical resource in the area; the site may be not highly significant or not sufficiently well studied to rank higher. A ranking of 5 means that the land has potential to contain heritage resources based on its biogeophysical attributes (Arrow Archaeology Ltd. 2017).

7.2.1 Historical Values

Historical values include historic sites and objects dating from the first European occupation until approximately 50 years ago. These sites may include below surface remains (such as buried foundations or dumps) as well as surface remains such as collapsed or standing historic buildings.

The MC1 Option Area has no record of any significant Euro-Canadian settlement in the area, no recorded historical structures or resources in the area, and is rated as having low potential to contain any historical structures (Arrow Archaeology Ltd. 2017). On this basis, this assessment concludes that the MC1 Option Area has no historical values present.

7.2.2 Archaeological Values

There are two recorded extant archaeological sites within the study area and a third site approximately 500 m outside. EfPq-2 is near existing Highway 66 and the south end of the anticipated reservoir, Efpq-3 is south of the south end of the anticipated reservoir and EfPq-5 is just outside the southwestern terminus of the LAA, near Highway 66. All three sites have been recorded as small campsites that date to the pre-contact period and all three sites are considered significant or potentially significant (Arrow Archaeology Ltd. 2017).

[1] In Alberta an historical resource is defined as ". . . any work of nature or of humans that is primarily of value for its palaleontological, archaeological, prehistoric, historic, cultural, natural, scientific or esthetic interest, including but not limited to, a palaeontological, archaeological, prehistoric, historic or natural site, structure or object." (*Alberta Historical Resources Act*, Revised Statutes, 2000, Ch. H-9, 1(e)).

No local area or regional systematic searches or surveys to locate and record archaeological resources that included the MC1 Option LAA or RAA have been identified. The general scarcity of recorded sites in the area appears to be primarily due to a lack of research in the area. Areas rated as having high potential to contain archaeological sites are characterized as level fluvial aggradational or cut terrace forms and higher areas with south aspects that are within 400 m of the modern channel/floodplain of the Elbow River, as well as areas near creek/river confluences and around springs (See **Figure 6**). Areas more distant from the modern river channel with a southerly aspect are rated as having moderate archaeological potential. The Elbow River floodplain itself, including gravel and sand bars, is rated as having little potential to contain intact archaeological sites. (Arrow Archaeology Ltd. 2017).

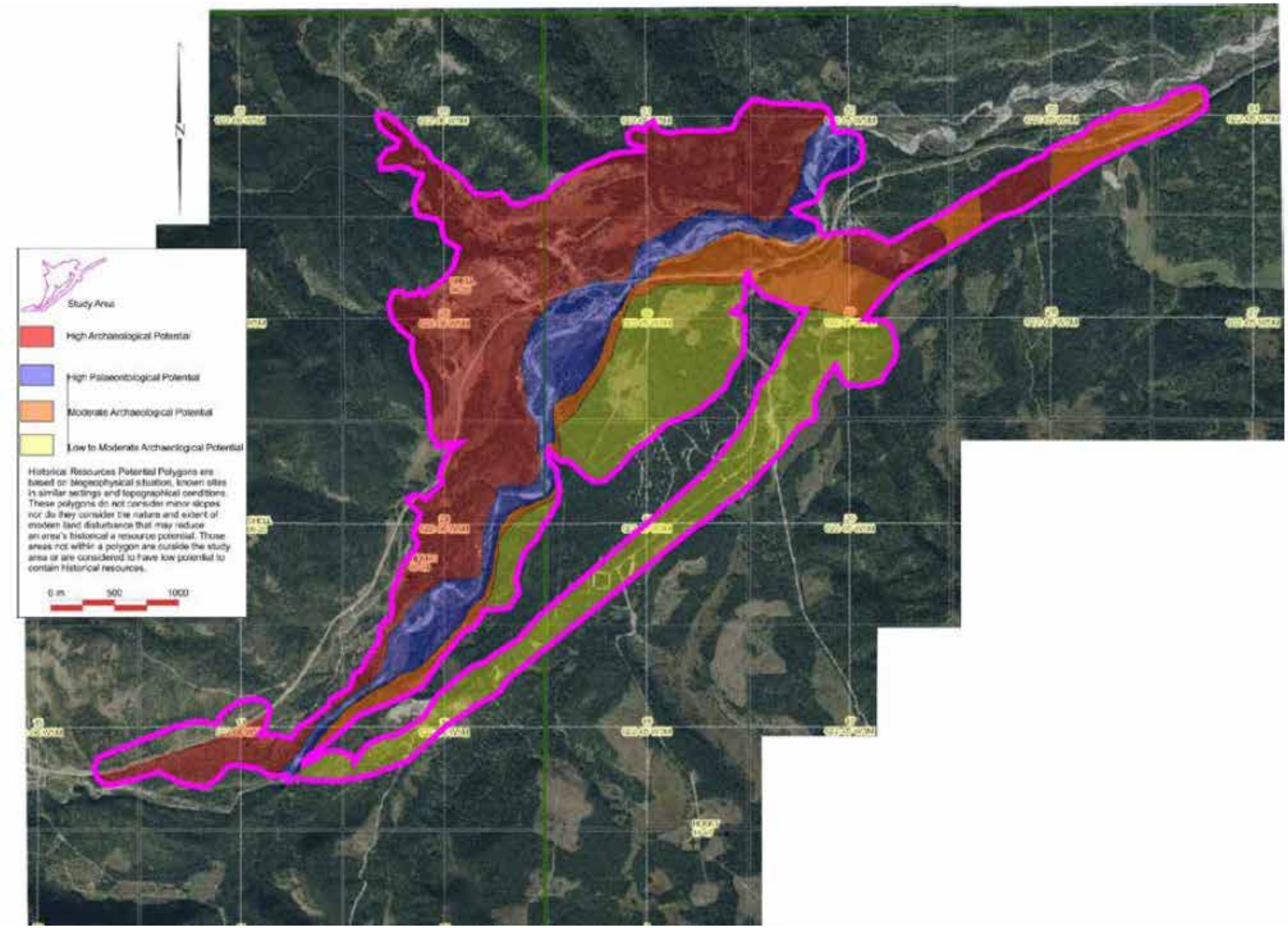

Figure 6 Archaeological Site and Paleontological Resource Potential (Source: Arrow Archaeology Ltd. 2017)

Sites that may exist are most likely to be shallow-buried, short-term campsites. The area is likely to have been used year-round for a variety of traditional uses for many thousands of years prior to European contact, but many if not most occupations were likely transitory given the dominant and highly mobile economic system occurring for much of the Holocene in Alberta, including the Front Ranges (Arrow Archaeology Ltd. 2017)

7.2.3 Paleontological Values

Paleontological values relate to paleontological resources (also known as fossils) which include evidence of extinct multicellular beings and objects designated by regulations as paleontological resources.

There are no recorded paleontological resources in the MC1 Option Area; however, some potential exits for the area to contain important fossil remains and other paleontological resources. Bedrock exposures in the MC1 Option Area are classified as Upper Cretaceous. The Brazeau Formation, the terminal Upper Cretaceous Formation overlies material from the older Wapiabi (Alberta Group) Formation. Both are composed of mudstone, siltstone, and sandstone and although neither are known for important paleontological materials, some potential remains for discovery of minor fossil remains (Arrow Archaeology Ltd. 2017).

Previous geological work in the area included searches in the Upper Cretaceous formations, but no significant fossils finds are reported from the area. Limited paleontological field surveys have been conducted in the area (Arrow Archaeology Ltd. 2017).

The thick gravel bars of the Elbow River's modern channel and floodplain are considered to have some paleontological potential for the remains for Pleistocene and early Holocene fauna. Bones of Pleistocene horse and camel and other late ice age mammals are found in settings along the Bow River analogous to the MC1 Option. As a result, the MC1 Option Area is classed as having moderate paleontological potential anywhere where there are relatively deep deposits of course fluvially deposited materials, including within aggradational terraces now covered with finer sediments (Arrow Archaeology Ltd. 2017).

7.2.4 Architectural Values

Architectural values can be attributed to notable architectural structures, elements, or features. This assessment concludes that there are no notable architectural values in the assessment area as the architectural structures, elements, or features present are limited to the Elbow River Ranger Station and the infrastructure that services the ranger station, McLean Creek campground and nearby recreational facilities, as well as the roads and infrastructure that service those facilities (Arrow Archaeology Ltd., 2017).

7.3 Application Case

This section presents the Application Case and describes the potential MC1 Option-related effects. It lists the potential MC1 Option-related interactions, describes the potential effects, assumed mitigation measures, and residual effects following application of mitigation.

7.3.1 Potential Option Interactions

The MC1 Option will require large-scale surface and subsurface disturbance and earth moving at and around the actual dam construction and will require realignment of Highway 66 through the area. Realignment would include complete construction, including a new road base, ditches, new surfacing and

related surface modification. In addition, construction of the MC1 Option includes borrow areas, laydown areas, access roads, and temporary workspace areas as well as relocation of existing facilities such as the Elbow River Ranger Station and Alberta Environment and Parks campgrounds, picnic areas, and infrastructure in the area related to these facilities. The assessment area size is 1,300 hectares (ha) and the areas that will be directly impacted by construction and related activities is estimated to be 400 ha to 500 ha.

Table 28 identifies the Option components and physical activities that might interact with physical heritage resources (archaeological and/or paleontological) during Construction and Operation and Maintenance.

Table 28 Potential Option Interactions with Physical Heritage Resources

Potential Interactions with (loss of or alteration to) Physical Heritage Resource Site (Archaeological and/or Paleontological) Content or Contexts	
Construction	
Clearing (temporary or permanent removal of vegetation and wetlands within the MC1 Option Area)	Yes
Road construction	Yes
Decommissioning and removal of existing provincial parks infrastructure and ranger station	Yes
Dam (cofferdam and earth fill) construction	Yes
Spillway construction	Yes
Rock groin and diversion tunnels construction	Yes
Laydown areas construction and use	Yes
Stockpile development and use	Yes
Borrow and spoil areas development and use	Yes
Realignment of McLean Creek and other small waterbodies	Yes
Realignment of Highway	Yes
Storage of water in permanent pond)	Yes
Reclamation (including revegetation, measures to restore altered habitat)	Yes
Operation and Maintenance	
Routine and Flood Operation and Maintenance	No

7.3.1.1 Potential Option Interactions with Archaeological Sites

Option activities within the LAA would potentially disturb two precontact archaeological sites identified as shallow buried, short-term campsites. Site EfPq-4 would be submerged at peak flood and Site EfPq-3 may be affected by the realignment of Highway 66, depending on specific routing within the realignment corridor.

Option activities would also disturb areas of archaeological potential within the LAA as indicated in **Figure 6.**

The MC1 Option would interact with areas of both high and moderate archaeological potential. Areas of high potential would be affected primarily by the reservoir. Areas of moderate potential would be affected more by the highway realignment.

7.3.1.2 Potential Option Interactions with Paleontological Resources

Option activities would also disturb areas of paleontological potential within the assessment area as indicated in **Figure 6**. Areas of high paleontological potential would be affected primarily by the reservoir.

7.3.2 Potential Effects

The specific effect to existing and potential archaeological or paleontological sites that may occur is loss of or alteration to site content or context. This effect results from surface or subsurface disturbance involved in project activities such as vegetation removal, topsoil removal, borrow activities, excavation, construction, roadwork and covering of sites (rendering them unavailable for future study).

7.3.3 Mitigation Measures

The HROA recommended that both an archaeological and palaeontological Historical Resource Impact Assessments (HRIA) be conducted for minimally disturbed or undisturbed natural terrain areas where there would be surface and subsurface impacts. It is assumed, if the MC1 Option were to be constructed, that an HRIA would be conducted, and recommended mitigation identified in the HRIA implemented. Standard mitigation measures that would be anticipated to be identified by the Historical Resources Branch of the Alberta Culture and Tourism (ACT) would be likely to include:

1. For sites identified as low to moderate heritage value, locations would be documented and photographed, and a sample of artifacts collected.
2. For sites of moderate to high heritage value, avoidance or additional mitigation, such as detailed recording and mitigative excavation to retrieve a larger sample of artifacts and obtain an improved understanding of the cultural affiliation may be required.
3. Construction monitoring by a professional archaeologist may be undertaken depending on the results of mitigative excavations.
4. For any unexpected significant find during construction, notification of ACT, who will determine the appropriate mitigation, would be required.
5. For any chance find of human remains made during construction, all construction would immediately cease in the area, the site would be secured and all provincial regulations regarding the chance find of human remains would be followed.

Mitigations for effects to paleontological resources are likely to include:

1. Area-specific mitigation measures identified in an HRIA, such as possible deep testing of potentially fossiliferous sequences.
2. Construction monitoring by a professional paleontologist. The paleontologist would salvage any fossils unearthed by construction and record the location and stratigraphic context.

7.3.4 Residual Effects

Project-specific environmental effects on archaeological sites and paleontological resources are mitigated by the standards established by ACT. After implementation of the required mitigation measures, and Indigenous engagement, it is anticipated that there would be no residual effects on physical heritage resources. Therefore, no substantive adverse residual effects have been identified to be carried forward for consideration in the cumulative effects assessment (i.e., Planned Development Case).

7.4 Summary of Physical Heritage or Historical, Archaeological, Paleontological or Architectural Values

The assessment determined that no historical values or architectural values are present in the MC1 Option Area. With respect to archaeological and paleontological values, the assessment notes that construction of the MC1 Option would be supported by HRIA field studies required by Alberta Culture and Tourism (ACT) for archaeology and paleontology to be completed prior to construction. As such, the assessment assumes that mitigation and/or construction monitoring required by ACT will effectively mitigate potential effects and no residual effects to physical heritage (i.e., archaeological sites and paleontological resources) are anticipated as a result of the MC1 Option.

8.0 SUMMARY

This report responds to IR 3-45(b) and provides an assessment of potential MC1 Option-related effects on on Indigenous health and socio-economic conditions, cultural heritage and the current use of lands and resources for traditional purposes, and physical heritage or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

The assessment drew on the findings of the MC1 Option Screening Report (Hemmera 2017) with respect to potential effects of the MC1 Option on valued components considered in the Screening Report.

The methodology used to support the assessment followed the methodological approach used to support the assessment presented in the MC1 Option Screening Report (Hemmera 2017) with the scope of Indigenous groups considered being consistent with the corresponding sections of the EIS for the SR1 Project.

With respect to **Indigenous health and socio-economic conditions** the assessment concludes that the MC1 Option may result in following residual effects:

- Positive, substantive, residual effects on non-traditional land and resource use;
- Positive, non-substantive, residual effects on Indigenous labour force, Indigenous contracting and procurement opportunities and Indigenous regional economic conditions;
- Positive, substantive, residual effects on public health and safety and emergency response; and,
- Positive, non-substantive, residual effects on Indigenous health services.

With respect to **cultural heritage and the current use of lands and resources for traditional purposes**, the assessment concludes that the MC1 Option may result in the following residual effects:

- Adverse changes in available lands and terrestrial resources which may be non-substantive or substantive, depending on the specific characteristics assigned by each individual Indigenous group;
- Adverse changes in available waterbodies and aquatic resources which may be non-substantive or substantive, depending on the specific characteristics assigned by each individual Indigenous group;
- Adverse changes to the quality of current use activities, conditions and resources which may be non-substantive or substantive, depending on the specific characteristics assigned by each individual Indigenous group;
- Adverse changes in access to cultural heritage and/or current use activities, conditions, and resources which may be non-substantive or substantive, depending on the specific characteristics assigned by each individual Indigenous group; and,
- As detailed in **Section 6.3.4.5**, changes to the tangible and intangible aspects of cultural heritage and the current use of lands and resources were not characterized.

With respect to physical heritage or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, the assessment concludes that no historical values or architectural values are present in the MC1 Option area and that the MC1 Option will not result in residual effects on archaeological and paleontological values.

The assessment notes that construction of the MC1 Option would be supported by HRIA field studies required by ACT for archaeology and paleontology to be completed prior to construction. As such, the assessment assumes that mitigation and/or construction monitoring required by ACT would effectively mitigate potential effects to archaeological sites and paleontological resources) potentially associated with the MC1 Option.

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10.0 APPENDICES

10.1 Appendix 1

MC1Option Screening Report Selected Valued Components

This information is excerpted from the MC1 Option Screening Report (Hemmera 2017).

Table 4.3-1 Selected Valued Components for the Elbow River Dam at McLean Creek Option

MC1 Option Screening Report Section	Selected VC	Rationale
Section 6.1 Atmospheric Environment	Air Quality	MC1-related activities may result in emissions of air contaminants and contribute to changes in air quality in the project area.
	Climate and Climate Change	MC1-related activities may result in emissions of greenhouse gases and contribute to climate change.
	Noise	MC1-related activities may result in changes of noise levels and low frequency noise in the project area.
Section 6.2 Terrain and Soils	Terrain and Soils	MC1-related activities would have the potential to change soil quantity and quality, slope stability and topography, as well as increase erosion and cause effects due to inundation and sediment deposition.
Section 6.3 Hydrogeology	Groundwater Quantity	Changes to the groundwater recharge and interaction with surface water would result from the flooding upstream of the dam and interception of groundwater flow through the Elbow River Valley by the MC1 dam.
	Groundwater Quality	Presence of the permanent pond, and interception of flow downstream of the dam have the potential to influence groundwater quality adjacent to the pond and, to a lesser extent, the flood footprint.
Section 6.4 Fluvial Geomorphology	Fluvial Geomorphology	Construction of the dam, and impoundment of water, would result in sediment build up in the reservoir and increased erosion downstream of the dam which would change channel morphology in the Elbow River.
Section 6.5 Water Quality	Surface Water Quality for Aquatic Organisms	The construction and operation of the MC1 dam would change water quality in the Elbow River and the area of the permanent pond. Such changes in water quality have the potential to change habitat conditions for aquatic organisms.
	Drinking Water Quality	MC1-related construction activities (e.g., land clearing and decommissioning of facilities) may adversely affect water quality by mediating chemical contaminants, pathogens and sediment transport to watercourses. Immediately following permanent pond filling, water quality may change from that presently found in the river and not meet standards for drinking water supply.
Section 7.1 Vegetation and Wetlands	Vegetation	MC1 has the potential to displace and alter vegetation species composition and extent through both permanent and periodic inundation, direct removal during construction, and potential spread of invasive species with the disturbance associated with construction and flooding.
	Wetlands	MC1 has the potential to affect wetlands through both permanent and periodic inundation of the reservoir, as well as by direct removal during construction, change in wetland functionality and/or classification resulting from the change in the water table, and the potential spread of invasive species with the disturbance associated with construction and flooding.

MC1 Option Screening Report Section	Selected VC	Rationale
Section 7.2 Wildlife and Wildlife Habitat	Grizzly Bear	Grizzly bear are known to occur in the vicinity of the project area and interactions with MC1 components or activities are likely. Grizzly bear are listed as At Risk provincially and Endangered under the Alberta *Wildlife Act*, and as Special Concern by COSEWIC. The MC1 Option area is within a Grizzly Bear Zone and in a Recovery and Support Zone defined in the Grizzly Bear Recovery Plan.
	Ungulates	Ungulates (moose, deer, elk) are known to occur in the vicinity of the MC1 Option area, and interactions with MC1 components or activities are likely. The MC1 Option area is in a Key Wildlife Biodiversity Zone. These zones are established to protect habitats that support wintering ungulates and biodiversity. Ungulates are harvested species with economic and social importance to First Nations, the public, and the Government of Alberta
	Bats	Bats are likely present in the vicinity of the MC1 Option area based on range maps and available habitats, and interactions with MC1 Option components or activities are likely. Little brown bat and northern long-eared bat are schedule 1 species under SARA
	Birds Breeding birds Raptors and owls Harlequin duck Piscivorous birds	Birds are known to occur in the vicinity of the MC1 Option area, and interactions with MC1 components or activities are likely. Most bird species and their nests are protected by the *Migratory Birds Convention Act* and the *Wildlife Act.* Harlequin duck is identified in the Kananaskis Country Provincial Recreation Area and Bragg Creek Provincial Park Management Plan as a species of management concern.
	Amphibians and reptiles	Amphibians and reptiles include species of management concern to science, the public, and regulators due to their sensitivity to environmental change and population declines
Section 7.3 Aquatic Environment	Fish and Fish Habitat	The creation of the MC1 dam would result in changes to existing fish habitat and may also indirectly affect fish habitat in adjacent areas in the Elbow River and tributaries, and may also create new different habitat in the permanent pond and flood inundation areas. These changes may indirectly affect species distribution and abundance upstream and downstream of the dam.
Section 8.1 Land Use and Management	Land Use and Management	Construction and operation of MC1 would result in changes in current uses of some lands and resources including: recreational use of lands and waterways, access to recreational and resource use areas, and land use policies and resource management initiatives. The MC1 Option would also result in changes, including removal or relocation, to existing infrastructure including roads, buildings, facilities, water supply wells and abandoned oil wellsites.
Section 8.2 Socioeconomic Resources	Socioeconomic Resources	The MC1 Option would result in changes, including some benefits, to local and regional economies and the regional labour market as a result of employment and capital expenditures related to constructing and operating MC1.
Section 8.3 Public Health and Safety	Public Health and Safety	Public health has the potential to be affected by MC1-related changes to air quality, drinking water quality, soil quality, and noise levels. Changes in traffic flow and MC1-related construction and operation activities also have the potential to interact directly with public safety. The MC1 Option would mitigate flood risks downstream of the site, which would also directly affect public health and safety.

10.2 Appendix 2

MC1 Option Screening Report Valued Components Not Selected

This information is excerpted from the MC1 Option Screening Report (Hemmera 2017).

Table 4.3-2 Valued Components not selected for the Elbow River Dam at McLean Creek EIS Report

Selected VC	Rationale
Contaminated Sites	Although some potential contaminants of concern were identified in some areas that would be decommissioned as part of the MC1 Option, assessment of contaminated sites is addressed through the Alberta Environmental Site Assessment Guidelines and the Canadian Standards Association (CSA) Standard Z678-01 - Phase I Environmental Site Assessment (ESA) and CSA Standard Z769-00 – Phase II ESA requirements for Phase I and II studies. The Phase I ESA and Phase II ESA are included as **Appendix 3-A** and **Appendix 3-B,** respectively.
Hydrology	Although the creation of the MC1 dam would alter the surface hydrology of the Elbow River, the purpose of the MC1 Option is to reduce peak flows in the Elbow River during a flood event. Hydrology is discussed in **Section 2.1 Option Setting**.
Historical Resources	A Historical Resources Overview was conducted for the MC1 Option; findings are summarized in **Section 2.1 Option Setting**, and the report is attached as **Appendix 2-A**. If the MC1 Option were to proceed, the contents of the Historical Resources Overview would be submitted to Alberta Culture and Tourism, who would either issue a requirement for an Historical Resources Impact Assessment (HRIA) or provide a *Historical Resources Act* approval that would allow the MC1 Option to proceed without an HRIA.
Traditional Knowledge	A summary of Aboriginal rights and interests in the MC1 Option area is presented in **Section 2.1 Option Setting**. No MC1-specific consultation has been conducted for this assessment. Traditional Knowledge is held by the community, and only with direct consultation and negotiation could an agreement be reached for them to gather and share that information with the Proponent; therefore, Traditional Knowledge is not included as a VC.

10.3 Appendix 3

MC1 Option Screening Report Local and Regional Assessment Areas

This information is excerpted from the MC1 Option Screening Report (Hemmera 2017).

Table 4.3-4 Local and Regional Assessment Areas for the Elbow River Dam at McLean Creek Option

Valued Component	Local Assessment Area	Regional Assessment Area
Atmospheric Environment	N/A. Greenhouse gases (GHGs) are assessed on a regional basis.	GHGs: Alberta and Canada
	Air Quality: Rectangular area extending 5 km from MC1 footprint	Air Quality: Rectangular area extending 20 km from the MC1 footprint.
	Noise: MC1 footprint plus 2-km buffer	Noise: MC1 footprint plus 5-km buffer
Terrain and Soils	Based on the AMEC 2015 study area and extended to include additional MC1 components (the highway realignment and one area with a 100 m buffer).	LAA plus 5-km buffer
Groundwater Quality and Quantity	The MC1 Option area plus the downstream AOI incorporating Elbow Creek and associated alluvial aquifer from the dam to outlet of the permanent gated outlet conduit structure.	Encompasses the area within 1 km off the LAA and the pond level during an event similar to the 2013 flood.
Fluvial Geomorphology	The Elbow River from the MC1 reservoir downstream to where the Elbow River enters the Glenmore Reservoir.	The Elbow River watershed to the upstream extent of the Glenmore Reservoir.
Surface Water Quality for Aquatic Organisms and Drinking Water Quality	The Elbow River from the upstream extent of the reservoir formed by the MC1 dam down to the upstream extent of the Glenmore Reservoir.	The Elbow River Watershed from headwaters to the upstream extent of the Glenmore Reservoir.
Vegetation and Wetlands	MC1 footprint plus a 100 m buffer.	The Elbow River Watershed from headwaters to the upstream extent of the Glenmore Reservoir.
Wildlife and Wildlife Habitat (all VCs)	Comprises an approximate 1-km buffer around the MC1 infrastructure and includes the realigned Highway 66 and permanent pond.	Grizzly Bear Management Area 5
Fish and Fish Habitat	The Elbow River and tributaries (upstream of the MC1 dam to the 2013 flood elevation and the Elbow River, approximately 1 km downstream of the MC1 dam. Includes instream habitat and riparian habitat (at an average depth of 10 m on each bank/approach).	The Elbow River Watershed from headwaters to the upstream extent of the Glenmore Reservoir.
Land Use and Management and Infrastructure	Encompasses an approximately 1-km buffer around the MC1 Option area, the 2013 flood event, and the realignment for Highway 66. The LAA is the area with the highest potential for direct interactions with land and resource use and access to resource and recreational areas.	Extends upstream approximately 9 km within the Elbow valley and adjacent slopes to the mouth of Quirk Creek, and downstream approximately 9 km to the Bragg Creek Area Structure Plan eastern boundary to include downstream land use.

Valued Component	Local Assessment Area	Regional Assessment Area
Socio-economic Resources	N/A. The socio-economic resources assessment area is defined as the RAA.	Includes municipalities and communities, including Aboriginal communities, where most of the construction workforce for the MC1 Option could reasonably be expected to be accommodated. These communities include the City of Calgary, and the communities of Bragg Creek, Redwood Meadows, and parts of Kananaskis Improvement District. The communities of Bragg Creek and Redwood Meadows are expected to experience potential MC1-related effects due to population change and increased traffic volumes.
Public Health and Safety	Encompasses the area within which the MC1 Option would be likely to interact with and potentially result in effects on the local atmospheric environment, water quality and flood risk, as follows: Atmospheric environment: extending 5 km from the MC1 Option area. Water quality: Elbow River from the upstream extent of the MC1 reservoir to the upstream extent of the Glenmore Reservoir Flood risk: includes Bragg Creek and Redwood Meadows	Encompasses the area within which the MC1 Option would be likely to interact with and potentially result in effects on the regional atmospheric environment, water quality and flood risk, as follows: Atmospheric environment: extending 20 km from the MC1 Option area. Water quality: Elbow River Watershed from the headwaters to the upstream extent of the Glenmore Reservoir. Flood risk: includes Bragg Creek, Redwood Meadows and the City of Calgary.

10.4 Appendix 4

Lease Identification and Status

The information in this Appendix is excerpted from the MC1 Option Screening Report (Hemmera 2017).

Dispositions

Dispositions are permits, licenses, or leases that grant permission for a specific activity or development on a specific area of land, and are subject to fees, rules and standards. Existing dispositions that overlap with the LAA are described below and listed in **Table 1**.

- A Recreation Lease (REC2811) overlaps by 1.0% with the MC1 Option area and is adjacent to Highway 66. The lease is owned by Easter Seals Alberta Society, and is the location of Camp Horizon, which offers residential camps for children and adults with disabilities and medical conditions, as well as Outdoor Education Projects for schools and other.
- Two Mineral Surface Leases (i.e., oil and gas exploration) overlap with the MC1 Option area: MSL781267 is a well site with an access road, located on the north side of the Elbow River and inside the reservoir boundary for the Option (i.e., the Option area overlaps with 97.0% of MSL781267). A sump site (MSL130225) and associated roadway Licence of Occupation (LOC130222) are southwest of the Option on the edge of the reservoir and adjacent to Highway 66. The leases are both owned by Shell Canada.
- Three Grazing Leases are located in the LAA east of the MC1 Option area on both sides of the Elbow River. The LAA intersects with a small portion of two of the leases and includes 97.5% of GRL33163. The edge of GRL33163 (0.05 ha) intersects with the Option area.
- A Miscellaneous Lease (DML920078) identified for commercial development is located north of Highway 66. The area is used for film set production. The MC1 Option area intersects with 33.9% of DML920078.
- Several easements for powerlines overlap the MC1 Option area and LAA. A total of three easements (EZE100002, EZE140080, and EZE890421) have 100% overlap with the Option area, and six easements for powerlines have 100% overlap with the LAA (**Table 1**). All powerline easements in the LAA are owned by Fortis Alberta Inc. Licenses of Occupation for roadways and access roads cross the Option area and LAA, and provide access to tenured resource uses such as pipeline and well site access. One Licence of Occupation for a pipeline access road overlaps with the Option area (LOC001390).
- Pipeline Agreements and Pipeline Installation Leases overlap with the MC1 Option area and LAA. Approximately 14.9% of one pipeline overlaps with the Option area (PLA5098, owned by Atco Gas and Pipelines Ltd.)

Existing Dispositions

Two Parks Easements (PEZ100001 and PEZ140001) are located entirely in the MC1 Option area. These dispositions are owned by Fortis Alberta Inc. and denote pipeline easements through Elbow River and McLean Creek PRAs.

Table 1 Existing Dispositions Overlapping with the Option Area

Disposition ID	Disposition Type	Purpose	Status	Area (ha)	Area of Intersect (ha)	% of Intersect
REC2811	Recreation	Recreational Campsites	Active	24.8	0.3	1.0
MSL130225	Mineral Surface Lease	Sump Site	Letter of Authority	0.80	0.01	1.2
MSL781267	Mineral Surface Lease	Well Site and Access Road	Active	1.88	1.82	97.0
GRL33163	Grazing Lease	Grazing	Active	63.3	0.1	0.1
EZE100002	Easement	Powerline	Letter of Authority	0.3	0.3	100.0
EZE120385	Easement	Powerline	Letter of Authority	0.2	0.1	100.0
EZE140080	Easement	Powerline	Letter of Authority	3.4	3.4	100.0
EZE840116	Easement	Powerline	Letter of Authority for Amendment	16.8	5.2	30.9
EZE890421	Easement	Powerline	Active	0.5	0.5	100.0
DML920078	Miscellaneous	Commercial Development	Land Amendment Application	6.5	2.2	33.9
PLA5098	Pipeline Agreement	Pipeline	Active	1.49	0.2	14.9
RDS790062	Roadway	Roadway	Active	42.9	1.3	3.0
LOC001390	Licence of Occupation	Access Road	Letter of Authority	9.5	2.8	29.3
PEZ100001	TP&R Easement	Parks Easement	Active	0.40	0.40	100.0
PEZ140001	TP&R Easement	Parks Easement	Active	0.40	0.40	100.0

Note: TP&R is a disposition type located in provincial parks.

Disposition Reservations and Notations

Disposition reservations or notations are not formal (i.e., authorized) dispositions, but are areas with a registered interest by one or more agency and where land use restrictions or a requirement for consultation are imposed with respect to surface disposition. Disposition reservations and notations in the LAA are described below and in **Table 2**.

Crown reservations include Protective Notations (PNT) and Consultative Notations (CNT), which are registered by AEP and to which conditions to industrial activity apply. Crown reservations in the LAA include potential provincial parks, ungulate habitat protection area, grazing allotments, watercourse protection, and areas with topographic constraints or resource concerns:

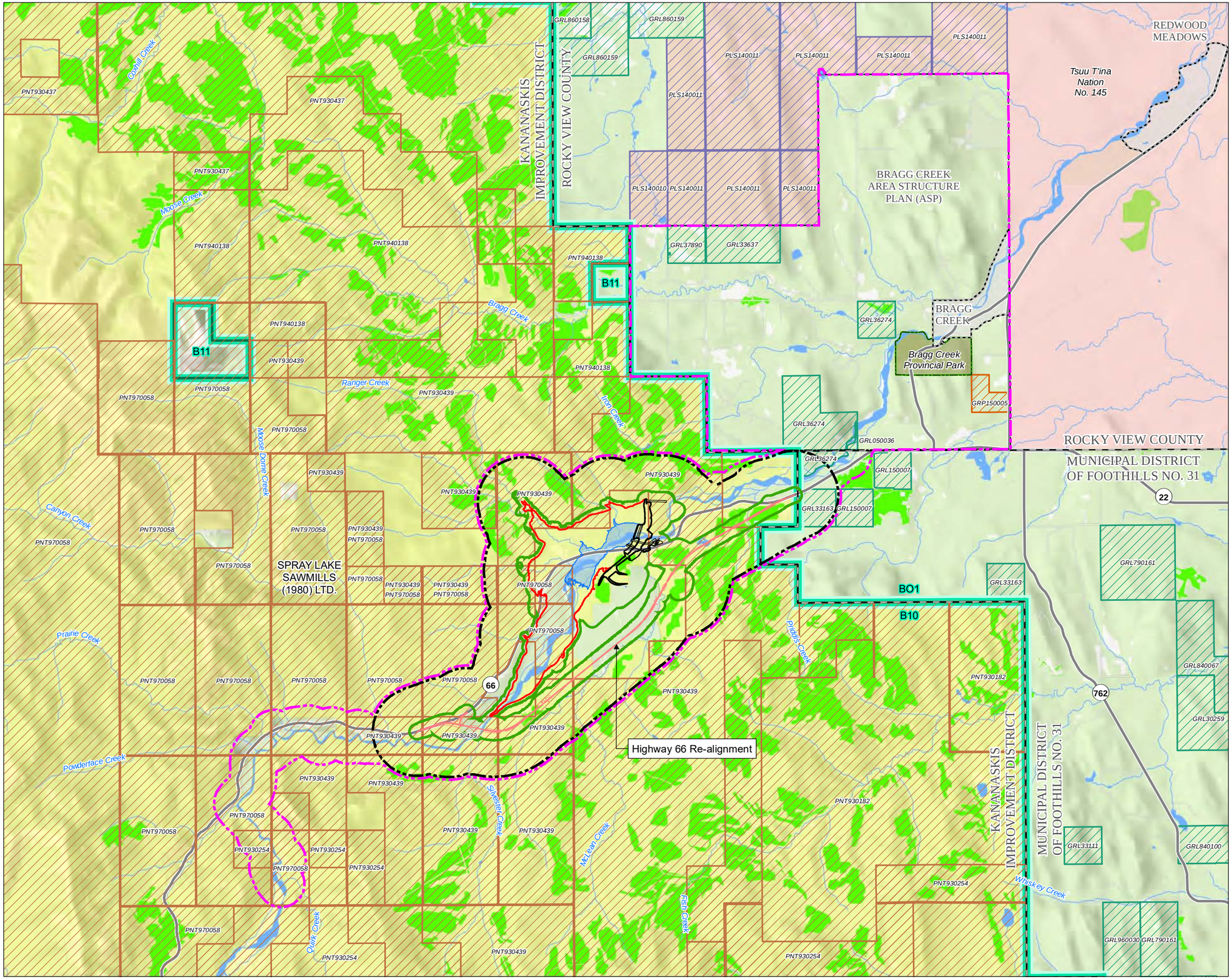
- A PNT between Elbow River PRA and Elbow River Launch PRA (PNT140043) is identified as having provincial park potential. More than half of the PNT area (57.3%) overlaps with the MC1 Option area.
- Ungulate habitat protection areas (PNT860034) provide important winter range areas for ungulate species (refer to the MC1 [Option Screening Report], Section 7.2 Wildlife and Wildlife Habitat for further information). The MC1 Option area does not intersect with the PNT. The LAA intersects with 26.3% of PNT860034, which is located north of the Elbow River in the eastern portion of the LAA.
- PNT090086 is a 3,503.3 ha area that overlaps with 18.3% of the MC1 Option area and 55.2% of the LAA. The area is listed as containing multiple resource concerns, and was noted to contain areas of native grassland, specifically foothills fescue grassland.
- Within the LAA there are two grazing allotment areas identified as PNTs. Both allotments are held by Alberta Agriculture and Forestry. The MC1 Option covers approximately 3.3% (284.8 ha) of PNT930439 and 17.0% (253.7 ha) of PNT970058. Both notation areas are adjacent to or overlapping with the reservoir.
- A PNT for watercourse protection (PNT840065) is at the eastern boundary of the LAA, reserving an area north of the Elbow River, and an area with identified topographic constraints such as steep, rolling topography lies to the south (PNT780209).
- Consultative Notations in the LAA include a residential buffer area and a range improvement plan area. The residential buffer area (CNT140022) overlaps with the Option area (27.1%) north of the Elbow River PRA. The range improvement plan area is encompassed by Grazing Lease GRL36274.
- Disposition Reservations (DRS), including a firefighting base camp (DRS392 and DRS 150004) and a surrounding area identified for structural development (DRS12006). The firefighting base camp and the Elbow District Ranger Station are both located in this area north of Highway 66, including multiple buildings and other structures. The majority of DRS392 would be encompassed by the reservoir, and a portion of this disposition overlaps with the permanent pond.
- Other DRSs include a waste disposal and reclamation site adjacent to Highway 66 in the eastern portion of the LAA (DRS800082), a sand and gravel removal area at the southern extent of the reservoir (DRS810028), and a holding reservation (HRS) south of Gooseberry PRA (HRS940044).
- Disposition Reservations for registered roadways (RRD) include Highway 66 and other roadways in the LAA.

Table 2 Disposition Reservations and Notations Overlapping with the Option Area

Reservation ID	Reservation Type	Purpose	Status	Area (ha)	Area of Intersect (ha)	% of Intersect
PNT090086	PNT	Multiple Resource Concerns	Active	3,503.3	640.1	18.3
PNT140043	PNT	Provincial Park Potential	Active	208.3	119.3	57.3
PNT930439	PNT	Grazing Allotment Area	Active	8,591.6	284.8	3.3
PNT970058	PNT	Grazing Allotment Area	Active	1,490.8	253.7	17.0
CNT140022	CNT	Residential Buffer	Active	587.7	159.3	27.1
DRS120006	DRS	Structural Development	Application	59.5	53.3	89.6
DRS150004	DRS	Firefighting Base Camp	Application	595.4	85.2	14.3
DRS392	DRS	Firefighting Base Camp	Active	35.3	35.3	99.9
DRS810028	DRS	Sand and Gravel Removal	Active	27.3	7.9	28.7
HRS940044	HRS	Transfer/Exchange Pending	Land Amendment Application	82.1	27.8	33.9
RRD8810268	RRD	Registered Roadway	Active	33.3	18.7	56.2
RRD8810269	RRD	Registered Roadway	Active	47.4	16.9	35.7

Elbow River at McLean Creek Dam (MC1)

Land Use and Management Lease Status in the Local Assessment Area and Regional Assessment Area



Legend

- MC1 Option Area
- Land Use and Management & Infrastructure LAA
- Land Use and Management & Infrastructure RAA
- 2013 Flood Event (1,424.1 m)
- MC1 Dam
- Highway 66 Re-alignment
- Permanent Pond
- Highway
- Bragg Creek Area Structure Plan Boundary
- Provincial Park
- Urban Area
- Watercourse
- Waterbody
- Municipal Boundary
- Existing Cut Block (as of 2014)
- Forest Management Area (FMA)
- Forest Management Unit (FMU)

Agriculture Disposition Types

- Grazing Lease (GRL)
- Grazing Permit (GRP)
- Private Land Sale (PLS)
- Protective Notation (PNT) - Grazing Allotment Area

Notes

1. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

Sources

- Basedata: Government of Alberta, 2017
- Preferred Road Option and Disturbed Areas: Opus International Consultants Limited, 2017
- Dam Details: Hatch Ltd., 2017
- Cut Block: Alberta Biodiversity Monitoring Institute (ABMI) Human Disturbance dataset, 2014.
- Aerial Imagery: SPOT 1.5 m, 2016

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