



**SUNCOR ENERGY INC.
Base Mine Extension**

INITIAL PROJECT DESCRIPTION

February 2020

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EXECUTIVE SUMMARY

Suncor Energy Inc. (Suncor) is submitting a proposal to develop the Base Mine Extension Project (the Project). All plausible pathways to address global emissions need energy from fossil fuels and Suncor views Canada's world class, strategic oil sands resource as a key part of the energy future for decades to come. Commensurate with Canada's ambitions, Suncor is committed to a long-term strategy of reducing absolute emissions. With the innovation we are known for, Suncor can provide the world with trusted low carbon energy.

Suncor has invested billions of dollars in infrastructure that produces value added products to meet the energy needs of Albertans and Canadians. This Project is necessary to continue to add value with this infrastructure. The bitumen from this project will be used to supply the existing upgraders at Suncor's Oil Sands Base Plant operations (Base Plant), when the existing mines are depleted. The Project is adjacent to Base Plant and includes an open pit mining operation and extraction facilities. Production is expected to be nominally 225 thousand barrels per day of replacement bitumen during its estimated 25-year operational life.

The Project application will be based on best-available technology. In parallel, Suncor is developing new technologies, such as non-aqueous extraction. These new technologies have the potential to significantly reduce the overall footprint, reclamation timeline, and GHG emissions of mining and will be incorporated as appropriate. In addition, Suncor will concurrently be aggressively pursuing paths to reduce emissions in other areas of its business and in ways that sequester carbon and produce net benefits.

Significant socioeconomic benefits and opportunities for Indigenous communities, local communities, the Province of Alberta, and Canada are expected to be generated by the Project. The benefits include:

- continued generation of municipal, provincial, and federal tax and royalty revenue;
- direct and indirect local and national employment; and
- investment in innovation and technology development.

Production is anticipated post this decade to support continued operations of existing infrastructure as production transitions from the existing mines to the Project. Suncor is committed to working with regulators, governments, Indigenous communities, and stakeholders to seek approval for this Project, while ensuring we are caring for each other and the earth, with a view to the long-term interests of Canada and its Peoples.

TABLE OF CONTENTS

	Page No.
INTRODUCTION	1
1. THE PROJECT’S NAME, TYPE OR SECTION AND PROPOSED LOCATION	1
2. PROPONENT’S NAME AND CONTACT INFORMATION.....	1
3. EARLY ENGAGEMENT WITH JURISDICTIONS OR AGENCIES	1
4. EARLY ENGAGEMENT WITH INDIGENOUS GROUPS.....	4
5. STUDIES OR PLANS RELEVANT TO THE PROJECT.....	5
6. STRATEGIC ASSESSMENT RELEVANT TO THE PROJECT	6
7. PURPOSE OF AND NEED FOR THE PROJECT	7
8. PROVISIONS IN THE SCHEDULE TO THE <i>PHYSICAL ACTIVITIES REGULATIONS</i> (PROJECT LIST).....	7
9. CONSTRUCTION, OPERATION, AND DECOMMISSIONING ACTIVITIES	7
10. ESTIMATE OF MAXIMUM PRODUCTION CAPACITY AND DESCRIPTION OF PRODUCTION PROCESSES	12
11. ANTICIPATED SCHEDULE FOR THE PROJECT.....	12
12. LIST OF POTENTIAL ALTERNATIVE MEANS AND ALTERNATIVES TO THE PROJECT	13
13. GEOGRAPHIC INFORMATION.....	13
14. PHYSICAL AND BIOLOGICAL ENVIRONMENT OF PROJECT’S LOCATION.....	16
15. HEALTH, SOCIAL, AND ECONOMIC CONTEXT.....	17
16. FINANCIAL SUPPORT FROM FEDERAL AUTHORITIES.....	19
17. FEDERAL LAND USED FOR PROJECT	19
18. LIST OF JURISDICTIONS THAT HAVE POWERS, DUTIES OR FUNCTIONS IN RELATION TO AN ASSESSMENT OF THE PROJECT’S POTENTIAL ENVIRONMENTAL EFFECTS	19
19. POTENTIAL CHANGES TO COMPONENTS OF THE ENVIRONMENT WITHIN LEGISLATIVE AUTHORITY OF PARLIAMENT	19
20. POTENTIAL CHANGES TO THE ENVIRONMENT ON FEDERAL LANDS AND LANDS OUTSIDE ALBERTA AND CANADA	20
21. IMPACT TO INDIGENOUS PEOPLES – PHYSICAL AND CULTURAL HERITAGE, TRADITIONAL LAND USE, HISTORICAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES	20
22. IMPACT TO INDIGENOUS PEOPLES – SOCIAL, ECONOMIC AND HEALTH CONDITIONS .	20
23. ESTIMATE OF POTENTIAL GREENHOUSE GAS EMISSIONS	21
24. TYPES OF WASTE AND EMISSIONS GENERATED BY PROJECT	21

LIST OF TABLES

	Page No.
Table 1: New Infrastructure, Structures, and Physical Works	10
Table 2: Existing Infrastructure, Structures, and Physical Works Operated in Association with the Project	12
Table 3: Anticipated Project Schedule.....	13

LIST OF FIGURES

	Page No.
Figure 1: Proposed Project Location	3
Figure 2: Generic Oil Sands Processes Schematic.....	8
Figure 3: Proposed Project Area with Conceptual Layout.....	15

LIST OF APPENDICES

APPENDIX A References
APPENDIX B Glossary

INTRODUCTION

This information has been prepared according to the *Impact Assessment Act* Guide to Preparing an Initial Project Description and a Detailed Project Description (Government of Canada 2019a) and Annex I of the guide, which aligns with Schedule 1 of the Information and Management of Time Limits Regulations. Sections 1 through 24 below correspond to requirements 1 through 24 as outlined in Annex 1 of the guide. A list of references cited in the Initial Project Description is provided in Appendix A. A glossary of technical terms used in this document is provided in Appendix B.

1. THE PROJECT'S NAME, TYPE OR SECTION AND PROPOSED LOCATION

Suncor Energy Inc. (Suncor) is proposing to develop the Base Mine Extension Project (the Project) to sustain the supply of bitumen to the existing upgraders at Suncor's Oil Sands Base Plant operation (Base Plant) as the mineable bitumen resource is depleted. The Project includes an open pit mining operation supplying oil sands to new bitumen froth production facilities, from which bitumen froth will be delivered by pipeline to Suncor's existing Base Plant facilities where further processing occurs including upgrading into various product blends for market. The Project is located adjacent to Base Plant and north of the city of Fort McMurray, Alberta, within the Regional Municipality of Wood Buffalo (Figure 1) – see Section 13 for additional details on the Project location.

2. PROPONENT'S NAME AND CONTACT INFORMATION

Suncor Energy Inc.

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Calgary, Alberta T2P 3E3

Project [email: BaseMineExtension@suncor.com](mailto:BaseMineExtension@suncor.com)

Project phone number: 1-855-955-3054

3. EARLY ENGAGEMENT WITH JURISDICTIONS OR AGENCIES

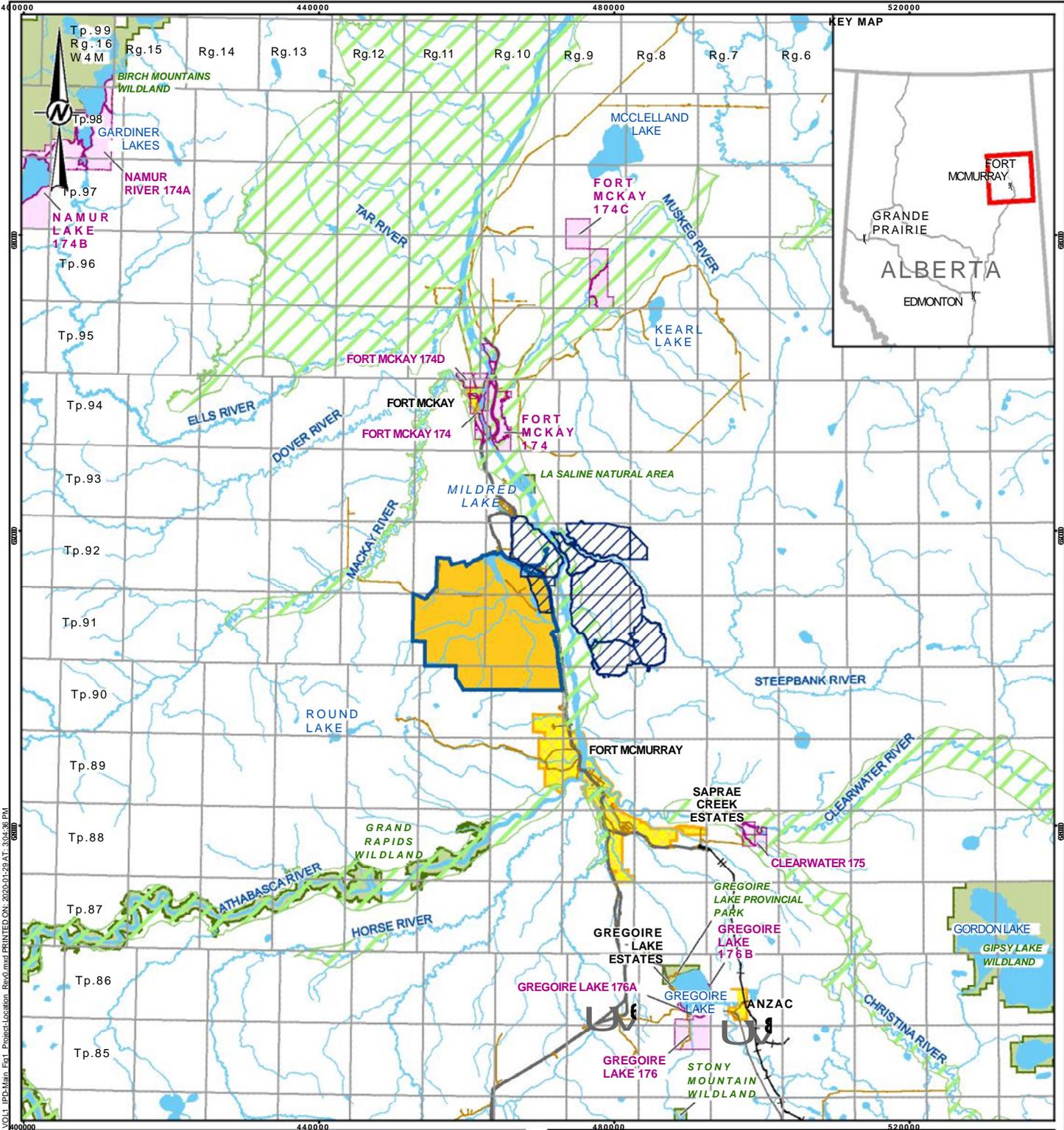
During the preparation of this Initial Project Description, engagement activities specific to the Project included:

- Regional Municipality of Wood Buffalo
 - Provided general project information update
- Alberta Energy Regulator
 - Provided general project information update
 - Wetland Policy discussion
- Alberta Environment and Parks
 - Provided general project information update
 - Wetland Policy discussion
- Alberta Aboriginal Consultation Office
 - Provided general project information update
- Fisheries and Oceans Canada
 - Provided general project information update
 - Preliminary discussions related to fisheries offsetting requirements
- Impact Assessment Agency of Canada
 - Provided general project information update
 - Discussions about regulatory process

These engagement activities have included phone discussions and in person meetings to review preliminary material including project schedule information, early engagement plans, regulatory processes and schedules, and planned project timing. The primary focus of discussions with the Impact Assessment Agency of Canada has been on understanding the *Impact Assessment Act* and clarifying associated regulatory processes. Key topics identified included:

- potential impacts to land use
- potential impacts to wildlife
- potential impacts to wetlands
- potential losses to fish habitat
- employment opportunities
- proximity of the Project to Fort McMurray

Suncor will continue engagement activities during the preparation of the Detailed Project Description through regular project updates and technical meetings.



- LEGEND**
- PRIMARY HIGHWAY
 - SECONDARY HIGHWAY
 - LOCAL ROAD
 - WATERCOURSE
 - RAILROAD
 - OPEN WATER
 - POPULATION CENTRE
 - FORT MCMURRAY URBAN DEVELOPMENT SUB-REGION
 - FIRST NATION RESERVE
 - PARK / PROTECTED AREA
 - KEY WILDLIFE AND BIODIVERSITY ZONE
 - PROPOSED PROJECT AREA
 - BASE PLANT OPERATION

- KEY WILDLIFE AND BIODIVERSITY ZONE
- PROPOSED PROJECT AREA
- BASE PLANT OPERATION

PROJECT
BASE MINE EXTENSION

TITLE
PROPOSED PROJECT LOCATION

CLIENT



YYYY-MM-DD 2020-01-29

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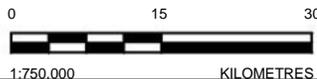
PREPARED PT

REVIEWED JG

APPROVED TD

REFERENCE(S)

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PROJECTION: UTM ZONE 12 DATUM: NAD 83



PROJECT NO.
19124718

PHASE

REV.
0

FIGURE
1

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4. EARLY ENGAGEMENT WITH INDIGENOUS GROUPS

Early engagement has occurred with the following Indigenous groups during preparation of the Initial Project Description:

- Fort McKay First Nation
 - in-person meeting to provide general project information update
 - request to review a draft version of this Initial Project Description
- Mikisew Cree First Nation
 - in-person meeting to provide general project information update
 - request to review a draft version of this Initial Project Description
- Athabasca Chipewyan First Nation
 - in-person meeting to provide general project information update
- Fort McMurray No. 468 First Nation
 - in-person meeting to provide general project information update
 - request to review a draft version of this Initial Project Description
- Fort Chipewyan Métis Local 125
 - in-person meeting to provide general project information update
- Fort McKay Métis Nation
 - in-person meeting to provide general project information update
- Fort McMurray Métis Local 1935
 - in-person meeting to provide general project information update
- Chipewyan Prairie First Nation
 - in-person meeting to provide general project information update

These engagement activities have included in person meetings to review preliminary material including project location, project type, project schedule information, regulatory processes and schedules, and future engagement opportunities.

The following Indigenous groups may also have interest in being involved in engagement activities related to the Project:

- Bigstone Cree First Nation
- Heart Lake First Nation
- K'at'l'odeeche First Nation
- Kikino Métis Settlement
- Original Fort McMurray First Nation
- Owl River Métis
- Smith's Landing First Nation
- Clearwater River Band #175
- Willow Lake Métis Local 780
- Métis Nation of Alberta Region 1

Topics raised by Indigenous groups related to the Project include:

- impacts to waterbodies, watercourses, water quality and water quantity during operations and at closure, including potential impacts to water access and navigation
- impacts to quality and quantity of fish and fish habitat during operations and at closure
- impacts to the wildlife and wildlife habitat during operations and at closure
- reduced quality of country foods and medicines
- impacts to ecosystems and harvesting areas, such as, loss of traditional use plants and vegetation and reduced quantity of wildlife in harvesting areas
- impacts to air quality, including odours, noise and dust from operations
- impacts to visual aesthetic and peaceful enjoyment of the landscape
- impacts to health status and Indigenous community health
- impacts to or loss of place-based sites
- impacts to access to traditionally used lands and resources both by land and water
- impacts to Indigenous communities, culture and heritage resources, including the inability to practice and pass on Indigenous culture, values, laws, customs and knowledge also related to loss of place-based sites
- impacts on Indigenous communities' sense of wellbeing, identity, spiritual practices, remoteness, solitude, privacy and safety
- loss of connection with cultural landscape
- impacts to visual aesthetics including light pollution Concerns

raised by Indigenous groups related to the Project include:

- reduced land access during construction, operations and reclamation activities for Indigenous community members to exercise rights, such as hunting, fishing, gathering and/or trapping
- inability to achieve planned land uses at closure
- cumulative negative environmental effects of existing and planned projects at both a local and regional scale
- cumulative negative community-specific socio-economic effects
- cumulative negative socio-economic effects of existing and planned projects within the region
- reduced land available in the region to exercise traditional land uses and rights, both temporally and spatially, currently and in the future
- the inability of the Lower Athabasca Regional Plan (Government of Alberta 2012) to balance industrial activity and the rights of Indigenous groups or manage cumulative effects
- increased avoidance of areas due to disturbance, activity, and perspectives regarding contamination
- increased real and cultural perspectives on contamination of lands, food and medicinal sources, which impacts use of the land, harvesting, and use and consumption of traditional foods and medicines.
- increased uncertainty to sustain social and cultural cohesion and social services including for health and well-being and public and traditional education
- inclusion of an external tailings area in the Project plan
- further contributions of the Project to the accumulation of oil sands process waters and fear of potential release of such waters, with unacceptable treatment processes, to the Athabasca River

Suncor will continue to engage and consult with Indigenous communities on: areas of potential impact and concern; appropriate Indigenous Knowledge and Land Use assessment boundaries that reflect community concerns and impacts; and what appropriate mitigation and accommodation measures may be, following submission of the Initial Project Description. Future engagement activities will vary depending on the nature and extent of impacts on communities, and how individual communities want to be engaged. Engagement may include open houses, on-the-land workshops, community meetings, and technical meetings. Engagement plans will be developed collaboratively with each Indigenous community. Suncor recognizes

that the Crown has consultation obligations with Indigenous communities that may supplement Suncor's planned engagement practices.

5. STUDIES OR PLANS RELEVANT TO THE PROJECT

The Project is located within the Athabasca Oil Sands Region, an area in which several developments have been the subject of provincial or joint federal-provincial regulatory review. Projects that have undergone such reviews include:

- Fort Hills Oil Sands Project
- Frontier Oil Sands Mine Project
- Horizon Oil Sands Project
- Jackpine Mine Project
- Jackpine Mine Expansion Project
- Joslyn North Mine Project
- Kearl Oil Sands Project
- Mildred Lake Extension Project

- Muskeg River Mine Expansion
- Suncor Millennium Oil Sands Project
- Suncor Steepbank Mine
- Suncor Voyageur Project

Each of the above projects has provided information on environmental conditions within northeastern Alberta. In addition, there have been a variety of historic environmental studies as well as a number of ongoing environmental monitoring programs within the proposed development area, including but not limited to:

- the Northern River Basins Study
- the Regional Aquatics Monitoring Program
- the Wood Buffalo Environmental Association
- the Governments of Alberta and Canada Joint Oil Sands Monitoring Program
- the Alberta Biodiversity Monitoring Initiative
- Cumulative Environmental Management Association studies
- Wildlife Habitat Effectiveness and Connectivity study
- Canada's Oil Sands Innovation Alliance studies
- Alberta's Environmental Monitoring and Science Program
- Oil Sands Monitoring Program
- Peace Athabasca Delta Environmental Monitoring Program

In addition, Indigenous groups, have developed reports relevant to the Project and the Oil Sands Region. As part of consultation, primary sources of information include information obtained directly from Indigenous groups, such as traditional land use and knowledge studies, socio-economic studies, cultural impact assessments, heritage surveys or other relevant studies conducted specifically for the project. Any general 'public' or secondary sources of information derived from Indigenous Knowledge including previously documented information on the area, not collected specifically for the purposes of the project, or desk-top or literature-based information will be re-validated with the originating community whose cultural and intellectual property it is in order to avoid de-contextualization of the knowledge and provide a Project-specific evaluation and lens. The proponent will provide Indigenous groups the opportunity to review and provide comments on the information used for describing and assessing effects on Aboriginal peoples

Indigenous groups have and are currently leading a number of Community Based Monitoring Programs.

The Lower Athabasca Regional Plan (Government of Alberta 2012) establishes strategic directions for the region for a ten-year period and includes environmental frameworks for air, water, and tailings management.. Recognizing the Plan's cultural deficiency, incomplete Frameworks and inability to manage effects to protect Constitutionally protected Aboriginal rights, other related independent sources will be referenced.

The Alberta Government also developed a Climate Leadership Plan (Government of Alberta 2018) that outlines climate initiatives.

Regional Traditional Ecological Knowledge for Athabasca River water flow and water levels have been completed in the Athabasca Oil Sands Region by Athabasca Chipewyan First Nation and Mikisew Cree First Nation (e.g., Chandler et al. 2010), though this work has yet to be finalized in the LARP Surface Water Quantity Management Framework despite its metrics being referenced as interim for supporting Indigenous navigation.

In 2010 the Community of Fort McKay conducted the Fort McKay Specific Assessment for the Shell Jackpine Mine Expansion and Pierre River Mine Project that included both an environmental and cultural assessment to determine the effects of the project on Fort McKay's cultural heritage as well as the environmental, traditional and cultural resources of importance to the Community. Resource management policy for public lands within the area is managed through Alberta-approved integrated resource plans. The Project is within the Fort McMurray Athabasca Oil Sands Sub-Regional – Integrated Resource Plan (Alberta Sustainable Resource Development 2002) that details the resource management policies for the lands and resources in

the area. The Integrated Resource Plan guidelines range from documentation of issues related to resource uses and development to definition of limits on how or where an activity is conducted.

Regional assessment work related to development in the region includes the Wood Buffalo National Park Action Plan (Parks Canada 2019), which was informed by the Strategic Environmental Assessment for Wood Buffalo National Park World Heritage Site. The Action Plan requires that the Outstanding Universal Value of Wood Buffalo National Park is considered in environmental assessments where potential specific or cumulative impacts may occur to Wood Buffalo National Park, including the Peace-Athabasca Delta.

6. STRATEGIC ASSESSMENT RELEVANT TO THE PROJECT

The Athabasca Oil Sands Region has not been the subject of a strategic or regional assessment. However, the following strategic assessments will be considered as being relevant to the Project.

Strategic Assessment of Climate Change

Wood Buffalo National Park Strategic Assessment

Suncor is aware of the draft strategic assessment of climate change (Government of Canada 2019b), which will apply to projects that undergo a federal impact assessment under the *Impact Assessment Act*. This Strategic Assessment will provide an approach to quantifying the greenhouse gas emissions of projects, including:

- outlining the approach to be used to estimate net and upstream greenhouse gas emissions
- clarifying that downstream emissions will not be assessed
- explaining how avoided emissions and greenhouse gas offsets are to be factored into estimates of greenhouse gas emissions

7. PURPOSE OF AND NEED FOR THE PROJECT

The purpose of the Project is to sustain the supply of bitumen to the existing upgraders at Suncor's Base Plant because the mineable bitumen resource is expected to be depleted. Bitumen froth production from the Project is required in 2030 to support safe and stable upgrader operations as production transitions from Base Plant.

The Project is needed to:

- realize the value of a responsibly produced strategic oil resource that helps to meet ongoing global energy needs and provides energy security for Canada
- generate significant socioeconomic benefits and opportunities for Indigenous communities, local communities, the Province of Alberta, and Canada, including continued generation of municipal, provincial, and federal tax and royalty revenue, continued direct local and national employment, as well as indirect and induced provincial and national economic benefits and employment, and
- support Natural Resource Canada's vision of "Improving the quality of life of Canadians by creating a sustainable resource advantage" (Natural Resources Canada website [<https://www.nrcan.gc.ca/nrcan/about-us/10838>] accessed January 9, 2020).

The potential benefits of the Project include:

- continued use of existing oil sands processing facilities at the Base Plant
- creating value from Canada's oil sands resources, proximal to existing Suncor facilities and infrastructure
- fostering opportunities to implement innovations that are currently being developed and enabling ongoing investment in research and development
- providing stable revenue that can be reinvested in assets that support the transforming global energy economy
- creating value for Suncor's shareholders
- satisfying the Alberta Energy Regulator's mandate to "ensure(s) the safe, efficient, orderly, and environmentally responsible development of oil, oil sands, natural gas, and coal resources over their entire life cycle" (Alberta Energy Regulator website [<https://www.aer.ca/providing-information/about-the-aer/who-we-are>] accessed January 9, 2020)

8. PROVISIONS IN THE SCHEDULE TO THE *PHYSICAL ACTIVITIES REGULATIONS* (PROJECT LIST)

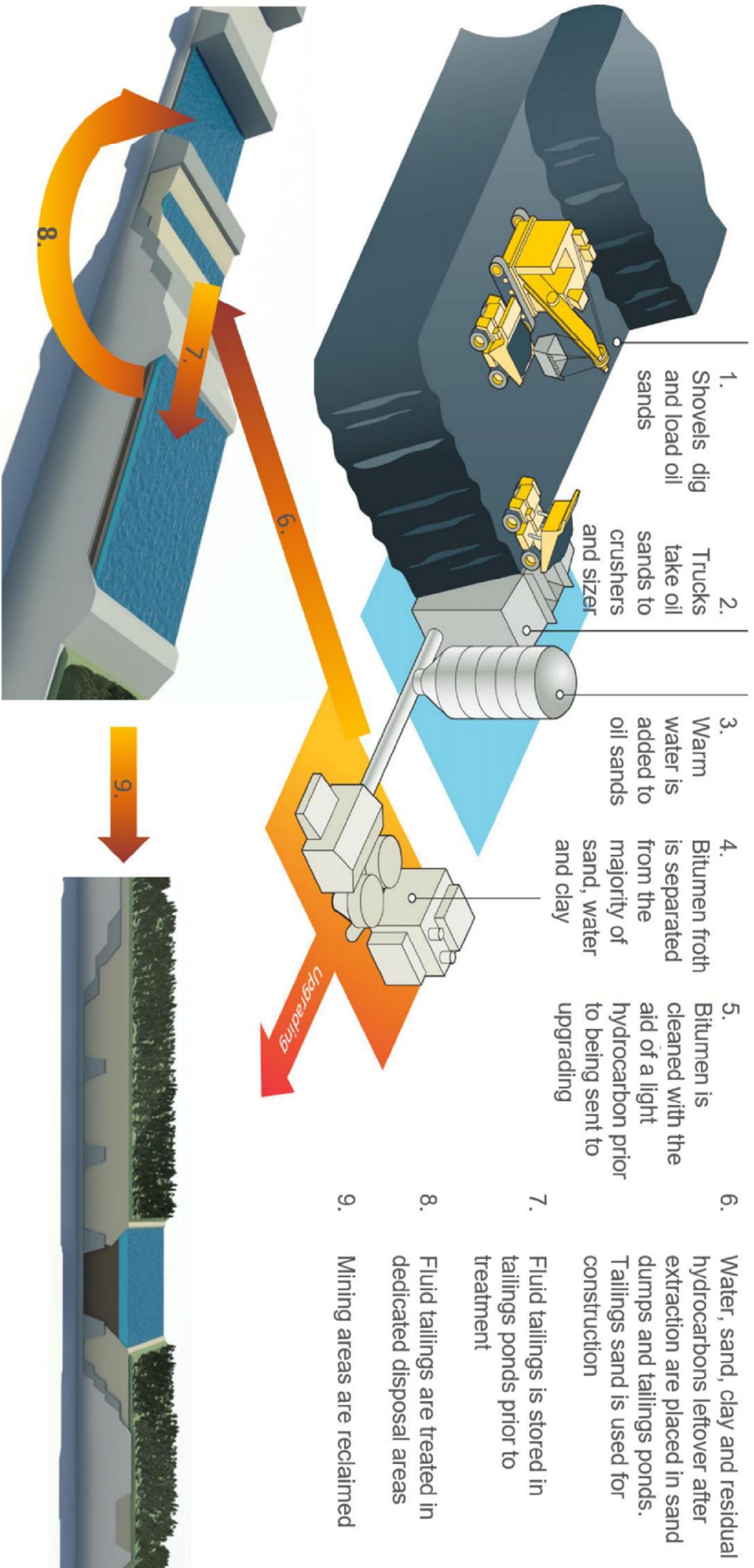
The relevant provision, Section 25 of Schedule 2, to the Physical Activities Regulations is:

"The expansion of an existing oil sands mine, if the expansion would result in an increase in the area of mining operations of 50% or more and the total bitumen production capacity would be 10 000 m³/day or more after the expansion."

The development area of existing mining operations is approximately 23 thousand hectares. The development area for the Project is expected to be approximately 20 thousand hectares, which represents an increase in the area of mining operations that is greater than 50%. The Project will not increase total bitumen production capacity. Total production is currently higher than 10 thousand cubic metres per day.

9. CONSTRUCTION, OPERATION, AND DECOMMISSIONING ACTIVITIES

A description of the generic oil sands mining, tailings, reclamation and extraction process provides context for the infrastructure, structures and physical works discussed in the tables below. Throughout the following discussion, please refer to Figure 2.



1. Shovels dig and load oil sands

2. Trucks take oil sands to crushers and sizer

3. Warm water is added to oil sands

4. Bitumen froth is separated from the majority of sand, water and clay

5. Bitumen is cleaned with the aid of a light hydrocarbon prior to being sent to upgrading

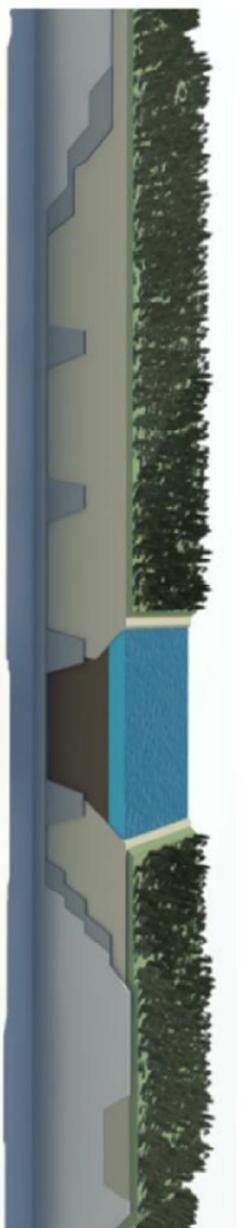
6. Water, sand, clay and residual hydrocarbons leftover after extraction are placed in sand dumps and tailings ponds. Tailings sand is used for construction

7. Fluid tailings is stored in tailings ponds prior to treatment

8. Fluid tailings are treated in dedicated disposal areas

9. Mining areas are reclaimed

Upgrading



CLIENT	YYYYMMDD	2020-01-14	TITLE	PROJECT
Suncor ENERGY	DESIGNED	JG	GENERIC OIL SANDS PROCESSES SCHEMATIC	BASE MINE EXTENSION
	PREPARED	PT		
	REVIEWED	LP		
	APPROVED	TD		
	PROJECT NO.	19124718	CONTROL	
	REV.	0	FIGURE	2

Step 1: Excavation – Large mine shovels dig and load oil sands and overburden (not depicted) into mine trucks. Overburden is located above the oil sands and must be removed before mining oil sands.

Step 2: Transportation of Mined Materials – Mine trucks transport material to assigned destinations. Overburden is transported to construction projects such as roads, dams and overburden disposal areas. Oil sands are transported to the Ore Preparation Plant where it is crushed to reduce the size of the oil sands prior to slurry preparation.

Step 3: Ore Slurry Preparation – Warm water is added to the crushed oil sands to create a slurry to facilitate transportation via pipeline to the primary extraction plant.

Step 4: Primary Extraction – This stage involves the separation of bitumen froth from the slurry. The bitumen froth is subsequently transported to the secondary extraction facility. The remaining material (tailings) is transported to a tailings area for disposal (see Step 6).

Step 5: Secondary Extraction – This stage involves the addition of a light hydrocarbon (naphtha) to clean up the bitumen by removing residual minerals and water before the bitumen is sent to upgrading for further processing. The residual minerals and water are treated to recover the light hydrocarbon before being transported to a tailings area.

Step 6: Coarse Tailings – The tailings from the primary extraction facilities is comprised of water, sand, clay and residual hydrocarbon after the extraction process. The coarse tailings are deposited in a tailings area.

Step 7: Fluid Tailings – The disposal of coarse tailings in a tailings area results in the natural separation of fluid tailings, comprised primarily of water with suspended fine minerals. Over time, the fine minerals in the fluid tailings settle to the bottom of the deposit while water rises to the surface. This water is recycled to the extraction process.

Step 8: Treated Tailings – The fluid tailings are transferred to a dedicated disposal area within a mined-out area of the mine pit for treatment and deposition. The treatment promotes rapid settlement and expression of water that can be recycled to the extraction process. This treatment of fluid tailings accelerates the reclamation process for this tailings stream.

Step 9: Reclamation – Disturbed areas are reclaimed progressively as necessary criteria are met. The final landscape is expected to be a mix of uplands, wetlands, lakes and streams and will meet traditional end land use capacity approval conditions. The closure drainage system will be designed to convey water via streams to lakes and wetlands prior to release to the surrounding environment.

Step 10: Return to End Land Uses – ecology is functioning, biodiversity is restored and end land uses can be supported. Risks to the environment and people have been eliminated.

Anticipated new infrastructure, structures, and physical works are provided in Table 1.

Table 1: New Infrastructure, Structures, and Physical Works

Phase	New Infrastructure, Structures, and Physical Works
Construction	Initial site preparation, including: <ul style="list-style-type: none"> • timber salvage • surface drainage control systems • groundwater management system - prevents groundwater ingress into mine excavation • salvage and stockpiling of reclamation material from construction areas • potentially development of fish habitat offset features
	Relocation of third party infrastructure located in the Project area
	Initial overburden excavation that is required to: <ul style="list-style-type: none"> • expose ore for the start of bitumen production • recover overburden materials that are required for construction activities such as <ul style="list-style-type: none"> • road construction • construction of overburden dumps • construction of external tailings area • construction of tailings and other pipeline corridors
	Construction of facilities: <ul style="list-style-type: none"> • administration building, tailings and mine maintenance shops • Ore Preparation Plant, which is comprised of ore crushers and sizers and slurry preparation • Primary Extraction Plant where bitumen froth is separated from the sand, water and clay
	Construction of linear infrastructure: <ul style="list-style-type: none"> • Between Ore Preparation Plant and Primary Extraction Plant, including: <ul style="list-style-type: none"> • oil sands slurry pipeline • high voltage powerline • water pipeline • natural gas pipeline • access road • Between Primary Extraction Plant and Base Plant, including: <ul style="list-style-type: none"> • high voltage powerline • bitumen froth pipeline • water pipeline • tailings pipeline • natural gas pipeline • access road • Between Primary Extraction Plant and the external tailings area, including <ul style="list-style-type: none"> • coarse tailings pipeline • reclaim water pipeline • fluid tailings pipeline
	General maintenance (e.g., mobile equipment) and emergency services

Table 1: New Infrastructure, Structures, and Physical Works

Phase	New Infrastructure, Structures, and Physical Works
Operation	Site preparation, including: <ul style="list-style-type: none"> • timber salvage • surface drainage ditches to direct surface runoff away from mine operations • groundwater management system to prevent ingress of groundwater into mine excavation • salvage and stockpiling of reclamation material
	Mining and tailings operations, including: <ul style="list-style-type: none"> • excavation of overburden transported to construction projects such as roads, tailings dams and overburden disposal areas • excavation and transportation of oil sands ore to a crusher and sizer • haul road construction needed for the transportation of overburden and oil sand • tailings management: <ul style="list-style-type: none"> • transportation of tailings from the primary extraction plant to tailings areas via pipeline • transportation of fluid tailings via pipeline • construction and operation of fluid tailing treatment facilities • water recycle for re-use in the extraction process • transportation of secondary extraction tailings to Project tailings facilities via pipeline
	Oil sands processing: <ul style="list-style-type: none"> • operation of the Ore Preparation Plant • transportation of oil sand slurry from the Ore Preparation Plant to the Primary Extraction Plant via pipeline • operation of the primary extraction plant • emergency response plans • <u>transportation of bitumen from the Primary Extraction Plant to the Base Plant secondary</u>
	General maintenance (e.g., processing plants, mobile equipment and linear infrastructure) and emergency services
	Progressive reclamation of mining and tailings areas: <ul style="list-style-type: none"> • development of surface drainage channels and micro-topographical features • topsoil and subsoil placement • revegetation
	Development, monitoring and maintenance of fish habitat offset features and closure landforms
	Ongoing Environmental monitoring to validate assessment predictions
Decommissioning	Ongoing tailings management: <ul style="list-style-type: none"> • transportation of fluid tailings via pipeline • fluid tailings treatment
	Removal of buildings and linear infrastructure
	Maintenance (e.g., mobile equipment) and emergency services
	Reclamation of mining and tailings areas: <ul style="list-style-type: none"> • <u>discussion on end land use planning</u> • development of surface drainage channels and micro-topographical features • topsoil and subsoil placement
	Ongoing environmental monitoring - of closure landforms and aquatic features in compliance with approved Reclamation and Closure Plans

The Project will integrate with existing water, power, heat and fuel utilities and use existing approved secondary extraction and upgrading facilities at the Base Plant (Figure 1). Existing facilities that will be operated in association with the Project but are approved under another approval are provided in Table 2.

Table 2: Existing Infrastructure, Structures, and Physical Works Operated in Association with the Project

Phase	Existing Infrastructure, Structures, and Physical Works
Construction	Existing power sources at Base Plant as well as the existing substations and power distribution network will support construction until the new transmission line to the Project is constructed and operational.
	Some support services (such as, hazardous waste yard and landfill) at Base Plant may serve the Project during the construction phase.
	AOSTRA Road will provide access to the site until the permanent access road is constructed.
	Lodging facilities (Worker Camps).
Operation	Operation of existing water intakes, steam and hot water sources at Base Plant.
	Existing power sources as well as the existing substations and power distribution network at Base Plant will support ongoing operations.
	Operation of existing secondary extraction at Base Plant - where bitumen is cleaned with the aid of a light hydrocarbon.
	Existing upgrading facilities at Base Plant – bitumen is delivered to the upgraders for further refinement.
	Some support services (such as, hazardous waste yard and landfill) at Base Plant may continue to serve the Project during the operations phase.
Operation (continued)	Lodging facilities (Worker Camps) – during periods of peak manpower requirements such as large maintenance events.
	Existing tanks at Base Plant will be used to store products and the existing network of pipelines will be used to distribute the various products from Upgrading to market.
Decommissioning	Existing power sources at Base Plant as well as the existing substations and power distribution network will support decommissioning as the Project powerlines are decommissioned.
	Some support services (such as, hazardous waste yard and landfill) at Base Plant may continue to serve the Project during the decommissioning phase.
	Lodging facilities (Worker Camps).

10. ESTIMATE OF MAXIMUM PRODUCTION CAPACITY AND DESCRIPTION OF PRODUCTION PROCESSES

The Project is expected to produce up to 80 million barrels per year (nominally 225 thousand barrels per day) of bitumen froth during its estimated 25-year operational life.

The Project is an open pit mine and Suncor plans to employ the best available oil sands development practices. Ore is mined with large mine shovels and transported by mine trucks to the ore preparation plant where the ore is crushed and mixed with warm process water. The resultant slurry is transported by pipeline to the primary extraction plant. Bitumen froth product from the primary extraction plant is transported by pipeline to the existing Base Plant secondary extraction facility.

The plan is for the Project to integrate with existing water, power, heat and fuel utilities and use the existing approved secondary extraction and upgrading facilities at Base Plant.

11. ANTICIPATED SCHEDULE FOR THE PROJECT

The anticipated schedule for the Project (Table 3) includes an initial seven years to account for the regulatory process. A decision by Suncor to sanction the Project would occur after regulatory approvals are in place.

Table 3: Anticipated Project Schedule

Phase	Timing	Notes
Regulatory Process	2019-2026	Both federal and provincial regulatory process
Construction	2026-2030	Site preparation and construction of facilities on Project site, including infrastructure to existing Base Plant facilities
Operations	2030-2055	Mining, reclamation, and bitumen extraction activities
Decommission	Starts in 2055	Removal of all structures, reclamation and closure. The duration will be more certain as plans are developed

12. LIST OF POTENTIAL ALTERNATIVE MEANS AND ALTERNATIVES TO THE PROJECT

The purpose of the Project is to sustain the supply of bitumen to the existing upgraders at Suncor’s Base Plant facility because the mineable bitumen resource is expected to be depleted. Bitumen froth production from the Project is required in 2030 to support safe and stable upgrader operations as production transitions from Base Plant.

Alternatives to the Project include development of a different Suncor-owned oil sands lease, and import of bitumen from existing bitumen production operations, which could be Suncor-owned or owned by other operators.

Potential alternate means of developing the Project include:

- alternate mining methods
- alternate extraction technologies
- alternative degrees of integration with existing facilities and infrastructure
- alternative tailings management and treatment
- alternative reclamation and closure methods

Suncor is continuing to evaluate new technologies for commercialization and will work with communities, regulators and stakeholders to share information as development is advanced.

13. GEOGRAPHIC INFORMATION

The Project is located north of the city of Fort McMurray, Alberta, within the Regional Municipality of Wood Buffalo approximately three kilometres north of the Fort McMurray Urban Development Sub-Region boundary on the west side of Highway 63, in Township 92, Ranges 9-11, West of the 4th Meridian; Township 91, Ranges 9-11, West of the 4th Meridian; and Township 90, Ranges 9-11, West of the 4th Meridian (Figure 1).

Other communities situated near the Project include Fort McKay (approximately 21 kilometres north) and Anzac (approximately 50 kilometres south), as shown in Figure 1. The development will be located adjacent to two active open pit mining operations: west of the Base Plant and south of Syncrude Mildred Lake operations (Figure 3). The Project is located in an area where Traditional Land Use is practiced. There are two potential trapper cabins close to the Project that will be validated with owners during consultation. There are five temporary worker camps within the Project area and three located within two kilometres of the Project area.

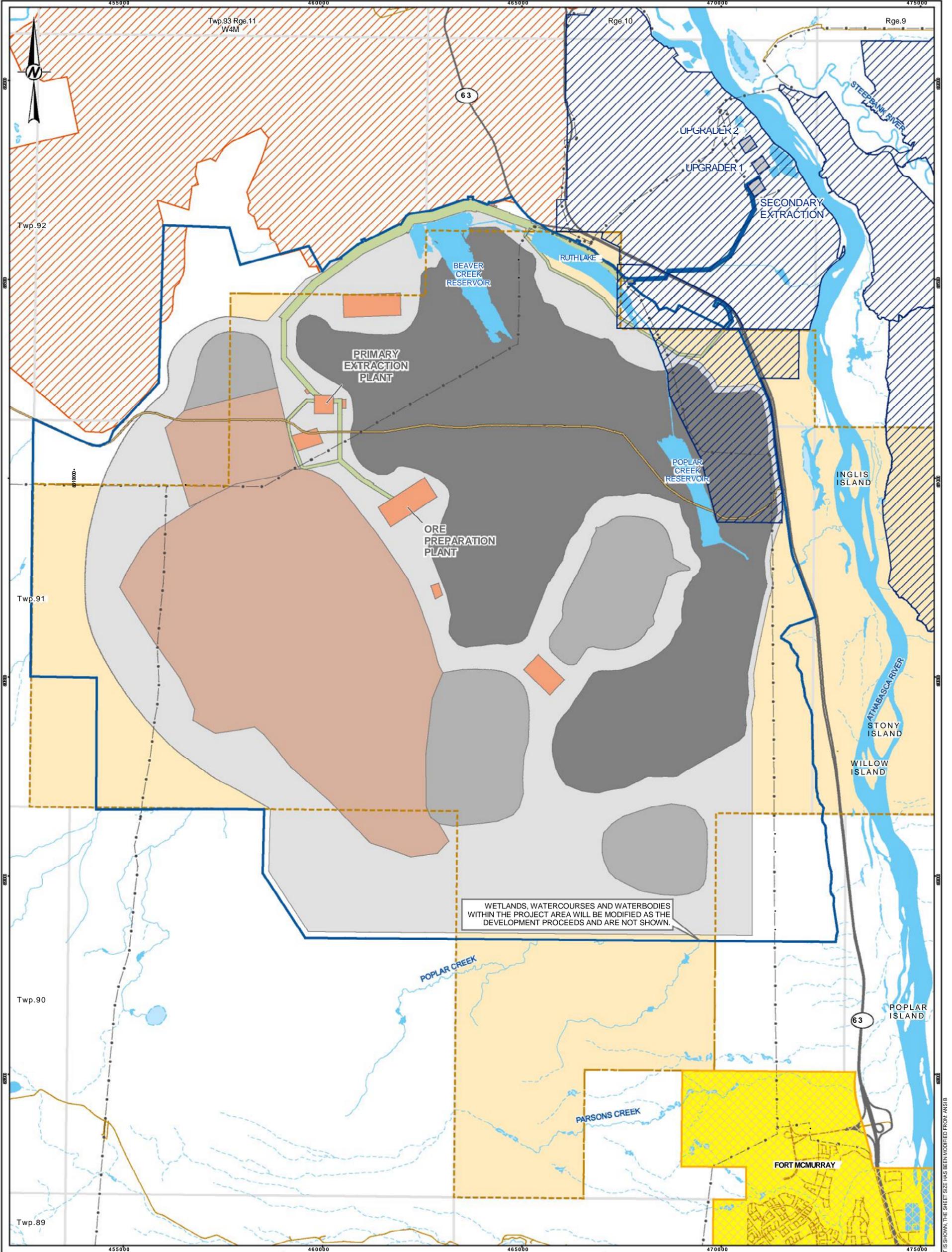
The Project will be developed on the following mineable Oil Sands Leases under the *Mines and Minerals Act*: 7280060T23, 7406090415, 7414060262, 7411060938, 7411060939, and 7405080346 (Figure 3).

The development area for the Project is approximately 20 thousand hectares in size, with the centre of the development being located at Latitude 56° 53' 37.51" and Longitude 111° 35' 23.51".

There are several Indigenous communities with traditional lands and/or reserve lands and/or community owned lands located within a 200 kilometre radius of the Project, including:

- Fort McKay First Nation
- Fort McKay Métis Nation
- Mikisew Cree First Nation
- Athabasca Chipewyan First Nation
- Chipewyan Prairie First Nation
- Fort McMurray No. 468 First Nation
- Fort McMurray Métis Local 1935
- Fort Chipewyan Métis Local 125

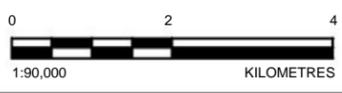
The closest reserve lands to the Project are Fort McKay First Nation, which are approximately 14 kilometres away. No portion of the Project development will occur on federal lands. In addition to the reserve lands described above, the closest federal lands to the Project are Wood Buffalo National Park, which is located approximately 120 kilometres north of the Project.



WETLANDS, WATERCOURSES AND WATERBODIES WITHIN THE PROJECT AREA WILL BE MODIFIED AS THE DEVELOPMENT PROCEEDS AND ARE NOT SHOWN.

LEGEND

	PRIMARY HIGHWAY		BASE PLANT OPERATION
	LOCAL ROAD		SUNCOR OIL SANDS LEASES AND PERMITS
	AOSTRA ROAD	PROJECT FOOTPRINT	
	TRANSMISSION LINE		FACILITIES
	WATERCOURSE		LINEAR INFRASTRUCTURE
	INTERMITTENT WATERCOURSE		MINE AREA
	OPEN WATER		MINING INFRASTRUCTURE
	INTERMITTENT OPEN WATER		OVERBURDEN DISPOSAL AREA
	FORT MCMURRAY URBAN DEVELOPMENT SUB-REGION		TAILINGS AREA
	SUNCOR MILDRED LAKE MINE		
	PROPOSED PROJECT AREA		



NOTE(S)
WETLANDS, WATERCOURSES AND WATERBODIES WITHIN THE PROJECT AREA WILL BE MODIFIED AS THE DEVELOPMENT PROCEEDS.

REFERENCE(S)
ALBERTA DIGITAL BASE DATA OBTAINED FROM ALTALIS LTD. © GOVERNMENT OF ALBERTA 2019. ALL RIGHTS RESERVED. IHS ENERGY INC. AND GEOGRATIS. © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. HYDROGRAPHY WITHIN THE POPLAR CREEK AND BEAVER RIVER WATERSHEDS UPDATED BY GOLDER.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT
BASE MINE EXTENSION

TITLE
PROPOSED PROJECT AREA WITH CONCEPTUAL LAYOUT

CLIENT	YYYY-MM-DD	2020-02-03
	DESIGNED	JG
	PREPARED	PT
	REVIEWED	JG
	APPROVED	TD

PROJECT NO.	PHASE	REV.	FIGURE
19124718		0	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3S.

14. PHYSICAL AND BIOLOGICAL ENVIRONMENT OF PROJECT'S LOCATION

The Project is located in the Central Mixedwood natural subregion (Natural Regions Committee 2006). This subregion is spatially the largest in the province covering 25% of Alberta's land area. The cool boreal climate regime is conducive to the growth of mixed aspen-spruce forests. The Central Mixedwood subregion contains a significant component of wetlands in poorly drained areas. The topography of the Project area generally has subdued relief, with nearly level to gently rolling topography.

The Project is located in the Athabasca Oil Sands Region, which is generally described as having a cool, continental climate. Three Environment Canada stations, using data from 1971 to 2000, are used to represent the range of climate conditions in the region: Fort Chipewyan (north), Fort McMurray (central) and Cold Lake (south).

Similar wind patterns are observed at Fort Chipewyan, Fort McMurray and Cold Lake. There is a general east-west wind pattern at all stations; however, east-northeasterly winds are observed more frequently at Fort Chipewyan, while east-southeasterly winds are observed more frequently at Fort McMurray. Calm conditions occur 16% of the time at Fort Chipewyan, 17% of the time at Fort McMurray and 13% of the time at Cold Lake.

Similar temperatures are observed at all stations during the summer months. The average temperature in July is 17 degrees Celsius. There are greater differences during the winter months when Fort Chipewyan is about 4 degrees Celsius cooler than Fort McMurray and Cold Lake is about 2 degrees Celsius warmer than Fort McMurray. The lowest winter temperatures occur in January where the average temperatures are 23 degrees Celsius at Fort Chipewyan, 19 degrees Celsius at Fort McMurray and 17 degrees Celsius at Cold Lake. The average annual temperature is -1.9 degrees Celsius at Fort Chipewyan, 0.7 degrees Celsius at Fort McMurray and 1.7 degrees Celsius at Cold Lake.

The Project is located within the Lower Athabasca Region of Alberta primarily on provincial Crown lands that are administrated under the Alberta *Public Lands Act*. The current zoning designation is rural district. Zoning Designations for the Project are shown in Figure 1.

The Project overlaps portions of the Mildred – Kearl Lakes, Athabasca – Clearwater, Stony – Birch and Fort McMurray Fringe Regional Management Areas. One of the broad objectives of the Fort McMurray – Athabasca Integrated Resource Plan is to “encourage development of the surface mineable and in situ oil sands reserves in the Athabasca Oil Sands deposit” (Alberta Sustainable Resource Development 2002).

The Project development area includes several existing land uses, including oil and gas, recreation (including fishing, hunting, using all-terrain vehicles, snowmobiling and canoeing), trapping, traditional uses, and timber harvesting. The Project development area also supports the exercise of Treaty and Aboriginal rights.. The Project development area contains both privately owned and provincial Crown surface rights. Geological exploration drilling has taken place at various times within the Project development area since the 1940s. Much of the Project area was impacted by a wildfire that burned through the area in May 2016.

Project area/regional valued components identified previously include:

- sport and forage fish species, including some Aboriginal culturally-relevant species, such as Arctic grayling, burbot, goldeye, lake whitefish, mountain whitefish, northern pike, yellow perch, longnose sucker, white sucker, brook stickleback, emerald shiner, fathead minnow, brassy minnow, finescale dace, flathead chub, lake chub, northern redbelly dace, pearl dace, trout-perch, spoonhead sculpin and slimy sculpin
- terrestrial vegetation including white spruce, jack pine, aspen or mixed stands of aspen, white spruce, balsam poplar and/or white birch
- forested and non-forested wetlands types
- old growth forest areas
- valued wildlife species include those of ecological and some with Aboriginal significance or with status both nationally and provincially, including moose, black bear, beaver, muskrat, fisher, lynx, woodland caribou, Canadian toad, ducks and geese, old growth forest birds, marsh birds (e.g., yellow rail), mixedwood forest birds, boreal owl and whooping crane

15. HEALTH, SOCIAL, AND ECONOMIC CONTEXT

Health Context of Regional Municipality of Wood Buffalo

The Project is located in the Alberta Health Services North Zone, which was formed in 2009 and includes the former Northern Lights Health Region, the Aspen Health Region, and the Peace County Health Region.

The North Zone is the largest health zone in Alberta. While the Project is in the North Zone, much of the health-related research was conducted in the previous Northern Lights Health Region but is still considered relevant for the Project.

The Royal Society of Canada produced a report in 2010 on the oil sands that includes information on health status within the Northern Lights Health Region. The report indicates that the Northern Lights Health Region has a less favourable health status than the provincial average for a number of non-environmental indicators, such as prevalence of diabetes, substance-related disorders, mortality due to homicide and motor vehicle collisions, and sexually transmitted infections. The Northern Lights Health Region also has the lowest availability of medical doctors among similarly sized centres (RSCEP 2010).

A comparison of cancer rates in the North Zone to the provincial average is provided by Alberta Health Services in the *2019 Report on Cancer Statistics in Alberta* (AHS 2019). The report indicates that between 2012 to 2016, there were no statistically significant differences in the age-standardized incidence rates for all cancers (per 100 thousand population, all ages) between the North Zone and the provincial average.

Socio-Economic Context of Regional Municipality of Wood Buffalo

Development of the Regional Municipality of Wood Buffalo (RMWB), and Fort McMurray in particular, has been tied to the development of the oil sands. Prior to commercial development of the oil sands industry, the region's economy was reliant on its function as a transportation thoroughfare to regions further south, and on traditional resource industries such as hunting, fishing, trapping and forestry.

Large-scale development in the region began in the mid-1960s and led to several significant changes over the next five decades. The following information highlights periods of substantial change in regional socio-economic conditions, often driven by development of the oil sands industry.

Early 1960s to 1986 - The construction and subsequent operation of the Great Canadian Oil Sands Plant (now Suncor Energy Inc.) in the 1960s, followed by the Syncrude Mildred Lake operation in the 1970s, ushered in the first period of rapid growth. The regional population grew from about 2,600 in the early 1960s to over 26 thousand in 1978, an annual growth rate of 15%. Most of this growth occurred in Fort McMurray which accounted for over 90% of the regional population. Between 1978 and 1986, Fort McMurray grew by a further 50%, or approximately 12 thousand residents, reaching approximately 37 thousand (AOSERP 1979; AMA 1975, 1980). This rapid population growth placed pressure on several local services and infrastructure.

1986 to the late 1990s - The next wave of development faltered in the early 1980s under pressure of technical challenges, rising costs, and depressed product prices. Employment in the oil sands during this timeframe was stable or marginally declining. As a result, by 1999 the population of Fort McMurray remained virtually unchanged from 1986 (RMWB 1999).

Late 1990s to 2008 - This was the second major growth period for the oil sands and, correspondingly, for the region. Construction and sustaining capital expenditures in the province's oil sands industry increased from \$1.5 billion in 1998 to over \$18 billion in 2008. This expansion drove corresponding employment growth as the number of workers more than doubled. Employment growth drove corresponding rapid population growth in the region, leading to high demand for regional infrastructure and services. The resident population of Fort McMurray more than doubled from approximately 36 thousand in 1999 to over 70 thousand by 2008. In the mid to latter part of the 2000's, oil sands projects were increasingly being proposed further north of Fort McMurray. This led to the development of several permanent work camps intended to support ongoing operations.

2008 to 2011. A number of oil sands projects were halted in response to the global financial and debt crisis, leading to a drop of nearly 40% in annual construction and capital expenditures in the province's oil sands industry between 2008 and 2009. As a result of this slowdown, growth in the region moderated. The population in Fort McMurray grew by an estimated 3% per year between 2008 and 2010 (RMWB 2010). Between 2010 and 2012, the urban population remained virtually unchanged (RMWB 2012). The reduced population growth provided infrastructure and service providers an opportunity to catch up, in part, on earlier demand (i.e., pre-2008).

2012 to 2015. Rebounding oil prices drove stronger than anticipated increases in oil sands investments. Some projects that were halted in 2008/09 were back on track by the end of 2011. As a result, the resident population in Fort McMurray grew to approximately 80 thousand, an increase of over 10% between 2012 and 2015 (RMWB 2015). The region appeared poised for another extended period of growth driven by expansion of the oil sands industry.

2015 to Present. In late 2014, oil prices declined rapidly, falling over 50% by year's end. This led to a retraction of economic activities and a worsening economic environment. Many oil sands producers shelved future expansion projects in favour of streamlining existing operations, including implementing workforce reductions. During this period, the region was severely affected by a large wildfire that forced the rapid evacuation of several communities, destroying thousands of homes and other structures (AMA 2016; CBC 2017). As a result, the region's permanent population decreased nearly 9% between 2015 and 2018.

The Region Today

The RMWB is a relatively large and diverse municipality, principally comprised of:

- Fort McMurray, a regional service centre with an estimated permanent population of approximately 72 thousand in 2018 (RMWB 2018)
- smaller rural communities with a combined permanent population estimated at approximately 3 thousand in 2018 (RMWB 2018)
- a shadow population estimated at over 36 thousand, with approximately 90% of this population housed in temporary worker dwellings (i.e., camps) (RMWB 2018)
- an on-reserve population estimated at just over 1,700 in 2016 (StatsCan 2016)

Fort McMurray has grown over time from a relatively small, isolated northern town with few amenities into one of Alberta's larger urban centres. This transition means that the breadth and nature of services and infrastructure in the community have also grown. Today, Fort McMurray offers a range of health, education, social, recreation, and cultural amenities and services that are commensurate with a community of its size. In addition, several of the hamlets within the Regional Municipality of Wood Buffalo also have local community and recreation facilities to support residents in those communities.

Drawing on available demographic data over a period of approximately 20 years, several key elements of the region's current social environment were identified.

Relatively young population - Ample work opportunities over the past two decades have attracted relatively young workers to the region which has helped to keep the median age in Fort McMurray (33.1) below both the provincial and national averages (Stats Can 2016). However, with the recent economic slowdown, the median age in the community has increased slightly as the number of people aged 15 to 29 has decreased (Stats Can 2011, 2016).

Relatively diverse population - There are a relatively larger number of Indigenous people in the region as well as many different ethnic communities that call Fort McMurray home. These demographic factors influence the types of programs and services needed by residents as well as the manner in which they need to be delivered (e.g., different educational and cultural backgrounds).

Relatively large shadow (i.e., non-resident) population - Although the majority of the shadow population are housed in temporary worker dwellings (i.e., camps), there are approximately two thousand additional people who stay in residential accommodations (e.g., houses, apartments, condos) and approximately 1,600 people who stay in non-residential accommodations (i.e., hotels and motels) when working in the region.

16. FINANCIAL SUPPORT FROM FEDERAL AUTHORITIES

There is no proposed or anticipated federal financial support for the Project.

17. FEDERAL LAND USED FOR PROJECT

No federal lands will be used for the Project.

18. LIST OF JURISDICTIONS THAT HAVE POWERS, DUTIES OR FUNCTIONS IN RELATION TO AN ASSESSMENT OF THE PROJECT'S POTENTIAL ENVIRONMENTAL AND HEALTH EFFECTS

The Alberta Energy Regulator, established under the *Responsible Energy Development Act*, has jurisdiction for provincial permits or authorizations that may be required to carry out the Project pursuant to the *Oil Sands Conservation Act*, the *Water Act*, and the *Alberta Environmental Protection and Enhancement Act*. The Alberta Historic Resources Management Branch has provincial jurisdiction for assessment of impacts to archeological sites, paleontological sites, historic buildings, and traditional use sites pursuant to the *Historical Resources Act*.

The Alberta Consultation Office was created in 2014 to work closely with government ministries and regulators to ensure that Alberta's duty to consult is met, including with respect to energy resource developments. Pursuant to a Ministerial Order, the AER is required to request advice from the ACO prior to making a decision on an energy application for which consultation is required.

The ACO is responsible for¹:

- determining if consultation is required;
- managing the consultation process;
- assessing the adequacy of consultation undertaken; and
- providing advice to the AER on whether actions may be required to address potential adverse impacts on Treaty rights, harvesting and traditional use activities.

While the AER is responsible for considering and accommodating (avoiding, minimizing, or mitigating) the impacts of energy applications on the Constitutionally recognized rights of Indigenous peoples. The ACO's process is a part of, but not a substitute for, the AER discharging its statutory functions and responsibilities².

Crown-Indigenous Relations and Northern Affairs Canada, and the Minister responsible for Crown-Indigenous Relations who has been mandated, among other things, to³:

- implement UNDRIP (through co-developed legislation) by the end of 2020; and
- continue to advance meaningful inclusion of First Nations, Inuit and Métis partners in federal and intergovernmental decision-making processes that have an impact on Indigenous rights and interests.

Environment and Climate Change Canada has duties in relation to potential effects of the Project through the *Species at Risk Act* and the *Migratory Birds Convention Act*. Fisheries and Oceans Canada also has duties related to the assessment of effects and authorization of impacts to fish and fish habitat pursuant to the *Fisheries Act*.

¹ <https://www.aer.ca/documents/actregs/JointOperatingProcedures.pdf?0.951868691369796> and https://www.aer.ca/documents/actregs/JointOperatingProcedures_MetisSettlements.pdf?0.623697236458437

² Ibid.

³ <https://pm.gc.ca/en/mandate-letters/2019/12/13/minister-crown-indigenous-relations-mandate-letter>

If the fisheries offsetting options for the Project include offsetting opportunities outside the Project area the potential impacts of these options would be assessed as directly linked or necessarily incidental to the involvement of Fisheries and Oceans Canada.

An explosives license may also be required under the Federal Explosives Act for the storage and use of explosives as part of mining activities.

19. POTENTIAL CHANGES TO COMPONENTS OF THE ENVIRONMENT WITHIN LEGISLATIVE AUTHORITY OF PARLIAMENT

Fish and Fish Habitat - The development of the Project may impact fish and aquatic habitat due to the diversion or elimination of waterbodies and watercourses or deposition of deleterious substances into waters frequented by fish in the Project development area. Potential changes in water quality may result in fish tainting, effects on fish health, productivity, and population.

Aquatic Species at Risk - The development of the Project is not expected to impact aquatic species at risk.

Wildlife Species at Risk - The development of the Project may impact wildlife (including species listed in the *Species at Risk Act*) and wildlife habitat. Potential impacts may result in changes to wildlife habitat and availability, wildlife abundance, movement, health and populations and mortality.

Migratory Birds - The development of the Project may impact migratory birds. Specifically, the Project may impact species designated under the *Species at Risk Act* or the *Migratory Birds Convention Act*. Potential impacts to migratory birds may result in changes to habitat (including breeding, foraging and stopover areas), direct and indirect mortality, abundance, and diversity.

20. POTENTIAL CHANGES TO THE ENVIRONMENT ON FEDERAL LANDS AND LANDS OUTSIDE ALBERTA AND CANADA

The Project is not expected to result in changes to reserve lands and federal lands - no portion of the Project development currently occurs on reserve lands or federal lands. The hydrology and water quality assessment will evaluate impacts on water quantity and quality in Wood Buffalo National Park.

The Project is not expected to result in changes outside of Alberta. The air quality assessment will evaluate trans-boundary impacts on ambient air quality, based on proximity of the Project to the Alberta/Saskatchewan border. The hydrology and water quality assessments will evaluate trans-boundary impacts on water quantity and quality to the Alberta/Northwest Territories border.

The Project is not expected to result in changes outside of Canada.

21. IMPACT TO INDIGENOUS PEOPLES – PHYSICAL AND CULTURAL HERITAGE, TRADITIONAL LAND USE, HISTORICAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES

Suncor is engaging with Indigenous peoples to determine the potential impacts to physical and cultural heritage, and current use of lands and resources for traditional purposes, with regard to both historic and reasonably anticipated future use, due to the Project. Section 4 lists some concerns raised by Indigenous peoples during ongoing engagement activities.

The Project will result in impacts to Indigenous peoples, Constitutionally protected Aboriginal & Treaty Rights as well as Traditional Uses through potential changes to land access, loss of traditional lands and ability to hunt, fish, gather and/or trap as well as the ability to practice their culture.

Structures, sites or things that are of historical, archaeological, paleontological or architectural significance to Indigenous peoples within the Project area may be impacted by development of the Project. These will be identified through ongoing engagement and consultation with potentially impacted Indigenous peoples and a plan for preservation or commemoration will be discussed.

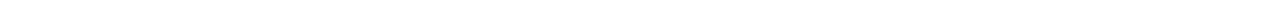
22. IMPACT TO INDIGENOUS PEOPLES – SOCIAL, ECONOMIC AND HEALTH CONDITIONS

Suncor is engaging with Indigenous peoples to determine the potential impacts to health, social and economic conditions due to the Project. Section 4 lists concerns raised by Indigenous peoples during ongoing engagement activities. Through past engagement, Suncor understands that there are both positive and negative impacts to social, economic and health conditions to Indigenous peoples due to oil sands development.

Key socio-economic issues raised by Indigenous groups through previous engagements on Suncor-related initiatives include:

- the ability to participate in employment and business opportunities (for individuals, as well as Indigenous communities)
- the effect of developments since the 1960s on traditional lands and ways of life / culture
- contribution of the Project to cumulative effects already being experienced in the region
- impacts to physical infrastructure in the region, including housing affordability and roads / traffic levels and related impacts to road safety
- impacts to social infrastructure and ability to access needed services (health, education, social, emergency, policing) for Indigenous communities
- changes in social conditions brought on by population change in the region

Suncor will continue to engage with Indigenous peoples, seek to identify specific impacts to economic, social and health conditions and incorporate into ongoing assessment work and planning for the Project.



23. ESTIMATE OF POTENTIAL GREENHOUSE GAS EMISSIONS

An initial estimate of annual greenhouse gas emissions associated with the Project has been developed based on previously modelled estimates for other Suncor operations. The initial estimate is approximately three million metric tons of carbon dioxide equivalent annually over the life of the Project.

24. TYPES OF WASTE AND EMISSIONS GENERATED BY PROJECT

This section identifies waste and emissions that have not been previously described in Section 9 and substances that are expected to leave the Project area.

Land - Wastes that may be generated in or on the land during any phase of the Project include regulated and non-regulated waste products. The management plan for Project wastes will be based on successful practices now in place at Base Plant. Non-regulated domestic and industrial waste products will be managed through approved landfills, which may be located at the Base Plant. Regulated waste products including chemical liquid wastes, inorganic compounds, bitumen sludge, flammable and corrosive liquids, dipentene, methanol and paints are disposed of through third party waste management facilities. Recyclable and reclaimable materials include, but are not limited to aerosols, batteries, containers, cardboard, tires and scrap metal. End destinations for these materials will vary by material type.

Air - Air emissions that may be associated with any phase of the Project include oxides of nitrogen emissions from the mine fleet and combustion sources. Volatile organic compounds and other hydrocarbon emissions are expected from mine fleet exhaust, the mine pit area, extraction operations and tailings areas. Potential sources of total reduced sulphur and hydrogen sulphide include the groundwater management system and tailings areas. Particulate matter emissions are expected from site clearing, mining and tailings areas, and combustion sources. Greenhouse gases are also expected from combustion sources and tailings areas on the Project area. As the Project is designed to sustain the supply of bitumen to Base Plant, annual air emissions from Base Plant operations are not expected to increase.

Water - Waste is not expected to be generated in or on water during any phase of the Project. All liquid wastes and water-carried waste that result from industrial processes related to Project activities are managed within a closed-circuit system and will not be released to the environment without required subsequent approvals.

APPENDIX A

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APPENDIX B

Glossary

Term	Definition
Base Mine	Mining operations (Lease 86/17, Steepbank Mine, Millennium Mine, and North Steepbank Extension Mine) that are part of Base Plant.
Base Plant	Suncor's existing oil sands processing plant and associated mines (Lease 86/17, Steepbank Mine, Millennium Mine, and North Steepbank Extension Mine).
Base Plant Facilities	Oil sands processing plants and facilities that are part of Base Plant.
Bitumen	A highly viscous, tar-like, black hydrocarbon material having an American Petroleum Institute gravity of about 9 (specific gravity about 1.0). It is a mixture of complex organic compounds.
Bitumen Froth	Air-entrained bitumen with a froth-like appearance that is the product of the primary extraction process.
Bitumen Froth Production Facilities	A collective term used to describe the ore preparation plant and primary extraction facilities.
Boreal Forest	Forest growing in high-latitude environments where freezing temperatures occur for six to eight months and in which the trees are capable of reaching a minimum height of 5 metres and a canopy cover of 10 percent. The Boreal Forest areas are covered in forested lands that are made up of trees, such as pine, spruce, larch (tamarack), fir, poplar and birch. The boreal forest also includes lakes, rivers and wetlands. It is home to an extensive range of mammals, birds, insects, fungi and micro-organisms.
Coarse Tailings	Coarse tailings, a subset of primary extraction tailings, is comprised of approximately 71 to 76 weight percent coarse particles (sand), 18 to 22 weight percent water, and 5 to 10 weight percent fine particles (clays).
Dedicated Disposal Area	An area where treated tailings are placed to further consolidate.
End Land Use	The allowable use(s) of disturbed land following reclamation.
External Tailings Area	A tailings area that is located outside the mine pit. External Tailings Areas are enclosed by dams made with tailings and overburden materials.
Fisheries Offsetting Plan	A plan to compensate for the effects of a project on productive fish habitats to help maintain and enhance the sustainability and ongoing productivity of downstream fisheries.
Fluid Tailings	Fluid tailings is a subset of the coarse tailings stream, comprised of fine particles, water and bitumen, that is not captured within the coarse tailings matrix at deposition, and collects within the tailings area separate from the coarse tailings. Fluid Tailings contain more than 5 weight percent suspended solids and has an undrained shear strength that is less than 5 kilopascals (as per Alberta Energy Regulator Directive 085 – Fluid Tailings Management for Oil Sands Mining Projects).
Fugitive Emissions	Substances emitted from any source except those from stacks and vents. Typical sources include gaseous leakage from valves, flanges, drains, volatilization from ponds and lagoons, and open doors and windows. Typical particulate sources include bulk storage areas, open conveyors, construction areas or plant roads.
Greenhouse Gas	Gases such as carbon dioxide (CO ₂), water vapour, methane (CH ₄), nitrous oxide (N ₂ O), and other trace gases which trap heat in the atmosphere, producing the greenhouse effect.
Hydrogen Sulphide	Hydrogen sulphide is a chemical compound with the formula H ₂ S. It is a colourless chalcogen hydride gas with the characteristic foul odour of rotten eggs.
Hydrotransport	The transport of granular materials (e.g., oil sands ore or extraction tailings) by means of a water-based slurry in a pipeline.

Term	Definition
Littoral Area or Zone	The area/zone in a lake that is closest to the shore. It includes the part of the lake bottom, and its overlying water, between the highest water level and the depth where there is enough light (about 1% of the surface light) for rooted aquatic plants and algae to colonize the bottom sediments.
Lower Athabasca Regional Plan	The Lower Athabasca Regional Plan (LARP) is a comprehensive, forward-thinking and legally binding roadmap that enhances the Alberta government's environmental management, addresses growth pressures and supports economic development. It is the first of seven regional plans committed to under Alberta's innovative Land-use Framework. The regional plan considers the cumulative effects of all activities on air, water and biodiversity. It establishes new environmental frameworks with limits to protect air and surface water quality and increases the total conserved land within the region to more than two million hectares.
Mine Pit	The areas where oil sands ore are mined.
Oil Sands Deposit	A sand deposit containing a heavy hydrocarbon (bitumen) in the intergranular pore space of sands and fine-grained particles. Typical oil sands comprise approximately 10 weight percent bitumen, 85 weight percent coarse sand (>44 µm), and a fines fraction (<44 µm).
Oil Sands Ore (Mineable Bitumen)	Oil sands ore (or mineable bitumen) is that portion of an oil sands deposit that is economical to extract bitumen that meets the Alberta Energy Regulator Directive 082 – Operating Criteria: Resource Recovery Requirements for Oil Sands Mine and Processing Plant Operations.
Oil Sands Slurry	Consists of oil sands ore, which is made up of sand, clay and bitumen, as well as water.
Overburden	Overburden is the material that lies above the mineable oil sands deposit. Overburden is removed during surface mining and may be deposited in external disposal areas, backfilled into mine pit areas, used as part of reclamation activities, or used for construction purposes. Overburden material that has specific strength attributes can be used for the construction of dams for the containment of fluids, such water and/or tailings.
Ore Preparation Plant	The bitumen production facility where the mined oil sands ore is crushed (sized) and mixed with hot/warm water to form a slurry that can be pumped to the primary extraction plant.
Particulate Matter	Refers to any mixture of solid particles or liquid droplets that remain suspended in the atmosphere for appreciable time periods. Examples of particulates are dust and salt particles, water and acids.
Primary Extraction Plant	A processing plant where slurried oil sands from the Ore Preparation Plant is separated into a bitumen froth and a tailings stream. The bitumen froth is delivered via pipeline to the Secondary Extraction Plant. Tailings from the primary extraction plant is sent to the external tailings area via pipeline.
Reclamation	The return of disturbed land or wasteland to a state of useful capability. Reclamation is the initiation of the process that leads to a sustainable landscape (see definition), including the construction of stable landforms, drainage systems, wetlands, soil reconstruction, addition of nutrients and revegetation. This provides the basis for natural succession to mature ecosystems suitable for a variety of end uses.
Regional Municipality of Wood Buffalo (RMWB)	A specialized municipality located in northeastern Alberta that was formed as a result of the amalgamation of the City of Fort McMurray and Improvement District No. 143 on April 1, 1995. The RMWB, which is the second largest municipality in Alberta by area, is the home to vast oil sands deposits, also known as the Athabasca oil sands.
Revegetation	The process of replanting disturbed land.

Term	Definition
Secondary Extraction Plant	This plant receives bitumen froth from the primary extraction plant where it is diluted with a light hydrocarbon (naphtha) and centrifuged to produce a clean bitumen product for refinement in the upgraders. The waste byproduct of this plant is a tailings stream (froth treatment tailings).
Tailings Areas	Constructed impoundments required to contain tailings and effluent enclosed by dams made with materials such as coarse tailings, overburden, and other mined waste materials suitable for construction.
Total Reduced Sulphur	A term used to collectively describe hydrogen sulphide and mercaptans.
Traditional Land Use	Use of the land by Indigenous groups for harvesting traditional resources such as wildlife, fish or plants, or for cultural purposes such as ceremonies or camping.
Treated Tailings	Any fluid tailings treated through mechanical processes, natural processes, or chemical addition designed to densify the fluid tailings to promote accelerated reclamation of tailings areas.
Truck and Shovel Operation	The process of using large trucks and shovels (specialized excavators) for the excavation and transportation of mined materials, such as overburden and oil sands.
Upgrader	A facility for processing heavy oil or bitumen to reduce the density and viscosity of oil, and otherwise improve the value of the oil.
Volatile Organic Compounds	Volatile organic compounds are compounds that easily become vapours or gases. They have high vapour pressure at ordinary room temperatures. They are released from burning fuels such as gasoline, wood, coal or natural gas.
Wood Buffalo Environmental Association	An association whose purpose is to monitor and provide accurate, credible, transparent and understandable information on air quality and air related environmental impacts in the Regional Municipality of Wood Buffalo.