



**SUNCOR ENERGY INC.
OIL SANDS**

**Suncor Energy Inc.
Coke Fired Boiler Replacement Project
Project Description**

**Submitted to:
The Canadian Environmental Assessment Agency**

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Abbreviations and Acronyms

Abbreviation/Unit	Definition
"	inch
ABMI	Alberta Biodiversity Monitoring Institute
ABSA	Alberta Boiler Safety Association
ACO	Aboriginal Consultation Office
ACFN	Athabasca Chipewyan First Nation
AER	Alberta Energy Regulator (formerly Energy Resources Conservation Board [ERCB]) – a corporation created by the <i>Responsible Energy Development Act</i> , passed on December 10, 2012, and proclaimed on June 17, 2013. All regulatory functions previously carried out by the ERCB have been taken over by AER.
AESO	Alberta Electric System Operator
AIES	Alberta Integrated Electric System
ASRD	Alberta Sustainable Resource Development (predecessor to Alberta Environment and Sustainable Resource Development, and now changed to Alberta Environment and Parks [AEP])
ATCO	ATCO Electric
AUC	Alberta Utilities Commission
B	billion
BFW	Boiler Feed Water
BTNN	wooded bog
CFB	Coke Fired Boiler
CEAA	Canadian Environmental Assessment Agency
cm	centimetre
CO	carbon monoxide
CO ₂	carbon dioxide
dB	decibels
dBA	"a-weighted" decibels
E	east
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIA	Environmental Impact Assessment
EMCLA	Ecological Monitoring Committee for the lower Athabasca

Abbreviations and Acronyms

Abbreviation/Unit	Definition
EPEA	Alberta <i>Environmental Protection and Enhancement Act</i>
ERCB	Energy Resources Conservation Board (predecessor to the Alberta Energy Regulator)
ESRD	Alberta Environment and Sustainable Resource Development, some functions of which have been transferred to the Alberta Energy Regulator – June 17, 2013. Alberta Environment and Sustainable Development was renamed to Alberta Environment and Parks (AEP) in 2015.
EUB	Energy and Utilities Board (now AER)
FGD	Flue Gas Desulfurization
FM468	Fort McMurray No. 468 First Nation
FMFN	Fort McKay First Nation
FTNN	Wooded Fen
GHG	Greenhouse gas
GOA	Government of Alberta
GT	Gas Turbine
GTG	Gas Turbine Generator
ha	Hectare
HRIA	Historic Resources Impact Assessment
HRSR	Heat Recovery Steam Generator
ISD	Industrial Systems Designation
km	kilometre
km ²	kilometre per square kilometre
km ²	square kilometre
K _{ow}	Octanol-water Partition
kPa	kilopascals
LARP	Lower Athabasca Regional Plan
LMCP	Life of Mine Closure Plan
L/s	litres per second
LSA	local study area
LSD	Legal Subdivision
m	metre
m ²	square metre
m ³	cubic metre
m ³ /s	cubic metres per second
m ³ /t	cubic metres per tonne
masl	metres above sea level
M bbls	Million barrels

Abbreviations and Acronyms

Abbreviation/Unit	Definition
M bcm	Million bank cubic metres
mg/L	Milligrams per litre
Min.	minimum
M lcm	Million loose cubic metres
mm	millimetre
M m ³	Million cubic metres
MRP	Mine Reclamation Plan
MSL	Mineral Surface Lease
Mt	million tonnes
MW	Mega-Watt
NA or N/A	not applicable
NGTL	Nova Gas Transmission Limited
NID	Needs Identification Document
No.	number
NO _x	Oxides of Nitrogen
NW	Northwest
OSCA	Alberta <i>Oil Sands Conservation Act</i>
PM _{2.5}	Particulate matter with a mean aerodynamic diameter of 2.5 microns (µg) or less
psig	Pounds per square inch gauge
Rge.	Range
RFG	Rich Fuel Gas
RMWB	Regional Municipality of Wood Buffalo
SARA	<i>Species at Risk Act</i>
SE	southeast
SO ₂	Sulfur dioxide
SONS	Shrubby swamp
STG	Steam Turbine Generator
t/cd	tonnes per calendar day
t/d	tonnes per day
t/m ³	tonnes per cubic metre
Twp	Township
TCPL	TransCanada Pipeline
ULFG	Ultra Lean Fuel Gas
UTM	Universal Transverse Mercator
W	West

Abbreviations and Acronyms

Abbreviation/Unit	Definition
W4M	West of the Fourth Meridian
WBEA	Wood Buffalo Environmental Association
WONN	Shallow open swamp
wt%	weight percent
μm	micron or micrometre
$\mu\text{S}/\text{cm}$	microSiemens per centimetre

1 GENERAL INFORMATION

Suncor Energy Inc. (Suncor) is Canada's largest integrated energy company, the fifth largest North American energy company, and has a place on the global stage as one of the largest independent energy companies in the world. As Canada's largest energy company, Suncor has a significant role to play, both within its plant gates and as a partner in broader energy discussions and strategies.

Suncor accepts the scientific consensus, publically stating that "climate change is happening and we need to take action." Energy development has an impact on the environment and we must do our part to manage and minimize our carbon footprint. Suncor is committed to developing long-term, sustainable solutions and being part of something that's bigger than just our company or industry. Nearly two decades ago a plan was launched to manage our greenhouse gas emissions (GHGs), and we continue to invest in technology and innovation to reduce our emissions intensity.

As part of this commitment to manage GHGs, Suncor is advancing a new project, the Coke Fired Boiler Replacement Project (the Project), that will replace three existing Coke Fired Boilers (CFBs) at Suncor's Oil Sands Base Plant, with natural gas powered cogeneration units. This Project's environmental benefits are significant including:

- 46% reduction of sulfur dioxide (SO₂) emissions
- 17% reduction of nitrogen oxide (NO_x) emissions
- 66% reduction of particulate matter emissions
- 35 % reduction in freshwater use.

The cogeneration units will continue to meet the steam demands of the facility, and will also generate approximately 700 MW of electricity. The units will be constructed within the existing footprint of Suncor's facility.

This document describes the potential environmental, socio-cultural and economic advantages of replacing three existing CFBs with natural gas powered cogeneration units at Base Plant. As this project improves the environmental performance of the Suncor Base Plant facility and is aligned with Federal and Provincial policies, Suncor seeks confirmation that a Federal Environmental Assessment under CEAA 2012 is not required.

Suncor recently received confirmation from Alberta Energy Regulator (AER) that an environmental assessment was not required under Provincial legislation.

Suncor will engage with local stakeholders to identify potential environmental impacts and potential mitigation measures. Suncor's objective is that the final project development plan will reflect input provided by stakeholders including regulators and local Aboriginal communities and take into account all relevant environmental factors.

The location of the Project is shown in Figure 1 located in Appendix 1.

This document has been prepared in accordance with the *Prescribed Information for the Description of a Designated Project Regulations (SOR/2012-148)* and the *Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012* (the Guide).

1.1 PROJECT OVERVIEW

Suncor owns and operates an Oil Sands Base Plant (mining, extraction and upgrading, hereinafter “Base Plant”) located approximately 25 kilometers north of Fort McMurray, Alberta. Suncor recovers bitumen from Oil Sands through its mining operations. The bitumen from operations is upgraded to refinery ready feedstock and diesel fuel. Base Plant has an area that supplies steam, electricity, boiler feed water, and hot water to run its operations. It primarily consists of three CFBs, five natural gas-fired boilers, and two natural gas turbines. The existing CFBs supply 57% of the total steam load at Base Plant and produce no electricity. The CFB’s that have been in operation since 1967 are one of Suncor Base Plant’s largest emitters of sulfur dioxide, nitrogen oxides and particulate matter. The existing CFBs use a Flue Gas Desulfurization (FGD) system to remove the sulfur dioxide from the emissions associated with coke combustion. The FGD system uses fresh water drawn from the Athabasca River for this process and is one of Suncor’s largest water demands at Base Plant.

Suncor will be seeking regulatory approval to replace the three existing CFBs at Base Plant with more thermally efficient, natural-gas powered cogeneration units, which generate two products: low-carbon electricity (which the province requires to meet its stated climate goals) and steam (which Suncor requires to supply its base plant operations). The Project will replace the three CFBs with two new natural gas fired cogeneration units and therefore all power and steam generation at Base Plant will be from natural gas as a fuel source. The implementation of this Project will generate approximately 700 MW of additional reliable, low cost, low carbon intensity power to be sold into the Alberta grid by Q3 2022.

The two new generators would increase Suncor’s generation capacity to a theoretical 1600 MW across all 13 generators. The additional generation, coupled with efficiency gains seen at Base Plant increase the theoretical available export power to as much as 1220 MW. Therefore, the expected normal operating range would be 950 to 1150 MW.

Suncor is primarily focused on ensuring reliable steam supply for its facilities, but believes that implementing cogeneration is the most cost and carbon efficient method of producing both steam and power. Because of the continuous nature of our Base Plant operations, cogeneration is expected to provide a reliable and stable power source with excess electricity being contributed to the Alberta grid. Suncor’s systems are designed to fulfill its facility electrical demands first, and then deliver any excess power to Alberta’s grid. Base Plant currently has the ability to produce and export approximately 450 MW of power to the Alberta grid from existing generation assets. The total output of electricity fluctuates mainly due to the thermal needs of Base Plant, maintenance activities, plus the electrical demand from the Alberta Interconnected Electrical System (AIES). Base Plant is connected to the Alberta Grid through a single connection point called Ruth Lake, which is owned by ATCO. Suncor currently generates approximately 901

MW across 11 generators, of which 320 to 450 MW is consumed within the Base Plant. The remaining produced generation is exported to the AIES and the normal operating range is 300 to 450MW.

With the addition of the Project, a second connection point will be required. This new connection point is called Thickwood Hills, which is a direct connection to the new Alberta 500kV transmission system.

1.2 PROJECT NEED AND BENEFIT

In Alberta, laws such as the *Environmental Protection and Enhancement Act* (EPEA), the *Oil Sands Conservation Act* (OSCA) and the *Water Act* protect the environment by regulating industrial activities under the purview of the AER. Suncor has an existing EPEA Operating Approval, an OSCA Commercial Scheme Approval and several Water Act Approvals for Base Plant. These approvals have environmental parameters that define the current approved environmental footprint. The implementation of the Project would provide an improvement to the current environmental performance at Base Plant by achieving the following results:

The Project results in a reduction in the current EPEA Air Emissions at Base Plant

Historically, through existing air monitoring and emissions compliance reporting Suncor has been able to benchmark the current air emissions at Base Plant emitted from the CFBs. On the basis of the emissions parameters provided for the new natural gas fired cogeneration equipment the Project is expected to reduce annual air emissions as follows:

- 46% reduction of sulfur dioxide (SO₂) emissions
- 17% reduction of nitrogen oxide (NO_x) emissions
- 66% reduction of particulate matter emissions

The Project reduces the Fresh Water Intake Demand at Base Plant

The shift to natural gas fired co-generation will not require the FGD system. As a result there will be a reduction of gross Athabasca river water intake of 5.5 Mm³/year which equates to a 30% reduction in the overall water demand at Base Plant.

The Project is within currently approved and assessed footprint.

The natural gas cogeneration facility will be integrated into the existing equipment and operations at Base Plant, and will be located within the existing approved footprint. Figure 2 located in Appendix 1 shows a site layout that illustrates the proposed location of the natural gas fired cogeneration units in relation to the existing electrical generation infrastructure within Base Plant. The proposed location is close in proximity to existing Base Plant utilities to facilitate seamless integration of the Project. The Project facility footprint for the new cogeneration units at Base Plant will be 2.5 ha located within a previously disturbed area.

The Project also currently includes a Natural Gas pipeline and High Voltage tie-in infrastructure to the existing utilities as described below:

- A new 14" NG line will be installed from the new cogeneration units across Base Plant, to an existing Nova Gas Transmission Ltd. (NGTL) Terminal. The total length of this pipeline will be approximately 5.6 km.
- Construction of approximately 4.1 km of two new single-circuit 260kV travelling between the new Cogeneration substation and the existing Suncor Voyageur substation.
- Construction of approximately 7.9 km of new single-circuit 260kV travelling between Suncor's existing Millennium substation and ATCO Electric's (ATCO's) existing Ruth Lake substation.

The entire Project footprint is shown in Figure 3 and 4 located in Appendix 1. As is shown in Figure 3 and 4 the entire Project is within the existing EPEA and OSCA boundary so the area has already undergone an Environmental Impact Assessment (EIA).

As shown in Figure 5 in Appendix 1 the Project area has also had a Historical Resources Assessment (HRIA) completed and there were no Historical Resource Value areas identified. This area is already disturbed and clearance has been provided prior to the establishment of the current infrastructure.

Alignment with Climate Leadership Plan

The Project has alignment with the Government of Alberta (GOA) Climate Leadership Plan. In November 2015, the GOA announced the Climate Leadership Plan. The GOA stated that the Climate Leadership Plan aims to improve air quality by ending coal power emissions by transitioning to stable, reliable and cleaner sources of electricity. The plan sets a "30 by 30" renewable energy target, in which 30% of Alberta's electricity will come from renewable sources by 2030. The GOA has embarked on redesigning the electricity market to reduce Greenhouse Gas (GHG) emissions, including the termination of coal-fired power and the expansion of renewable energy generation by 2030.

As part of this plan, the provincial government declared three pillars that will guide Alberta's energy system transformation. They are reliability, cost competitiveness and environmental integrity. Alberta's Oil Sands industry, through projects such as the Project, may offer the province with a unique advantage when it comes to transforming its electrical grid.

Cogeneration provides a highly reliable, cost-efficient, "made-in-Alberta" solution to accelerate the phase-out of coal and achieve additional GHG emission reductions. Industrial cogeneration has the potential to become a major driver for the early retirement of Alberta's coal-fired power, and support Alberta's renewable energy objectives and 2030 environmental goals.

To generate electricity for its public grid, Alberta currently relies primarily on burning coal, which emits about 46 million tonnes of carbon dioxide a year, or more than 11 tonnes per

capita. While switching to natural gas fired generation will reduce emissions, stand-alone natural gas single cycle or combined cycle power generation technologies will convert only 30 to 50 per cent of the fuel energy into electricity. The rest of the energy is lost as heat to the atmosphere.

In contrast, the proposed cogeneration units are expected to be over 80% efficient at converting fuel energy into usable heat and electricity.

1.3 PROJECT PROPONENT AND CONTACT INFORMATION

The Project name and proponent contact information are provided below:

Name of the designated project:	Coke Fired Boiler Replacement Project
Name of the proponent:	Suncor Energy Inc.
Address of the proponent:	P.O. Box 2844, 150 - 6 Avenue S.W., Calgary, Alberta, T2P 3E3
Chief Executive Officer	Steve Williams President and CEO SWilliams@suncor.com 403-296-4646
Principal Contact Person	Jason Heisler Manager EH&S Regulatory Approvals, Oil Sands jheisler@suncor.com 403-296-3608

1.4 LIST OF JURISDICTIONS AND OTHER PARTIES CONSULTED

Details around Stakeholder Engagement are provided in Section 6 of this Project Description. Although the Project is in the early stages of development and planning, Suncor began preliminary, informal engagement with a number of jurisdictions and other stakeholders (Table 1).

Table 1: Jurisdictions and other parties that Suncor has consulted with regarding the Project

Federal Government:	Canadian Environmental Assessment Agency (CEAA)
Provincial Government:	Alberta Energy Regulator (AER) Alberta Electric System Operator (AESO) Alberta Utilities Commission (AUC) Alberta Transportation

	Aboriginal Consultation Office (ACO) Alberta Climate Change Office
Municipal Government:	The Regional Municipality of Wood Buffalo (RMWB)
Other Stakeholders	ATCO Electric (ATCO) TransCanada PipeLines Ltd. (TCPL)

As the Project progresses, additional jurisdictions and stakeholders will be consulted. Aboriginal consultation will be confirmed with the ACO. As part of the AUC approval requirements, all landowners, residents and occupants within 2 km of the Project site boundary will be notified and consulted.

1.5 ENVIRONMENTAL ASSESSMENT AND REGULATORY REQUIREMENTS OF OTHER JURISDICTIONS

As mentioned previously in Section 1.2, Alberta's EPEA, OSCA and *Water Act* protect the environment by regulating industrial activities. The AER is responsible for energy projects, specifically upstream oil and gas, oil sands and coal projects. Suncor has an existing EPEA Operating approval, an OSCA Commercial Scheme approval and several Water Act approvals for Base Plant. These approvals have environmental parameters that define the current approved environmental footprint.

In Alberta, the *Environmental Assessment (Mandatory and Exempted Activities) Regulation* lists specific activities which are either mandatory and will require an Environmental Impact Assessment report, or exempted and do not require one. All projects not on either list are called discretionary and the AER decides whether further consideration under the environmental assessment process is required. The Project is not listed as a mandatory or exempted activity, and is therefore considered discretionary and will require submission of a Project Summary table and map for provincial Environmental Assessment (EA) determination. On September 21, 2017, Suncor filed a Project Summary table and map for the Project for provincial EA determination. On September 27, 2017 the AER responded and determined an EA is not required for the Project. The AER submission and decision are included in Appendix 2.

AER

Suncor's EPEA Operating Approval, and its Oil Sands Conservation Act (OSCA) Commercial Scheme approval for Base Plant will require amendment. Detailed information will be provided to support these amendment Applications, as required under the EPEA *Guide to Content for Energy Project Applications* and the *Directive 023: Oil Sands Project Applications*.

AUC

The AUC regulates the utilities sector, natural gas and electricity markets. The AUC is an independent, quasi-judicial agency of the province of Alberta. The AUC is responsible to ensure

that the delivery of Alberta's utility service takes place in a manner that is fair, responsible and in the public interest. In addition, the AUC ensures that electric facilities are built, operated and decommissioned in an efficient and environmentally responsible way. The *Hydro and Electric Energy Act* gives the AUC authority to approve construction of any electric power generating facility in Alberta.

In July of 2016, Suncor filed a System Access Service Request with the AESO. The AESO's connection process (Connection Process) governs the application requirements and timing of any submissions that need to be approved by the AUC. Suncor is in discussion with both the AESO and ATCO regarding the Project's preferred connection option. Once Stage 4 of the Connection Process is completed, a Facility Application, Needs Identification Document (NID), Industrial System Designation (ISD) Amendment, and Generator Application will be filed with the AUC for a Permit and License of the new power plant, transmission lines and substation alterations.

Utility infrastructure services for natural gas supply and high voltage lines for the Project will be provided to Suncor by third parties TCPL and ATCO, respectively. Each of these infrastructure-related services is under the jurisdiction of various provincial or federal agencies, and approvals for these services will be sought independently by the third-party provider. These services, and their associated regulatory requirements, are described in Section 2.1.

Table 2: Municipal, provincial and federal legislation; regulatory requirements; and permits, licences and authorizations.

Legislation/ Regulation	Overseeing Agency	Relevance to Project
Municipal Authority		
Regional Municipality of Wood Buffalo By-laws	Regional Municipality of Wood Buffalo	Updates to existing Development Permit
Provincial Authorities		
<i>The Environmental Assessment Act</i>	Alberta Energy Regulator	Environmental Assessment not required (See Appendix 2)
<i>Environmental Protection and Enhancement Act (EPEA)</i>	Alberta Energy Regulator	Amendment to existing EPEA Operating Approval No. 94-02-00, as amended
<i>Oil Sands Conservation Act (OSCA)</i>	Alberta Energy Regulator	Amendment to existing OSCA Commercial Scheme 8535M, as amended (Category 1)
<i>Water Act</i>	Alberta Energy Regulator	Water will be supplied within

		existing infrastructure as approved under current Water Act Licence No. 00254384-00-00 (as amended) and existing Water Act Diversion License No. 73872-01-00 (as amended). An amendment to the Water Act License will be required for the relocation of the existing industrial runoff pond
<i>Public Lands Act</i>	Alberta Energy Regulator	A pipeline agreement may be required for the portion of the natural gas line outside of the existing Mineral Surface Lease (MSL) 901468
<i>Public Lands Act</i>	Alberta Environment and Parks	An easement may be required for the portion of the high voltage line(s) outside of the existing approvals
<i>Hydro and Electric Energy Act</i>	Alberta Utilities Commission	Amendment to existing ISD Decision 21043-D01-2015
Highways/Transportation	Alberta Transportation	Permits for any crossings associated with Highway 63
<i>Historical Resources Act</i>	Alberta Culture & Tourism	Confirmation on Historical Resource Value
Federal Authorities		
<i>The Canadian Environmental Assessment Act</i>	Canadian Environmental Assessment Agency	Environmental Assessment determination is required
<i>Aeronautics Act, Canadian Aviation Regulations, Standard 621</i>	Transport Canada	Suncor may be required to submit an Aeronautical Assessment Form for Obstruction Marking and Lighting for Transport Canada to determine the need for the application of marking and lighting of objects that may pose a hazard to aviation of the stack (current design measures 54.9 m tall).

The Project will be subject to legislative and regulatory requirements including permits, licences and authorizations. The environmental assessment requirements and regulatory review process for the Project are primarily under the jurisdiction of AER and AUC. A list of municipal, provincial and federal legislation; regulatory requirements; and permits, licences and authorizations that are anticipated at this time are provided in Table 2.

1.6 REGIONAL ENVIRONMENTAL STUDIES

As confirmed by CEAA via email on January 6, 2017, there are currently no relevant federal regional studies in the Project site area.

Suncor supports and considers the Lower Athabasca Regional Plan (LARP) frameworks, objectives and outcomes in our operational and planning activities. LARP is a comprehensive, forward-thinking and legally binding roadmap that sets out an approach to manage lands and natural resources in the Lower Athabasca Region to help achieve Alberta's long-term economic, environmental and social goals. LARP established resource and environmental management outcomes that consider the cumulative effects of all activities on air, water, land and biodiversity.

The Project is consistent with the strategic direction and outcomes identified by LARP. The Project is in alignment with the LARP guiding principles outlined below:

- Economic potential of oil sands resource is optimized
- Ensure the region's economy is diversified
- Landscapes are managed to maintain ecosystem function and biodiversity
- Air and water are managed to support human and ecosystem needs
- Infrastructure development supports economic and population growth

There is currently an extensive system of environmental monitoring and management within the Lower Athabasca Region. In addition to the extensive environmental assessments and compliance related monitoring programs that occur at Base Plant as part of the EPEA Operating Approval, information on the overall condition of the environment in the Oil Sands region is gathered, managed and analysed under the coordination of the Environmental Monitoring and Science Division of the GOA in collaboration with other regional, provincial and federal organizations.

In 2012, the governments of Canada and Alberta agreed to work together to develop a more integrated understanding of environmental conditions in and around Alberta's oil sands region. The Oil Sands Monitoring Program was built upon pre-existing regional programs that monitored air, water, land and biodiversity to further understand the current conditions and changes that have already occurred, improve characterization of the state of the environment on an ongoing basis, and provide information to broadly understand and evaluate cumulative environmental effects of resource development in the region.

The Oil Sands Monitoring Program includes the following components:

- **Air Monitoring Program:** The Wood Buffalo Environmental Association (WBEA) is an integrated and intensive program on air and terrestrial monitoring in the region. WBEA reports accurate and timely high quality data from Air, Terrestrial and Human Exposure Monitoring Programs to ensure regional stakeholders have the information they need to make informed environmental decisions. The measurements undertaken to monitor pollutant transformation are well suited to gain a better understanding of local air quality and atmospheric transformation processes experienced by the pollutants emitted from multiple sources over the short to medium term.
- **Water Monitoring Program:** The quality and quantity of the water in the Athabasca River watershed is a key concern in the region. This program is currently set up to quantify and assess the sources, transport, loadings, fate, and types of oil sands contaminants in the Athabasca River system and effects on key aquatic ecosystem components (both within the oil sands development area and in downstream receiving environments) that are measures of ecosystem health and integrity (fish, invertebrates).
- **Wildlife contaminants and toxicology Program:** The purpose of this program is to assess the health of sensitive wildlife species in the Oil Sands Region and to make the results of these assessments available to decision makers. The initial focus was on the identification of a variety of wildlife indicators (including birds, mammals, amphibians and plants) to select species most suitable for monitoring contaminant exposure and impacts. This component has successfully initiated a broad program to examine the potential effects of chemical contaminants from oil sands development on the native biota coupled with selected laboratory exposure studies.
- **Biodiversity and land disturbance Program:** This component includes core terrestrial biodiversity monitoring activities that piggyback on an existing province-wide monitoring program – the Alberta Biodiversity Monitoring Institute (ABMI) and the Ecological Monitoring Committee for the lower Athabasca (EMCLA). ABMI was initially set up to help monitor and understand how Alberta’s rapidly changing landscapes affect our wildlife and habitats. Industry and government have a shared responsibility for ensuring that wildlife and biodiversity monitoring takes place in a way that provides high quality data for environmental management and assessing cumulative effects.

2 PROJECT INFORMATION

The Figure 6 shown below shows the basic process flow for the Project. In the cogeneration plant, the natural gas is combusted to produce power in a gas turbine which is converted to electrical power by a coupled generator. The hot exhaust gases from the gas turbine are then used along with intermittent supplemental natural gas combustion in the duct burners to produce steam in the Heat Recovery Steam Generator (HRSG).

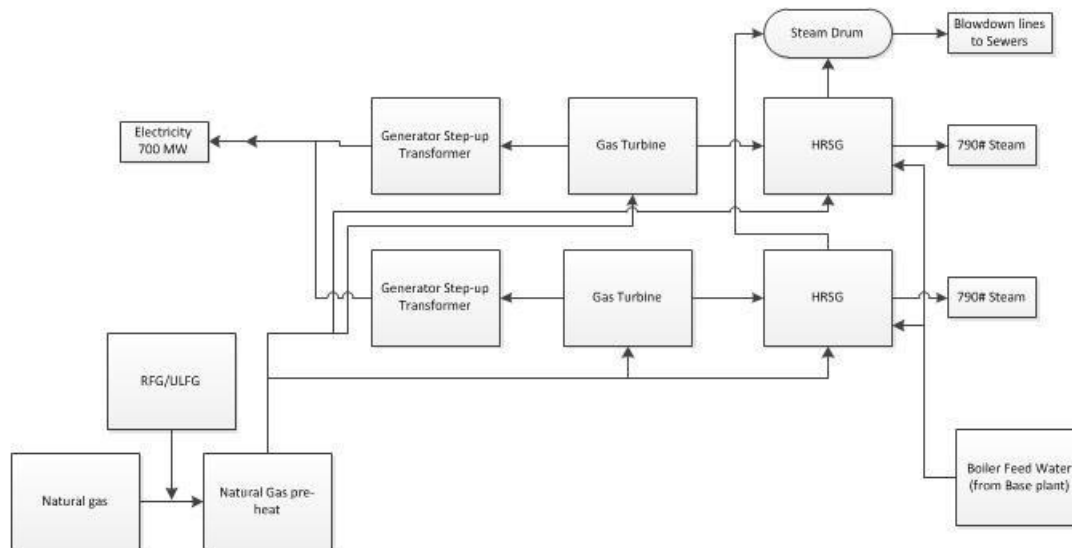


Figure 6: Project Process Flow Diagram

2.1 PROJECT CONTEXT AND OBJECTIVES

Permanent Facilities and Infrastructure

The Project includes the addition of the following major equipment and infrastructure:

- Two cogeneration units consisting of gas turbine and generator (GTG), HRSG, Generator Step-Up Transformer (GSU) and auxiliary equipment. GTG's and auxiliary equipment requiring winterization are housed in winterized vendor enclosures. No powerhouse building is required because these systems are designed to be operated outdoors, with key components in their own enclosures.
- Five boiler feed water pumps will be housed in a new pump house building with proximity to the new cogeneration units.

- A new 14" Natural Gas line will be installed from the new cogeneration units across Base Plant, to an existing TCPL Terminal. The total length of this pipeline will be approximately 5.6 km.
- Natural Gas Letdown Station including Pre-Heat designed to utilize waste heat from the blowdown to pre-heat the natural gas fuel to the Gas Turbine and the HRSG duct burners.
- An electrical building will house the major electrical distribution equipment, and supply power to the new plant.
- Construction of a new 260kV substation for the Cogeneration generators (located in the Project footprint).
- Construction of approximately 4.1 km of two new single-circuit 260kV travelling between the new Cogeneration substation and the existing Suncor Voyageur substation.
- Construction of approximately 7.9 km of new single-circuit 260kV travelling between Suncor's existing Millennium substation and ATCO Electric's existing Ruth Lake substation.
- Pipe Rack – Interconnecting existing piping and the new cogeneration units.

Boiler Feed Water

There are no expected modifications to the existing Base Plant Boiler Feed Water (BFW) treatment plant which supplies water to the new cogeneration units. The BFW system will be connected to the new cogeneration facility through an existing pipe rack. BFW production and quality is expected to be the same as with the existing CFB's. The BFW pumps will be steam driven and will not contribute any additional emissions to Base Plant. The five boiler feed water pumps will be housed in a new pump house building and will be located on existing disturbed footprint.

Blowdown Water

Blowdown water is a by-product of steam production that is essentially condensed steam to control boiler water quality by continuously removing impurities (i.e. dissolved solids) to avoid blockage of piping systems. The stream of blowdown water produced from the cogeneration units is fed to a steam drum to recover some low pressure steam and to separate the condensed blowdown water. In the design for the cogeneration units, the blowdown water stream comes from the HRSG and it contains energy that can be used to pre-heat the natural gas feeding into the plant. After the heat is extracted from the blowdown water, it will be incorporated into existing water recycling practices at Base Plant; ultimately disposed of in the waste water ponds as per current operations of the CFBs approved by the AER.

Currently blowdown water from existing CFBs is cooled with the addition of fresh water from the Athabasca River. The design for the new cogeneration units will cool the blow down water with a different process. The blowdown water will be directed to the waste water ponds, which is where

the blowdown from the existing CFBs is currently discharged. Blowdown streams will be used to preheat natural gas. This allows the cooled blowdown stream to be discharged to the sewer without requiring quench water during normal operating conditions. The change in process is expected to eliminate the annual consumption of 0.5Mm³/year of freshwater from the river for blowdown water cooling purposes. Further, the new process should reduce the volume of blowdown water (as it will be only be the water from the steam drum, not the water from the steam drum plus the cooling water from the Athabasca River) to be managed with the existing water recycling practices at site that are overseen by the AER.

The continuous and intermittent blowdown streams from the new cogeneration units will be directed to the same location as the existing blowdown stream from the CFBs. Currently, the blowdown is directed to the waste water ponds at Base Plant where most of the water is recycled and reused in different oil sand processes. Conversely, the Project is expected to reduce fresh water consumption.

Natural Gas Line

A new 14" Natural Gas line will be installed from the new cogeneration units across Base Plant, to an existing TCPL Terminal. The total length of this pipeline will be 5.6 km. As mentioned in Section 1.2 this area will be in area where there has already been an EIA and HRIA. Natural gas will be used as the main fuel for the unit. Prior to entering the gas turbine, the natural gas will be heated using the continuous blowdown stream generated in the HRSGs. This natural gas preheat configuration allows more heat recovery and improved energy efficiency. HRSGs will be designed to burn Rich Fuel Gas (RFG) and Ultra Lean Fuel Gas (ULFG) as a supplementary fuel to the Natural Gas. RFG and ULFG are by-products of the upgrading operations at Base Plant. Currently the projected volumes of RFG and ULFG cannot satisfy the fuel load of the new HRSGS and will be a supplementary fuel gas based on availability. The burning of excess RFG/ULFG instead of natural gas has the potential to improve the GHG footprint for Base Plant by 33K Ton CO₂/yr since the less gas will be sent to the Base Plant flaring system.

High Voltage Electrical

A high voltage system is required to transfer power from the new cogeneration units, through new and existing transmission lines and associated substations (Suncor and third party) for export into the Alberta Inter-connected Electric System (AIES). The overall high voltage scope of work within the Base Plant footprint includes:

- Construction of a new 260kV substation for the Cogeneration generators (located at the Project footprint).
- Construction of approximately 4.1 km of two new single-circuit 260kV travelling between the new Cogeneration substation and the existing Suncor Voyageur substation.
- Construction of approximately 7.9 km of new single-circuit 260kV travelling between Suncor's existing Millennium substation and ATCO Electric's existing Ruth Lake substation.

A new electrical building will house the major electrical distribution equipment, and supply power to the new plant.

Utilities and Infrastructure

Instrument air, utility air, firewater and service water/utility water will be supplied from existing systems at Base Plant.

Ancillary Connections

The natural gas supply for the new cogeneration units will be provided via a new meter station at an existing tie-in connection to Nova Gas Transmission Ltd. (NGTL) near Base Plant. NGTL will be solely responsible for constructing and operating any additional facilities providing natural gas supply to the tie-in location. As a transportation customer of NGTL, Suncor is not privy to the specific expansion requirements of the existing NGTL integrated gas transportation system within Alberta. Any facilities that are requested by a customer to be added to the NGTL system must be approved by the National Energy Board (NEB) as the NGTL system is regulated under federal jurisdiction. NGTL is responsible for undertaking the application for such facilities and receiving approval from the NEB.

The Project will tie into the AIES via a newly constructed 500 kV transmission system which is to be completed in 2019 and will allow for the efficient transfer of excess generation currently being experienced in the Fort McMurray area. This additional electric interconnection infrastructure will fall outside the footprint of the Base Plant. The construction and operation will be by ATCO. The electric interconnection infrastructure work includes:

- Construction of approximately 26 to 40 km of one new double-circuit 260kV connection between the Voyageur substation (existing) and ATCO's Thickwood Hills substation (planned)
- Potential modifications to ATCO's existing Ruth Lake substation

ATCO will be solely responsible for transmission line routing, stakeholder engagement, regulatory approvals/permits, construction and operations.

Steam and Electricity Production

The Project is expected to produce ~790psig and 750°F superheated steam and approximately 700 MW net power output. Suncor's steam demands are expected to remain relatively the same as with the existing CFBs. The high pressure (HP) steam will be supplied to existing steam turbines and other Base Plant processes. A portion of the HP steam is let down to medium and low pressure level for low pressure steam consumers across Base Plant. The distribution of the steam produced by the new assets will not change significantly; minor changes will be related to decommissioning steam users associated to the existing CFBs units. All the modifications will be on existing disturbed footprint.

Temporary Facilities and Infrastructure

Most of the temporary construction facilities will be located onsite at Base Plant. During construction, temporary structures will be required for construction offices, equipment storage, workforce muster points and various other functions. The temporary structures will be similar to those typically used on large construction sites, such as integrated workforce trailer systems. All temporary facilities would be within the existing disturbed area of Base Plant and will be near the 2.5 hectares of the Project shown in Figure 2 in Appendix 1.

2.2 FEDERAL REGULATORY PROVISIONS

The threshold of development required for a CEAA review is outlined in the *Regulations Designating Physical Activities*. The following Schedules are relevant for this Project:

- Schedule 2 states: “The construction, operation, decommissioning and abandonment of (a) a new fossil fuel-fired electrical generating facility with a production capacity of 200 MW or more”
- Schedule 3 states: “The expansion of (a) an existing fossil fuel-fired electrical generating facility that would result in an increase in production capacity of 50% or more and a total production capacity of 200 MW or more”

The new cogeneration units will replace three CFB's, and as such can be considered modification to existing infrastructure and operations, and not a new facility or expansion.

There have been previous projects that involve expansion/construction of natural gas generation facilities in Alberta where no federal EA was required such as the Genesee Generating Station Expansion, and the Heartland Generating Station Expansion. The Project is very similar to these projects.

2.3 PROJECT SCHEDULE AND ACTIVITIES

The Project activities will include pre-construction, construction, commissioning, operation and reclamation of the site. The Project is designed for an approximate 35 year design life. Additional details for each of the Project activities are provided below. As the Project progresses, these details will be further refined, and below is the expected timetable:

Activity	Schedule
Federal Environmental Assessment (As required)	January 2018- December 2018

Pre-construction (includes geotechnical studies, surveys, obtaining necessary regulatory approvals)	Current to Q4 2018
Construction and Commissioning	Q1 2019 to Q2 2022
Operation	Q3 2022
Decommissioning and Reclamation	Upon closure of Base Plant operations-estimated to be 2073

2.3.1 Pre-construction

The Project site pre-construction activities include completion of the land, underground and geotechnical surveys required for design and construction. Land surveys will identify site boundaries and topographic details required for site preparation and grading. Geotechnical surveys will be conducted to gather information on soil consistency and structure needed for piling and foundation design. Ground scans will be completed to identify any unknown underground utilities in the area of the Cogeneration plant.

2.3.2 Construction

The construction phase will include the major works and activities required for construction of the Project, including site preparation, excavation and foundation construction, building erection, installation of equipment and equipment commissioning. The anticipated schedule is provided in Table 3. A brief description of construction activities follows the table. These timelines may shift as Project details are finalized. Some activities may run in parallel. Timelines and details pertaining to work associated with third party infrastructure (NGTL and ATCO) have not been captured here.

Table 3: Anticipated Schedule

Construction Activity	Schedule
Site preparation	Q 1 2019 to Q4 2019

Foundation excavation and construction and pilling installation	Q4 2019 to Q1 2022
Building erection, installation of equipment, natural gas pipeline construction, and piping installation	Q3 2020 to Q1 2022
Equipment commissioning and testing	Q1 2022 to Q2 2022
Start of Operation	Q3 2022

2.3.2.1 Site preparation

Site construction infrastructure (trailers, electricity, natural gas services) will be installed. Existing construction laydown, storage and fabrication areas will be utilized.

The following existing infrastructure will be relocated as part of the 'Site Preparation' scope of work which shall be completed in advance of other construction activities:

- Electrical and communication lines in the proposed cogeneration location.
- Existing tote storage building.
- Relocation of existing industrial runoff pond and subsequent construction of new pond. The area indicated for the development of the Project is currently an area where industrial runoff is collected from the Base Plant site. The collected industrial runoff is managed within the existing water systems of the plant. The existing pond footprint will be partially repurposed for the new cogeneration units and unavailable for industrial runoff management. The new pond will be developed on previously disturbed lands utilizing the adjoining site and contours. Suncor is investigating options for utilizing this industrial runoff from the new pond in the water management program as make up water for Base Plant operations outside of the planned Project footprint. The Base Plant industrial runoff system will remain separate from the industrial wastewater systems of the Project.

2.3.2.2 Foundation Excavation and Construction

Excavation for subsurface infrastructure will be constructed and the infrastructure installed.

Foundation piles will be installed to bear the loads of major equipment and for the powerhouse administration. Once piles have been installed, they will be tied together with concrete foundation elements to complete the foundations. Once concrete slabs have been poured, backfill will be placed against the foundation to complete the surface works.

2.3.2.3 Building Erection and Equipment Installation

The current execution strategy is to maximize the modularization of equipment and pipe racks. The GTG's and HRSG's will be modularized along with the auxiliary equipment packages required to operate and control the unit.

2.3.2.4 Operation

The day to day operation and maintenance of the current assets are provided by a staff of operators, engineers and other support staff. Once the new assets are in operation, the displaced assets will be shut down, decommissioned and maintained in a safe state.

Operation and maintenance of the new assets will be handled by the existing staff of approximately twenty-five people per shift. The staff also provides this service to other Suncor utilities assets such as Utility Water Treatment, Potable water treatment, compressed air systems.

The new assets will be operated in a manner that provides consistent and reliable thermal energy to the Base Plant operation.

2.3.2.5 Decommissioning and Reclamation

The CFBs will cease operations upon completion and commissioning of the new proposed cogeneration. The CFBs and related equipment will be de-commissioned which involves complete isolation of the units either by double-block-and-bleed, blanking, or complete disconnection. This will isolate the units from any live operational assets. Alberta Boiler Standards Authority (ABSA) requirements for decertifying registered components will be followed. Sustainment plans will be developed to maintain the idle assets in a safe condition until their eventual removal at end of base plant operations.

As the Project is located within the disturbed and approved footprint of Suncor's Base Plant, associated Decommissioning and Reclamation activities will be incorporated into the existing Base Plant Reclamation and Closure Plan.

The decommissioning phase will include removing major equipment and associated piping and electrical systems from the site. Following decommissioning of the Project, the Project site will be reclaimed to an equivalent pre-disturbance land capability.

2.4 EMISSIONS, DISCHARGES AND WASTE

The Project is not expected to introduce new waste materials at Base Plant or nor to the environment that are not already addressed in the current EPEA approval and OSCA approval. Continuous waste streams like blowdown from the cogeneration will be managed as per current operation. Intermittent waste streams including (waste oils, waste material from equipment cleaning etc.) will be managed in accordance with Suncor's existing approvals and internal guidelines and procedures.

Background Information – Existing Plant

Emissions and waste streams to air, water and soils are regulated and approved under the EPEA. Suncor has environmental management systems in place to ensure compliance is maintained for its EPEA approval.

Suncor has an approved AER landfill within the footprint of Base Plant. An Annual Waste Report is provided to AER that details the yearly summary of waste volumes buried at the landfill.

Selected liquid waste streams are diverted to the tailings management system. The volumes of liquid wastes disposed to the ponds are reported to AER in the Suncor Annual Waste Report.

Suncor conducts Waste Minimization Activities at Base Plant where opportunities are explored and implemented for recycling of many waste streams.

There are four domestic wastewater (sewage) systems located at the Suncor Oil Sands operation; two of which are associated with camp facilities. Suncor's objective for domestic wastewater treatment is to provide treatment capacity and meet release environmental standards. During the construction phase, portable toilets will be utilized.

The assumption is the Project will utilize existing disposal infrastructure at Base Plant.

2.4.1 Atmospheric Emissions

Construction

The primary sources of air emissions during Project construction will be the operation of heavy industrial equipment (e.g., bulldozers, graders, cranes, trucks). Although specific equipment has not yet been identified, it is expected that this equipment will include diesel-fired engines. The emission sources will be mobile, but operation of the majority of this equipment will be confined to the Project site. Major emissions from the diesel-fired engines are expected to include Carbon Monoxide (CO), NOX, fine particulates (particulates smaller than 2.5 microns [PM2.5]), and greenhouse gasses (GHGs). Air emissions will be reduced by adopting standard mitigation and management practices such as preventative maintenance to reduce combustion emissions and maximize fuel efficiency, and minimum vehicle idling.

Dust emissions from the site preparation within the Plant limits will be minimized by spraying water on road surfaces as required. Water will be supplied from existing water supply at Base Plant.

Operation

As mention in Section 1.2, the Project is expected to result in significant reductions in air emissions at Base Plant.

2.4.2 Liquid Discharges

Construction

The main sources of liquid discharge sources during the construction phase include sanitary waste, rain water, and snowmelt. Each source will be controlled differently to avoid spills and unplanned releases.

Rain water and snowmelt will need to be monitored and controlled during construction. The developed Project site, including the construction laydown, parking and trailer areas, will be graded to drain site water to temporary ditches or the storm water pond. The storm water pond will be designed to collect surface water runoff only; therefore, it is unlikely to come into contact with contaminants.

Machinery will be kept in proper working order during construction to avoid spills of machinery fluids such as oils, fuels and coolants. The site procedures manual will identify proper spill handling techniques and spill reporting criteria for the Project. Spill kits will be located around the construction site.

Construction activities will be within the Base Plant footprint which has existing water management systems and are regulated by the AER.

Operation

Building Drainage and HRSG Sump

The process drainage system will be designed to protect the atmosphere, soil, surface water, and groundwater from contamination and to provide safe, economical collection and flow of all raw sewage to treatment and/or holding facilities and subsequently to approved disposal. The system will be integrated into existing water management systems.

Runoff Water

The surface water runoff from the catchment areas, cogeneration unit and its fire water system drainage will be integrated with the existing water management system that is regularly monitored as required by the AER.

HRSG Blowdown

HRSG continuous and intermittent blowdown will be discharged into the Suncor waste water ponds through a connection to the existing industrial water management system. Blowdown volume is not expected to change as the steam demand will remain constant.

2.4.3 Types of Waste and Plans for Disposal

Typical wastes expected in Suncor Cogeneration Plant:

Waste Type	Operation Length	Suncor experience handling the waste
Equipment cleaning products	intermittent	This is the Existing Base Plant operation.
Wasted oils from equipment drainage	intermittent	This is the Existing Base Plant operation.
Blowdown	Continuous & intermittent	This is the Existing Base Plant operation.

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3 PROJECT LOCATION

3.1 PROJECT COORDINATES

The Project will be located on the following parcel: 16-23-092-10-W4 and 01-26-092-10-W4 as shown In Figure 1 and 2 in Appendix 1.

The geographic coordinates for the Project site are:

Latitude: 57° 0' 8.4" N Longitude : 111° 29' 9.5" W

Universal Transverse Mercator (UTM): X: 47480 Y: 6317752

3.2 PHOTOGRAPHS (OF WORK LOCATIONS)

Figure 7 located in Appendix 1 shows the proposed site and some pictures of the existing footprint.

3.3 PROXIMITY

3.3.1 Proximity to permanent, seasonal or temporary residence

The location of the Project is shown in Figure 1 located in Appendix 1. There are no permanent, seasonal or temporary residences in close proximity of the Project.

Given that the Project is not expected to result in any adverse environmental effects within the region, adverse environmental effects on lands outside of Alberta or Canada are similarly not expected.

3.3.2 Traditional territories, settlement land

The location of the Project is shown in Figure 1 located in Appendix 1. Base Plant is located near Fort McMurray in northern Alberta, which is in Treaty 8 territory. It is therefore located in the traditional territory of a number of Aboriginal communities. The Aboriginal communities are identified in Section 6.1.1.

Given that the Project is not expected to result in any adverse environmental effects within the region, adverse environmental effects on lands outside of Alberta or Canada are similarly not expected.

3.3.3 Federal lands

Federal lands identified in proximity of the Project include Wood Buffalo National Park of Canada, located approximately 118 km to the North.

Given that the Project is not expected to result in any adverse environmental effects within the region, adverse environmental effects on lands outside of Alberta or Canada are similarly not expected.

3.4 LAND

The Project is located approximately 25 kms north of Fort McMurray, Alberta within the RMWB Land Use District and is identified as Rural District within the RMWB's Land Use Bylaw.

The Project is located on the NE 23-092-10 W4M and the SE 26-092-10 W4M. Suncor holds the subsurface rights for the underlying oil sands rights by way of Crown Mineral Lease # 7387060T04 from top of Wabiskaw-McMurray formation to base of Wabiskaw-McMurray formation. Additionally, Suncor holds the underlying Limestone rights from surface to basement by way of Crown Mineral Lease # 9416020159.

The lands are GOA Crown lands that Suncor holds a Mineral Surface Lease (MSL) 901468 for the surface of the lands for the operation of an Oil Sands mine and associated infrastructure.

4 FEDERAL INVOLVEMENT

4.1 FINANCIAL SUPPORT

The Project does not include any proposed or anticipated federal financial support.

4.2 FEDERAL LANDS

The Project will not require the granting of any interest in federal land, including reserve land.

4.2.1 Federal legislative or regulatory requirements

The Project will include an exhaust stack approximately 54.9 m in height based on current design. As such, Suncor will submit an Assessment Request for Obstruction Marking and Lighting to Transport Canada, and a Land Use Application to NAV Canada. The exhaust stacks would not be the tallest obstruction at Base Plant and will not exceed any of the criteria constituting an obstacle to navigation listed in Canadian Aviation Regulations 2012-1 Division III – Marking and Lighting of Obstacles to Air Navigation, Section 601.23.

There are no other federal permits, licences, or other authorizations required to carry out the Project.

5 ENVIRONMENTAL EFFECTS

5.1 PHYSICAL AND BIOLOGICAL SETTING

The Project will be integrated into the existing equipment and operations at Base Plant, and will be located within the existing approved operational footprint. This section provides a general description of the region; however, the Project site will be located on existing disturbed area, and is an improvement to our environmental footprint, with limited potential to cause adverse environmental effects.

5.1.1 Climate

The climate of the Fort McMurray area is characterized by long, cold winters and short, cool summers. Mean daily temperatures are generally lowest during the period from December to February, with mean daily temperatures below -30°C in some periods. Mean daily temperatures are typically highest from June to August.

Precipitation is moderate and typically greater in summer than in winter, with a long-term annual mean precipitation of 436.0 mm for the period 1945 to 2014 (Hatfield et al. 2016). The historical mean precipitation (as snow) for the winter period (Nov 1 to March 31) is approximately 92 mm.

There is a general east-west wind pattern in the Fort McMurray area. Potential evapotranspiration has been estimated by Hackbarth and Nastasa (1979) to be 493 mm.

5.1.2 Terrain and Soil

Information on Lease 86/17 and Fee Lot 2 pre-development soils, vegetation and forest site capability ratings and reclaimed soils and forest ecosystem capability is summarized from Can-Ag Enterprises (1997a,b) and Golder (1998a). The development on much of these areas was completed prior to the formalization of the Alberta Vegetation Inventory process therefore information is not directly comparable with other areas of the Suncor developments.

Pre-development soils on Lease 86/17 included:

- Six soil map units were identified in Lease 86/17: McMurray soil map units, Rough Broken 2 soil map units, Rough Broken 3 soil map units, Firebag soil map units, Ruth Lake soil map units and Muskeg soil map units.

5.1.3 Hydrology

The Project is located in the Athabasca River watershed which has an approximate area of 159,000 km². The river originates at the Columbia Glacier in Jasper National Park and travels over 1,500 km through the Athabasca oil sands deposit, and eventually discharging into the Peace-Athabasca Delta, roughly 120 km to the north of the Project site.

Specifically, the Project is located in a disturbed area within the footprint of Suncor Lease 86/17, on the west side of the Athabasca River. The topography and drainage on Lease 86/17 (including the Project site) has been altered by mining activities. Surface water drainage is either retained on site or captured in sedimentation ponds and discharged to the Athabasca River via approved outfalls.

5.1.4 Hydrogeology

Regional hydrogeological units relevant to the Suncor Lease 86/17 area include Pleistocene clay, silt, sand and gravel overlying the bitumen-bearing Cretaceous McMurray Formation and, in turn, overlying Devonian-aged strata of the Waterways Formation. Buried erosional channels forming groundwater aquifers have been identified on or adjacent to Suncor Lease 86/17, including the Mildred Lake Aquifer beneath the north end of Lease 86/17 and the Southwest Aquifer partially beneath the southwest end of Lease 86/17. Within the Base Plant the major potential conduits for groundwater flow are: 1) unconsolidated granular aquifers in the Quaternary-aged deposits; 2) Cretaceous-aged sand aquifers of the McMurray Formation (i.e. the Basal Aquifer); and 3) upper Devonian-aged carbonate aquifers (limestone / dolostone) of the Waterways Formation.

The original surface has been modified by development and is now below a layer of fill materials of various types and thicknesses, placed directly over Devonian Waterways limestone, or over the original overburden sediments and peat. The vertical thickness of the sediments is typically 5 m or less, and extends laterally only a few meters. Depth to limestone is reported to be less than 9 m below the original ground surface (not including fill materials), but may locally be greater where there are structural depressions in the limestone (sink holes, fractures). The limestone surface dips towards the Athabasca River, and the surface of the limestone is highly irregular due to erosion / Karsting.

There are two groundwater-bearing zones: 1) groundwater within surficial sediments; and 2) groundwater within limestone. The geology and groundwater flow patterns beneath the site can locally be complex and flow depends on the amount and placement of fill materials, natural sediments, preferential pathways through fractured or faulted rock, buried ancient channels, etc. Relative to the more localized flow systems in the Quaternary units, a more regional groundwater flow system has developed in the Basal Aquifer and Upper Devonian water-bearing units.

5.1.5 Vegetation and Wetlands

Information on Lease 86/17 and Fee Lot 2 pre-development soils, vegetation and forest site capability ratings and reclaimed soils and forest ecosystem capability is summarized from Can-Ag Enterprises (1997a,b) and Golder (1998a). The development on much of these areas was completed prior to the formalization of the Alberta Vegetation Inventory process therefore information is not directly comparable with other areas of the Suncor developments.

Pre-development forest capability assessments on Lease 86/17 included:

- Approximately 475 ha of the area was productive forests, with 265 ha of the area being coniferous dominated, 19% productive mixed wood forests and 4% deciduous dominated. Dominant trees species included aspen and balsam poplar, black spruce, white spruce, jack pine and tamarack.
- The forested areas were influenced by forest fires in 1840 and 1940.

Vegetation types found in the Lease 86/17 included:

- Sixteen ecosite phase and wetlands types were described, including: lichen jack pine (a1), blueberry jack pine-aspen poplar (b1), blueberry white spruce-jack pine (b4), Labrador tea-mesic-jack pine-black spruce (c1), low-bush cranberry-aspen (d1), low-bush cranberry-aspen-white spruce (d2), dogwood balsam poplar-aspen (e1), dogwood balsam poplar-white spruce (e2), dogwood white spruce (e3), Labrador tea-subhygric black spruce-jack pine (g1), Labrador tea - horsetail white spruce-black spruce (h1), shrubland, shrubby swamp (SONS), wooded fen (FTNN), wooded bog (BTNN) and shallow open water (WONN).
- Upland ecosite phases covered 46% of the study area, wetlands covered 52% of the area, while open waters and disturbed areas covered the remaining 2% of the area.

5.1.6 Wildlife

More than 41 species of mammals, 188 species of birds, four species of amphibians and one reptile species potentially inhabit the Oil Sands Region, either on a seasonal or year-round basis (Oil Sands Vegetation Reclamation Committee 1998). Within Alberta's Oil Sands, the Suncor's Base Plant operations are located in the Central Mixed wood natural sub region of the boreal forest natural region (Natural Regions Committee 2006, Brown and Naeth 2014). The lease straddles the Athabasca River, is bounded to the east by the Steepbank River and provides diverse habitat for a number of these wildlife species.

Species at risk with the potential to occur within the project area were identified and evaluated as part of the environmental impact assessment for Base Plant. Because it will be completed entirely within Base Plant's existing footprint no new impacts to species at risk are expected to result from the Project.

Pre-development wildlife surveys completed in the Suncor project areas include Gulley (1983), Westworth, Brusnyk & Associates (1996a,b,c) and Golder (1998f, 2003d, 2005d).

5.1.7 Fish and Fish Habitat

Pre-development aquatic resources surveys completed in the Suncor project areas include Golder (1996b; 1997a,b; 1998b,c,d,e; 2003a,b,c,e; 2005a,b,c,f).

Fish and fish habitat data in the Athabasca River, including the reach adjacent to the Project site, is available through regional aquatic monitoring since 1987. A variety of sport and forage fish species have been identified in the Athabasca River and its tributaries, including Arctic

grayling (*Thymallus arcticus*), burbot (*Lota lota*), northern pike (*Esox Lucius*), walleye (*Sander vitreus*), yellow perch (*Perca flavescens*), brook stickleback (*Culaea inconstans*), finescaled dace (*Phoxinus neogaeus*), lake chub (*Couesius plumbeus*), longnose dace (*Rhinichthys cataractae*), longnose sucker (*Catostomus catostomus*), northern redbelly dace (*Phoxinus eos*), Pearl dace (*Margariscus margarita*), slimy sculpin (*Cottus cognatus*), spoonhead sculpin (*Cottus ricei*), spottail shiner (*Notropis hudsonius*), trout-perch (*Percopsis omiscomaycus*), and white sucker (*Catostomus commersoni*).

5.1.8 Land Use

The lands proposed for the Project have existing disturbance related to the operation of Base Plant. For the Project, no new disturbance would be required and all activities would be conducted within the existing Base Plant MSL approval, EPEA approval, Water Act approval and Scheme approval. The tie-ins outside of these approvals will be on existing MSLs held by our service providers TCPL and ATCO.

The Base Plant EPEA approval requires a Mine Reclamation Plan (MRP) and Life of Mine Closure Plan (LMCP). The MRPs are updated every 3 years (showing 10 years of reclamation) and the LMCP are updated once in a 10 year EPEA approval period and then within the renewal application.

The lands proposed for the Ancillary connections described in Section 2.1 will be under the care and control of ATCO and TCPL.

5.1.9 Groundwater and Surface Water Users

The AEP Water Well database (AEP 2015) was searched for drillers' reports describing groundwater wells drilled within a 3 km buffer zone of the Suncor site. A total of 64 drillers' reports are on file with AEP, with well uses identified as industrial, dewatering, domestic, observation, monitoring and unknown/other uses. A review of the water well records indicates that the majority of the wells are abandoned, inactive or non-existing. On the west side of the Athabasca River, there is no active well for industrial / dewatering use or domestic use in close proximity less than 3 Km of the Project site.

The RMWB obtains their water from the Athabasca River, approximately 30 Km upstream of the Project site. Other surface water users are industrial *Water Act* license holders who withdraw and use water from the Athabasca River in oil sands processing and operation. Suncor currently has water license 0038538-00-00 that allows for up to 59,824,750 m³ of water per year from the Athabasca River.

The water use proposed for the Ancillary connections described in Section 2.1 will be under the care and control of ATCO and TCPL.

5.1.10 Historical Resources Value

As shown in Figure 5 in Appendix 1 the Project area has also had a Historical Resources Impact Assessment completed and there were no Historical Resource Value areas identified. This area is already disturbed and clearance has been provided prior to the establishment of the current infrastructure.

5.2 ANTICIPATED CHANGES

5.2.1 Fish and Fish Habitat

No local or regional fish or fish habitat as defined by the *Fisheries Act* will be affected by the Project. Water withdrawal for the Project will be through existing infrastructure and within the limit of the approved Alberta Water Act License. Wastewater will be managed through the closed-circuit system and there will be no discharges to receiving aquatic environment.

The shift to natural gas fired cogeneration will not require the FGD system resulting in a 30% decrease in the overall water demand at Base Plant reducing withdrawals from the Athabasca River.

5.2.2 Aquatic Species/Marine plants

There are no aquatic species or marine plants as defined under the *Species at Risk Act* on the Project site. The majority of the Project site is on industrial/Base Plant that would not be considered habitat for aquatic species. As such, the Project is not expected to adversely affect aquatic species at risk, as defined under SARA.

The shift to natural gas fired co-generation will not require the FGD system resulting in an expected 30% decrease in the overall water demand at Base Plant. The reduction in water use will mean less water taken from the Athabasca River.

5.2.3 Migratory Birds

The majority of the Project site is within the previously disturbed footprint of Suncor's approved Base Plant. Due to existing disturbance and on-going industrial activity these areas are not likely to be preferred habitat for most bird species. Additionally, the requirement for tree clearing and the potential for habitat disturbance will be minimized as new linear corridors will follow existing disturbances.

Mitigation measures and industry best practices will be implemented during construction, operation and maintenance to reduce potential increased mortality risk for migratory birds due to Project related industrial activity. Avoidance measures including consideration of the general nesting period of migratory birds as described by Environment and Climate Change Canada (ECCC 2016) will be incorporated where possible.

Suncor has a waterfowl protection plan for the Base Plant site. It includes commitments to cannons, effigies, radars as well as monitoring and hazing efforts for birds that may come in contact with process affected water.

As a result, the Project is not expected to adversely affect migratory birds, as defined under the *Migratory Birds Convention Act*.

5.2.4 Green House Gases

In addition to meeting the Base Plant steam and electricity demand, the proposed cogeneration units are expected to make available approximately 700 MW of clean, reliable and low cost base load power to the Alberta grid by Q3 2022. Since the cogeneration units will be used to make two energy products, instead of one, the actual point source GHG emissions will increase as compared to the existing CFB's by less than 10%. However, overall provincial emissions intensity will decrease when you allocate the GHG emissions to each product as follows:

- The total GHG emission associated with steam production from natural gas fired cogeneration units will be 1.4Mt/year, which is 42% lower than the current GHG emissions from the existing CFB's to produce the same steam.
- Although the generation of the additional power supplied to the Alberta grid increases Suncor's overall GHG emissions, it is important to keep in mind that the additional power produced from cogeneration potentially displaces higher carbon intensity power produced from conventional sources on a per MW basis. Conventional generation sources are less efficient because much of the fuel energy is lost as waste heat whereas cogeneration unit technology in the Project is more thermally efficient, capturing and repurposing the waste heat to create steam.

Total direct emissions associated with the operation of the Project average 2.8 MtCO₂e/year, and are as a result of the combustion of natural gas in the Cogeneration units (both GTGs and HRSGs) to produce steam and power. Emissions associated with the production of steam are forecasted to average 1.4 MtCO₂e/year. Emissions associated with the construction phase of the Project are assumed to be negligible in comparison to the Oil Sands Base site-wide total emissions. Oil Sands Base site-wide total emissions range from 9 to 10 MtCO₂e/ year over the next ten years.

The increase in GHG emissions on the overall Oil sands base greenhouse gas intensity will be less than 5%, with the operation of the Project.

Although the Project results in incremental emissions in comparison to keeping the CFBs in operation, the power exported to the grid will offset over three million tCO₂e at a 0.6 tCO₂e/MWh grid factor. The Project will therefore help drive a greener Alberta grid with its efficient low intensity power generation. The provision of heat and power with lower carbon intensity to the Oil Sands industry will help the Mining and Upgrading sectors achieve emission reduction targets.

'Energy in' is the natural gas supply (GJ) to the GTGs and HRSGs of the Cogen units, and 'Energy out' is the energy in steam and power generation (GJ). The energy loss ('Energy In' – 'Energy Out') is allocated to steam and power based on their energy contents. The same allocation methodology is applied to GHG emissions allocation, where the total emissions are quantified based on the total natural gas supply and then allocated to steam and power based on their energy contents. The following are key assumptions for the GHG emissions quantification. Please note that utilization factors are considered in the power and steam production forecast and GHG estimate.

- Emission factors (based on 2016 compositional analysis):
 - Natural gas emission factor for CO₂ = 2.061 tCO₂/e3m³
 - Natural gas emission factor for CH₄ = 3.943E-05 tCH₄/e3m³
 - Natural gas emission factor for N₂O = 3.771E-05 tN₂O/e3m³
- Global warming potentials:
 - CO₂ = 1 tCO₂/tCO₂e
 - CH₄ = 25 tCO₂/tCO₂e
 - N₂O = 298 tCO₂/tCO₂e

5.3 ANTICIPATED CHANGES TO FEDERAL LANDS OR LANDS OUTSIDE OF THE PROVINCE

The Project is within Suncor's Base Plant as described in Section 1.1.

The closest national park is the Wood Buffalo National Park of Canada located approximately 118 km to the North of the Project. The Project is not expected to result in adverse environmental effects on the Wood Buffalo National Park of Canada National Park due to its distance from the Project.

For transboundary effects with Saskatchewan, the Project will result in lower air emissions from Base Plant and thus lower amount of air pollutants potentially entering Saskatchewan.

Given that the Project is not expected to result in any adverse environmental effects within the region, adverse environmental effects on lands outside of Alberta or Canada are similarly not expected.

5.4 ANTICIPATED CHANGES TO ABORIGINAL PEOPLE

The Project is not expected to adversely affect Aboriginal peoples from changes to the environment for the following reasons:

- Traditional land use - The majority of the Project is located within Suncor's current operating footprint. Both of the tie-in points (TCPL and Voyageur Substation are accessed through existing land dispositions or crossing Highway 63). The tie-ins will be on existing MSLs held by our service providers TCPL and ATCO.
- No new disturbance is anticipated. The Project site has restricted access with a fence preventing entry from the adjacent roadway and it is not currently used for traditional purposes by Aboriginal peoples.
- Air quality - The implementation of the Project will result in a reduction in air emissions at Base Plant as outlined in Section 1.2.
- Noise - Given that the Project will comply with AUC Rule 012 – Noise Control and that the nearest Aboriginal home community of Fort McKay is located approximately 22 km from the Project facility, adverse noise effects on Aboriginal peoples are not expected.

- Fish, fish habitat and wildlife – as the Project is being constructed within the current, operating Suncor footprint, adverse effects to fish, fish habitat, wildlife and water are not anticipated.
- Water quality – The Project facility will be integrated into existing water systems and is being constructed within the current, operating Suncor facility. The shift to natural gas fired co-generation will not require the FGD system resulting in a 30% decrease in the overall water demand at Base Plant which translates to less stress on the Athabasca River.
- Historical resource sites - The Project is predominantly located within Base Plant. No new disturbance is anticipated. No other structures, sites or things that are of historical archaeological, paleontological, or architectural significance are currently known to exist within the Project facility. As shown in Figure 5 in Appendix 2 the Project area has had a Historical Resources Impact Assessment completed and there were no Historical Resource Value areas identified.
- Ancillary Connections - The lands proposed for the Ancillary connections described in Section 2.1 will be under the care and control of ATCO and TCPL.

6 STAKEHOLDER ENGAGEMENT

Suncor recognizes that the trust and support of stakeholders – individuals and groups who could be affected by Suncor’s operations or who could, through their actions, affect Suncor’s business are foundational to successful energy development. Suncor works hard to build and maintain relationships with local communities and stakeholders to meaningfully consider their issues and concerns about the effect of proposed development and operations on the land and resources, including working together to mitigate potential environmental and social impacts, and ensuring that local communities benefit from development.

The GOA’s Guidelines on Consultation with First Nations on Land and Natural Resource Management (Government of Alberta, June 6, 2016) will apply to any application submitted related to the Project where new disturbance is created or where there could be an adverse impact on the exercise of Aboriginal Treaty rights. Suncor will engage with the ACO to review the Project and work to assess if there will be formal consultation required. Based on current understanding of the Project, Suncor does not anticipate any new disturbance will be required.

Based on the formal ACO assessment, Suncor will additionally review the AER’s Joint Operating Procedures for First Nations Consultation on Energy Resource Activities (AER, June 10, 2015) to confirm which level of Joint Operating Procedure Process will be followed.

Suncor will also review the AUC’s Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments Appendix A1 – Participant involvement program guidelines (AUC, February 1, 2016) to ensure full understanding of the Rule 007 consultation requirements and will incorporate this information into the Project specific consultation plan.

6.1.1 List of Potentially Affected and Interested Aboriginal Groups

Base Plant is located near Fort McMurray in northern Alberta, which is in Treaty 8 territory. It is therefore located in the traditional territory of a number of Aboriginal communities include the following who may be consulted on the Project:

- Fort McKay First Nation (FMFN)
- Athabasca Chipewyan First Nation (ACFN)
- Mikisew Cree First Nation (MCFN)
- Fort McMurray No. 468 First Nation (FM468)
- Fort Chipewyan Métis Local 125
- Fort McKay Métis Community Association
- Fort McMurray Métis Local 1935

The Project is located in an area where FMFN, MCFN, FM468 and ACFN as well as Fort McKay Metis, Fort McMurray Metis and Fort Chipewyan Metis have expressed an interest regarding traditional use. This traditional use includes hunting, fishing as well as collecting of berries and

traditional plants. Additionally there are a number of traplines outside of the Base Plant footprint. As the region has been developed with an increasing industrial presence, these communities have noted their concerns around the cumulative effects to air, water quality and impacts to vegetation and wildlife have impacted their ability to use the area surrounding the Project. As a result, communities are looking to more distant, undeveloped areas in the region in order to practice their traditional activities.

While not fully mitigating, this project will help reduce the impacts of Base Plant operations on the surrounding air and water quality through the expected reductions of NOx, SO2, PM2.5 emissions and reduced water for Base Plant operations. As noted in Section 1.2 this project does not propose additional disturbances which could affect Indigenous use of the lands surrounding the project location.

Suncor maintains close relationships with the Aboriginal communities surrounding our operations. There are Agreements in place with many of these communities which include focus areas such as Aboriginal Business Development, Skills, Education and Training and expectations around ongoing engagement. Based on Community preferences, Suncor meets routinely (typically monthly or biannually) with most communities to provide updates on Suncor activities and projects and provide opportunity to understand and discuss new or recurring concerns. Suncor also facilitates a number of multi community engagement projects such as a Traditional Wetland Plant Study where Suncor works directly with 5 local First Nations and 1 Metis community to understand what wetland plant species are of particular significance, and is working to better understand how to ensure these species are included in future reclamation planning.

6.1.2 Description of Engagement or Consultation Activities Carried out to Date

Aboriginal Community	Approximate Distance from the Project	Date	Means Of Engagement	Key Comments
Fort McKay First Nation	22 km	Sept 5, 2017	Conference Call	Basic introduction on project including discussion on CEAA PD and AER/OSCA submission timelines. No concerns expressed.
Athabasca Chipewyan First Nation	191 km	Sept 26, 2017	Face to Face	Basic introduction on project including discussion on CEAA PD and AER/OSCA submission timelines.

Aboriginal Community	Approximate Distance from the Project	Date	Means Of Engagement	Key Comments
				No concerns expressed
Mikisew Cree First Nation	191 km	Sept 6, 2017	Face to Face	Basic introduction on project including discussion on CEAA PD and AER/OSCA submission timelines. No concerns expressed
Fort McMurray No. 468 First Nation	67 km	Sept 7, 2017	Conference Call	Basic introduction on project including discussion on CEAA PD and AER/OSCA submission timelines. No concerns expressed
Fort Chipewyan Metis Local 125 (191 km)	Projected meeting in Q4 2017			
Fort McKay Metis Community Association (22 km)	Projected meeting in Q4 2017			
Fort McMurray Metis Local 1935 (38 km)	Projected meeting in Q4 2017			

7 PUBLIC AND OTHER PARTIES

7.1.1 Overview on any ongoing consultation activities, Key Comments and Concerns expressed by stakeholders and any responses

On July 13, 2017, Suncor published the 2017 Report on Sustainability (Sustainability Report). The report outlines Suncor's environmental performance in 2016 and is prepared in accordance with the Global Reporting Initiative (GRI) core guidelines. The Sustainability Report disclosed the following item regarding the Project:

“Advancing a significant emissions reduction opportunity to replace the legacy petroleum coke-fired boilers from our Base Plant. We are currently evaluating the investment of replacing the coke-fired boilers with natural gas boilers which would result in significant emissions reductions estimated at one megatonne a year. Another option we are evaluating is the potential to install highly efficient natural gas cogeneration units in place of natural gas boilers.”

The Sustainability Report is easily accessible on the Suncor website for many external stakeholders.

As well, the Daily Oil Bulletin published the following article on July 13, 2017:

Suncor Highlights GHG Reductions And Indigenous Relationships In 2017 Sustainability Report

“Continuous base asset improvements and energy efficiency are key to Suncor's GHG reductions, which includes advancing emission-reduction opportunities to replace the legacy petroleum coke-fired boilers at the company's base plant. Management is currently evaluating replacing these boilers with natural gas ones, which would reduce emissions by approximately one megatonne annually.”

To date, Suncor has not received any concerns for the Project stemming from the above disclosures.

Suncor met with the RMWB in October, 2017 to provide an update on the Project. There were no concerns raised following a basic introduction of the Project and overview of CEAA PD/ AER/OSCA submission timelines.

7.1.2 A description of any consultation that have occurred with other jurisdictions that have an environmental assessment or regulatory decision to make with respect to this project

Please refer to Section 1.5.

8 CONCLUSION

Suncor is committed to environmental stewardship; with 50 years of energy experience at Oil Sands, Suncor continues to consider new operational practices to enhance environmental performance. The information provided in this document provides compelling evidence that the implementation of the Project is expected to provide an improvement to the current environmental performance at Base Plant by achieving the following:

A reduction in the EPEA Air Emissions as follows:

- 46% reduction of sulfur dioxide (SO₂) emissions
- 17% reduction of nitrogen oxide (NO_x) emissions
- 66% reduction of particulate matter emissions

A reduction of the 'Fresh Water Intake Demand' at Base Plant as the shift to natural gas fired co-generation will not require the FGD system resulting in a 30% decrease in the overall water demand at Base Plant.

The Project utilizes Base Plant's existing operational footprint that has undergone and Environmental Impact Assessment (EIA) and Historical Resources Impact Assessment (HRIA).

The Project is in alignment with the following GOA policies that contribute to improved environmental performance in Alberta:

- Alberta's climate strategy, providing reliable, low GHG intensity and reliable electricity to market.
- Alignment and consistent with the strategic direction and outcomes identified by LARP.

Suncor's investment in the Project has the potential to benefit the economy, people and nearby communities through the creation of reliable and low cost, low GHG electricity.

Suncor will engage with local stakeholders to identify potential environmental impacts and potential mitigation measures. Suncor's objective is that the final project development plan will reflect input provided by stakeholders including regulators and local Aboriginal communities and take into account all relevant environmental factors. The Project will be subject to several legislative and regulatory requirements both federal and provincial; to date, operating within existing boundaries set up AER and AUC. Initial engagement with the AER on September 22, 2017 when Suncor filed a Project Summary Table and Map for provincial EA determination resulted in a AER decision that an EA is not required for the Project at the provincial level.

There have been previous projects that involve expansion/construction of natural gas generation facilities in Alberta where no federal EA was required such as the Genesee Generating Station

Expansion, and the Heartland Generating Station Expansion. The Project is very similar to these projects.

Based on the information contained herein, Suncor seeks confirmation that an assessment is not required under CEAA 2012.

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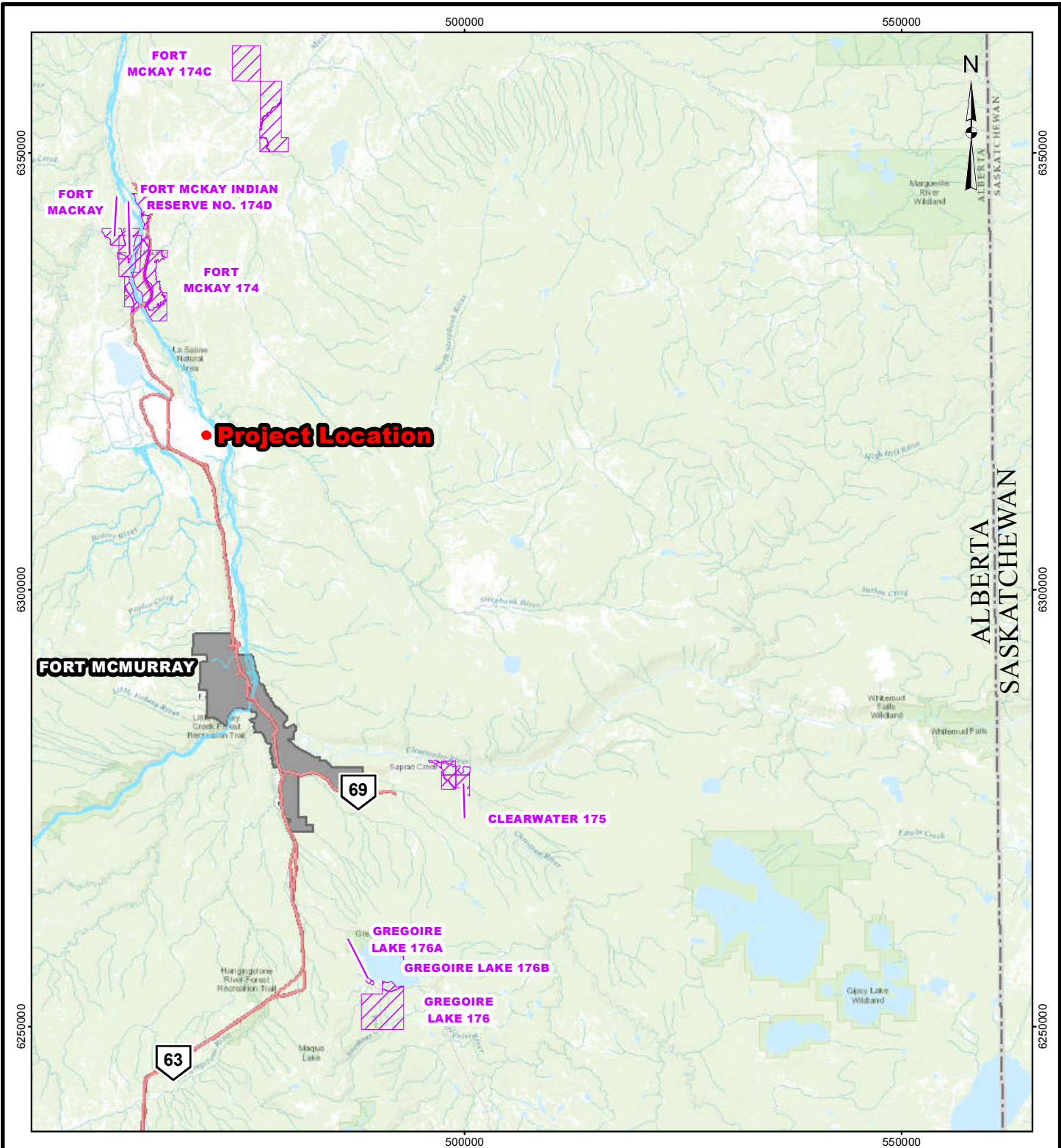
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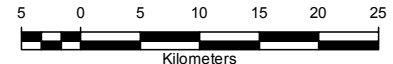
10 APPENDICES

Appendix 1 – Maps for Project



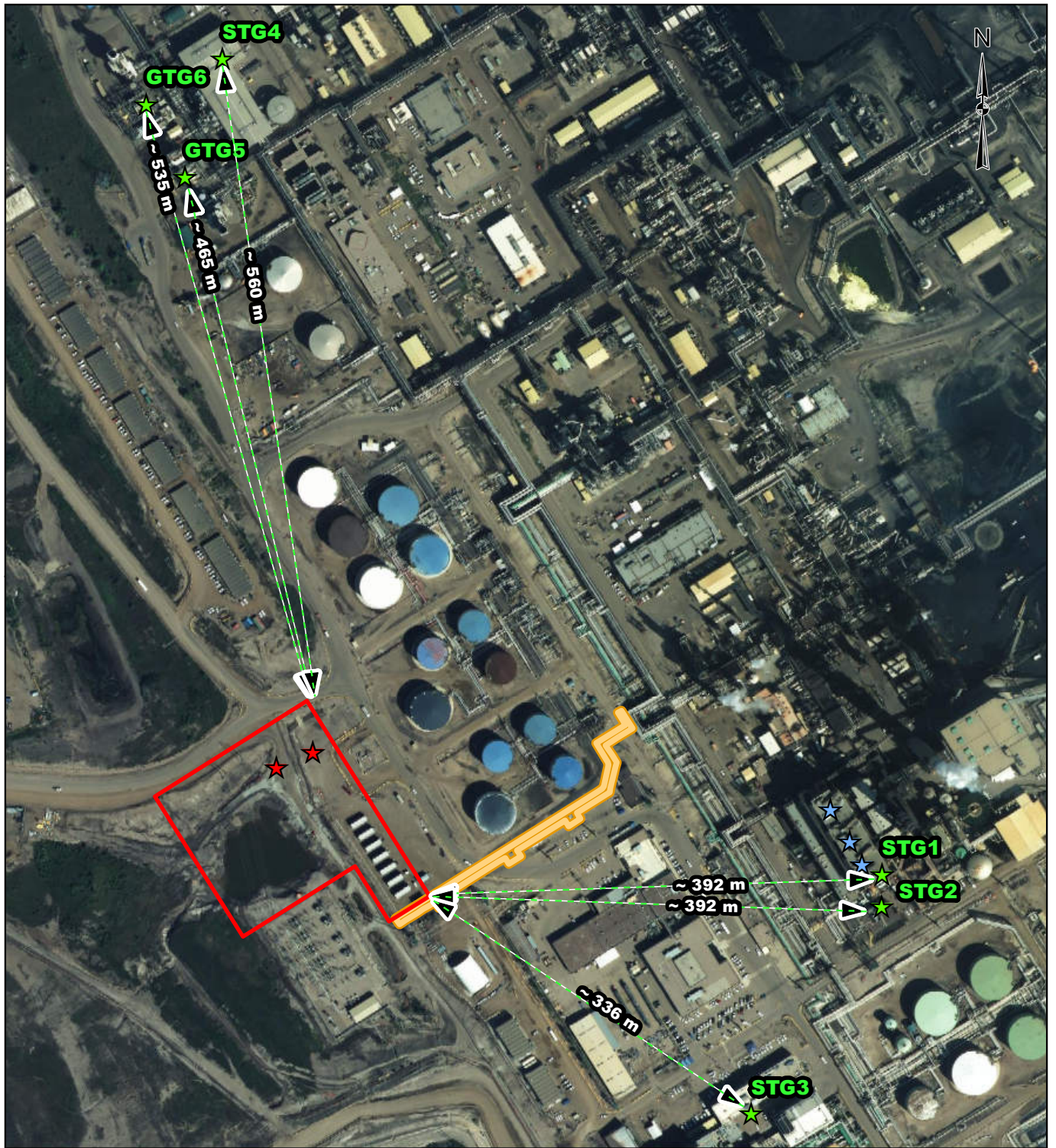
LEGEND

- Project Facility Location
- First Nations
- Major Road
- Provincial Boundary
- Town/City
- Township
- Watercourse
- Waterbody



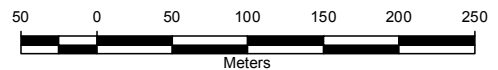
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Coke Boiler Replacement Application			
TITLE:			
Project Location Overview			
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APPD	XX	2-Mar-16	





LEGEND

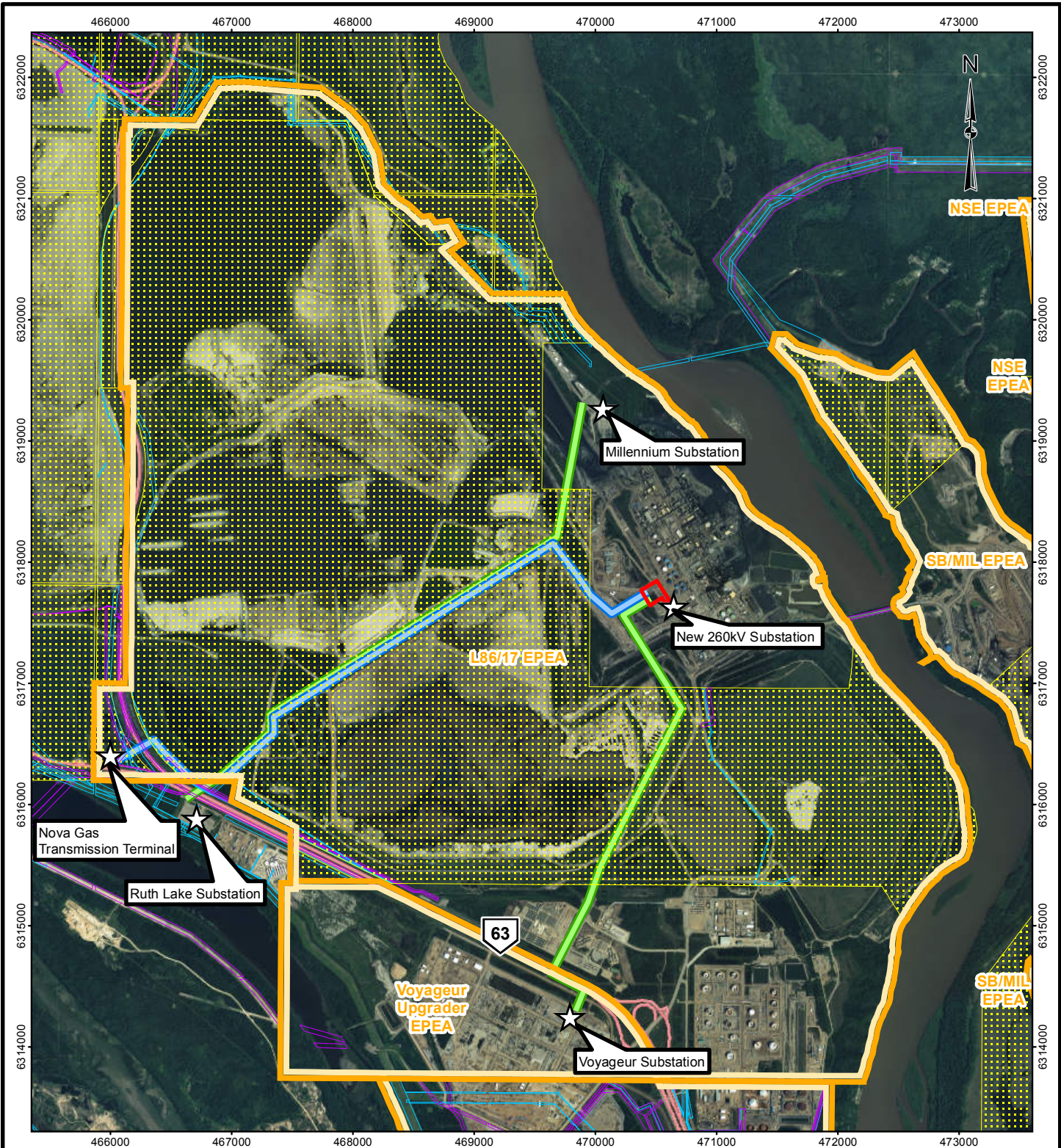
- ★ Existing Generators
 - STG - (Steam Turbine Generators) use high pressure steam
 - GTG - (Gas Turbine Generators) use a gas turbine powered by Natural Gas
- ★ Coke Fired Boilers
- ★ New Gas Fired Generators
- ▭ Project Facility Location
- ▬ Tie-in Piperack



PROJECT:			
Coke Boiler Replacement Application			
TITLE:			
Project Overview			
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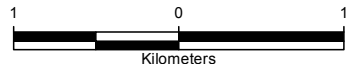


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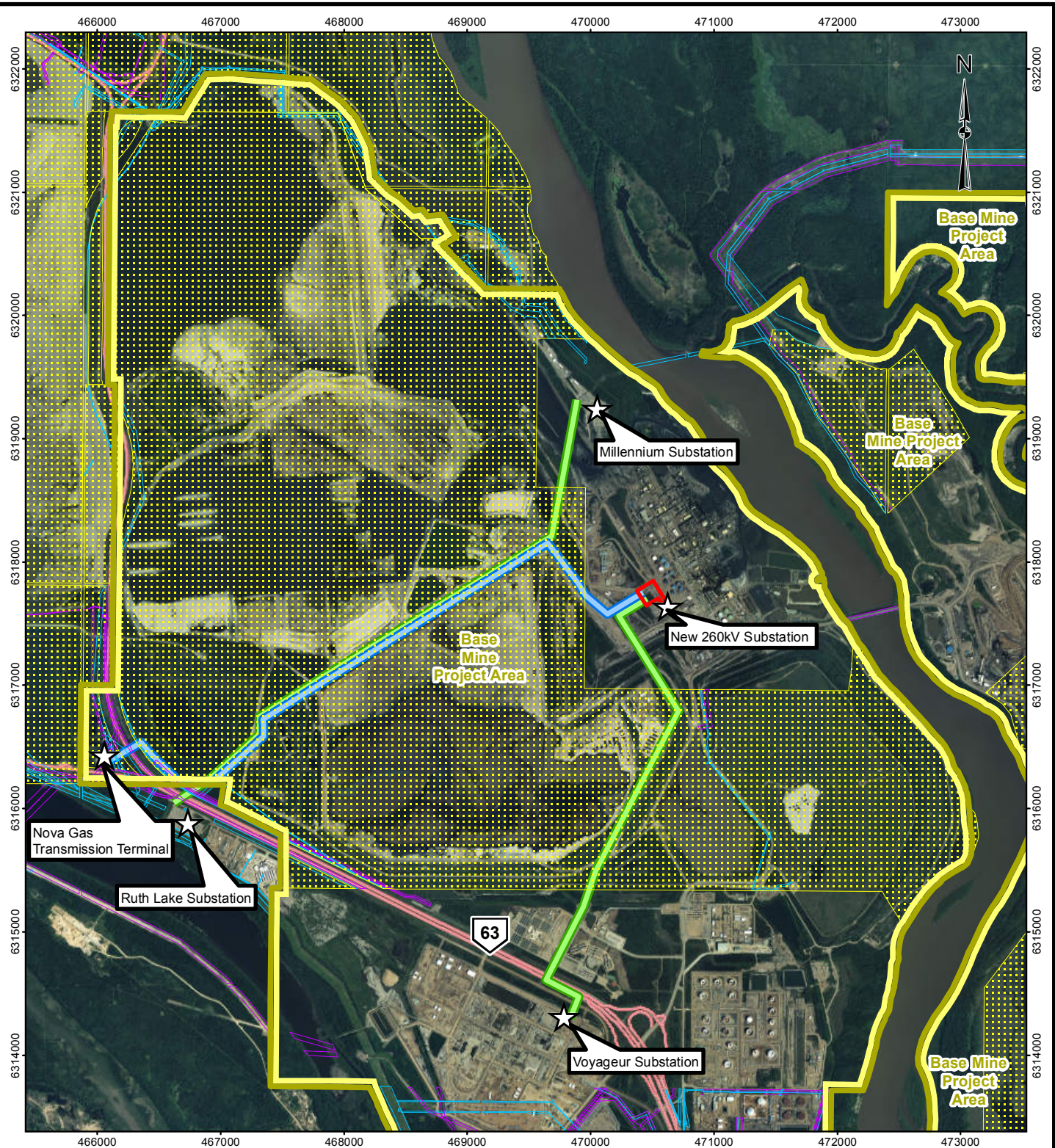
LEGEND

- Existing High Voltage Route
- Natural Gas Route
- Major Road
- Easement (EZE)
- Mineral Surface Lease (MSL)
- Pipeline Agreement (PLA)
- Project Facility Location
- EPEA - Approved Project Boundaries



PROJECT: Coke Boiler Replacement Application				
TITLE: Project Footprint - EPEA				
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APPD	XX	2-Mar-16		

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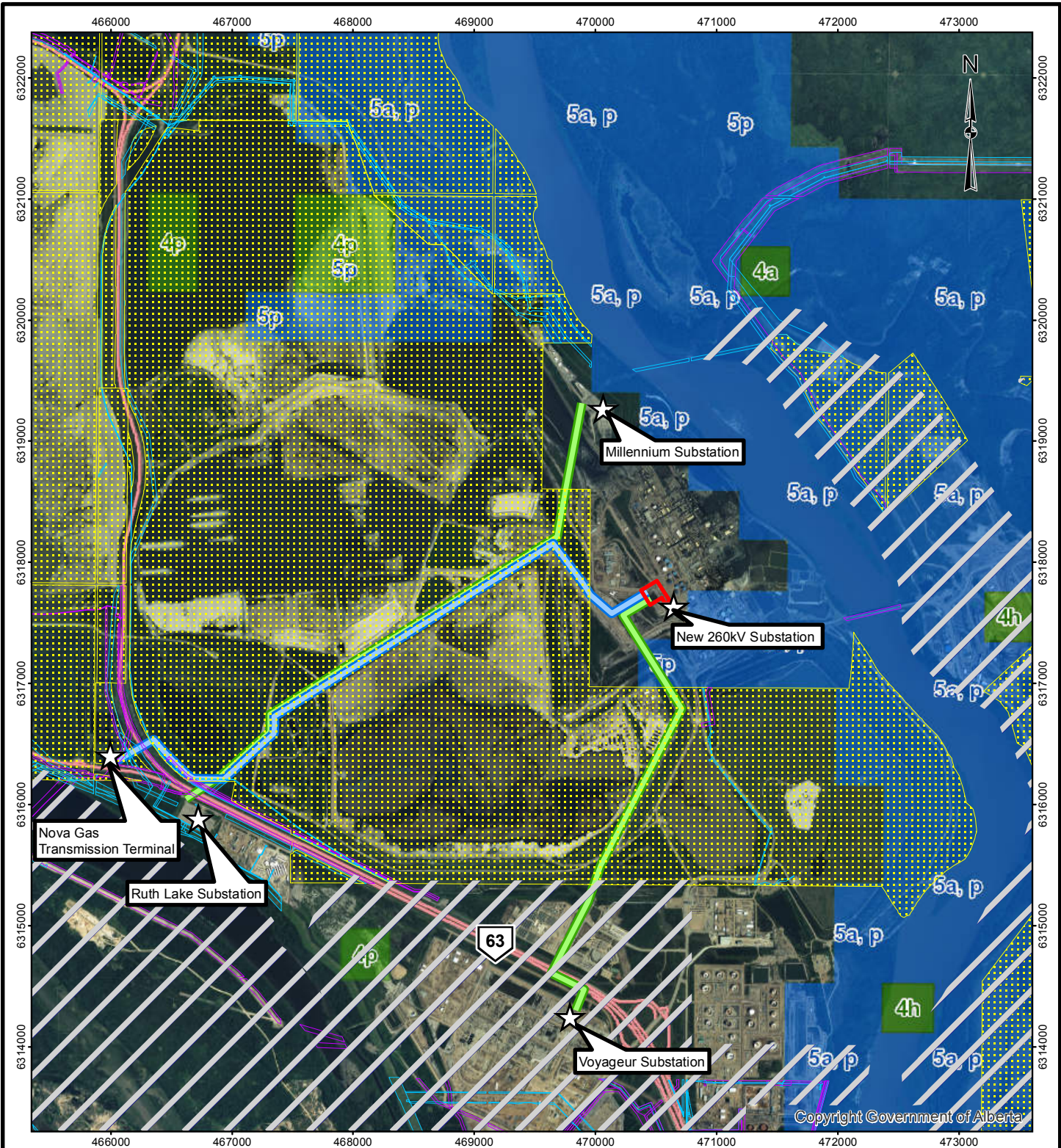
LEGEND

- High Voltage Route
- Natural Gas Route
- Major Road
- Easement (EZE)
- Mineral Surface Lease (MSL)
- Pipeline Agreement (PLA)
- Project Facility Location
- OSCA Project Areas - Approved -



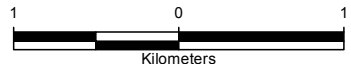
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TITLE: Project Footprint - OSCA				
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LEGEND

- High Voltage Route
- Natural Gas Route
- Major Road
- Easement (EZE)
- Mineral Surface Lease (MSL)
- Pipeline Agreement (PLA)
- Project Facility Location
- HRIA
- HRV 4
- HRV 5



PROJECT: Coke Boiler Replacement Application			
TITLE: Project Footprint - HRIA			
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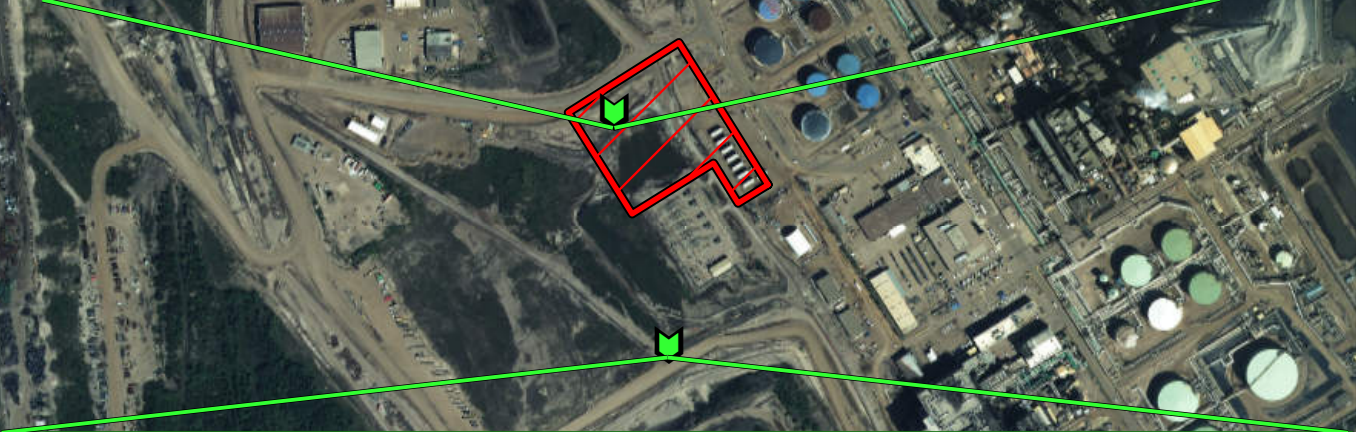
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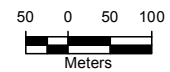
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LEGEND

 Photo Locations

 Project Facility Location



PROJECT:				Coke Boiler Replacement			
TITLE:				Facility Photo Location			
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		REVIEW XX		1-Mar-16		Figure 7	
		APPD XX		2-Mar-16			

Appendix 2 – Alberta Energy Regulator Environmental Assessment Determination



Suncor Energy Inc.
P.O. Box 2844
150 6th Avenue S.W.
Calgary, Alberta, T2P 3E3
www.suncor.com

September 21, 2017

Alberta Energy Regulator
Authorization, Mining, Oil Sands East
Twin Atria Building, 2nd Floor
4999 - 98th Avenue
Edmonton, AB T6B 2X3

Attention : Camille Almeida, Camille.Almeida@aer.ca

Dear Madam:

**RE: Suncor Energy Inc. (Suncor) – Coke Boiler Replacement Project
Project Summary Table and Project Location Map
Environmental Protection and Enhancement Act (EPEA) Approval No. 94-02-00, as
amended and Oils Sands Conservation Act (OSCA) Scheme 8535**

Suncor Base Plant (Base Plant) has an area that supplies steam, electricity, boiler feed water, and hot water to run its operations. It primarily consists of three petroleum coke-fired boilers, two natural gas-fired boilers, and two natural gas turbines. Suncor is exploring the potential to replace the three existing Coke Fired Boilers (CFB's) at Base Plant with natural gas-fired cogeneration units known as the Coke Boiler Replacement Project (Project).

Figure 1 located in Appendix 2 shows the proximity of the site for the new co-generation units within the Regional Municipality of Wood Buffalo (RMWB).

As requested by the Alberta Energy Regulator (AER) Environmental Assessment team in the October 13th, 2016 meeting, Suncor hereby submits an updated Project Summary Table and Project Location Map for the Project to support the Environmental Assessment determination process. The *Environmental Assessment (Mandatory and Exempted Activities) Regulation* lists specific activities which are either mandatory and will require an Environmental Impact Assessment report, or exempted and do not require one. The Project is not designated as a mandatory activity. Suncor believes that an Environmental Assessment should not be required as the environmental footprint of the Project is within the existing environmental parameters of the current EPEA approval 94-02-00. In fact, this Project would improve environmental performance at Base Plant and provides alignment with many provincial policies on improving environmental performance.

Suncor believes an Environmental Assessment should not be required for the Project for the following reasons:

The Project results in a reduction in the EPEA Air Emissions at Base Plant

The existing CFB's are one of Suncor's largest emitters of sulfur dioxide, nitrogen oxides and particulate matter at Base Plant and have been in place since 1967. The Project will reduce air emissions as follows:

- 46% reduction of sulphur dioxide (SO₂) emissions
- 17% reduction of nitrogen oxide (NO_x) emissions
- 66% reduction of particulate matter emissions

The Project reduces the Fresh Water Intake Demand at Base Plant

The existing CFBs utilize a Flue Gas Desulphurization (FGD) system to remove the sulphur dioxide from the emissions associated with coke combustion. The FGD system utilizes fresh water drawn from the Athabasca River for this process and is one of Suncor's largest water demands for Base Plant. The shift to natural gas fired co-generation will not require the FGD system resulting in a 30% decrease in the overall water demand at Base Plant.

The Project utilizes the Existing Land Footprint at Base Plant

The natural gas cogeneration facility will be integrated into the existing equipment and operations at Base Plant, and will be located within the existing approved footprint. Figure 2 located in Appendix 2 shows a site layout that illustrates the proposed location of the natural gas fired cogeneration units in relation to the existing infrastructure located at Base Plant.

The Project facility footprint for the new cogeneration units at Base Plant will be 2.5 Ha located within a previously disturbed area. Figure 3 located in Appendix 2 shows the proposed site and some pictures of the existing footprint.

The Project also includes a Natural Gas (NG) pipeline and High Voltage (HV) tie-in infrastructure to the existing utilities as described below:

- A new 14" Natural Gas line will be installed from the new cogeneration units across Base Plant, to an existing TCPL Terminal. The total length of this pipeline will be approximately 5.6 km.
- Construction of approximately 4.1 km of two new single-circuit 260kV travelling between the new Cogeneration substation and the existing Suncor Voyageur substation.
- Construction of approximately 7.9 km of new single-circuit 260kV travelling between Suncor's existing Millennium substation and ATCO Electric's existing Ruth Lake substation.

The entire Project footprint is shown in Figure 4 and 5 located in Appendix 2. As is shown in Figure 4 and 5 the entire Project is within the existing EPEA and OSCA boundary so the area has already undergone an Environmental Impact Assessment (EIA).

The Project is also in alignment with many key government policies on environmental performance as follows:

Alignment with Government of Alberta Climate Leadership Plan

In November 2015, the Government of Alberta announced the Climate Leadership Plan. The Government of Alberta stated that the Climate Leadership Plan will improve air quality by ending coal power emissions by transitioning to stable, reliable and cleaner sources of electricity. The proposed cogeneration units would make available approximately 700 Megawatts (MW) of clean and reliable natural gas fired power to the Alberta grid by Q3 2022 that displaces current coal fired power demand that aligns with the Climate Leadership Plan.

Alignment with Lower Athabasca Regional Plan

Suncor supports and actively participates in the Lower Athabasca Regional Plan (LARP). The Project is in alignment with the LARP guiding principles outlined below:

- Economic potential of oil sands resource is optimized
- Region's economy is diversified
- Landscapes are managed to maintain ecosystem function and biodiversity
- Air and water are managed to support human and ecosystem needs
- Infrastructure development supports economic and population growth

In summary, Suncor believes that an Environmental Assessment should not be required as the environmental footprint of the Project is within the existing environmental parameters of the current EPEA approval 94-02-00 and provides the following items to support improvements to environmental performance:

- Reduction in the EPEA Air Emissions at Base Plant
- Reduction in the Fresh Water Intake Demand at Base Plant
- Utilizing the Existing Disturbed Land Footprint at Base Plant

Should you require any further information or clarification, please do not hesitate to contact me at (403) 296-6315.

Yours truly,

SUNCOR ENERGY INC.

Douglas Castellino, P.Eng

<Original signed by>

Senior Regulatory Approvals Advisor

(403) 296-6315

1. Appendices

APPENDIX 1: Project Summary Table

Project Summary Table			
Proponent Name:	Suncor Energy Inc.	Date:	September 21, 2017
Project Name:	Coke Boiler Replacement Project	Company Contact Name and Information:	Douglas Castellino
Name of Company that will hold Approval:	Suncor Energy Inc.	Company Website:	www.suncor.com
Type of Project (e.g., in-situ, mine, quarry, upgrader, etc.):	Asset Replacement	New Project, Expansion, Additional Phase or Modification:	Modification
Projected Construction Start (Month/Year):	April 2018	Projected Operation Start (Month/Year):	November 2021

<p>Life of Project (# years, YYYY – YYYY):</p>	<p>35 year life 2021-2056</p>	<p>Project Location (Legal Land Description and Longitude/Latitude) and Municipality:</p>	<p>The Project will be located on the following parcel: 16-23-092-10-W4 and 01-26-092-10-W4 (Figure 1&2).</p> <p>The geographic coordinates for the Project site are:</p> <p>Latitude: 57° 0' 8.4" N Longitude : 111° 29' 9.5" W</p> <p>UTM: X: 47480 Y: 6317752</p> <p>Regional Municipality of Wood Buffalo</p>
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<p>Total Project Area (ha):</p>	<p>The final project facility footprint at Base Plant will be 2.5 Ha within a previously disturbed area.</p> <p>A new 14" Natural Gas line will be installed from the new cogeneration units across Base Plant, to an existing TCPL Terminal.</p> <p>Construction of approximately 4.1 km of two new single-circuit 260kV travelling between the new Cogeneration substation and the existing Suncor Voyageur substation.</p> <p>Construction of approximately 7.9 km of new single-circuit 260kV travelling between Suncor's existing Millennium substation and ATCO Electric's existing Ruth Lake substation.</p> <p>All construction will occur in previously approved areas within the EPEA approval.</p>	<p>Private, Federal or Provincial Land:</p>	<p>Provincial and Private Land</p>
<p>Nearest Residence(s) (km):</p>	<p><i>Approximately 5 km from the nearest permanent residence.</i></p>	<p>Types of Activity (major project processes, components including capacity/size, if available):</p>	<p>Construction and installation of gas turbine generators and associated equipment, natural gas pipeline, pipe rack and high voltage lines for 700MW of power.</p> <p>All construction will be within existing EPEA footprint.</p>

<p>Feedstocks and design feed rates (maximum daily, annual)</p>	<p>Natural Gas already supplied to Base Plant</p>	<p>Products and design production rates (maximum daily, annual)</p>	<p>The estimated power that will be produced is ~700 MW. Regulatory approvals specific to the electrical aspects are regulated by Alberta Electric System Operation (AESO) and Alberta Utilities Commission (AUC)</p>
<p>Byproducts and wastes (specify types, rates and storage capacities)</p>	<p>There will be no new marketable by-products and wastes generated that have not already been approved under the existing EPEA approval.</p>	<p>Product storage facilities and capacities</p>	<p>No storage required</p>
<p>Nearest First Nation Reserve(s) and Métis Settlements (name and km):</p>	<p>Fort Mackay First nation community is 26.6 km from Base Plant. The Fort McKay Metis Local #63 are located in Fort McKay as well.</p>	<p>Project Products:</p>	<p>The estimated power that will be produced is ~700 MW. Regulatory approvals specific to the electrical aspects are regulated by Alberta Electric System Operation (AESO) and Alberta Utilities Commission (AUC)</p>
<p>Power Source (if on site power generation describe quantity (MW) and facilities):</p>	<p>Construction and installation of gas turbine generators and associated equipment, natural gas pipeline, pipe rack and high voltage lines for 700MW of power. The estimated power that will be produced is ~700 MW. Regulatory approvals specific to the electrical aspects are regulated by Alberta Electric System Operation (AESO) and Alberta Utilities Commission (AUC)</p>	<p>Method of Product Transport (e.g., pipeline, rail, truck, etc.):</p>	<p>The excess power generated will be transported by Electric Transmission regulated by the Alberta Electric System Operation (AESO) and Alberta Utilities Commission (AUC)</p>

Average Production Capacity per Year (specify units):	The estimated power that will be produced is ~700 MW. Regulatory approvals specific to the electrical aspects are regulated by Alberta Electric System Operation (AESO) and Alberta Utilities Commission (AUC)	Infrastructure Requirements (e.g., roads, pipelines, water intake, storage, tankage, etc.):	Natural gas pipeline, pipe rack and high voltage lines
Location of End Market:	The end market of the exported power is Alberta, Canada market.	Expected Types of Air Emissions (e.g., SO₂, NO_x, CO₂, etc.):	NOX, SO2, CO, NH3, particulate matter (2.5)
Project By-Products:	There will be no marketable by-products generated.	Types of Solid Wastes Generated:	No solid waste generated
Expected Types of Water Effluent Releases (note the water bodies the effluent will be released to):	Blowdown water will be cooled and then flow to existing on-site wastewater ponds	Nearest Waterway/Waterbody (name and km):	Athabasca River <1 km
Waste Disposition / Disposal (i.e., Disposal Well, Salt Caverns, Landfill, or Third-Party):	There will be no wastes generated that have not already been approved under the existing EPEA approval	EPEA Approval Required (Y/N/Unknown):	Yes – amendment to existing Operating Approval 94-02-00 (as amended) will be required.
Watercourse Crossings (type of crossing, any Class A to C waterbodies):	No watercourse crossings	Water Act License Required (Y/N/Unknown. If yes, purpose, source and estimated volumes):	Within existing Water Act Diversion License No. 73872-01-00 (as amended).
Regulatory Board(s) (ERCB/NRCB/AUC):	AER/CEAA/AESO/AUC	Waterbodies Required (Y/N/Unknown/NA. If yes, # and ha):	No
Water Act Approval Required (Y/N/Unknown. If yes, purpose):	Within existing Water Act License No. 00254384-00-00 (as amended).	Will any of the components or activities associated with the project affect fish and/or fish habitat? (Y/N):	No

<p>Identify applicable sections of <i>Designated Physical Activities Regulation</i> pursuant to the <i>Canadian Environmental Assessment Act, 2012</i></p>	<p>Designation of Project to be determined based on engagement with the Canadian Environmental Assessment Agency.</p>	<p>Nearest Water Well (km) (Domestic and Commercial):</p>	<p>A number of registered wells are identified from searching the Alberta Water Well Information Database within the project area including industrial, domestic and unknown use wells all under Suncor control</p>
<p>Are any works or undertakings proposed to take place in, on, over, under, through or across a navigable water? (Y/N):</p>	<p>No</p>	<p>Access Improvements to Provincial Highway:</p>	<p>No improvements required</p>
<p>Nearest Provincial Highway (# and distance):</p>	<p>Highway 63 (<1 km)</p>	<p>Total Area to be Disturbed (ha):</p>	<p>On existing cleared footprint</p>
<p>Traffic Impact Assessment Required (Yes/No/Unknown):</p>	<p>No</p>	<p>Post-reclamation Land Use(s):</p>	<p>Developed lands will be reclaimed to develop into self-sustaining biologically diverse ecosystems and sees a closure topography composed primarily of terrestrial landforms with some wetland and aquatic features. The reclaimed lands will provide a range of end uses, including: forestry, wildlife habitat, traditional use and recreation.</p>

<p>Identify Existing Land and Water Use(s), Resource Management, or Conservation Plans Within or Near the Project site:</p>	<p>The area is approved for the Suncor oil sands mining operation and does not include any activities that result in new footprint disturbance affecting resource use; therefore, no reassessment is required. The project area is within the boreal forest ecosystem and includes forested areas, wetlands, man-made reservoirs and streams and natural waterways. Parts of the area have been developed for extraction of granular resources, and other areas have been developed for commercial enterprises. The existing land uses have included forestry, wildlife habitat, traditional use and recreation.</p>	<p>Reclamation Start and End (YYYY - YYYY):</p>	<p>2073-2100</p>
<p>Decommissioning Start and End (YYYY-YYYY):</p>	<p>2062-2070</p>	<p>Historic Resources Impact Assessment Required (Y/N/Unknown):</p>	<p>The project area does not include any new footprint over and above that already approved for Suncor EBDA operations; therefore, no additional HRIAs are required to be completed.</p>
<p>Unique Environmental or Social Considerations (Describe or None):</p>	<p>None</p>	<p>Estimated Operation Persons-Years of Employment:</p>	<p>Not applicable. As this is an asset replacement, the workforce will be redirected from the decommissioned assets to the new assets.</p>
<p>Estimated Construction Person-Years of Employment:</p>	<p>Estimated to be 325 – 350 person years (not including manufacture of equipment etc.).</p>	<p>Method of Transport of Employees to Site (Construction and Operation):</p>	<p>From Fort McMurray or camps via bus for construction, and bus from Fort McMurray for operation.</p>
<p>Construction or Operation Camp Required (Y/N/Unknown. If yes, on-site or off-site):</p>	<p>No for Operation Unknown for Construction Location Unknown</p>	<p>Is any part of the project on or next to federal lands?</p>	<p>No</p>

<p>Will the project involve the manufacture and storage of explosives (Y/N):</p>	<p>No</p>	<p>Aboriginal Groups Involved in Stakeholder Engagement:</p>	<p>Consultation to be confirmed with ACO. Engagement likely to include:</p> <ul style="list-style-type: none"> • Fort McKay First Nation • Athabasca Chipewyan First Nation • Mikisew Cree First Nation • Fort McMurray 468 First Nation • Chipewyan Prairie Dene First Nation • Fort Chipewyan Metis Local 125 • Fort McKay Metis Community Association • Fort McMurray Metis Local 1935 <p>In accordance with Suncor's Aboriginal consultation policy, we will consult with potentially impacted stakeholders throughout the life of the project and at the direction of the Regulator.</p>
<p>Date Stakeholder Engagement Started (Public/Aboriginal):</p>	<p>Informal engagement began October 20, 2016. Consultation to be confirmed with ACO.</p>	<p>Public Groups involved in Stakeholder Engagement:</p>	<p>The Regional Municipality of Wood Buffalo</p>

APPENDIX 2: Project Maps

September 27, 2017

Douglas Castellino
Suncor Energy Inc.
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Calgary, Alberta, T2P 3E3

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Calgary, Alberta T2P 0R4
Canada

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Environmental Impact Assessment (EIA) Report Not Required

Further to your letter of September 21, 2017, I wish to advise you that pursuant to section 44 of the *Environmental Protection and Enhancement Act (EPEA)*, I have considered the application of the environmental assessment process to your proposed Suncor Energy Inc. (Suncor) Base Plant Coke Boiler Replacement Project. This activity is not a mandatory activity for the purposes of environmental assessment. Having regard to the consideration set out in section 44(3) of *EPEA*, I have decided that further assessment of the activity is not required. Therefore, a screening report will not be prepared and an environmental impact assessment report is not required.

Please note that this decision is based on the current information about the project, and I reserve the right to review this decision should different or new information come to light. Suncor should also note that section 47 of *EPEA* gives the minister responsible for *EPEA* the authority to order the preparation of an environmental impact assessment report under appropriate circumstances, notwithstanding a director's decision to not require an environmental impact assessment report.

Suncor should be advised that although an environmental impact assessment report is not required for this project, the Alberta Energy Regulator may have other regulatory requirements under other energy legislation. For more information about these requirements, please go to www.aer.ca

Suncor should also note that section 3 of Alberta Indigenous Relations' *Government of Alberta's Guidelines on Consultation with First Nations on Land and Natural Resource Management* may apply to this project, and Suncor may be required to submit a First Nations Consultation Plan to the department. For more information about the First Nations consultation process, please contact the Aboriginal Consultation Office.

There is the potential requirement for a review under the *Historical Resources Act*. Contact George Chalut (780-431-2329) with the Historic Resources Management Branch, Alberta Culture and Tourism.

Suncor should also contact Shauna Sigurdson (780-495-2236) with the Canadian Environmental Assessment Agency to discuss the potential submission of a federal project description and any federal environmental assessment requirements under the *Canadian Environmental Assessment Act, 2012*.

If you have any questions or need further information, please e-mail
AEREnvironmental.Assessment@aer.ca.

inquiries 1-855-297-8311
24-hour
emergency 1-800-222-6514

Sincerely,
<Original signed by>

Rob Cruickshank
Manager, Oil Sands East, Mining Authorizations
(Designated Director under *EPEA*)

RC/ca

cc: Albert Liu (AER)
Adriana Ledi (AER)
Melanie Daneluk (AEP)
Vince Biamonte (IR)
Anna Curtis (ACT)
Shauna Sigurdson (CEAA)