METHANEX

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PROJECT DESCRIPTION:

Methanex Medicine Hat Proposed Expansion Project

METHANEX CORPORATION
MEDICINE HAT, AB

May 2013

METHANEX

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1.0 GENERAL INFORMATION AND CONTACTS

1.1 Purpose

The purpose of this document is to fulfill requirements within the *Canadian Environmental Assessment Act*, 2012 (CEAA 2012) for submission of a project description of a "designated project" to inform a decision, by the Canadian Environmental Assessment Agency, on whether or not an "environmental assessment" (as defined within CEAA) of the proposed project will be required.

1.2 Proposed Project Overview

PROPOSED PROJECT CONTEXT

The impact of shale gas development in North America has resulted in a competitively priced natural gas environment. Given that natural gas is used as both a feedstock and a combustion fuel in the methanol production process, Methanex Corporation (Methanex) is investigating further methanol production options in North America to supply the fast-growing Asia Pacific market. A methanol expansion in Medicine Hat, Alberta is one of the North American options under consideration.

BACKGROUND OF METHANEX MEDICINE HAT LOCATION

Historically, the Methanex facility in Medicine Hat contained three methanol manufacturing plants with a combined capacity of 1 million metric tonnes per year. The site began production in February 1975 when Plant 1 was brought on-line. Plant 2 began production in 1976, and Plant 3 was brought on-stream in 1981.

High North American natural gas pricing and volatile market conditions resulted in the permanent shutdown of the Medicine Hat methanol Plant 2 in 1997 and Plant 1 in 1999. In 2001, Plant 3 was temporarily shutdown and preserved in a state that would allow for restart in the event of improved market conditions.

In 2003, demolition of Plants 1 and 2 began, while Plant 3 continued to sit idle in a state of preservation for potential future re-start. Fortunately, recent market conditions changed significantly with lower North American natural gas prices and stronger demand for methanol, which resulted in the viability of restarting Plant 3. In March of 2011, the Medicine Hat facility received Operating Approval from Alberta Environment and Sustainable Resource Development to begin operating Plant 3 to produce methanol.

PROPOSED PROJECT

The Methanex Medicine Hat Expansion Project (the Project) described in this project description document is an expansion of the existing Methanex Medicine Hat, AB methanol production facility via construction of a new methanol production unit at the existing location. The current production capacity at the existing Medicine Hat facility is approximately 0.5 million tonnes/year; the expansion project would result in a further 1 to 1.3 million tonnes/year of methanol production or an increase in methanol production of over 200%.

Refer to *Figure 1* for an aerial photo of the existing Methanex Medicine Hat location and *Figure 2* for a depiction of the regional location of the existing facility and the project location.

Figure 1 - Aerial Photo of Existing Facility with City of Medicine Hat in Background

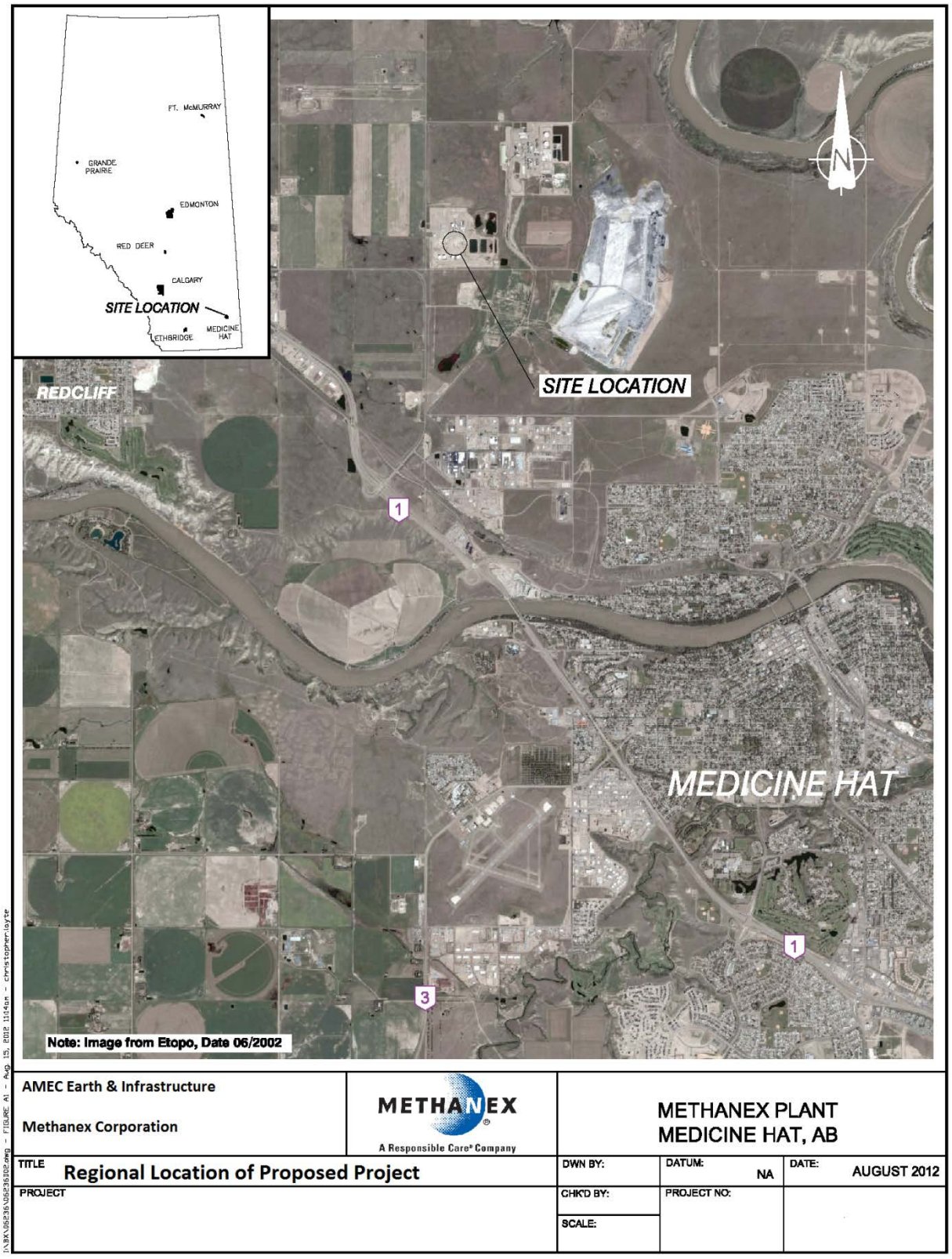


Figure 2 - Regional Location of Proposed Project and Methanex Medicine Hat, AB

1.3 Generalized Methanol Production Process

The proposed Project would make use of a conventional, multi-stage manufacturing process:

- Firstly, natural gas is mixed with steam in a conventional steam methane reformer to create reformed gas (also referred to as synthesis gas);
- The reformed gas then goes through a methanol conversion process, whereby crude methanol is produced; and.
- Lastly, crude methanol is distilled through a multi-stage distillation process, which results in pure, chemical grade methanol.

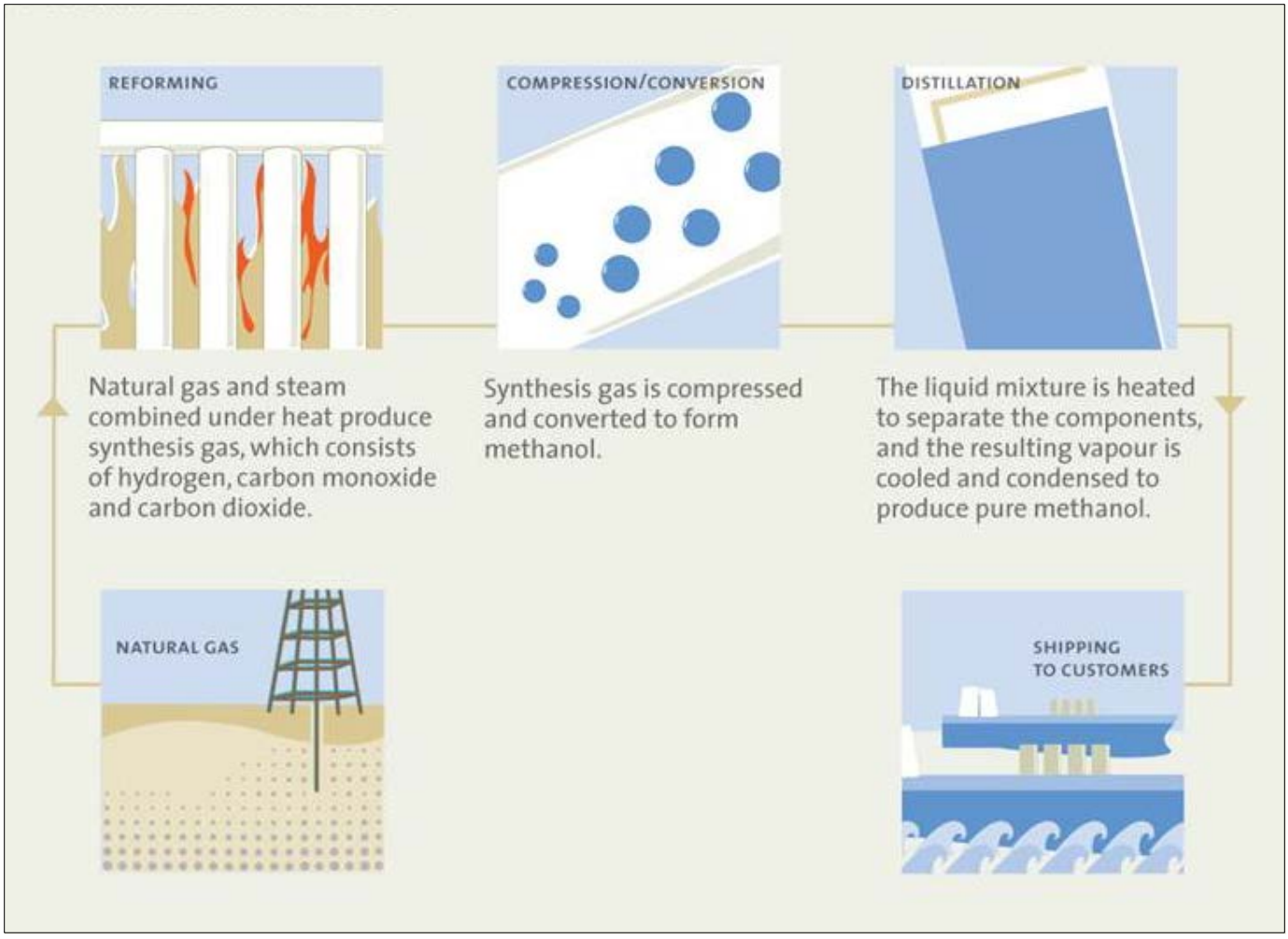


Figure 3 - Methanol Production Overview

1.4 Proponent Contact Information

NAME OF THE DESIGNATED PROJECT:

Methanex Medicine Hat Expansion Project

NAME OF THE PROPONENT:

Methanex Corporation

ADDRESS OF THE PROPONENT:

3806 – Box Springs Rd. NW
P.O. Box 1100
Medicine Hat, AB
T1A 7H1

PLANT MANAGER:

Cliff Janzer
Plant Manager
Email: cjanzer@methanex.com
Ph: (403) 527-8141 extension 105

PRINCIPAL CONTACT PERSON:

Craig Marshall
Environmental Coordinator
Email: cmarshall@methanex.com
Ph: (403) 527-8141 extension 129

1.5 Overview of Consultation Activities

Given that the proposed Project is still in the feasibility phase, Methanex has initially undertaken preliminary consultation activities and plans to conduct further consultation, as required, at a later stage. The following is a summary of the parties that have been preliminarily consulted about the Project at varying degrees:

Canadian Environmental Assessment Agency (CEAA):

- Susan Tiege, Section Team Lead, Alberta & NWT Regional Office, CEAA
- Christi Horne, Project Manager, Alberta & NWT Regional Office, CEAA

Alberta Environment and Sustainable Resource Development (AESRD):

- Corinne Kristensen, Acting Team Leader, Environmental Assessment Group, AESRD.
- Sarabpreet Singh, Environmental Assessment Co-ordinator, Environmental Assessment Group, AESRD
- Susan McIntosh, Team Leader, Industrial Authorizations Team, AESRD

City of Medicine Hat:

- Administrative Committee
- Environmental Utilities group
- Emergency Management
- Mayor Norm Boucher

Blake Pedersen, Provincial Member of the Legislative Assembly (MLA), Medicine Hat

Methanex's Community Advisory Panel (CAP), includes Council members from City of Medicine Hat and Town of Redcliff

LaVar Payne, Federal Member of Parliament (MP), Medicine Hat

Canadian Fertilizers Ltd., Medicine Hat, AB

Public at large (via Medicine Hat News newspaper articles and Medicine Hat local television news broadcast)

Medicine Hat and District Chamber of Commerce

Economic Development Alliance of Southeast Alberta

File Hills Qu'Appelle Tribal Council

Nekaneet First Nation

Siksika Nation

Blood Tribe

Piikani Nation

Stoney Nakoda First Nation (includes the Bearspaw First Nation, Chiniki First Nation, and Wesley First Nation)

Tsuu T'ina Nation

Métis Nation of Alberta, Region 3

Métis Nation of Alberta Association Local Council 8 (Medicine Hat)

1.6 Other Environmental Assessment and/or Regulatory Requirements

PROVINCE OF ALBERTA *ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT* APPROVAL REQUIREMENTS

The existing Medicine Hat facility is classified as a Division 2, Part 2 (b) (ix) "a petrochemical manufacturing plant" under the Alberta *Environmental Protection and Enhancement Act* (EPEA), *Activities Designation Regulation*. As such, the facility

requires an EPEA Operating Approval from Alberta Environment and Sustainable Resource Development (AESRD). The existing facility currently holds EPEA Operating Approval No. 9887-03-03. An expansion to the facility (i.e. the construction and operation of a new/additional plant) would require an amendment to the current EPEA Operating Approval. Initial discussions have begun with AESRD Southern Region Approvals Team regarding the potential project and the approval requirements.

PROVINCE OF ALBERTA *ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT* POTENTIAL ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The proposed Project is not on the "Mandatory" or "Exclusion" list of the Alberta *Environmental Assessment (Mandatory and Exempted Activities) Regulation*. As such, it is considered a discretionary activity and will need to be reviewed by AESRD, Environmental Assessment Team on a case-specific basis to determine whether or not Environmental Assessment is required. Methanex will be submitting project summary documentation to AESRD requesting a determination of whether or not they will require an Environmental Assessment for the Project.

It is worthy to note that during the application process to achieve an EPEA Operating Approval for the re-start of the facility in 2011, a Provincial Environmental Assessment was not required.

CITY OF MEDICINE HAT, ENVIRONMENTAL UTILITIES

The existing Medicine Hat facility currently holds an Industrial Water and Sanitary Sewer Service Permit with the City of Medicine Hat, Environmental Utilities Department. To accommodate the proposed Project, the existing permit would need to be revised to reflect an increased freshwater supply rate and daily volume and an increased wastewater discharge rate and daily volume. The increased water and sewer requirements of the proposed Project would require upgrades to the existing City of Medicine Hat water supply and sanitary sewer pipelines currently serving the existing Methanex Medicine Hat location; discussions with the City of Medicine Hat, Environmental Utilities have commenced and are ongoing.

1.7 Regional Study Information

According to information from the Canadian Environmental Assessment Agency (CEAA), there has not been a regional study under the *Canadian Environmental Assessment Act, 2012* in the Medicine Hat region of Alberta (Susan Tiege, personal communication, April 16, 2013).

2.0 PROJECT INFORMATION

PROJECT DESCRIPTION AND PRODUCTION CAPACITY

The impact of shale gas development in North America has resulted in a competitively priced natural gas environment. Given that natural gas is used as both a feedstock and a combustion fuel in the methanol production process, Methanex Corporation (Methanex) is investigating further methanol production options in North America to supply the fast-

growing Asia Pacific market. A methanol expansion in Medicine Hat, Alberta is one of the North American options under consideration.

The Methanex Medicine Expansion Project (the Project) described in this project description document is an expansion of the existing Methanex Medicine Hat, AB methanol production facility via construction of a new methanol production unit at the existing location. The current production capacity at the existing Medicine Hat facility is approximately 0.5 million tonnes/year; the expansion project would result in a further 1 to 1.3 million tonnes/year of methanol production or an increase in methanol production of over 200%.

RELATIVE PROVISION FROM THE REGULATIONS DESIGNATING PHYSICAL ACTIVITIES

The Project is considered to be a designated project for the purposes of *the Canadian Environmental Assessment Act, 2012* (CEAA 2012) as it was deemed to be a physical activity fitting the following description from the Schedule of the *Regulations Designating Physical Activities* (SOR/2012-147):

> *20. The construction, operation, decommissioning and abandonment, or an expansion that would result in an increase in its production capacity of more than 35%, of:*
>
> *d) a facility for the manufacture of chemical products with a production capacity of 250 000 t/a or more.*

2.1 Existing Methanol Production Facility Process and Component Description

The following describes the methanol production process at the existing Medicine Hat methanol production facility. Refer to *Figure 4* for a line drawing rendition of the main infrastructure and equipment at the existing Medicine Hat methanol production facility.

Refer to *Figure A-1 and A-2* in *Appendix A* for an aerial view of the existing facility. *Figure A-2* contains an overlay with text descriptions of the various infrastructure on-site.

FEED GAS PREPARATION:

Sulfur poisons the downstream reformer catalyst and needs to be removed from the natural gas entering the process; the sulfur guard vessel carries out this function.

STEAM METHANE REFORMING:

The function of this step is to produce reformed gas (also known as synthesis gas) comprised primarily of hydrogen, carbon dioxide, and carbon monoxide from a mixture of natural gas and steam using a steam methane reformer (SMR). The desulfurized natural gas is mixed with steam and heated inside the SMR. The natural gas and steam mixture then enters tubes inside the SMR that are filled with nickel oxide reforming catalyst. The natural gas and steam mixture reacts with the catalyst to form carbon dioxide, carbon monoxide, and hydrogen. The heat required for this endothermic reaction is supplied by burning a mixture of natural gas and process purge gas.

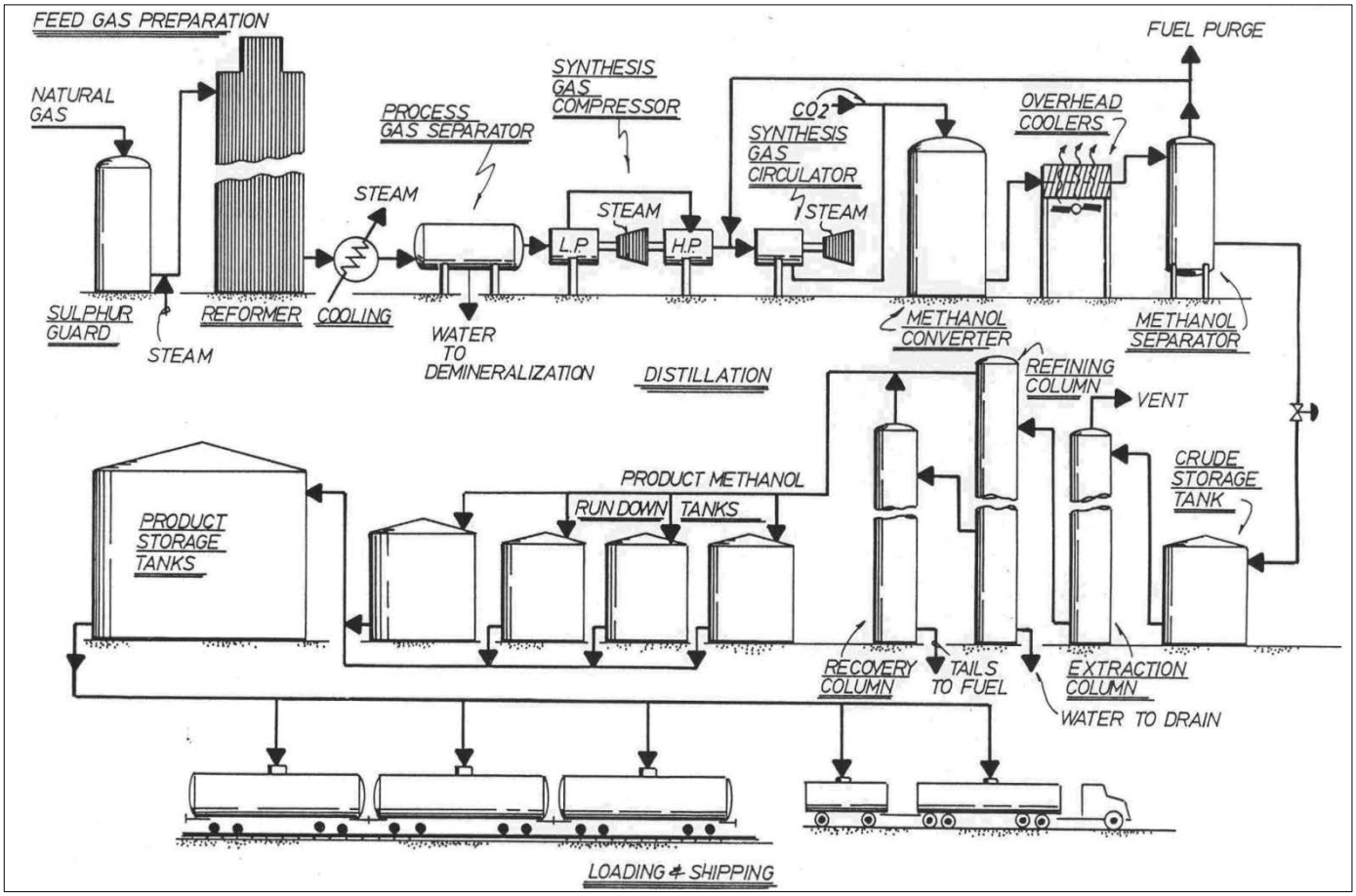


Figure 4 - Line Drawing Rendition of Main Infrastructure for Operations of Existing Facility

REFORMED GAS COMPRESSION:

Prior to compression, moisture is removed from the reformed gas in the process gas separator. Dry reformed gas is then compressed in a two-stage centrifugal compressor to achieve the pressure required for methanol conversion. The compressors are powered by high pressure steam turbines.

METHANOL CONVERSION:

In the methanol converter vessel, a mixture of high pressure reformed gas and methanol converter recycle gas react to form crude methanol in the presence of a copper-based catalyst.

CRUDE METHANOL DISTILLATION:

Crude methanol is refined in the distillation section to produce chemical grade methanol. Distillation is accomplished using three distillation columns: extraction column, refining column, and recovery column.

The extraction column is used to remove non-condensables and light ends from the crude methanol. A small portion of condensed liquid from the extraction column is

purged to the tails storage tank to avoid build-up of light ends in the top of the column. Non-condensables and light ends are purged from the extraction column and recovered for reformer combustion fuel.

The refining column is fed by partially purified methanol from the bottom of the extraction column and functions to separate methanol from water and higher boiling compounds. Refined methanol from the refining column is directed to the rundown tanks for intermediate storage. A side-stream from this column containing heavy alcohols is directed to the tails storage tank. Water from the refining column bottoms is discharged to the wastewater pond system.

The recovery column is used to recover methanol from a refining column side stream purge, which contains primarily methanol and ethanol. Refined methanol from the recovery column is directed to the rundown tanks for intermediate storage. Column bottoms, which contain a mixture of methanol, ethanol, water, and heavy alcohols, are sent to the tails tank.

INTERMEDIATE STORAGE TANKS:

Intermediate storage tanks, consisting of a tails tank, crude tank, and three rundown tanks, are used to store products from various stages in the process.

The crude tank stores crude methanol and acts as a production buffer when increasing or reducing plant front end rates.

Three rundown tanks store refined methanol from distillation where it is analyzed to determine whether it meets product specifications before it is transferred to the final refined product storage tanks.

The tails tanks stores tails fluid received from the distillation section. Tails fluid is used in combination with natural gas as package boiler combustion fuel.

The crude and rundown tanks are equipped with water-based vapour scrubbing systems to reduce methanol vapour emissions from the tanks to atmosphere. Beneath the all of the intermediate storage tanks and on top of the earthen berm is a polyethylene liner for secondary containment. The liners include a weeping system around the base ring wall that is utilized for leak detection.

AUXILIARY (PACKAGE) BOILER:

The auxiliary (package) boiler generates medium pressure steam that is used during plant startups and to control the steam header pressure during steady-state operation. The boiler uses a mixture of natural gas and tails fluid as combustion fuel. Under steady-state operating conditions, the auxiliary boiler runs at approximately 13% of its rated capacity. Combustion flue gas from the boiler is emitted through the package boiler stack.

METHANOL INVENTORY STORAGE SYSTEM:

Refined methanol product is stored in four refined product storage tanks with an average single tank capacity of approximately 16,000 m^3.

Each tank is equipped with a methanol vapour scrubber and three vapour conservation vents to minimize and control methanol emissions from the tanks to atmosphere. Beneath the refined storage tanks and on top of the earthen berm is a polyethylene liner for secondary containment. The liners include a weeping system around the base ring wall that is utilized for leak detection.

METHANOL PRODUCT LOADING SYSTEM:

The facility has a methanol product loading system whereby refined methanol product from the refined product storage tanks is loaded into railcars and tanker trucks for market distribution.

Each product loading station has a vapour collection system that captures methanol vapours from pressure release venting and product loading; the captured vapour is then piped to a common methanol vapour scrubber before release to atmosphere. A secondary containment system has been installed beneath the entirety of the product loading area.

AERIAL COOLING SYSTEM:

The aerial cooling system consists of a bank of elevated aerial coolers in the process area (consisting of large fans and piping with external fins to increase surface area for cooling) that provides convective cooling service to a number of process operations, including: distillation, the glycol heat tracing system, and crude methanol processes.

COOLING WATER SYSTEM:

The cooling water system provides cooling for various process systems and streams. Circulation of cooling water is provided by pumps located in the cooling water pump house. After removing heat from the plant process streams, cooling water is returned to the cooling tower risers for distribution into the cooling tower. Air is drawn into the cooling tower using large fans installed at the top of each cooling tower cell and cooling water is cooled in the tower by exchanging heat with the surrounding atmosphere. The cooling tower is equipped with drift eliminators to minimize carryover of entrained water droplets in the air emissions from the cooling tower.

A slip stream (cooling water blowdown) from the cooling water system diverts some of the cooling water to the wastewater ponds to assist in the control of suspended matter and salt formation in the cooling water. The cooling water filtering system is frequently backwashed with raw water to remove accumulated salts and solids; wastewater from this process is discharged to the wastewater ponds.

To prevent corrosion of the cooling water piping and heat exchangers, corrosion inhibitor chemicals are added on a continuous basis. To inhibit biological formation in the cooling water system, biocide and sodium hypochlorite are also injected on a continuous basis.

Caustic soda and sulfuric acid are used to control the cooling water pH. Other additives such as foam control and dispersing agents are added on an as needed basis.

WATER TREATMENT SYSTEM

The water treatment system is used to remove impurities from the raw (fresh) water and water collected from process streams. The water treatment equipment is housed inside the water treatment building. The primary purpose of the water treatment system is produce demineralized water of a quality that is appropriate for steam generation, via a series of interconnected ion exchange vessels.

Raw water for the facility is currently obtained under from the City of Medicine Hat, Environmental Utilities. Raw water supply from the City of Medicine Hat is firstly contained in a poly-lined raw water storage pond which provides some buffer capacity in the event of temporary losses in City water supply. Raw water from the storage pond is pumped to the water treatment system for treatment.

To maintain efficiency, the ion exchange vessels must be regenerated on a routine basis with acid or caustic. A portion of the regeneration wastewater is used as cooling water make-up in the cooling water system. The majority of wastewater from the regeneration process is directed to neutralization tanks (where pH is neutralized) and is then discharged to the wastewater ponds.

FLARE SYSTEM:

A single flare stack is used to safely burn combustible gases generated during plant startup, shutdown, or periodic plant upsets. Under normal operating conditions, the flare does not operate, and only the pilot flames are burning.

SANITARY WASTE SYSTEM:

All sanitary waste generated on-site is discharged to the City of Medicine Hat sanitary sewer system.

PROCESS WASTEWATER SYSTEM:

Wastewater from various process systems is collected in the process sewers and stored in the wastewater ponds prior to discharge to the City of Medicine Hat sanitary sewer system.

Process wastewater sources include: cooling tower blowdown, water treatment wastewater, distillation refining column bottoms; and storm water runoff from specific process areas.

WASTEWATER POND SYSTEM:

The facility has twin wastewater ponds, each with an approximate capacity of 15,700 m^3. The wastewater ponds have been lined with a polyolefin liner, which was specifically chosen to be compatible with the wastewater constituents from the process.

INDUSTRIAL RUNOFF SYSTEM:

Industrial runoff from the site is controlled and contained on-site. Runoff from the majority of the site is directed via drainage trenches to the main storm water pond located in the northeast portion of the site. A small portion of site runoff is directed to a small runoff containment area at the southeast corner of the site. Storm water pond volumes are normally managed by evaporation, but may also be pumped to either the raw water pond or wastewater ponds.

In specific areas of higher potential contamination (product loading area, and an area located adjacent to the wastewater treatment building), industrial runoff may be directed to the process wastewater system and discharged to the wastewater ponds.

2.2 Other Existing Non-Process Infrastructure

The following existing buildings / infrastructure are not directly involved in the methanol production processes, but are necessary to support the overall operation of the site:

- Administration building and parking lot;
- Security and miscellaneous workshop building;
- Training, laboratory, and storage building;
- Emergency response building;
- Warehouse;
- Maintenance shop and offices;
- Operations control room; and
- Storage, fabrication, and hazardous waste storage building.

It is expected that some expansion of these buildings or infrastructure would be required to accommodate the proposed Project.

2.3 Distillation Expansion Project Currently Under Construction

The facility is currently in the process of carrying out an expansion project to construct an Auxiliary Distillation Unit and re-introduce the practice of injection of off-site produced carbon dioxide (CO_2) to increase efficiency and production at the facility.

It is expected that construction of the Auxiliary Distillation Unit will be complete and the unit will be operational by the fall of 2013.

2.4 Components and Activities of the Proposed Project

The following section lists and briefly describes the infrastructure and equipment that would be required for the proposed Project and the operation of a new methanol production unit. The proposed Project is conceptual and detailed engineering and design has not commenced, therefore a statement of approximate dimensions of the infrastructure and equipment is not possible.

The methanol production process that would be employed for the proposed methanol production unit would utilize the same conventional methanol production process as the existing Medicine Hat methanol production unit described above with the exception of the addition of a saturator vessel (see description below).

Additionally, there are plans to take advantage of opportunities for interconnection and symbiosis between the proposed Project and the systems and infrastructure already existing at the Medicine Hat location. The advantage of symbiosis with the existing Medicine Hat location is that certain infrastructure and equipment already existing at the Medicine Hat facility would be utilized and only require relatively minor expansion versus construction of new infrastructure and equipment. Section "b) Existing Medicine Hat Site Physical Works Requiring Modification as Part of the Proposed Project" identifies the existing infrastructure and equipment that will be utilized to reduce the need for new construction.

Refer to *Figure B-1, B-2, and B-3* in *Appendix B* for a conceptual representation of the proposed facility layout and location.

a) Proposed Physical Works for the Project:

- *Desulphurization unit*: removes sulphur from the natural gas that would be utilized as process natural gas in the steam methane reforming process.

- *Saturator*: vessel that saturates process natural gas with water vapour prior to the gas entering the steam methane reformer.

  NOTE: the existing Medicine Hat methanol production unit does not have a saturator. The addition of a saturator to the proposed methanol manufacturing unit will increase process efficiency and decrease water usage and wastewater production.

- *Steam methane reformer (SMR):* utilizes natural gas (methane/CH_4) as a feedstock (under the necessary heat, pressure, and steam ratio, and in the presence of a catalyst) to produce reformed gas (or synthesis gas), which is comprised primarily of carbon dioxide (CO_2), carbon monoxide (CO), and hydrogen (H_2).

- *Auxiliary (package) boiler:* an auxiliary boiler generates medium pressure steam that is used during plant startups and to control the steam header pressure during steady operation. Under steady operating conditions, the auxiliary boiler would run at less than 100% of its rated capacity.

- *Compressors / compressor building:* steam driven compressors compress reformed gas from the SMR to the specific pressure required in the methanol conversion stage. The compressors would be housed inside of a compressor building.

- *Methanol converter:* vessel that converts reformed gas (under the necessary heat and pressure, and in the presence of a catalyst) into crude methanol.

- *Distillation towers:* distillation towers would be installed with the purpose of distilling crude methanol (approximately 80% methanol, 20% water, and a small component of other components) into refined, chemical grade methanol. The number of distillation towers required for the Project is not known at this time and would be

determined during the detailed engineering phase.

- *Aerial cooling system:* the aerial cooling system would consist of a bank of elevated aerial coolers in the process area (consisting of large fans and piping with external fins to increase surface area for cooling) to provide convective cooling service to a process operations.

- *Rundown tanks*: two rundown tanks would be constructed (within the appropriate secondary containment structures) to contain "intermediate" refined methanol from the distillation stage.

- *Crude tank*: one crude tank would be constructed (within the appropriate secondary containment structures) to contain crude methanol from the methanol conversion processes (prior to distillation).

- *Tails tank*: one tails tank would be constructed (within the appropriate secondary containment structures) to contain tails fluid from the distillation stage.

- *Refined product storage tank*: one refined product storage tank would be constructed (within the appropriate secondary containment structures) to store refined methanol (received from the rundown tanks) prior to loading into railcars and tanker trucks for transportation to market.

- *Flare:* a single flare stack would be utilized to safely burn combustible gases generated during plant startup, shutdown, or periodic plant upsets. Flare gases would be piped from the plant to the flare stack where any flammable gases are combusted. Combustion products consist primarily of carbon dioxide and water vapours.

  Upset conditions that would potentially lead to combustible gases being directed to flare include, but are not limited to: compressor turbine driver trips, 100% reformer trip, reformer trip to minimum fire, unexpected pressure surges, and other pressure upsets.

  Under normal operating conditions, the flare would not operate and only the pilot flames would be burning.

b) Existing Medicine Hat Site Physical Works Requiring Modification as Part of the Proposed Project:

- *Water treatment system:* modifications in the form of an expansion to the site's existing water treatment system would occur, rather than construction of a new stand-alone water treatment system for the new methanol production unit.

  An expansion of the raw (fresh) water storage pond may also be required.

  An additional consideration is the additional fresh water supply that would be required for the proposed Project. At present, the base case consideration is to continue to obtain the fresh water supply from the City of Medicine Hat,

Environmental Utilities. Optionally, further investigation is being conducted into the construction and operation of a new river water pump house.

- *Wastewater systems:* it is expected that modifications to the wastewater systems, such as replacement of wastewater discharge pumps, new wastewater pond construction, or expansion of existing wastewater ponds, could be required to accommodate the proposed Project.

  As discussed previously, construction and operation of the new methanol production unit would involve the installation of a saturator vessel, which reduces the production of wastewater.

  Wastewater from the site, including the additional wastewater produced from the operation of the Project, would continue to be discharged to the City of Medicine Hat sanitary sewer system.

- *Methanol product loading system:* modifications in the form of an expansion to the site's existing product loading system would occur, rather than construction of a new stand-alone product loading system for the new methanol production unit.

- *Distillation systems:* piping tie-ins would occur between the existing distillation systems and the distillation systems for the new methanol production unit to allow operational flexibility as required.

c) Potential Option for Fresh Water Supply Directly from the South Saskatchewan River via Construction and Operation of a River Water Pump House:

As stated previously, the present base case consideration is to continue to obtain the fresh water supply from the City of Medicine Hat, Environmental Utilities. Presently, the City of Medicine Hat, Environmental Utilities supplies water that is drawn from the Police Point Aquifer (untreated) and from the City's Municipal Water Treatment Facility. Due to the increased water supply demands of the proposed Project, the City would need to conduct some relatively minor modifications to the existing water supply pipelines within approximately two kilometres of the Methanex site.

Optionally, further investigation is being conducted into the construction and operation of a new river water pump house, which would annually draw not more than approximately 5 million m^3 of fresh water per year (volume includes supply for both the existing and proposed Project requirements) from the South Saskatchewan River. The investigation of this component of the proposed Project is in the very preliminary stages and details of a proposed location, water supply licensing, ownership and operation of the pump house (between Methanex and the City of Medicine Hat), and ownership and operation of the associated supply / piping infrastructure is not known. Methanex understands that additional Federal and Provincial regulatory approvals and clearances (ex. Federal *Fisheries Act* and *Navigable Water Act*, and Alberta *Water Act*) would be required for a project of this nature and further discussions with the necessary government departments / regulators would occur if the project was to materialize beyond preliminary consideration.

d) Civil Work Required for the Proposed Project:

Civil work associated with the proposed Project would primarily include:

- Site grading / leveling to allow construction of infrastructure;
- Contouring and ditch construction to allow drainage of surface runoff;
- Expansion of the site's current storm water / runoff pond to incorporate a subsoil borrow pit located east of the proposed Project area; and
- Installation of pilings and footings for proposed infrastructure.

The detail of the proposed civil work has not yet been determined and would be established during the detailed engineering stage of the proposed Project.

Refer to *Figures B-1, B-2, and B-3* in *Appendix B* for a visual representation of the conceptual design of the Project area, which generally displays the area of land that would be disturbed by civil works.

2.5 Summary of Emissions, Discharges, and Waste for the Proposed Project

a) Contaminant Emissions to Air:

AIR EMISSIONS RESULTING FROM THE COMBUSTION OF FUELS

The primary air emission contaminants that would be released as a result of combustion of natural gas and other fuels used to create heat for the process are: carbon dioxide (CO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and minor amounts of volatile organic compounds (VOCs). The main combustion sources would be the steam methane reformer and auxiliary boiler. Other sources of combustion, that would receive intermittent use during emergency or preventative maintenance situations, would be the flare stack, emergency electrical generators, and diesel fire water pumps.

Methanex is currently undergoing investigations to identify nitrogen oxide (NO_x) reduction technologies for the existing Medicine Hat site steam methane reformer and auxiliary package boiler. It is expected that NO_x reduction technology in the form of low NO_x burners and/or selective catalytic reduction would be included in the design of the proposed Project to mitigate the release of NO_x emissions to air.

The proposed Project would be subject to Provincial greenhouse gas (GHG) legislation and regulation stipulating targets for reduction of GHGs (applicable to the CO_2 emissions mentioned previously). Additionally, Methanex is currently in discussion with Environment Canada regarding the development of Federal GHG regulations that will likely set a GHG emission intensity standard for new facilities; applicability of Federal regulations would depend on the date that regulations come into force.

METHANOL VAPOUR AIR EMISSIONS

The potential for the emission of methanol vapour, a volatile organic compound (VOC), exists from fugitive emissions from process equipment and components, storage tank vents, product loading operation vents, and distillation vents.

To mitigate the release of methanol vapours, Methanex Medicine Hat currently conducts an annual fugitive emission leak detection monitoring and repair program, operates methanol vapour scrubbing systems for methanol storage tanks and product loading operations, and recovers distillation vent vapours for use as combustion fuel in the steam methane reformer. It is expected that all of these methanol vapour emission control technologies would be included in the design of the proposed Project.

AIR EMISSIONS FROM COOLING TOWERS

Air emissions from cooling towers are mainly comprised of pure water vapour. However, it would be expected that relatively small amounts of particulate matter and VOCs, carried in water droplets that become entrained in the cooling tower air emissions stream, would also be emitted from the cooling towers. The liquid water droplets, termed cooling tower drift, can be controlled by the installation of drift eliminators in the cooling towers. Cooling towers for the proposed Project would be equipped with high efficiency drift eliminators, which would mitigate the amount of particulate matter and VOCs emitted from this source.

AIR EMISSIONS DURING CONSTRUCTION

Air contaminant emissions specifically due to the proposed Project during the construction phase (vs. the existing methanol manufacturing unit operations that would be occurring simultaneously) would primarily include internal combustion engine exhaust from construction machinery (ex. heavy machinery required for civil work) and other construction vehicles. It is expected that this would be a minor source of air contaminant emissions.

b) Liquid Discharges:

SANITARY WASTE SYSTEM

All sanitary waste would be discharged to the City of Medicine Hat sanitary sewer system.

PROCESS WASTEWATER SYSTEM

Wastewater from various process systems would be collected in the process sewers and stored in the wastewater ponds prior to discharge to the City of Medicine Hat sanitary sewer system.

Process wastewater sources would include: cooling tower blowdown, water treatment system liquid waste, distillation refining column bottoms, and storm water runoff from specific process areas.

WASTEWATER POND SYSTEM

The existing Medicine Hat facility has twin wastewater ponds, each with an approximate capacity of 15,700 m^3, which temporarily store wastewater prior to discharge to the City of Medicine Hat sanitary sewer system. The waste water ponds have been lined with a polyolefin liner, which is compatible with the wastewater constituents from the process.

WASTEWATER SYSTEM MODIFICATIONS

As discussed previously in Section 2.4 “b)”, it is expected that modifications to the wastewater systems would be needed, but at this point it is not known.

SECONDARY CONTAINMENT SYSTEMS

Areas of high potential contamination associated with the proposed Project (ex. chemical storage tank areas, distillation areas, etc.) would be equipped with appropriate secondary containment systems that would contain any leaks or releases of potential contaminants.

c) Summary of Waste Types and Disposal Methods:

The proposed Project would produce routine types of industrial waste, some of which would be considered hazardous waste under Alberta Provincial regulations. All generated waste will be recycled where facilities exist for that waste type; in the event that recycling is not an available or feasible option, waste would be disposed of at appropriate facilities dictated by the waste type. All hazardous waste disposal or recycling will be performed in accordance with applicable Provincial and Federal legislation and regulations.

A summary of expected waste types and waste management methods are listed in Table 1.

Table 1 - Summary of Project Waste Types and Management Method

Waste Type	Management Method
Various Catalyst	Recycled
Used Lubricating Oil	Recycled
Scrap Metal	Recycled
Cardboard	Recycled
Paper/Cardboard Mix	Recycled
Plastics	Recycled
Newspaper	Recycled
Unsegregated Non-Hazardous Waste	Municipal Landfill
Oily Rags, Sorbents, and Filters	Engineered Landfill with Leachate Collection
Aerosol Cans	Recycled
Empty $1m^3$ Plastic Chemical Totes	Recycled
Empty Plastic Drums	Recycled
Empty Containers - Plastic	Recycled
Empty Metal Drums	Recycled

2.6 Construction, Operation, Decommissioning, and Abandonment Schedule

Table 2 - Summary of Project Phases, Schedule, and Activities

Project Phase	Estimated Duration (Years)	Description of Activities Occurring During Project Phase
Construction	2 years	*Civil construction activities:* topsoil stripping and conservation; site leveling/grading; site contouring and ditch construction; piling installation; concrete pads and foundations installation; installation of gravel in laydown and other areas; road building (paved and graveled); storage tank secondary containment construction *Equipment/vessel construction activities:* equipment staging/laydown; piping construction; vessel installation/erection; large equipment installation (ex. pumps, compressors, etc.); storage tank installation; electrical and instrumentation construction *Building and large infrastructure construction activities:* compressor building construction; cooling tower construction; steam methane reformer construction (i.e. large structure requiring many modes of construction, such as concrete work, piping, brick work, steel work, etc.); electrical and instrumentation construction
Operation	20+ years	Production of methanol via conventional steam methane reformer, methanol conversion, and distillation processes / technologies Process startups / shutdowns (planned and unplanned) Emergency and non-routine flaring Methanol product storage Methanol product loading into railcars and tanker trucks Preventative maintenance activities and unplanned equipment and infrastructure repairs Large scale turn-around activities on an approximately 36-48 month schedule
Decommissioning	2 years	Teardown and removal of equipment for recycling and/or potentially re-sale
Site Reclamation and Remediation	2-5 years	Site reclamation (re-grading, contouring, re-vegetation, etc.) for future determined, end land-use which will likely be industrial Activities to remediate any contaminated areas that are identified during environmental site assessment activities

3.0 PROJECT LOCATION

3.1 Geographic Coordinates of Proposed Project Location

The geographic coordinates of the centre of the proposed Project are:

Table 3 - Geographic Coordinates of Centre of Project Location

	Degrees	Minutes	Seconds	Datum
N	50°	05’	02.9”	WGS 84
W	110°	43’	42.0”	

3.2 Legal Descriptions of Proposed Project

The proposed Project would be located on portions of Methanex Corporation privately owned land with the following legal descriptions:

- Northwest Quarter of Section 14, Township 13, Range 6, West of the 4th Meridian
- Southwest Quarter of Section 14, Township 13, Range 6, West of the 4th Meridian

Refer to *Appendix D* for copies of the legal land titles for these locations.

For reference purposes *Figures B-1*, *B-2*, *B-3* in *Appendix B*, and *C-3* in *Appendix C* all contain reference to legal land description coordinate systems.

3.3 Proposed Project Site Plans

Refer to *Appendix B, Figures B-1, B-2,* and *B-3* for proposed Project site plans.

3.4 Regional Maps / Satellite Imagery

Refer to *Appendix C*, *Figures C-1* and *C-2* for maps depicting the regional location of the proposed Project, satellite imagery of the regional area, and the location of the proposed Project in relation to existing features, including but not limited to the following:

- South Saskatchewan River;
- Existing Methanex Medicine Hat site;
- Existing Canadian Fertilizers Industries Ltd. site;
- Former location of Western Co-operative Fertilizers Ltd. site;
- City of Medicine Hat general;
- Town of Redcliff general;
- Brier Park Industrial Area (Medicine Hat);
- Redcliff Industrial Area; and
- City of Medicine Hat, Northeast Crescent Heights subdivision (residential area).

3.5 Photographs of Proposed Project Area

Figure 5 - South-Central Location Viewing North

Figure 6 - South-Central Location Viewing East
(Canadian Fertilizers Ltd. in background)

Figure 7 - South-Central Location Viewing West
(existing Methanex infrastructure in background)

Figure 8 - South-Central Location Viewing South
(existing Methanex infrastructure in background)

Figure 9 - North-Central Location Viewing North

Figure 10 - North-Central Location Viewing East
(Canadian Fertilizers Ltd in background)

Figure 11 - North-Central Location Viewing West
(Box Springs Rd. in background)

Figure 12 - North-Central Location Viewing South
(existing Methanex Infrastructure in background)

Figure 13 - Central Location Viewing North

Figure 14 - Central Location Viewing East
(Canadian Fertilizers Ltd. in background)

Figure 15 - Central Location Viewing West

Figure 16 - Central Location Viewing South
(existing Methanex infrastructure in background)

3.6 Project Proximity to Residences, Aboriginal Lands, and Federal Lands

PROXIMITY TO PERMANENT, SEASONAL, OR TEMPORARY RESIDENCES

The proposed Project location is approximately:

- 2.7 km from the nearest residential area within Redcliff, AB (NW side of Highway 1); and
- 2.9 km from the northeast Crescent Heights subdivision within Medicine Hat, AB.

PROXIMITY TO ABORIGINAL LANDS (TRADITIONAL TERRITORIES, SETTLEMENT LAND UNDER A LAND CLAIM AGREEMENT, LANDS USED FOR TRADITIONAL PURPOSES BY ABORIGINAL PEOPLES)

There is no known settlement land under a land claim agreement within close proximity to the proposed Project location.

The proposed Project will not require access to, use or occupation of, or exploration, development, and/or production of lands or resources currently used for known traditional purposes by Aboriginal peoples.

Given that the proposed Project is still in the feasibility phase, Methanex has initially undertaken preliminary consultation activities and plans to conduct further consultation, as required, at a later stage. The following section is a brief summary of the detailed discussion in Section 7.0 of the First Nations and Métis groups that may potentially have traditional territories or traditional land uses in the area of the proposed Project. It is noted that detailed consultation with each of the Aboriginal groups would be required to determine whether the project area is specifically within their traditional territories or in proximity to lands used for traditional purposes. Methanex has forwarded a letter with a high-level description of the proposed Project to all of the identified Aboriginal groups encouraging the groups to contact Methanex with comments or questions in regards to the proposed Project.

First Nations:

The project site and Medicine Hat, AB is on the boundary between Treaty #4 (Manitoba and Saskatchewan) and Treaty #7 (Southern Alberta); these treaties are between Canada and the First Nations. There are no reserves, as defined in the *Indian Act*, in the Medicine Hat area. Treaty #4 and Treaty #7 First Nations may have traditional territories in the proposed Project area.

Métis:

The Métis of southern Alberta are represented by the Métis Nation of Alberta Region 3. The Métis Nation in Medicine Hat is represented by Métis Local Council #8. Their location in the project area suggests that the Métis may have conducted traditional activities in the project area and could be affected by the project. Contact with the Métis Local Council #8 would be required to determine whether the project area is specifically within their traditional territories.

PROXIMITY TO FEDERAL LANDS

The project is not on or in close proximity to any Federal lands.

3.7 Land and Water Use

ZONING DESIGNATIONS OF PROJECT LOCATION

In accordance with the City of Medicine Hat *Land-Use By-law No. 3181*, the proposed Project location is located within Land Use District "M3 - General Heavy Industrial".

CURRENT LAND OWNERSHIP OF PROJECT LOCATION

The proposed Project lands are currently privately owned by Methanex Corporation.

Copies of the legal land titles are available in *Appendix D*.

APPLICABLE LAND USE WITHIN OR NEAR PROJECT LOCATION

The existing Methanex methanol production facility occupies heavy industrial land; a portion of the proposed Project will be located within this existing land use.

The proposed Project location to the north of the existing Methanex methanol production facility is vacant pasture/grass land with existing disturbances, such as gas well access roads, gas well sites, pipeline rights-of-way, and graveled "overflow" parking lot. Historically, this pasture land was used for agricultural purposes for grazing cattle; this activity has not occurred at this location since 2010 when the facility "re-start project" commenced.

To the north of the proposed Project location is Methanex privately owned vacant pasture/grass land).

To the east of the proposed Project location is heavy industrial land privately owned by Canadian Fertilizers Ltd and currently operated for the manufacture and shipment of nitrogen fertilizer (ammonia and urea).

To the west of the proposed Project location is Box Springs Road and privately owned agricultural land (pasture/grass land and crop land); a portion of the land to the west is currently for sale for potential commercial development.

To the south of the proposed Project location is privately owned former Western Cooperative Ltd. heavy industrial land currently under active reclamation and remediation; the current land cover is pasture/grass land and hay crops.

SURFACE OR GROUNDWATER USE WITHIN OR NEAR PROJECT LOCATION

There is no surface or groundwater use within or near the proposed Project location.

RESOURCE MANAGEMENT OR CONSERVATION PLANS WITHIN OR NEAR PROJECT LOCATION

There are no resource management or conservation plans within or near the proposed Project location.

MARINE TERMINAL AT PROJECT LOCATION

The proposed Project location does not involve the construction, operation, decommissioning, or abandonment of a marine terminal.

The proposed Project does require the use of a marine terminal to enable shipment of the methanol product to international markets. Although not directly involved with the proposed Project, Methanex is currently also evaluating potential options on the west coast of Canada for location/use of a marine terminal.

PORT AUTHORITY OR PORT LAND USE AT PROJECT LOCATION

The proposed project does not take place within the water or lands administered by a Canada Port Authority under *Canada Marine Act* and its regulations.

ACCESS TO, USE OR OCCUPATION OF, OR EXPLORATION, DEVELOPMENT, AND PRODUCTION OF LANDS AND RESOURCES CURRENTLY USED FOR TRADITIONAL PURPOSES BY ABORIGINAL PEOPLES

The proposed Project will not require access to, use or occupation of, or exploration, development, and/or production of lands or resources currently used for known traditional purposes by Aboriginal peoples.

The proposed Project location is located on privately owned land. The majority of the land has restricted access for security and safety purposes as it is an active industrial location. The land area currently not under direct industrial use has been privately owned by Methanex since 1994 (and previous to that by Novacor Chemicals who Methanex purchased the current location from) and access is controlled by barbwire fencing. The land has been used occasionally for cattle grazing during previous years, but at this time the land is sitting vacant.

4.0 FEDERAL INVOLVEMENT

PROPOSED OR ANTICIPATED FEDERAL AUTHORITY FINANCIAL SUPPORT

The proposed Project would not receive any Federal financial support from any Federal authorities.

FEDERAL LANDS USED FOR THE PURPOSE OF CARRYING OUT THE PROPOSED PROJECT

The proposed Project would not require the use of any Federal lands for the purpose of carrying out the proposed Project.

FEDERAL LEGISLATIVE OR REGULATORY REQUIREMENTS

It is not anticipated that any Federal legislative or regulatory requirements, beyond those within the *Canadian Environmental Assessment Act* requiring the submission of this project description, will be applicable to the base case of the proposed Project.

Potential Option for Fresh Water Supply Directly from the South Saskatchewan River via Construction and Operation of a River Water Pump House:

As stated previously in Section 2.4, subsection "c)", the present base case consideration is to continue to obtain the fresh water supply from the City of Medicine Hat, Environmental Utilities. Optionally, further investigation is being conducted into the construction and operation of a new river water pump house, which would annually draw not more than approximately 5 million m^3 of fresh water per year (volume includes supply for both the existing and proposed Project requirements) from the South Saskatchewan River.

The investigation of this component of the proposed Project is in the very preliminary stages and details of a proposed location, water supply licensing, ownership and operation of the pump house (i.e. Methanex vs. the City of Medicine Hat), and ownership and operation of the associated supply / piping infrastructure is not known. Methanex understands that additional Federal and Provincial regulatory approvals and clearances (ex. Federal *Fisheries Act* and *Navigable Water Act*, and Alberta *Water Act*) would be required for a project of this nature and further discussions with the necessary government departments / regulators would occur if the project was to materialize beyond preliminary consideration.

5.0 ENVIRONMENTAL SETTING

As support for the Feasibility Study, Methanex retained TERA Environmental Consultants (TERA) to complete a high level environmental overview of the proposed Project area and surrounding vicinity to identify environmental sensitivities within the proposed Project area based on readily available and recent environmental reports, database searches, and a site visit.

TERA documented the findings of the high level environmental overview in a report titled *Environmental Overview for the Proposed Methanex Corporation Medicine Hat Plant Expansion* report (the Report) (TERA, 2013). The Report provides information relevant to environmental legislation and regulations, land use and natural resource use, terrain and soils, hydrology and fish, vegetation, wildlife, and historical resources. The Report also provides the results of a site visit which was conducted to supplement and verify the information collected for the proposed Project area.

The following information presented in this section is taken directly from the TERA Report; refer to *Appendix E* for a full copy.

5.1 Terrain and Soils

The Oldman Formation, developed in the Late Epoch of the Cretaceous Period of the Mesozoic Era, underlies the proposed Project area (Hamilton et al. 1999). The Oldman Formation consists of non-marine “pale grey, thick-bedded, medium-grained to coarse-grained, feldspathic sandstone; grey clayey siltstone; green and grey mudstone; dark grey and brown carbonaceous shale; and ironstone concretionary beds” (Hamilton et al. 1999).

The proposed Project is located within the Cavendish Plain District of the Bigstick Lake Plain Section of the Eastern Alberta Plains Region (Pettapiece 1986). Undulating glacial fluvial materials (Pettapiece 1986) dominate the Cavendish Plain.

According to Shetsen (1987), the surficial geology underlying the proposed Project consists of draped moraine and stagnation moraine. The draped moraine generally consists of uneven till up to 5 m thick with minor amounts of water-sorted material. The stagnation moraine generally consists of uneven till up to 30 m thick with localized areas of water-sorted material. Topography is generally undulating to hummocky with surface modifications caused by lake and stream erosion and deposition (Shetsen 1987).

Soils underlying the proposed Project have been mapped as belonging to the Foremost soil series (Alberta Soil Information Centre 2001). These soils have developed on washed and sorted, medium-textured till and often contain sandy lenses (Soil Classification Working Group 1998). Foremost soils are classified within the Brown Chernozem Great Group and within the Orthic Brown Chernozemic Subgroup (Soil Classification Working Group 1998). Soils of the Brown Chernozem Great Group are present within the most arid parts of the Chernozemic soils climatic range (Soil Classification Working Group 1998).

Site Visit:

No obvious soils issues were observed during the site visit. Further information on the site visit is presented in Section 5.6.

5.2 Hydrology and Fish

There are no fish-bearing permanent waterbodies or watercourses and no fish-bearing habitat present within or directly adjacent to the proposed Project area. According to Grassland Vegetation Inventory mapping (Alberta Sustainable Resource Development [AESRD] 2012), there are no lentic temporary or lentic seasonal wetlands present within the proposed Project area or areas directly adjacent, however, lower class wetlands (i.e., Stewart and Kantrud [1971] Classes I and II) are often difficult to identify through photo interpretation and may have been missed.

Site Visit:

No wetlands of any classification were observed during the site visit. Further information on the site visit is presented in Section 5.6.

5.3 Vegetation

The proposed Project is located in southeastern Alberta in the Dry Mixedgrass Natural Subregion of the Grassland Natural Region. The Dry Mixedgrass Natural Subregion combines the warmest summers and least precipitation of any natural subregion in Alberta and is subject to long, cold winters with little snow cover. Chinooks are less common than in more westerly subregions. Native vegetation in the subregion is dominated by mixed-height grasslands comprised of blue grama (Bouteloua gracilis), needle-and-thread (Stipa comata), June grass (Koeleria macrantha) and western wheatgrass (Pascopyrum smithii). Shrublands comprised of silver sagebrush (Artemisia cana), prickly rose (Rosa acicularis), buckbrush (Symphoricarpos occidentalis) and silverberry (Elaeagnus commutata) occur in depressions or on slopes with northerly or easterly aspects. Few trees are present in the subregion and mainly occur in river valleys and in deep coulees (Natural Regions Committee 2006).

The environmental sensitivity of the Dry Mixedgrass Natural Subregion is well-documented and native prairie land is recognized for its significant ecological, cultural and economic value. Native vegetation can be very difficult to re-establish if disturbed, due to shallow profile, poorly-developed or erosion prone soils.

The proposed Project is located within the Sensitive Ranges of Endangered and Threatened Plants (AESRD 2010-2012). A historical occurrence of tiny cryptanthe (Cryptantha minima), a species listed federally under Schedule 1 of the *Species At Risk Act* (SARA) as Endangered and listed as Threatened by the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) (2013), has been identified in the Project area within 14-13-6 W4M (Alberta Conservation Information Management System [ACIMS] 2012).

Rare vascular plant species and rare ecological communities have the potential to occur in the Dry Mixedgrass Natural Subregion.

Weeds and Pest Infestation:

Known weeds of concern in the proposed Project area include common baby's breath (Gypsophila paniculata), downy brome (Bromus tectorum) and leafy spurge (Euphorbia esula) (Storch pers. comm.), all of which are listed as Noxious under the *Alberta Weed Control Act*.

Site Visit:

Since the site visit was conducted outside of the growing season, the presence or absence of rare plants, rare ecological communities, and weeds could not be confirmed. Invasive plant species were observed during the site visit, with the highest densities observed along the north boundary of the existing plant site and east boundary of the proposed plant expansion area. These species were likely introduced as a result of the existing disturbances in the proposed Project area (e.g., existing plant site, pipeline rights-of-way, well sites, access roads, etc.). Further information on the site visit is presented in Section 5.6.

5.4 Wildlife

The proposed Project is located in the Dry Mixedgrass Natural Subregion of the Grassland Natural Region in Alberta (Natural Regions Committee 2006). This natural subregion represents

the driest area of the province with native trees primarily present in coulees and valley bottoms. Permanent water covers approximately 2% of this subregion with an additional 3% covered by temporary wetlands (Natural Regions Committee 2006). The region includes many distinct habitat types and unique wildlife species that are only found in the Dry Mixedgrass Natural Subregion, including eastern short-horned lizard, greater sage grouse, mountain plover, Ord's kangaroo rat and sage thrasher (Natural Regions Committee 2006), all of which are listed as Endangered under Schedule 1 of SARA.

Migratory Birds:

The level of disturbance within the existing plant itself is likely too high to attract nesting migratory birds, however, suitable nesting habitat for migratory birds is present within the native prairie located directly adjacent to the existing Methanex facility. Migratory bird nests are protected under the *Migratory Birds Convention Act*, which prohibits the killing, capturing, injuring, taking or disturbing of migratory birds or the damaging, destroying, removing or disturbing of nests.

Species with Special Conservation Status:

The proposed Project is located within the Sensitive Ranges of several species with special conservation status including: Burrowing Owl Range; Eastern Short-horned Lizard Range; Sensitive Amphibian Range for Great Plains toad and plains spadefoot; Sensitive Raptor Range for ferruginous hawk, golden eagle and prairie falcon; and Sharp-tailed Grouse Range. The proposed Project is also located within the species ranges of other sensitive and endangered species including long-billed curlew, short-eared owl, Sprague's pipit and upland sandpiper (AESRD 2010-2012). Sensitive Snake Range for bullsnake, plains hognose snake and prairie rattlesnake is also located approximately 432 m north of the proposed expansion area (AESRD 2010-2012).

A search of the AESRD Fisheries and Wildlife Management Information System (AESRD 2013) resulted in an incidental occurrence of plains spadefoot (listed as May Be at Risk by AESRD [2011]) within 1 km of the Project area (Lupyczuk 2000).

A list of species with special conservation status with potential to occur in the Dry Mixedgrass Natural Subregion was compiled for the proposed Project. Species with special conservation status have the potential to occur within the native prairie located directly adjacent to the existing Methanex facility. A review of the list of species with special conservation status that are listed under Schedule 1 of the SARA and by the COSEWIC (2013) that have potential to occur within the proposed Project area based on species range, species habitat requirements and professional knowledge include the following:

- American badger (listed as Special Concern by COSEWIC [2013]);
- Baird's sparrow (listed as Special Concern by COSEWIC [2013]);
- Barn swallow (listed as Threatened by COSEWIC [2013]);
- Bobolink (listed as Threatened by COSEWIC [2013]);
- Burrowing owl (listed as Endangered under Schedule 1 of SARA and by COSEWIC [2013]);
- Chestnut-collared longspur (listed as Threatened under Schedule 1 of SARA and by COSEWIC [2013]);
- Ferruginous hawk (listed as Threatened under Schedule 1 of SARA and by COSEWIC

[2013]);
- Common nighthawk (listed as Threatened under Schedule 1 of SARA and by COSEWIC [2013]);
- Long-billed curlew (listed as Special Concern under Schedule 1 of SARA and by COSEWIC [2013]);
- McCown's longspur (listed as Special Concern under Schedule 1 of SARA and by COSEWIC [2013]);
- Short-eared owl (listed as Special Concern under Schedule 1 of SARA and by COSEWIC [2013]); and
- Sprague's pipit (listed as Threatened under Schedule 1 of SARA and by COSEWIC [2013]).

Site Visit:

No wildlife species with special conservation status or their key habitat features were directly observed during the site visit, however, recent diggings of an American badger were observed throughout the proposed Project area. Existing disturbance in the proposed Project area (i.e., elevated noise levels, existing industrial sites, pipelines, well sites, Box Springs Road and well site access roads), reduces the likelihood of the proposed Project area providing habitat for wildlife species with special conservation status. Further information on the site visit is presented in Section 5.6.

5.5 Historical Resources

Alberta Culture (2013) indicated that 14-13-6 W4M has a listed Historical Resource Value (HRV) of 5 (believed to contain a historical resource), however, the only legal subdivisions (LSDs) listed by Alberta Culture (2013) are LSDs 13 to 16. Since the proposed Project will not be located in any portion of 14-13-6 W4M with a listed HRV, clearance under the *Historical Resources Act* is not required.

Site Visit:

No historical resources or any evidence of the potential presence of a historical resource was observed during the site visit. Further information on the site visit is presented in Section 5.6.

5.6 Site Visit Details

A site visit was conducted of the proposed Project area on April 4, 2013. The objective of the site visit was to verify and supplement the information gathered through the desktop review. The site visit was conducted on foot by two TERA biologists and consisted of a thorough ground search of the proposed plant expansion area and surrounding vicinity.

The proposed Project area is located on gently undulating native prairie within a heavy industrial area that contains high amounts of existing disturbance. Disturbance within the proposed Project area includes: the existing Methanex facility, located directly south of the proposed expansion area; the Canadian Fertilizers Ltd. facility, located approximately 265 m northeast of the east boundary of the proposed expansion area; and Box Springs Road, located approximately 200 m west of the proposed expansion area. Smaller scale disturbances also

present in the proposed Project area include pipeline rights-of-way, well sites, and well site access roads. The existing Methanex facility is operational 24 hours a day resulting in consistently elevated noise levels throughout the proposed Project area.

The existing heavy industrial sites, in combination with other existing disturbances (i.e. pipelines, well sites, and well site access roads) have likely facilitated the introduction of invasive plant species to the proposed Project area. Invasive plant species were observed within the proposed Project area. Since the site visit was conducted outside of the growing season, the presence or absence of weeds could not be confirmed during the site visit.

The native prairie within and directly adjacent to the proposed Project area has the potential to provide habitat for rare plants, rare ecological communities, and wildlife species with special conservation status and their key habitat features (e.g., nests, dens, leks, etc.). However, the high level of existing disturbance in the proposed Project area (i.e. elevated noise levels, existing heavy industrial sites, pipelines, well sites, Box Springs Road, and well site access roads) reduces the likelihood of this area providing habitat for rare plants, rare ecological communities, and wildlife species with special conservation status. Since the site visit was conducted outside of the growing season, the presence or absence of rare plants and rare ecological communities could not be confirmed during the site visit. No wildlife species with special conservation status or their key habitat features were directly observed during the site visit, however, recent diggings of an American badger were observed throughout the proposed Project area. Despite the previously reported occurrence of plains spadefoot within 1 km of the proposed Project, no amphibian breeding habitat was observed. No wetlands were observed within or directly adjacent to the proposed Project area.

No obvious soils issues were observed during the site visit.

6.0 ENVIRONMENTAL EFFECTS

6.1 Conclusions from Environmental Setting Information

The high level of existing disturbance in the proposed Project area (i.e. elevated noise levels, existing heavy industrial sites, pipelines, well sites, Box Springs Road, and well site access roads) reduces the likelihood of this area providing habitat for rare plants, rare ecological communities, and wildlife species with special conservation status. However, the native prairie within and directly adjacent to the proposed Project area does have the potential to provide habitat for rare plants, rare ecological communities, and wildlife species with special conservation status and their key habitat features (e.g., nests, dens, leks, etc.); vegetation and wildlife field studies would be required prior to construction and early in an engineering and design stage to confirm their presence or absence.

Although there has been a historical occurrence of tiny cryptanthe (Cryptantha minima) identified within the vicinity of the proposed Project, it is not expected to be found within the proposed Project location as the habitat is not suitable for its presence (i.e. generally present on sandy soils and proposed Project location is located on relatively heavy clay till soils).

There are no fish-bearing permanent waterbodies or watercourses and no fish-bearing habitat present within or directly adjacent to the proposed Project area.

No amphibian breeding habitat occurs at the proposed Project location and no wetlands were observed within or directly adjacent to the proposed Project area.

The highly disturbed native prairie in the proposed Project area provides only marginal nesting habitat for migratory birds and there are no wetlands or waterbodies present in the proposed Project area. It is not expected that there will be any conflicts with migratory birds.

No significant issues with terrain or soil were noted for the proposed Project location.

There is no conflict with any known historical resources noted for the proposed Project location.

6.2 Changes to Wildlife or Habitat under Federal Jurisdiction

As identified in Section 5.2, there is no fish or fish habitat, no amphibian breeding habitat, and no wetlands in the proposed Project area. The highly disturbed native prairie in the proposed Project area provides only marginal nesting habitat for migratory birds and there are no wetlands or waterbodies present in the proposed Project area. As such, there will not be any changes caused to fish and fish habitat (as defined in the *Fisheries Act*), aquatic species (as defined in the *Species at Risk Act*), or migratory birds (as defined in the *Migratory Birds Convention Act*, 1994) as a result of the proposed Project.

6.3 Changes to the Environment on Federal Lands Outside of Alberta / Canada

No changes will occur to the environment on Federal lands outside of the Province of Alberta or outside of Canada as a result of carrying out the proposed Project.

6.4 Effect of Changes to the Environment on Aboriginal Peoples

It is believed that there will not be any negative effects on Aboriginal peoples as a result of any changes to the environment that may be caused as a result of carrying out the proposed Project, including effects on socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance.

7.0 ENGAGEMENT AND CONSULTATION WITH ABORIGINAL GROUPS

As support for the proposed Project, Methanex retained AMEC Human Environment (AMEC) to complete a high level investigation to identify Aboriginal groups that may be potentially affected and/or interested in the proposed Project, provide some general information about traditional territories, traditional land use, and land claims, and develop a proposed Aboriginal consultation plan. This section is a summary of the information provided by AMEC.

7.1 Potentially Affected / Interested Aboriginal Groups

The following is a discussion of the First Nations and Métis groups that may potentially have traditional territories or land uses in the area of the proposed Project location. It is noted that contact with each of the Aboriginal groups would be required to determine whether the

proposed Project area is specifically within their traditional territories or in proximity to any traditional land uses.

There is no known settlement land under a land claim agreement within close proximity to the proposed Project location.

The proposed Project will not require access to, use or occupation of, or exploration, development, and/or production of lands or resources currently used for known traditional purposes by Aboriginal peoples.

First Nations:

The project site and Medicine Hat, AB is on the boundary between Treaty #4 (Manitoba and Saskatchewan) and Treaty #7 (Southern Alberta); these treaties are between Canada and the First Nations. There are no reserves, as defined in the *Indian Act*, in the Medicine Hat area. Treaty #4 and Treaty #7 First Nations may have traditional territories in the project area and a general discussion of their traditional territories is presented in the following sections.

Contact with each of the identified First Nations would be required to determine whether the project area is specifically within their traditional territories or in proximity to any traditional land uses.

Treaty #4 First Nations:

The proposed Project is potentially within the traditional territory of members of File Hills Qu'Appelle Tribal Council. Specifically, one of the Tribal Council member Nations, Nekaneet First Nation, has a reserve in Southwestern Saskatchewan near Cypress Hills Interprovincial Park, SK, approximately 35 kilometres southwest of Maple Creek, SK and 85 kilometres southeast of Medicine Hat, AB. In its 1987 Claim Submission, Nekaneet First Nation stated that in the late 1800s, the Nation was a separate band in southwestern Saskatchewan. The band consisted of two groups: one located in the Saskatchewan Cypress Hills and one around Medicine Hat; this indicates that the Nekaneet First Nation historically used resources in the Medicine Hat area and potentially within or near the proposed Project area.

Treaty #7 First Nations:

The Siksika, Kainai, and Piikani First Nations are members of the Blackfoot Confederacy, which also includes the Blackfeet of Montana. As described on the Siksika Nation website, the Blackfoot, or the Children of the Plains, used a traditional territory that stretched from the North Saskatchewan River in Alberta and Saskatchewan to the south into Montana and from the Rocky Mountains to the Great Sand Hills in Saskatchewan. The proposed Project area would be on lands fitting the description of their traditional territory.

The Stoney Nakoda First Nation has a land claim that extends across southern Alberta from the Rocky Mountains to the Alberta/Saskatchewan border, again encompassing the Medicine Hat area and proposed Project area.

The Tsuu T'ina Nation are an Athapascan people with ties to northern Aboriginal peoples including the Beaver and Dene. Their traditional activities took place both in the Rocky

Mountains and on the plains. Those traditional activities may have extended into the Medicine Hat and proposed Project area.

Métis:

The Métis of southern Alberta are represented by the Métis Nation of Alberta Region 3. The Métis Nation in Medicine Hat is represented by Métis Local Council #8. Their location in the proposed Project area suggests that the Métis may have conducted traditional activities in the area and could be affected by the proposed Project. Contact with the Métis Local Council #8 would be required to determine whether the proposed Project area is specifically within their traditional territories.

7.2 Contact Information for Potentially Affected / Interested Aboriginal Groups

The Alberta Government maintains a listing of consultation contacts for each of the Province's First Nations; it is available at: http://www.aboriginal.alberta.ca/576.cfm and was accessed on April 16, 2013. Contact information for the Aboriginal groups from that listing that may potentially be affected by or interested in the proposed Project is presented in Table 4.

Table 4 - Aboriginal Groups Contact Information

Treaty #4	
File Hills Qu'Appelle Tribal Council Room 222-740 Sioux Avenue Box 985 Fort Qu'Appelle, Saskatchewan, SOG OCO Phone: (306) 332-8200 Phone: (306) 332-1811 www.fhqtc.com	**Nekaneet First Nation** Band Administration Office Maple Creek, SK S0N 1N0 Phone: (306) 662-3660 E-Mail nekaneet@sasktel.net

Note: table continued on next page.

Table 4 *Continued* - Aboriginal Groups Contact Information

Treaty #7	
Siksika Nation *[Updated April 6, 2013]* Richard Right Hand, Consultation Manager Email: rrh.siksika@gmail.com PO Box 1100 Siksika, AB, T0J 3W0 Office Phone: (403) 324-3240 J. Kent Ayoungman, Consultation Officer Phone: 403-901-6591 Email: kayoungman@hotmail.com	**Blood Tribe** *[Updated February 14, 2013]* JJ Shade, Interim Consultation Contact Blood Tribe Tribal Government & External Affairs PO Box 60 Standoff, AB, T0L 1Y0 Office Phone: (403) 737-8169 Cell Phone: (403) 448-0164 Email: jjshade@bloodtribe.org
Piikani Nation *[Updated September 20, 2012]* Byron Jackson, Manager Piikani Traditional Knowledge Services PO Box 3311 Brocket, AB, T0K 0H0 Office Phone: (403) 965-2985 Chief Gayle Strikes With A Gun & Lowell Yellow Horn PO Box 3311 Brocket, AB, T0K 0H0	**Stoney Nakoda First Nation (includes the Bearspaw First Nation, Chiniki First Nation, and Wesley First Nation)** [Updated September 20, 2012] William (Bill) Snow, Stoney Tribal Administration PO Box 120 Morley, AB, T0L 1N0 Office Phone: (403) 881-4760 Cell Phone: (587) 580-6212 Email: BillS@stoney-nation.com
Tsuu T'ina Nation [Updated April 6, 2013] Vanessa Crane, Tsuu T'ina Nation 9911 Chiila Blvd. Tsuu T'ina, AB, T2W 6H6 Office Phone: (403) 281-4455 Email: ttnconsultation@gmail.com	
Métis	
Métis Nation of Alberta **Region 3** 1415 - 28 Street NE Calgary, AB, T2A 2P6 Office Phone: (403) 569-8800 Toll Free Phone: 1 (800) 267-5844	**Métis Nation of Alberta Association Local Council '8' (Medicine Hat)** 517 3rd St. SE Medicine Hat, AB, T1A 0H2 Phone: (403) 504-4060 Email: metis8@miywasin.ab.ca

7.3 Aboriginal Consultation and Engagement Plan

Given that the proposed Project is still in the feasibility phase, Methanex has initially undertaken preliminary consultation activities and plans to conduct further consultation, as required, at a later stage. It is noted that detailed consultation with each of the Aboriginal groups would be required to determine whether the project area is specifically within their traditional territories or in proximity to lands used for traditional purposes. Methanex has forwarded a letter with a high-level description of the proposed Project to all of the identified Aboriginal groups encouraging the groups to contact Methanex with comments or questions in regards to the proposed Project.

To carry out any further required Aboriginal engagement and consultation Methanex would contact each of the previously identified First Nations and Métis groups via telephone or face-to-face meeting to determine whether any of the Aboriginal groups have traditional territory, traditional land uses, or land claims in or near the proposed Project area that could be affected by the proposed Project. For those groups that indicate they have Aboriginal interests that could be affected by the project, Methanex will work with those individual Aboriginal groups to establish a protocol to determine the level and timing of each consultation and engagement. It is noted that some of the Aboriginal groups have consultation guidelines which would inform the consultation and engagement protocol and process. For example, the Métis Nation of Alberta has policy guidelines regarding the duty to consult and these are available on their website (http://www.albertametis.com/MNAHome/Industry-Relations.aspx ; accessed April 16, 2013); the Stoney Nation conducts their consultation through the Stoney Information Letter.

Further Aboriginal consultation and engagement would provide each of the interested Aboriginal groups with information regarding the proposed Project scope, timing and opportunities for discussion. Methanex would provide opportunities for each Aboriginal group to express any concerns and interests with the proposed Project. Methanex would record and respond to those concerns and to questions about the proposed Project. Methanex would include the interested Aboriginal groups in the distribution of information that is provided to other groups and stakeholders.

8.0 CONSULTATION WITH PUBLIC AND OTHER NON-ABORIGINAL GROUPS

Methanex's goal is to build meaningful and sustainable relationships with communities potentially affected by existing and future operations. The objectives of consultation with public and other non-aboriginal groups (stakeholders) are to inform and identify concerns and issues that can be proactively addressed during the project design and/or operation.

8.1 Potentially Affected and Interested Stakeholders

Table 5 - Listing of Potentially Affected and/or Interested Stakeholders

Federal
• Canadian Environmental Assessment Agency • LaVar Payne, MP, Medicine Hat
Provincial
• Ministry of Environment and Sustainable Resource Development • Energy Resource Conservation Board • Hunter Wight, Executive Director, Office of the Premier, Southern Alberta at Government of Alberta • Blake Pedersen, MLA, Medicine Hat • Drew Barnes, MLA, Cypress-Medicine Hat

Note: table continued on next page.

Table 5 *Continued* - Listing of Potentially Affected and/or Interested Stakeholders

Local
• Public at large • City of Medicine Hat Mayor and Council • City of Medicine Hat Environmental Utilities • City of Medicine Hat Administrative Committee • City of Medicine Hat Emergency Management • Town of Redcliff Mayor and Council • Cypress County Council • Box Springs Business Park • Medicine Hat Heavy Industrial Group (Canadian Fertilizers, Viterra, Cancarb, Goodyear) • Methanex Community Advisory Panel • Medicine Hat and District Chamber of Commerce • Palliser Airshed Society • Southeast Alberta Watershed Alliance • Economic Development Alliance of Southeast Alberta • Community Foundation of Southeastern Alberta • Medicine Hat College

8.2 Overview of Stakeholder Consultation Activities to Date

Given that the proposed Project is still in the feasibility phase, Methanex has initially undertaken preliminary consultation activities and plans to conduct further consultation, as required, at a later stage. Through face-to-face meetings, plant tours, and telephone meetings, the following general information about the proposed Project was presented to the stakeholders listed in this section. Since the time of these meetings, some of the presented information has been revised slightly; for accuracy of those discussions the information presented here reflects the information that was presented and believed to be accurate at that time.

> *Methanex is the global leader in methanol production and supply. The recent impact of shale gas development in North America has resulted in a competitive environment in which to produce methanol. Methanex has taken advantage of the competitive gas pricing environment in North America and restarted its Medicine Hat facility and is relocating two of its Chile plants to Giesmar, Louisanna. Methanex is also examining options for further growth, including additional methanol capacity in North America to supply the fast-growing Asia Pacific markert.*
>
> *One option Methanex is examining is the potential for a new 1.1 to 1.3 million tonne per year methanol production facility at its Medicine Hat location. The plant would utilize steam reforming technology and would be operational in late 2017. Capital cost for the project would be over US$1billion and would have a direct impact on the local economy.*
>
> *Methanex's goal is to make a decision on the preferred location for its new methanol plant in Q3 2013 in order to allow for timely project execution. A key consideration will be to select a location that presents minimal to no issues that could have an impact on the overall project schedule.*

Medicine Hat is one of a number of potential locations being considered for Methanex's new methanol production facility build. It remains to be determined whether the Medicine Hat location will require a federal or provincial environmental impact assessment, however, it is Methanex's view that an environmental impact assessment should not be required as Methanex's Operating Approval application to Alberta Environment and Sustainable Resource Development will address the potential environmental issues and requisite mitigation associated with this type of facility. Methanex has completed a high-level environmental review and there were no known significant ecological sensitivities noted. Methanex would ensure a new plant in Medicine Hat would meet all required regulatory approval requirements at all levels of government.

The following key comments and concerns presented in Table 6 should be read in the context of a meeting where the above information was presented and are a high-level summary only (i.e. not necessarily an exhaustive representation of the discussions that occurred).

Table 6 - Stakeholder Consultation Activities to Date

Stakeholder	Date(s) of Consultation	Means of Consultation	Key Comments / Concerns
City of Medicine Hat Emergency Management	February 1, 2013	Face-to-face Meeting	• Discussed project and collaboration of emergency management plans. No concerns raised.
City of Medicine Hat, Mayor Norm Boucher	February 8, 2013	Face-to-face Meeting	• Discussed whether Methanex will require additional water, waste water and electricity services from the City. • Inquired about the potential benefits to Medicine Hat.
Blake Pedersen, MLA, Medicine Hat	February 8, 2013	Face-to-face Meeting	• Inquired about the potential benefits for the local region and required labour force during construction and operations.
Economic Development Alliance of Southeast Alberta	February 21, 2013	Face-to-face Meeting	• Inquired about the potential benefits for the local region and required labour force during construction and operations.
City of Medicine Hat Administrative Committee	March 7, 2013	Face-to-face meeting	• No concerns expressed. Encouraged further discussions with Methanex for the water, waste water and electrical services required for the project.
City of Medicine Hat Environmental Utilities and CF Industries	March 20, 2013	Face-to-face Meeting	• Discussed supply of water and waste water utilities for the project. No concerns about the City being able to supply services. Discussed potential river water intake/pump option. Discussions ongoing.

Note: table continued on next page.

Table 6 *Continued* - Stakeholder Consultation Activities to Date

Community Advisory Panel (CAP)	March 21, 2013	Plant tour and Face-to-face meeting	• Inquired whether there will be any increased rail traffic. Methanex response: Project would add about 2 additional rail car switches a day.
Alberta Environment and Sustainable Resource Development (AESRD) and Canadian Environmental Assessment Agency (CEAA)	March 22, 2013	Face-to-face meeting / telephone	• AESRD inquired about onsite storage capacity and required water supply; raised that a moratorium exists on new Saskatchewan River Basin licenses and that a river water intake option may have *Water Act* impact • CEAA inquired about potential river water intake/pump option; raised that First Nations/Metis consultation may be required; raised potential need for compliance with Fisheries & Oceans Canada, Transport Canada/Navigable waters regulations.
LaVar Payne, MP, Medicine Hat	February 8, 2013 April 12, 2013	Face-to-face Meeting	• Inquired about the new plant capacity once the distillation expansion is completed. • Asked when Methanex anticipates production if the new plant build is approved. • Inquired where Methanex will get water for a new plant. • Asked about the payroll and services impact on the local economy.

8.3 Overview of Ongoing and Proposed Stakeholder Consultation Activities

The sequence, extent and direction of stakeholder consultation will depend on the completion of the feasibility phase and the path of the approval process for the proposed Project. The stakeholder consultation process can be significantly affected by the regulatory process and stakeholders, and cannot be definitively predicted at this time.

As indicated previously, the stakeholder consultations to date have primarily involved face-to-face meetings. Methanex has addressed all concerns and comments raised during these consultations and will continue to do so.

8.4 Consultation with Other Jurisdictions

Methanex has conducted initial consultations with representatives from both the Environmental Assessment Group and the Industrial Authorizations Team of Alberta Environment and Sustainable Resource Development (AESRD). The proposed Project has been discussed at a high-level with the following representatives from AESRD:

- Corinne Kristensen, Acting Team Leader, Environmental Assessment Group;
- Sarabpreet Singh, Environmental Assessment Co-ordinator, Environmental Assessment Group; and
- Susan McIntosh, Team Leader, Industrial Authorizations Team, AESRD.

A face-to-face meeting was held with Corinne Kristensen and Sarabpreet Sing from the AESRD Environmental Assesment Group on March 22, 2013 in Edmonton, AB. Discussions with Ms. Kristensen and Mr. Sing focused around the Alberta Provincial Environmental Assessment (EA) requirements and Methanex also provided a high-level summary of the project concept. Under the Alberta Provincial EA regulatory scheme, the Project is not on the "Mandatory" or "Exclusion" list of the *Alberta Environmental Assessment (Mandatory and Exempted Activities) Regulation*. As such, it is considered a discretionary activity and will need to be reviewed by the AESRD, Environmental Assessment Team on a case-specific basis to determine whether or not an EA is required. Methanex will be submitting project summary documentation to AESRD requesting a determination of whether or not AESRD will require an EA for the Project. It is worthy to note that during the application process to achieve an EPEA Operating Approval for the re-start of the facility in 2011, a Provincial EA was not required.

Discussions with Susan McIntosh have occurred on multiple occasions in 2013 and have revolved around the Alberta *Environmental Protection and Enhancement Act* (EPEA) approval requirements for the proposed Project; Ms. McIntosh also participated via telephone in the discussion regarding Alberta Provincial EA requirements on March 22, 2013. The existing Medicine Hat facility is classified as a Division 2, Part 2 (b) (ix) "a petrochemical manufacturing plant" under the EPEA, *Activities Designation Regulation*. As such, the facility requires an EPEA Operating Approval from AESRD. The existing facility currently holds EPEA Operating Approval No. 9887-03-03. An expansion to the facility (i.e. the construction and operation of a new/additional plant) would require an amendment to the current EPEA Operating Approval.

APPENDIX A: AERIAL VIEWS

Aerial View of Existing Medicine Hat Location & Infrastructure

SCALE
1: 4000
0 20 40 60 80 m

amec

METHANEX
A Responsible Care® Company

CLIENT: METHANEX PLANT
MEDICINE HAT, AB

PROJECT:

TITLE: Figure A-1:
Aerial View of Existing Methanex Medicine Hat Facility

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.

FORMER REFUELING AREA
METHANOL TAILS STORAGE (ALCOHOLS & H_2O)
SOME HAZARDOUS WASTE STORAGE (OIL, BATTERIES ETC.)
LAYDOWN/BONEYARD AREA
CRUDE METHANOL STORAGE
HISTORIC CATALYST STORAGE
LAYDOWN AREA
STORAGE / FAB SHOP
INTERMEDIATE METHANOL STORAGE
BOX SPRINGS ROAD
HISTORIC CHEMICAL STORAGE SHED
RUNDOWN TANKS
METHANOL CONVERTER/SYNTHESIS AREA
OVERHEAD COOLER AND PIPE RUNS
GASOLINE TANK (2250 L)
HAZ WASTE STORAGE
GLYCOL TANK
WATER/STEAM CONDENSATE BUILDING
DIESEL TANK (2250 L)
FORMER WASTE OIL UST (1173 L)
STORM WATER STORAGE POND
LANDFARM AREA
COMPRESSOR BUILDING
DISTILLATION EQUIPMENT AREA
COOLING WATER PUMPHOUSE
TOWER
FIRE TRAINING AREA
MAINTENANCE SHOPS BUILDING
MINOR FUEL STORAGE
BFW PUMP HOUSE
WATER TREATMENT
SPOIL STORAGE AREA
PARKING LOT
WAREHOUSE
OIL STORAGE BUILDING
REFORMER
CONTROL ROOM
FLARE STACK
SECURITY BUILDING
EMERGENCY RESPONSE BUILDING
DEMIN WATER TANKS
ADMIN BUILDING
NATURAL GAS BACKUP GENERATOR
DIESEL BACKUP GENERATOR (SOME DIESEL STAINING ON SOIL)
TRAINING BUILDING
FORMER PLANT LOCATION #1
NITROGEN BUILDING MCC 8
FORMER PLANT LOCATION #2
RUN-OFF POND
RAW WATER STORAGE POND 11,600,000 GALS.
WASTE WATER STORAGE POND
WASTE WATER STORAGE POND
FORMER LOCATION OF WASTE WATER POND
REFRIGERANT (AMMONIA)
VRU
TRUCK & RAILCAR LOADING AREA
BOX SPRINGS ROAD
1
2
3
4
FORMERLY UNLINED (PRE 2010)
REFINED METHANOL STORAGE TANKS
HISTORIC SURFACE WATER PONDING (SOUTHEAST CORNER RUNOFF RETENTION POND)

SCALE
1: 3000
0 20 40 60 m

LEGEND:
FORMER PLANT LOCATION

amec
METHANEX
A Responsible Care® Company

CLIENT: METHANEX PLANT MEDICINE HAT, AB

PROJECT:

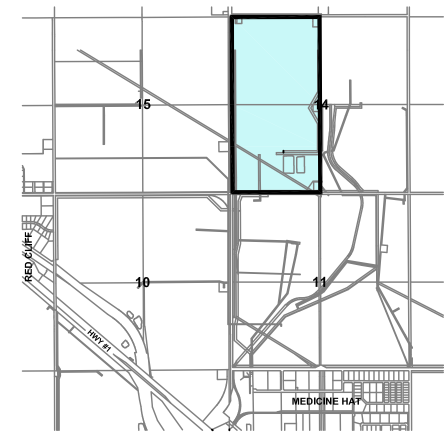
TITLE: **Figure A-2: Aerial View of Existing Methanex Medicine Hat Facility with Overlay of Infrastructure Line Drawing and Labels**

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.

PLOT 1:1=8 (L)
\\BRK\09235\09236006.dwg — FIGURE A2.1 — Aug. 17, 2012, 5:02pm — michael.jomes-davies

APPENDIX B: SITE PLANS

Proposed Project Site Plans



LOCATION PLAN

REVISION / ISSUED

No.	DATE	DESCRIPTION	BY	MWS - REF. #
0	MARCH 22, 2013	- PLAN ISSUED	BRW	M-0152-13
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LEGEND

Buried Pipe shown thus:
Buried Cable shown thus:
Buried Electrical Cable shown thus:
Buried Cathodic Cable shown thus:
Buried Telus Cable shown thus:
Buried Fire Water Line shown thus:
Buried Sewer shown thus:
Buried Storm Sewer shown thus:
Buried Water Line shown thus:
Buried Unknown Facility shown thus:
Buried Gas Co-op Line shown thus:
Above Ground Pipe shown thus:
Overhead Powerline shown thus:
Fence (Chain Link) Line shown thus:
Fence Line shown thus:
Culvert Line shown thus:

Utility Corridor shown thus:
Building shaded thus:
Tank shaded thus:
Gravel Surface shaded thus:
Asphalt Surface shaded thus:
Concrete shaded thus:
Pipe / Cable Tray shaded thus:
Stairs / Catwalk shaded thus:
Swept Area shown thus:
Power Pole shown thus:
Guy Wire shown thus:
Electrical Panel shown thus:
Telus Pedestal shown thus:
Riser shown thus:
Valve shown thus:
Light Standard shown thus:
Ground Rod shown thus:
Bollard shown thus:
Piezometer shown thus:
Bore Hole shown thus:
Fire Extinguisher shown thus:
Flare Stack shown thus:
Windsock shown thus:
Manhole shown thus:
Catch Basin shown thus:
Fire Hydrant shown thus:

NOTES:
CONTOUR INTERVAL = 0.50m
- Proposed plant information provided by Methanex.

50 40 30 20 10 0 50 100

NOTE: Positions of buried facilities shown are derived from interpretations of signals from electronic devices. Reception of electronic signals is subject to interference and has limitations, therefore it should not be assumed that all buried facilities are shown, and facilities which are shown should not be construed as "located" until physically exposed. All underground installations should be marked by the respective authorities prior to excavation or construction.
Alberta One Call: 1-800-242-3447

Figure B-1: Proposed Project Conceptual Site Plan

PRELIMINARY
May 10, 2013 2:05 PM

METHANEX

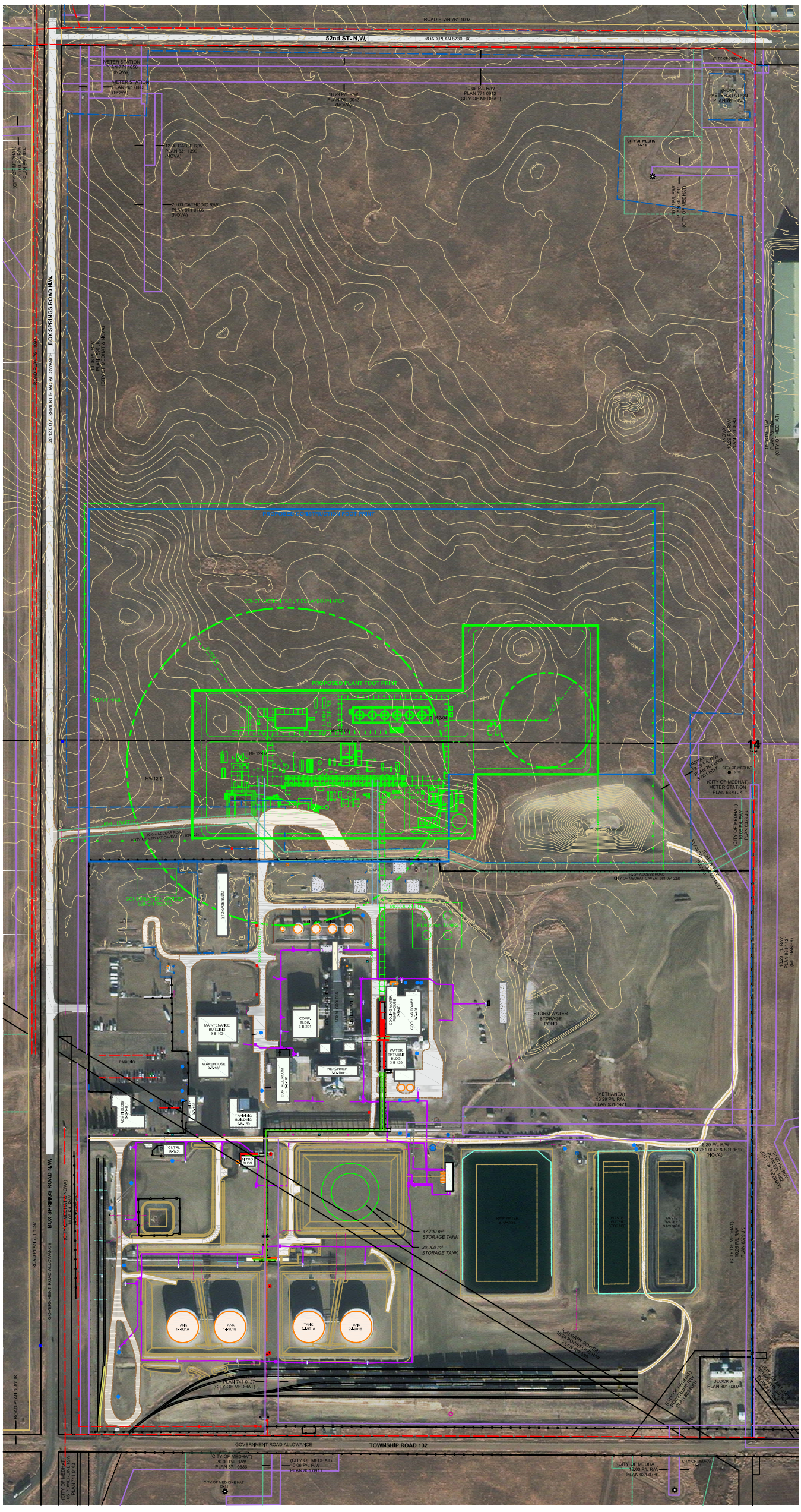
METHANEX PLANT SITE - MEDICINE HAT, ALBERTA - CANADA

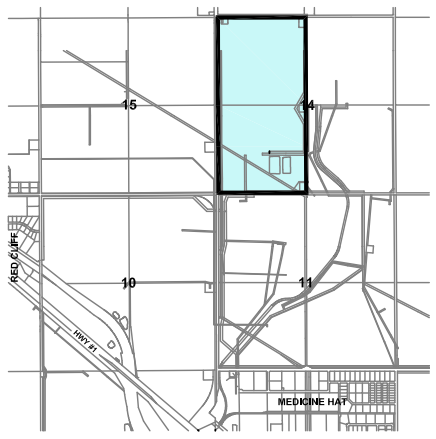
PLAN SHOWING

TOPOGRAPHIC SITE PLAN
IN
W.1/2 Sec.14 Twp.13 Rge.6 W.4M.

CITY OF MEDICINE HAT

SCALE 1:2000	MIDWEST SURVEYS INC. MEDICINE HAT - PHONE: 403-527-2944 (1-800-387-9703) FAX: 403-526-1271	REVISION 0
SHEET No. 1 of 1	MIDWEST SURVEYS	M-0152-13





LOCATION PLAN

REVISION / ISSUED

No.	DATE	DESCRIPTION	BY	MWS - REF. #
0	MARCH 22, 2013	- PLAN ISSUED	BRW	M-0152-13

LEGEND

Buried Pipe shown thus:
Buried Cable shown thus:
Buried Electrical Cable shown thus:
Buried Cathodic Cable shown thus:
Buried Telus Cable shown thus:
Buried Fire Water Line shown thus:
Buried Sewer shown thus:
Buried Storm Sewer shown thus:
Buried Water Line shown thus:
Buried Unknown Facility shown thus:
Buried Gas Co-op Line shown thus:
Above Ground Pipe shown thus:
Overhead Powerline shown thus:
Fence (Chain Link) Line shown thus:
Fence Line shown thus:
Culvert Line shown thus:

Utility Corridor shown thus:
Building shaded thus:
Tank shaded thus:
Gravel Surface shaded thus:
Asphalt Surface shaded thus:
Concrete shaded thus:
Pipe / Cable Tray shaded thus:
Stairs / Catwalk shaded thus:
Swept Area shown thus:
Power Pole shown thus:
Guy Wire shown thus:
Electrical Panel shown thus:
Telus Pedestal shown thus:
Riser shown thus:
Valve shown thus:
Light Standard shown thus:
Ground Rod shown thus:
Bollard shown thus:
Piezometer shown thus:
Bore Hole shown thus:
Fire Extinguisher shown thus:
Flare Stack shown thus:
Windsock shown thus:
Manhole shown thus:
Catch Basin shown thus:
Fire Hydrant shown thus:

NOTES:
CONTOUR INTERVAL = 0.50m
- Proposed plant information provided by Methanex.

NOTE: Positions of buried facilities shown are derived from interpretations of signals from electronic devices. Reception of electronic signals is subject to interference and has limitations, therefore it should not be assumed that all buried facilities are shown, and facilities which are shown should not be construed as 'located' until physically exposed. All underground installations should be marked by the respective authorities prior to excavation or construction.
Alberta One Call: 1-800-242-3447

Figure B-2: Proposed Project Conceptual Site Plan with Topographic Elevation Contours

PRELIMINARY

METHANEX

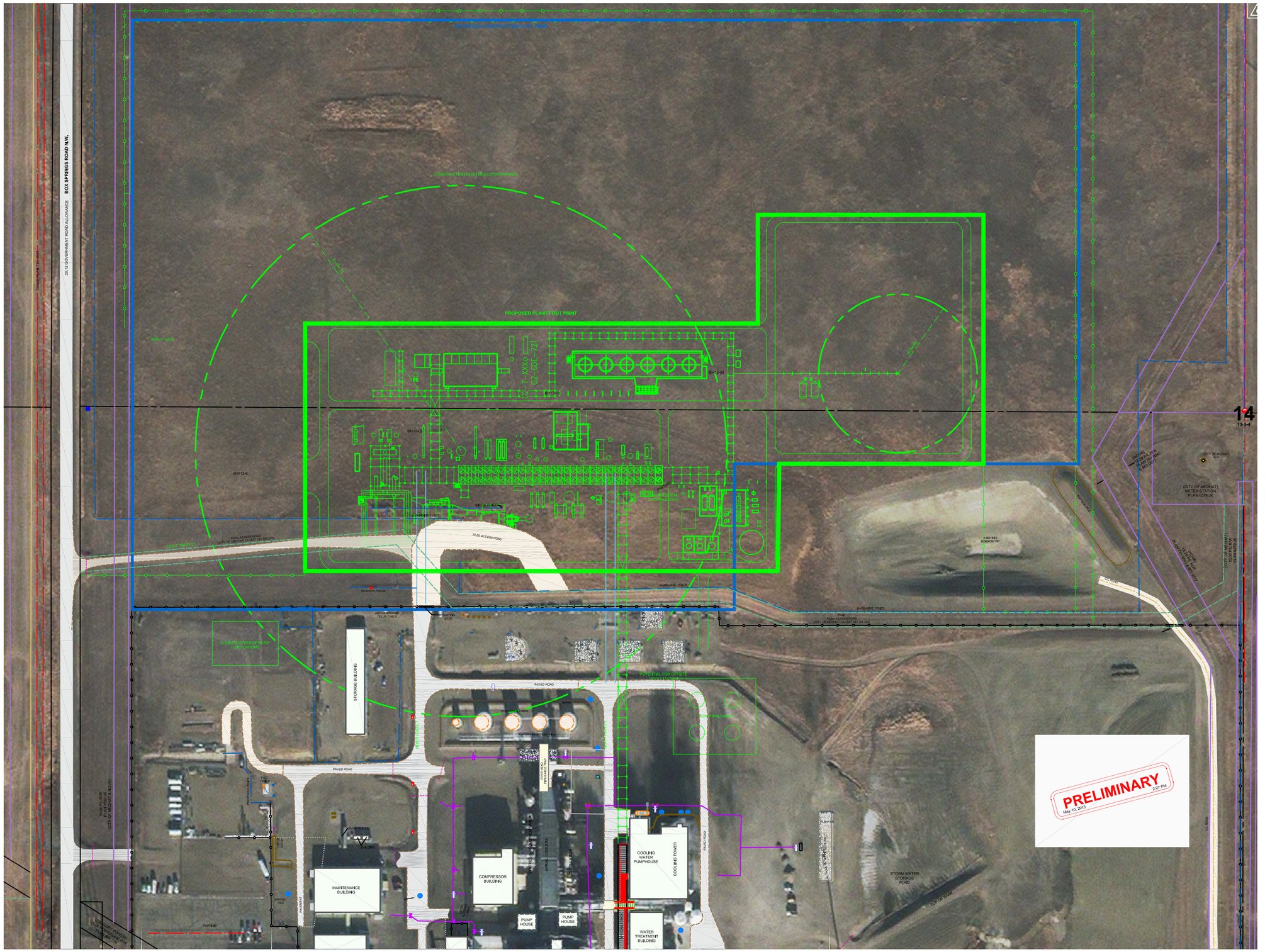
METHANEX PLANT SITE - MEDICINE HAT, ALBERTA - CANADA

PLAN SHOWING

TOPOGRAPHIC SITE PLAN
IN
W.1/2 Sec.14 Twp.13 Rge.6 W.4M.

CITY OF MEDICINE HAT

SCALE 1:2000	MIDWEST SURVEYS INC.	REVISION 0
SHEET No. 1 of 1	MEDICINE HAT - PHONE: 403-527-2944 (1-800-387-9703) FAX: 403-526-1271	M-0152-13



PLAN SHOWING
FEASIBILITY STUDY
TOPOGRAPHIC SITE PLAN
W.1/2 Sec.14 Twp.13 Rge.6 W.4M.
CITY OF MEDICINE HAT

METHANEX

LEGEND

Buried Pipe shown thus:
Buried Cable shown thus:
Buried Electrical Cable shown thus:
Buried Telus Cable shown thus:
Buried Fire Water Line shown thus:
Buried Sewer shown thus:
Buried Storm Sewer shown thus:
Buried Water Line shown thus:
Buried Unknown Facility shown thus:
Buried Gas Co-op Line shown thus:
Above Ground Pipe shown thus:
Overhead Power line shown thus:
Fence (Chain Link) Line shown thus:
Fence Line shown thus:
Culvert shown thus:
Utility Corridor shown thus:
Building shaded thus:
Tank shaded thus:
Gravel Surface shaded thus:
Concrete shaded thus:
Pipe / Cable Tray shaded thus:
Drains / Catchalls shaded thus:
Asphalt Surface shaded thus:
Power Pole shown thus:
Guy Wire shown thus:
Electrical Panel shown thus:
Telus Pedestal shown thus:
Riser shown thus:
Valve shown thus:
Light Standard shown thus:
Ground Rod shown thus:
Bollard shown thus:
Piezometer shown thus:
Bore Hole shown thus:
Fire Extinguisher shown thus:
Flare Stack shown thus:
Windsock shown thus:
Manhole shown thus:
Catch Basin shown thus:
Fire Hydrant shown thus:

NOTES:
CONTOUR INTERVAL = 0.25m

No.	DATE	REVISION / ISSUED	JOB No.	SCALE 1:1000
0.	Mar. 22, 2013	PLAN ISSUED	M-0152-13	

CHK'D BY: ND | DRAWN BY: BRW

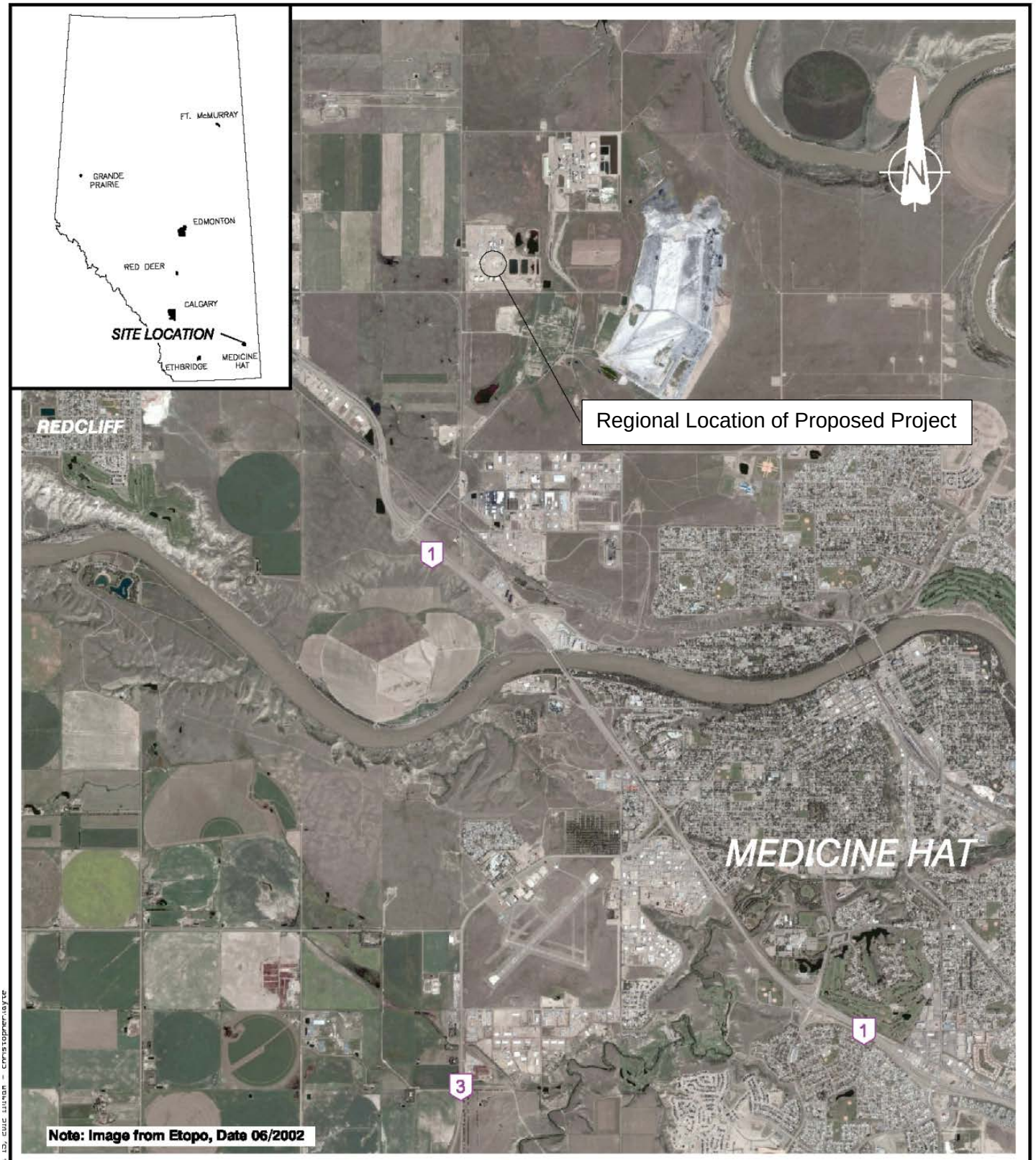
MIDWEST SURVEYS INC.
#100, 1825 - Bomford Crescent S.W.
Medicine Hat, AB
T1A 5E6
Tel: 403-527-2944

M-0152-13-STE

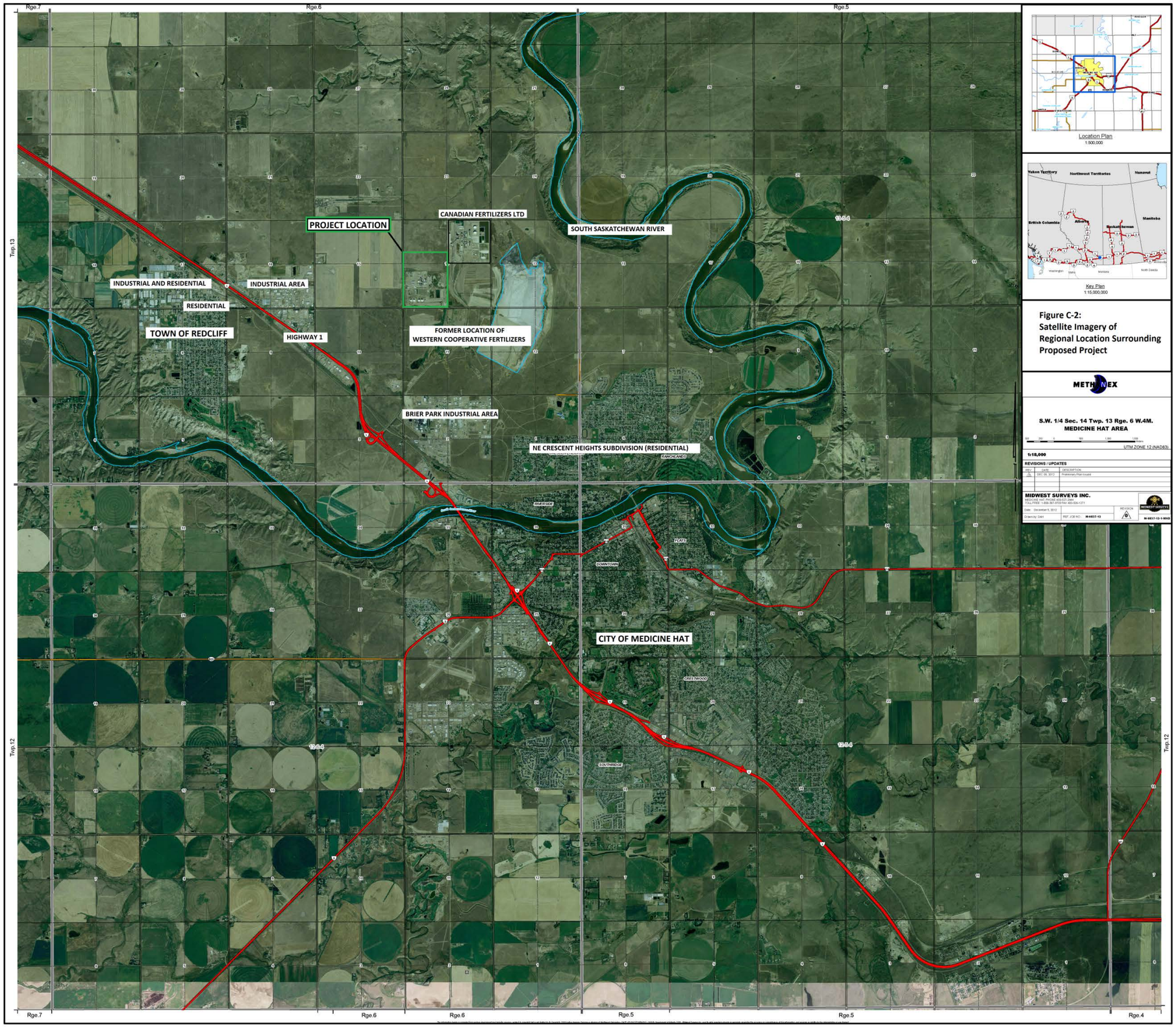
Figure B-3: Proposed Project Conceptual Site Plan Zoomed In

APPENDIX C: REGIONAL MAPS

Regional Maps / Satellite Imagery



AMEC Earth & Infrastructure Methanex Corporation	METHANEX® A Responsible Care® Company	METHANEX PLANT MEDICINE HAT, AB
TITLE **Figure C-1: Regional Location of Proposed Project**	DWN BY:	DATUM: NA / DATE: AUGUST 2012
PROJECT	CHK'D BY: SCALE:	PROJECT NO:



Location Plan
1:500,000

Key Plan
1:15,000,000

Figure C-2:
Satellite Imagery of Regional Location Surrounding Proposed Project

METHANEX

S.W. 1/4 Sec. 14 Twp. 13 Rge. 6 W.4M.
MEDICINE HAT AREA

1:18,000

UTM ZONE 12 (NAD83)

REVISIONS / UPDATES

REV	DATE	DESCRIPTION
0	DEC. 05, 2012	Preliminary Plan Issued

MIDWEST SURVEYS INC.
MEDICINE HAT, PHONE 403-529-3556
TOLL FREE: 1-800-367-4703 FAX: 403-526-1271

Date: December 5, 2012
Drawn by: DAH
REVISION: 0
REF. JOB NO: M-6837-13
M-6837-13-1-MAP

APPENDIX D: LEGAL TITLES

Legal Land Titles for Lands Owned by Methanex and Affected by Proposed Project

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0020 941 076	4;6;13;14;NW	941 013 227 +1

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 6 TOWNSHIP 13
SECTION 14
QUARTER NORTH WEST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES	ACRES (MORE OR LESS)
THE METER STATION SITE	7610043	0.559	1.38
THE METER STATION SITE	7610943	0.081	0.20
THE METER STATION SITE	7711056	0.291	0.72

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF MEDICINE HAT

REFERENCE NUMBER: 891 005 083

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
941 013 227	14/01/1994	TRANSFER OF LAND	$92,000,000	SEE INSTRUMENT

OWNERS

METHANEX CORPORATION.
OF 1800 WATERFRONT CENTRE
200 BURRARD ST
VANCOUVER
BRITISH COLUMBIA V6C 3M1

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
905JA .	16/06/1964	PUBLIC UTILITIES BOARD ORDER IN FAVOUR OF - DELTA GAS AND TRANSMISSION LTD. AFFECTED PLAN: 1590JK ORDER NO. 26474
761 096 501	30/07/1976	UTILITY RIGHT OF WAY GRANTEE - THE ALBERTA GAS TRUNK LINE CO LTD. AS TO PORTION OR PLAN:7610043 "TAKES THE PRIORITY OF CAVEAT 751102227 REGISTERED 18/09/1975"
771 140 174	07/10/1977	UTILITY RIGHT OF WAY GRANTEE - NOVA AN ALBERTA CORPORATION. AS TO PORTION OR PLAN:7710912 "DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 821198590"
811 170 941	09/09/1981	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF MEDICINE HAT. AS TO PORTION OR PLAN:8110877 "TAKES THE PRIORITY OF CAVEAT 801143638 REGISTERED 16/09/1980" (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 911287543)
821 139 586	11/08/1982	UTILITY RIGHT OF WAY GRANTEE - NOVA AN ALBERTA CORPORATION. AS TO PORTION OR PLAN:1590JK "DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 821198590"
821 166 971	29/09/1982	CAVEAT CAVEATOR - NOVA AN ALBERTA CORPORATION. "DATA UPDATED BY: TRANSFER OF CAVEAT 821198590"
821 212 795	10/12/1982	CAVEAT RE : SEE CAVEAT CAVEATOR - NOVA AN ALBERTA CORPORATION. 801-7 AVENUE S.W. CALGARY ALBERTA
831 019 753	03/02/1983	MORTGAGE OF UTILITY RIGHT OF WAY MORTGAGEE - MONTREAL TRUST COMPANY. AFFECTS INSTRUMENT: 761096501
831 183 867	05/10/1983	CAVEAT

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		RE : EASEMENT CAVEATOR - NOVA AN ALBERTA CORPORATION. 801-7 AVENUE S.W. CALGARY ALBERTA
971 001 392	03/01/1997	CAVEAT RE : RIGHT OF WAY AGREEMENT CAVEATOR - NOVA GAS TRANSMISSION LTD. 801-7 AVE S.W. P.O. BOX 2535 STATION "M" CALGARY ALBERTA T2P2N6 AGENT - LESLIE THOMAS
081 370 026	01/10/2008	CAVEAT RE : LEASE INTEREST UNDER 20 ACRES CAVEATOR - THE CITY OF MEDICINE HAT. ATTN: GAS UTILITY MANAGER 364 KIPLING ST SE MEDICINE HAT ALBERTA T1A1Y4

TOTAL INSTRUMENTS: 011

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 20 DAY OF MARCH, 2013 AT 10:07 A.M.

ORDER NUMBER:23133653

CUSTOMER FILE NUMBER: 10035.035

END OF CERTIFICATE

(CONTINUED)

OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0022 637 680	4;6;13;14;SW	941 013 227

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 6 TOWNSHIP 13
SECTION 14
QUARTER SOUTH WEST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES	ACRES MORE OR LESS
SUBDIVISION	8010307	0.579	1.43

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF MEDICINE HAT

REFERENCE NUMBER: 891 004 957

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
941 013 227	14/01/1994	TRANSFER OF LAND	$92,000,000	SEE INSTRUMENT

OWNERS

METHANEX CORPORATION.
OF 1800 WATERFRONT CENTRE
200 BURRARD ST
VANCOUVER
BRITISH COLUMBIA V6C 3M1

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
9001HC .	08/02/1957	UTILITY RIGHT OF WAY GRANTEE - ALTALINK MANAGEMENT LTD.. 2611 - 3 AVE SE CALGARY ALBERTA T2A7W7 AS TO PORTION OR PLAN:8159GW (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 021218501) (DATA UPDATED BY: CHANGE OF ADDRESS 091118576)
906JA .	16/06/1964	PUBLIC UTILITIES BOARD ORDER IN FAVOUR OF - DELTA GAS AND TRANSMISSION LTD. AFFECTED PLAN: 1590JK ORDER NO. 26475
821 116 819	05/07/1982	UTILITY RIGHT OF WAY GRANTEE - NOVA AN ALBERTA CORPORATION. AS TO PORTION OR PLAN:8010617
821 139 586	11/08/1982	UTILITY RIGHT OF WAY GRANTEE - NOVA AN ALBERTA CORPORATION. AS TO PORTION OR PLAN:1590JK "DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 821198590"
821 212 797	10/12/1982	CAVEAT RE : SEE CAVEAT CAVEATOR - NOVA AN ALBERTA CORPORATION. 801-7 AVENUE S.W. CALGARY ALBERTA
021 446 432	18/12/2002	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF MEDICINE HAT.
031 236 356	15/07/2003	DISCHARGE OF UTILITY RIGHT OF WAY 021446432 PARTIAL EXCEPT PLAN/PORTION: 0310780
081 034 223	24/01/2008	CAVEAT RE : LEASE INTEREST UNDER 20 ACRES CAVEATOR - THE CITY OF MEDICINE HAT. 364 KIPLING STREET SE, MEDICINE HAT ALBERTA T1A1Y4 AGENT - DAVID J PANABAKER

(CONTINUED)

TOTAL INSTRUMENTS: 008

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 20 DAY OF MARCH, 2013 AT 10:14 A.M.

ORDER NUMBER:23133751

CUSTOMER FILE NUMBER: 10035.035

END OF CERTIFICATE

APPENDIX E: ENVIRONMENTAL OVERVIEW REPORT

Environmental Overview Report for the Proposed Methanex Corporation Medicine Hat Plant Expansion

ENVIRONMENTAL OVERVIEW FOR THE PROPOSED METHANEX CORPORATION MEDICINE HAT PLANT EXPANSION

April 2013
10035

Prepared for:

Methanex Corporation
3806 Box Springs Road N.W. Medicine Hat, Alberta T1A 7H1

Prepared by:

TERA Environmental Consultants
159 Southwest Drive S.W. Medicine Hat, Alberta T1A 8E8
Ph: 403-527-4010

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1.0 INTRODUCTION

Methanex Corporation (Methanex) is in the process of completing a feasibility study for the proposed expansion of their Medicine Hat Methanol Plant (the Project). As support for the feasibility study, Methanex has retained TERA Environmental Consultants (TERA) to complete a high level environmental overview of the Project area (Figure 1) and surrounding vicinity to identify potential environmental sensitivities within the Project area based on readily available and recent environmental reports, database searches and a site visit.

This report provides a review of readily available and easily accessible environmental information relevant to the Project, including information relevant to environmental legislation and regulations, land use and natural resource use, terrain and soils, hydrology and fish, vegetation, wildlife and historical resources. This report also provides the results of a site visit which was conducted April 4, 2013, to supplement and verify the information collected for the Project area.

R 6 W4M

52 Street NW

Box Springs Road NW

15
13-6 W4M

14
13-6 W4M

T 13

T 13

R 6 W4M

N

METHANEX

April 2013

FIGURE 1

REGIONAL LOCATION

METHANEX CORPORATION
ENVIRONMENTAL OVERVIEW

10035

Road

Proposed Project Activities

* Please note that the entire map extent falls within the Municipal Boundaries of the City of Medicine Hat.

SCALE: 1:10,000

0 100 200 300 400 m

(All Locations Approximate)

tera ENVIRONMENTAL CONSULTANTS

UTM Zone 12N
Imagery provided by Methanex, Mar 13, 2013;
Roads: IHS Inc. 2013.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

Mapped By: JJK | Checked By: LA

10035_Fig1_Overview_RevO_13Mar2013.mxd

2.0 REGULATORY AND ENVIRONMENTAL FRAMEWORK

Various acts, regulations, guidelines and permits may apply to the Project. A summary of some applicable environmental regulatory requirements that may apply to the Project are provided in Table 1. This list is not designed to be an exhaustive list of all regulatory requirements, but rather a guide to the most common and applicable to the Project.

TABLE 1

REGULATORY FRAMEWORK

Legislation/Regulation	Overseeing Agency	Comments
Municipal Authorities		
Land Use By-law (LUB) By-law No. 3181	City of Medicine Hat	The City of Medicine Hat LUB is in place to "*regulate and control or prohibit the use and development of land and buildings within the city*".
Municipal Development Plan (MDP) By-law No. 4105	City of Medicine Hat	The City of Medicine Hat MDP provides a framework for growth and development for the city over the next 30 years.
Tri-Area Intermunicipal Development Plan (IDP)	City of Medicine Hat Town of Redcliff Cypress County	The IDP establishes a regional planning framework for the county to increase economic opportunities and manage land use, subdivision and development.
Provincial Authorities		
Environmental Protection and Enhancement Act	Alberta Environment and Sustainable Resource Development (AESRD)	The *Environmental Protection and Enhancement Act* governs all issues related to the environment and is designed to support and promote the protection, enhancement and wise use of the environment. Numerous regulations, Codes of Practice and standards and guidelines are associated with the *Act*.
Historical Resources Act	Alberta Culture	*Historical Resources Act* clearance is not always required for residential developments, however, Section 31 of the *Act* stipulates that the Minister must be notified of the discovery of any historical resource.
Water Act	AESRD	*Water Act* approval is required for all activities that may impact water and the aquatic environment.
Wildlife Act	AESRD	The Alberta *Wildlife Act* is the provincial legislation that protects wildlife and wildlife habitat. Section 36 (1) of the *Act* states that it is unlawful to willfully molest, disturb or destroy the house, nest or den of a prescribed wildlife species.
Federal Authorities		
Migratory Birds Convention Act	Environment Canada	The *Act* applies to all lands in Canada and prohibits disturbance to migratory birds, their nests or eggs.
Species at Risk Act (*SARA*)	Environment Canada	The *SARA* contains prohibitions that make it an offence to kill, harm, harass, capture or take an individual of a species listed in Schedule 1 of *SARA* as Endangered, Threatened or Extirpated. On private land, these prohibitions apply only to aquatic species listed in Schedule 1 and migratory birds listed in the *Migratory Birds Convention Act* and listed in Schedule 1.

3.0 ENVIRONMENTAL OVERVIEW

TERA completed a high-level desktop review and a site visit of the Project area to identify potential environmental constraints relevant to the Project. Readily available reports, maps and databases were reviewed for relevant information to include in the desktop review.

3.1 Desktop Review

3.1.1 Land and Natural Resource Use

Land titles acquired through Alberta Land Titles Spatial Information System state that SW 14-13-6 W4M and NW 14-13-6 W4M are owned by Methanex (Government of Alberta 2013). A search of the Geographic Land Information Management and Planning System found there to be a single active disposition on NW 14-13-6 W4M, a Right-of-Entry held by the City of Medicine Hat for a pipeline right-of-way; SW 14-13-6 W4M also has a single disposition on it for a Fortis Alberta Inc. power line easement (AESRD 2013a).

A search of Abacus Datagraphics Ltd. (AbaData) (2012) also indicated the presence of two gas wells in the vicinity of the Project. Both wells belong to the City of Medicine Hat and are located at 6-14-13-6 W4M and 14-14-13-6 W4M. The database search also indicated that several pipelines traverse the W1/2 14-13-6 W4M (AbaData 2012); these are summarised below in Table 2.

TABLE 2

PIPELINES LOCATED IN W1/2 14-13-6 W4M

Operator	Start Location (W4M)	End Location (W4M)	Product
City of Medicine Hat	11-15-13-5	4-14-13-6	Natural gas
	13-11-13-6	3-14-13-6	
	5-14-13-6	6-14-13-6	
	6-14-13-6	9-11-13-6	
	13-14-13-6	11-11-13-6	
	13-14-13-6	14-14-13-6	
	14-14-13-6	15-14-13-6	
	5-20-13-6	13-14-13-6	
	3-21-13-6	13-14-13-6	
	11-23-13-6	6-14-13-6	
	1-3-14-6	13-14-13-6	
Methanex	10-14-13-6	3-14-13-6	Miscellaneous liquids
NOVA Gas Transmission Ltd.	14-14-13-6	3-14-13-6	Natural gas
	1-22-13-6	1-23-13-6	
	5-11-14-6	13-14-13-6	

A spill was reported in the AbaData database search dating back to June 8, 2006. The spill originated from a City of Medicine Hat natural gas pipeline in 14-14-13-6 W4M and consisted of approximately 1,000 m^3 of raw gas production covering an area of 100 m^2 or less; no amount was recovered (AbaData 2012).

3.1.2 Terrain and Soils

The Oldman Formation, developed in the Late Epoch of the Cretaceous Period of the Mesozoic Era, underlies the Project area (Hamilton *et al*. 1999). The Oldman Formation consists of non-marine "*pale grey, thick-bedded, medium-grained to coarse-grained, feldspathic sandstone; grey clayey siltstone; green and grey mudstone; dark grey and brown carbonaceous shale; and ironstone concretionary beds*" (Hamilton *et al*. 1999).

The Project is located within the Cavendish Plain District of the Bigstick Lake Plain Section of the Eastern Alberta Plains Region (Pettapiece 1986). Undulating glacial fluvial materials (Pettapiece 1986) dominate the Cavendish Plain.

According to Shetsen (1987), the surficial geology underlying the Project consists of draped moraine and stagnation moraine. The draped moraine generally consists of uneven till up to 5 m thick with minor amounts of water-sorted material. The stagnation moraine generally consists of uneven till up to 30 m thick with localised areas of water-sorted material. Topography is generally undulating to hummocky with surface modifications caused by lake and stream erosion and deposition (Shetsen 1987).

Soils underlying the Project have been mapped as belonging to the Foremost soil series (Alberta Soil Information Centre 2001). These soils have developed on washed and sorted, medium-textured till and often contain sandy lenses (Soil Classification Working Group 1998). Foremost soils are classified within the Brown Chernozem Great Group and within the Orthic Brown Chernozemic Subgroup (Soil Classification Working Group 1998). Soils of the Brown Chernozem Great Group are present within the most arid parts of the Chernozemic soils climatic range (Soil Classification Working Group 1998).

Site Visit

No obvious soils issues were observed during the site visit. Further information on the site visit is presented in Section 3.2.

3.1.3 Hydrology and Fish

There are no fish-bearing permanent waterbodies or watercourses and no fish-bearing habitat present within or directly adjacent to the Project area. According to Grassland Vegetation Inventory mapping (Alberta Sustainable Resource Development [ASRD] 2012), there are no lentic temporary or lentic seasonal wetlands present within the Project area or areas directly adjacent, however, lower class wetlands (*i.e.*, Stewart and Kantrud [1971] Classes I and II) are often difficult to identify through photo interpretation and may have been missed.

Site Visit

No wetlands of any classification were observed during the site visit. Further information on the site visit is presented in Section 3.2.

3.1.4 Vegetation

The Project is located in southeastern Alberta in the Dry Mixedgrass Natural Subregion of the Grassland Natural Region. The Dry Mixedgrass Natural Subregion combines the warmest summers and least precipitation of any natural subregion in Alberta and is subject to long, cold winters with little snow cover. Chinooks are less common than in more westerly subregions. Native vegetation in the subregion is dominated by mixed-height grasslands comprised of blue grama (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*), June grass (*Koeleria macrantha*) and western wheatgrass (*Pascopyrum smithii*). Shrublands comprised of silver sagebrush (*Artemisia cana*), prickly rose (*Rosa acicularis*), buckbrush (*Symphoricarpos occidentalis*) and silverberry (*Elaeagnus commutata*) occur in depressions or on slopes with northerly or easterly aspects. Few trees are present in the subregion and mainly occur in river valleys and in deep coulees (Natural Regions Committee 2006).

The environmental sensitivity of the Dry Mixedgrass Natural Subregion is well-documented and native prairie land is recognised for its significant ecological, cultural and economic value. Native vegetation can be very difficult to re-establish if disturbed, due to shallow profile, poorly-developed or erosion prone soils.

The Project is located within the Sensitive Ranges of Endangered and Threatened Plants (AESRD 2010-2012). A historical occurrence of tiny cryptanthe (*Cryptantha minima*), a species listed federally under Schedule 1 of the *SARA* as Endangered and listed as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (2013), has been identified in the Project area within 14-13-6 W4M (Alberta Conservation Information Management System [ACIMS] 2012a) (Figure 2).

Rare vascular plant species and rare ecological communities with potential to occur in the Dry Mixedgrass Natural Subregion are presented in Appendices A and B, respectively. The loss of rare plant species or rare ecological communities may occur as a result of construction of the proposed development area.

Weeds and Pest Infestation

Weeds of concern in the Project area include common baby's breath (*Gypsophila paniculata*), downy chess (downy brome) (*Bromus tectorum*) and leafy spurge (*Euphorbia esula*) (Storch pers. comm.), all of which are listed as Noxious under the Alberta *Weed Control Act*. The introduction and/or spread of weed species may occur as a result of construction of the proposed Project.

Site Visit

Since the site visit was conducted outside of the growing season, the presence or absence of rare plants, rare ecological communities and weeds could not be confirmed. Invasive plant species were observed during the site visit, with the highest densities observed along the north boundary of the existing plant site and east boundary of the proposed plant expansion area. These species were likely introduced as a result of the existing disturbances in the Project area (*e.g.,* existing plant site, pipeline rights-of-way, well sites, access roads, etc.). Further information on the site visit is presented in Section 3.2.

3.1.5 Wildlife

The proposed Project is located in the Dry Mixedgrass Natural Subregion of the Grassland Natural Region in Alberta (Natural Regions Committee 2006). This natural subregion represents the driest area of the province with native trees primarily present in coulees and valley bottoms. Permanent water covers approximately 2% of this subregion with an additional 3% covered by temporary wetlands (Natural Regions Committee 2006). The region includes many distinct habitat types and unique wildlife species that are only found in the Dry Mixedgrass Natural Subregion, including eastern short-horned lizard, greater sage grouse, mountain plover, Ord's kangaroo rat and sage thrasher (Natural Regions Committee 2006), all of which are listed as Endangered under Schedule 1 of *SARA*.

Migratory Birds

The level of disturbance within the existing plant itself is likely too high to attract nesting migratory birds, however, suitable nesting habitat for migratory birds is present within the native prairie located directly adjacent to the existing Methanex plant. Migratory bird nests are protected under the *Migratory Birds Convention Act*, which prohibits the killing, capturing, injuring, taking or disturbing of migratory birds or the damaging, destroying, removing or disturbing of nests.

Species with Special Conservation Status

The Project is located within the Sensitive Ranges of several species with special conservation status including: Burrowing Owl Range; Eastern Short-horned Lizard Range; Sensitive Amphibian Range for Great Plains toad and plains spadefoot; Sensitive Raptor Range for ferruginous hawk, golden eagle and prairie falcon; and Sharp-tailed Grouse Range. The Project is also located within the species ranges of other sensitive and endangered species including long-billed curlew, short-eared owl, Sprague's pipit and upland sandpiper (AESRD 2010-2012). Sensitive Snake Range for bullsnake, plains hognose snake and prairie rattlesnake is also located approximately 432 m north of the proposed expansion area (AESRD 2010-2012).

A search of the AESRD Fisheries and Wildlife Management Information System (AESRD 2013b) resulted in an incidental occurrence of plains spadefoot (listed as May Be at Risk by ASRD [2011]) within 1 km of the Project area (Lupyczuk 2000) (Figure 2).

A list of species with special conservation status with potential to occur in the Dry Mixedgrass Natural Subregion was compiled for the Project (Appendix C). Species with special conservation status have the potential to occur within the native prairie located directly adjacent to the existing Methanex plant.

A review of Appendix C found that species with special conservation status that are listed under Schedule 1 of the *SARA* and by the COSEWIC (2013) that have potential to occur within the proposed Project area based on species range, species habitat requirements and professional knowledge include the following:

- American badger (listed as Special Concern by COSEWIC [2013]);
- Baird's sparrow (listed as Special Concern by COSEWIC [2013]);
- barn swallow (listed as Threatened by COSEWIC [2013]);
- bobolink (listed as Threatened by COSEWIC [2013]);
- burrowing owl (listed as Endangered under Schedule 1 of *SARA* and by COSEWIC [2013]);
- chestnut-collared longspur (listed as Threatened under Schedule 1 of *SARA* and by COSEWIC [2013]);
- ferruginous hawk (listed as Threatened under Schedule 1 of *SARA* and by COSEWIC [2013]);
- common nighthawk (listed as Threatened under Schedule 1 of *SARA* and by COSEWIC [2013]);
- long-billed curlew (listed as Special Concern under Schedule 1 of *SARA* and by COSEWIC [2013]);
- McCown's longspur (listed as Special Concern under Schedule 1 of *SARA* and by COSEWIC [2013]);
- short-eared owl (listed as Special Concern under Schedule 1 of *SARA* and by COSEWIC [2013]); and
- Sprague's pipit (listed as Threatened under Schedule 1 of *SARA* and by COSEWIC [2013]).

Site Visit

No wildlife species with special conservation status or their key habitat features were directly observed during the site visit, however, recent diggings of an American badger were observed throughout the Project area. Existing disturbance in the Project area (*i.e.*, elevated noise levels, existing plant site, pipelines, well sites, Box Springs Road and access roads), reduces the likelihood of the Project area providing habitat for wildlife species with special conservation status. Further information on the site visit is presented in Section 3.2.

3.1.6 Historical Resources

Alberta Culture (2013) indicated that 14-13-6 W4M has a listed Historical Resource Value (HRV) of 5 (believed to contain a historical resource), however, the only legal subdivisions (LSDs) listed by Alberta Culture (2013) are LSDs 13 to 16 (Figure 2). Since the Project will not be located in any portion of 14-13-6 W4M with a listed HRV, clearance under the *Historical Resources Act* is not required.

Site Visit

No historical resources or any evidence of the potential presence of a historical resource was observed during the site visit. Further information on the site visit is presented in Section 3.2.

3.2 Site Visit

A site visit was conducted of the Project area on April 4, 2013. The objective of the site visit was to verify and supplement the information gathered through the desktop review. The site visit was conducted on foot by two TERA biologists and consisted of a thorough ground search of the proposed plant expansion area and surrounding vicinity.

The Project area is located on gently undulating native prairie (Appendix D, Plate 1) within a heavy industrial area that contains high amounts of existing disturbance. Disturbance within the Project area includes: the existing Methanex methanol plant, located directly south of the proposed expansion area (Appendix D, Plate 2); the Canadian Fertilizers Ltd. plant, located approximately 265 m northeast of the east boundary of the proposed expansion area; and Box Springs Road, located approximately 200 m west of the proposed expansion area. Smaller scale disturbances also present in the Project area include pipeline rights-of-way, well sites and access roads. The existing Methanex plant is operational 24 hours a day resulting in consistently elevated noise levels throughout the Project area.

The existing plant sites, in combination with other existing disturbances (*i.e.*, pipelines, well sites and access roads), have likely facilitated the introduction of invasive plant species to the Project area. Invasive plant species were observed within the Project area, predominantly in the eastern portion of the proposed expansion area surrounding a recently excavated storm water pond (Appendix D, Plate 3) and along the north boundary of the existing plant site (Appendix D, Plate 2). Since the site visit was conducted outside of the growing season, the presence or absence of weeds could not be confirmed during the site visit.

The native prairie within and directly adjacent to the Project area has the potential to provide habitat for rare plants, rare ecological communities and wildlife species with special conservation status and their key habitat features (*e.g.,* nests, dens, leks, etc.). However, the high level of existing disturbance in the Project area (*i.e.*, elevated noise levels, existing plant site, pipelines, well sites, Box Springs Road and access roads) reduces the likelihood of this area providing habitat for rare plants, rare ecological communities and wildlife species with special conservation status. Since the site visit was conducted outside of the growing season, the presence or absence of rare plants and rare ecological communities could not be confirmed during the site visit. No wildlife species with special conservation status or their key habitat features were directly observed during the site visit, however, recent diggings of an American badger were observed throughout the Project area. Despite the previously reported occurrence of plains spadefoot within 1 km of the Project, no amphibian breeding habitat was observed. No wetlands were observed within or directly adjacent to the Project area.

No obvious soils issues were observed during the site visit.

R 6 W4M

52 Street NW

Box Springs Road NW

15
13-6 W4M

14
13-6 W4M

T 13

T 13

R 6 W4M

N

METHANEX

April 2013

FIGURE 2

WILDLIFE AND HRV

METHANEX CORPORATION
ENVIRONMENTAL OVERVIEW

10035

Road

Proposed Project Activities

HRV
- 4
- 5

FWMIS
- Plains Spadefoot and 100m Setback

ACIMS

Please note that 'Tiny Cryptantha' is found throughout the entire map extent.

Wildlife

Please note that the following wildlife are found throughout the entire map extent:

- Sharp tailed grouse
- Eastern short horned lizard
- Sensitive Amphibian Range (Great Plains Toad and Plains Spadefoot)
- Burrowing Owl Range
- Sensitive Raptor Range of the Bald Eagle, Ferruginous Hawk, Golden Eagle, Peregrine Falcon, Prairie Falcon

SCALE: 1:10,000

0 100 200 300 400 m

(All Locations Approximate)

tera ENVIRONMENTAL CONSULTANTS

UTM Zone 12N
Imagery provided by Methanex, Mar 13, 2013;
Roads: IHS Inc. 2013; HRV: Alberta Culture 2013; ACIMS: Alberta Tourism Parks and Recreation 2012; FWMIS: Alberta Environment and Sustainable Resource Development 2012.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

Mapped By: JJK | Checked By: LA

t:\10035_fig1_FWMIS_Revb_21Mar2013.mxd

4.0 CONCLUSIONS AND RECOMMENDATIONS

Despite occurring within a heavy industrial area surrounded by existing disturbance and anthropogenic activity, the Project is located in an area with multiple potential environmental sensitivities, including:

- previously reported rare plant occurrences;
- potential for weed infestation and/or spread;
- potential habitat for species with special conservation status and their key wildlife habitat features in the native prairie on the north side of the existing Methanex plant; and
- presence of migratory bird nesting habitat.

Historical Resource Act clearance is not required for the Project. In the event that a historical resource is discovered, Section 31 of the *Historical Resources Act* requires that the Minister be notified.

5.0 REFERENCES

5.1 Personal Communications

TERA wishes to acknowledge those people identified in the Personal Communications for their assistance in supplying information and comments incorporated into this report.

Storch, J. Agricultural Fieldman, Cypress County, Dunmore, AB.

5.2 Literature Cited

Abacus Datagraphics Ltd. 2012. Website: http://www.abacusdatagraphics.com/abadata.asp. Accessed: March 2013.

Alberta Conservation Information Management System. 2012a. Alberta Conservation Information Management System Data Search. Website: http://tpr.alberta.ca/parks/heritageinfocentre/datarequests/searchdata.aspx. Accessed: March 2013.

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APPENDIX A

RARE VASCULAR PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE DRY MIXEDGRASS NATURAL SUBREGION

Scientific Name	Common Name	Habitat	Provincial Designations	Federal/Global Designations
Agrostis exarata	spike redtop	Moist slopes and open areas. Usually areas that hold snow late in the growing season. Flowering from late June to August.	S2[1]	--
Almutaster pauciflorus	few-flowered aster	Saline soils, saline shores and depressions. Flowering from spring to fall.	S2S3[1] Sensitive[2]	--
Amaranthus californicus	Californian amaranth	Lakeshores, waste ground and roadsides. Flowering from July to October.	S1S2[1]	--
Ambrosia acanthicarpa	bur ragweed	Sand dunes. Flowering in July.	S2[1]	--
Anagallis minima	chaffweed	Dry slough bottoms and margins. Flowering in August.	S1S2[1]	--
Antennaria corymbosa	Corymbose everlasting	Open woods and meadows. Flowering in August.	S1[1]	--
Arabidopsis salsuginea	mouse-ear cress	Moist, saline shores and flats by springs and lakes. Flowering from late April to June.	S1[1]	--
Aristida purpurea var. *longiseta*	red three-awn	Dry, sandy plains. Flowering in July.	S2[1]	--
Asclepias viridiflora	green milkweed	Dry, prairie hillsides and sandy soil in coulees. Flowering from June to July.	S1[1]	--
Astragalus kentrophyta var. *kentrophyta*	prickly milk vetch	Dry prairies or low foothills and hard-packed sandy blowouts as well as eroding soils. Flowering from June to July.	S2[1]	--
Astragalus purshii	Pursh's milk vetch	Dry grassland and eroded slopes. Appears to favour sandy soils. Flowering from April to June.	S3 (W)[1] Sensitive[2]	--
Atriplex canescens	four-winged saltbush	Saline flats. Flowering from June to September.	SU[1]	--
Atriplex powellii	Powell's saltbush	Alkaline flats and badlands. Flowering from August to September.	S1[1] Sensitive[2]	--
Atriplex suckleyi	endolepis	Dry, eroded slopes. Flowering from late summer to fall.	S3 (W)[1]	--
Atriplex truncata	saltbush	Alkaline flats and disturbed ground. Flowering in August.	S1[1]	--
Bacopa rotundifolia	water hyssop	Mud-bottomed pools. Flowering from June to September.	S1[1]	--
Bidens frondosa	common beggarticks	Moist ground and ditches. Flowering from June to October.	S2[1]	--
Boisduvalia glabella	smooth boisduvalia	Prairie mud flats, especially alkaline areas. Flowering from June to July.	S2[1]	--
Botrychium campestre	field grape fern	Sandy soils and ditches. Flowering from early spring to late summer.	S1[1]	G3G4[3]
Calylophus serrulatus	shrubby evening-primrose	Sandy prairies and dunes.	S2[1]	--
Camissonia andina	upland evening-primrose	Dry prairie slopes. Flowering in May.	S1[1]	--
Camissonia breviflora	taraxia	Clay flats. Flowering in July.	S1[1]	--
Carex nebrascensis	Nebraska sedge	Marshy ground. Flowering from May to June.	S2[1]	--
Carex parryana var. *parryana*	Parry's sedge	Moist, open meadows and low ground near water and alkaline flats. Flowering in July.	S3 (W)[1]	--
Carex petasata	pasture sedge	Dry grassland and open woods. Flowering from May to July.	S1S2[1]	--
Castilleja sessiliflora	downy paintbrush	Dry prairie and grassland. Flowering in June.	S1[1]	--
Cerastium brachypodum	short-stalk mouse-ear chickweed	Dried slough bottoms. Flowering from April to July.	S1[1]	--
Chenopodium desiccatum	dried goosefoot	Undisturbed saline soils. Flowering in August.	S1[1]	--
Chenopodium incanum	hoary goosefoot	Sandy grounds, dry plains and hillsides. Flowering from June to September.	S1[1]	--
Chenopodium subglabrum	smooth goosefoot	Sand dunes. Flowering in July.	S1[1]	G3G4[3] Threatened[4,5]

Scientific Name	Common Name	Habitat	Provincial Designations	Federal/Global Designations
Chenopodium watsonii	Watson's goosefoot	Open areas. Flowering in June to September.	S1[1]	--
Crataegus douglasii	Douglas hawthorn	Open woods and rocky slopes.	S3 (W)[1]	--
Crepis atribarba	hawk's-beard	Dry, grassy slopes and moderate elevations. Flowering from June to July.	S2[1]	--
Crepis intermedia	intermediate hawk's-beard	Dry, open areas. Flowering in August.	S2[1]	--
Crepis occidentalis	small-flowered hawk's-beard	Dry, eroding slopes and sheltered, grassy coulee slopes. Flowering from May to June.	S2[1]	--
Cryptantha kelseyana	Kelsey's cat's eye	Poorly-developed sandy soils on level to gently sloping valley bottom terraces or uplands near valley breaks.	S1[1]	--
Cryptantha minima	tiny cryptanthe	Dry, eroded, prairie slopes. Flowering from May to June.	S3?[1] Endangered[2]	Endangered[4] Threatened[5]
Cuscuta gronovii	common dodder	Parasitic on shrubs in moist, shady areas. Flowering in August.	S1[1]	--
Cyperus schweinitzii	sand nut-grass	Dry, sandy soil and active dunes. Fruiting from late spring to early summer.	S2[1]	--
Cyperus squarrosus	awned nut-grass	Moist soil and sandy alluvium. Flowering from June to July. Produces fruit from July to August.	S1[1]	--
Downingia laeta	downingia	Muddy, often alkaline, shores. Flowering from July to August.	S2[1]	--
Draba reptans	creeping whitlow-grass	Dry, sandy or gravelly ground and especially disturbed sites. Flowering in April.	S1S2[1]	--
Elatine triandra	waterwort	Muddy shores and shallow water. Flowering from early summer to fall.	S1[1]	--
Eleocharis elliptica	slender spikerush	Neutral to calcareous wet places. Flowering from May to August.	S2?[1]	--
Eleocharis engelmannii	Engelmann's spike-rush	Wet places. Flowering from June to September.	S1[1]	--
Ellisia nyctelea	waterpod	Moist, shady woods and streambanks. Flowering from May to June.	S2[1]	--
Elodea bifoliata	two-leaved waterweed	Slow-moving water with sandy bottoms. Flowering from July to August.	S2[1]	--
Erigeron ochroleucus var. *scribneri*	buff fleabane	Dry, open slopes. Flowering from June to August.	S1?[1] Undetermined[2]	--
Erigeron radicatus	dwarf fleabane	Dry ridges and scree slopes. Flowering from late May to July.	S2[1] Sensitive[2]	G3[3]
Eriogonum cernuum	nodding umbrella-plant	Badlands and valley slopes. Sandy soil and sand dunes. Flowering from July to September.	S2[1]	--
Fraxinus pennsylvanica	green ash	Shores, thickets and along rivers.	S1[1]	--
Gratiola neglecta	clammy hedge-hyssop	Wet and muddy places. Flowering from June to August.	S2[1] Sensitive[2]	--
Halimolobos virgata	slender mouse-ear cress	Dry prairies, including benches and eroded hills. Flowering from May to July.	S1S2[1] Endangered[2]	Threatened[4,5]
Heliotropium curassavicum	spatulate-leaved heliotrope	Saline flats. Flowering from June to July.	S1[1] Sensitive	--
Hordeum pusillum	little barley	Saline prairie and eroded banks. Flowering from May to June.	SH[1]	--
Hymenopappus filifolius	Tufted hymenopappus	Dry, gravelly or sandy sites and coulee or badland edges.	S2[1]	--
Hypericum majus	large Canada St. John's-wort	Moist depressions in sand dunes and sandy shores. Flowering from late June to September.	S2[1] Sensitive[2]	--
Lesquerella arctica var. *purshii*	northern bladderpod	Dry, sandy or calcareous slopes and ridges as well as river flats. Flowering from June to July.	S2[1]	G4TNR[3]
Lilaea scilloides	flowering quillwort	Slough margins and mudflats. Flowering in July.	S1S2[1]	--
Linanthus septentrionalis	linanthus	Dry hillsides and plains. Flowering from May to June.	S2[1]	--
Lycopus americanus	American water-horehound	Marshy ground. Flowering in July.	S3 (W)[1]	--
Lysimachia hybrida	lance-leaved loosestrife	Moist meadows, shores and dry to moist open woods. Flowering in July.	S2[1]	--
Marsilea vestita	hairy pepperwort	Ditches, ponds and lakes. Flowering from May to August.	S2[1]	--

Scientific Name	Common Name	Habitat	Provincial Designations	Federal/Global Designations
Mimulus guttatus	yellow monkeyflower	Stream margins, meadows and springs. Flowering from July to August.	S2S3[1]	--
Mirabilis linearis	narrowleaf umbrella-wort	Coarse soils and disturbed or exposed areas in dry grasslands. Flowering from late spring to late summer.	S2?[1]	--
Muhlenbergia asperifolia	scratch grass	Moist, alkaline soil, especially where sandy.	S3 (W)[1] Sensitive[2]	--
Muhlenbergia racemosa	marsh muhly	Sandhills and dry slopes. Flowering from late July to August. Produces fruit from August to September.	S2[1]	--
Munroa squarrosa	false buffalo grass	Dry plains, slopes and disturbed areas. Flowering from June to August.	S2[1]	--
Nothocalais cuspidata	prairie false dandelion	Early-drying clay flats as well as moist, sandy grassland and edges of coulees or along coulee slopes. Flowering from April to June.	S2[1]	--
Nuttallanthus canadensis	field toad-flax	Moist, sandy places. Flowering from April to June.	S1[1]	--
Oenothera flava	low yellow evening-primrose	Dry slopes and flats as well as on moist, sandy soil. Flowering from July to August.	S2S3[1]	--
Onosmodium molle	western false gromwell	Gravelly banks and dry, open woods.	S2S3[1]	--
Oryzopsis micrantha	little-seed rice grass	Dry, open areas and rocky slopes and sandy woodlands. Flowering from June to July.	S2[1]	--
Osmorhiza longistylis	smooth sweet cicely	Moist woods. Flowering in June.	S2[1]	--
Parietaria pensylvanica	American pellitory	Gravelly places and disturbed areas as well as coulee woodlands and shrubbery. Flowering from May to July.	S3 (W)[1] Sensitive[2]	--
Phacelia linearis	linear-leaved scorpionweed	Dry, open slopes and shores. Flowering from June to July.	S2[1]	--
Picradeniopsis oppositifolia	picradeniopsis	Roadsides, bad lands, saline flats and dry plains. Flowering in July.	S1[1]	--
Poa nevadensis	Nevada bluegrass	Moist meadows in prairie.	SU[1]	--
Polanisia dodecandra	clammyweed	Sandy or gravelly soils and disturbed sites. Flowering from summer to early fall.	S2[1]	--
Polygonum polygaloides ssp. *confertiflorum*	Watson's knotweed	Moist meadows and flats. Flowering in June.	S3 (W)[1]	G4G5T3T4[3]
Potentilla finitima	sandhills cinquefoil	Sandy prairie, hills and dunes.	S1[1]	G2G4Q[3]
Potentilla paradoxa	bushy cinquefoil	Moist flats and shores. Flowering from June to July.	S3 (W)[1] Sensitive[2]	--
Potentilla plattensis	low cinquefoil	Prairie grassland and dry flats. Flowering from June to July.	S1S2[1]	--
Psilocarphus brevissimus var. *brevissimus*	dwarf woollyheads, prairie population	Dried beds of vernal pools. Flowering and fruiting from mid-March to mid-August.	S2S3[1]	Special Concern[4,5]
Puccinellia cusickii	Cusick's salt-meadow grass	Moist, generally alkaline areas.	SU[1]	G3G4Q[3]
Ranunculus glaberrimus	early buttercup	Prairie grassland and meadows. Flowering from May to June.	S2S3[1]	--
Rorippa curvipes	yellow cress	Moist ground. Flowering from May to September.	SU[1]	--
Rorippa curvipes var. *truncata*	blunt-leaved yellow-cress	Dried-up slough bottoms. Flowering from May to September.	S1S2[1]	--
Rorippa sinuata	spreading yellow cress	Shores, streamflats and roadsides. Flowering in June.	S1[1]	--
Rorippa tenerrima	slender cress	Moist, usually sandy, soil. Flowering in September.	S1S2[1]	--
Sagina decumbens	spreading pearlwort	Dry to moist open, sandy places. Flowering from spring to early summer.	SH[1]	--
Sagittaria latifolia	broad-leaved arrowhead	Ponds and lakes. Flowering in August.	S2[1]	--
Schizachyrium scoparium var. *scoparium*	little bluestem	Prairie grassland, foothills and calcareous soil. Flowering from July to August.	S3 (W)[1]	--
Scirpus pallidus	pale bulrush	Marshy areas. Flowering from June to July.	S1[1]	--
Shinnersoseris rostrata	annual skeletonweed	Sandy banks and dunes. Flowering in August.	S2[1]	--

Scientific Name	Common Name	Habitat	Provincial Designations	Federal/Global Designations
Sisyrinchium septentrionale	pale blue-eyed grass	Moist, grassy areas. Flowering from May to July.	S3[1] Sensitive	G3G4[3]
Solidago mollis	velvety goldenrod	Dry grassland and roadsides. Flowering from July to October.	S3 (W)[1]	--
Spartina pectinata	prairie cord grass	Saline shores and marshes. Flowering from late June to July.	S1[1]	--
Spergularia salina	salt-marsh sand spurry	Brackish or saline muds and sands. Flowering from May to August.	S2S3[1]	--
Sphenopholis obtusata	prairie wedge grass	Moist meadows and open woods. Flowering from June to July.	S2[1]	--
Stephanomeria runcinata	rush-pink	Dry, open sites and eroded slopes. Flowering from June to July.	S3 (W)[1] Sensitive	--
Suaeda moquinii	Moquin's sea-blite	Moist saline or alkaline areas. Flowering in July.	S2[1]	--
Suckleya suckleyana	poison suckleya	Saline shores. Flowering in June.	S1S2[1]	--
Thelesperma subnudum var. *marginatum*	greenthread	Dry, open sites and eroded slopes. Flowering from May to June.	S1[1]	--
Townsendia exscapa	low townsendia	Dry hillsides and prairies. Flowering in May.	S2[1]	--
Tradescantia occidentalis	western spiderwort	Sandy plains and partially stabilised interdunal areas. Flowering in June.	S1[1] Endangered[2]	Threatened[4,5]
Tripterocalyx micranthus	small-flowered sand verbena	Hard-packed or loose, alluvial sands. Flowering from May to July.	S1S2[1] Threatened[2]	Endangered[4,5]
Veronica catenata	water speedwell	Muddy shores and ditches. Flowering in July.	S2S3[1]	--
Viola pedatifida	crowfoot violet	Dry grassland. Flowering from May to June.	S2[1]	--
Yucca glauca	soapweed	Dry, open slopes and coulees. Flowering from May to July.	S1[1] Endangered[2]	Threatened[4,5]

Sources: ACIMS 2012a,b, 2013, AESRD 2012, Argus and Pryer 1990, COSEWIC 2013, Douglas *et al.* 2002, Flora of North America Editorial Committee 1993+, Government of Canada 2012, Kershaw *et al.* 2001, Moss 1983, NatureServe 2012a,b, Porsild and Cody 1980, Williston 2001

Notes:

1. Provincial (S) ranks are assigned by the provincial and federal Conservation Data Centre (CDC)[s]; in cases of conflict or missing data, the provincial CDC will have preference. Ranks range from 1 (five or fewer occurrences) to five (demonstrably secure under present conditions); definitions below are adapted from NatureServe (2012b), unless noted otherwise.

   S1 = Critically Imperilled: due to extreme rarity or some factor(s) making it especially vulnerable to extirpation. Typically five or fewer occurrences or very few remaining individuals (<1,000).

   S2 = Imperilled: due to rarity or some factor(s) making it very vulnerable to extirpation. Typically 6-20 occurrences or few remaining individuals (1,000-3,000).

   S3 = Vulnerable: rare and uncommon or found in a restricted range (even if abundant at some locations) or due to other factors making it vulnerable to extirpation. Typically 21-100 occurrences or between 3,000 and 10,000 individuals.

   S4 = Apparently Secure: uncommon, however, not rare and usually widespread in the province. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals.

   S5 = Secure: common, widespread and abundant in the province. Essentially ineradicable under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals.

   S#S# = Range Rank: a numeric range rank (*e.g.*, S2S3) is used to indicate the range of uncertainty about the exact status of the element.

   SH = Possibly Extirpated: known from only historical records, however, there is still some hope of rediscovery. There is evidence that the species may no longer be present in the jurisdiction, however, there is not enough to state this with certainty.

   SU = Unrankable: currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

   S#? = Inexact numeric rank: denotes inexact numeric rank.

   T = Designates a rank associated with a subspecies.

   Q = Questionable taxonomy: taxonomic status is questionable; numeric rank may change with taxonomy.

   (W) = Watch List: elements that are not currently considered as high conservation concern, however, there is some information to suggest that they may become rare should there be significant alterations to the element's habitats or population. Data for watch listed elements are collected by ACIMS (2012b).

   NR = Unranked: rank not yet assessed.

2. Alberta's *Wildlife Act*. A species legislated as Endangered or Threatened under the *Wildlife Act* or designated Special Concern by the Endangered Species Conservation Committee using definitions based on those used by the COSEWIC (AESRD 2012).

3. Global (G) ranks are based on species status world-wide and follow a system parallel to that for Provincial Ranks (Note 1), ranging from 1 (five or fewer occurrences) to 5 (demonstrably secure under present conditions). Only Global Ranks of concern (G1 to G3) or questionable ranks are displayed, range ranks (G#G#) which include a G1 to G3 ranking are also included (*e.g.* G3G4) (NatureServe 2012b).

4. *SARA*. The *Act* establishes Schedule 1 as the list of species to be protected on all federal lands in Canada. The *Act* also applies to all lands in Canada for Schedule 1 bird species cited in the *Migratory Birds Convention Act* and Schedule 1 aquatic species as determined by Fisheries and Oceans Canada.

   Endangered: a species that is facing imminent extirpation or extinction.

   Threatened: a species that is likely to become an Endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

   Special Concern: a species that is particularly sensitive to human activities or natural events, however, is not an Endangered or Threatened species.

5. COSEWIC (2013). Species listed as 'Extirpated', 'Not at Risk' or 'Data Deficient' were generally not included in the table without other noteworthy factors being present.

   Endangered: a species facing imminent extirpation or extinction.

   Threatened: a species likely to become Endangered if limiting factors are not reversed.

   Special Concern: a species that is particularly sensitive to human activities or natural events, however, is not an Endangered or Threatened species.

APPENDIX B

POTENTIAL RARE ECOLOGICAL COMMUNITIES IN THE DRY MIXEDGRASS NATURAL SUBREGION

Scientific Names	Common Names	Provincial and Global Ranks[1]
Forest/Woodland		
Acer negundo/Prunus virginiana	Manitoba maple/choke cherry	S1S2, G3
Populus angustifolia/Cornus stolonifera	narrow-leaf cottonwood/red-osier dogwood	S2S3, G4
Populus angustifolia/Symphoricarpos occidentalis	narrow-leaf cottonwood/buckbrush	S2S3
Populus deltoides/Cornus stolonifera	plains cottonwood/red-osier dogwood	S2S3, G2G3
Populus deltoides/Glycyrrhiza lepidota - Juncus balticus	plains cottonwood/wild licorice - wire rush	S2S3
Populus deltoides/Symphoricarpos occidentalis	plains cottonwood/buckbrush	S2S3
Populus x acuminata/Symphoricarpos occidentalis	lance-leaf cottonwood/buckbrush woodland	S1S2
Populus x jackii - Betula occidentalis/Salix lutea/Stipa comata	cottonwood - water birch/yellow willow/needle-and-thread	S1
Salix amygdaloides woodland	peach-leaved willow woodland	S1S2, G3
Shrubland		
Artemisia cana/Stipa viridula - Pascopyrum smithii	silver sagebrush/green needle grass - western wheatgrass	S2S3
Betula occidentalis grassland riparian shrubland	water birch grassland riparian shrubland	S2S3
Elaeagnus commutata/Pascopyrum smithii	silverberry/western wheatgrass	S3
Elaeagnus commutata - Prunus virginiana/Carex siccata	silverberry - choke cherry/hay sedge	S2S3
Elaeagnus commutata riparian shrubland	silverberry riparian shrubland	SU, G2Q
Prunus virginiana/Elymus lanceolatus - Koeleria macrantha	choke cherry/northern wheatgrass - June grass	S1S2
Rhus trilobata/Stipa comata	skunkbush/needle-and-thread	S2S3
Salix bebbiana/Cornus stolonifera	beaked willow/red-osier dogwood	S3?
Salix lutea/Cornus stolonifera	yellow willow/red-osier dogwood	S3?
Sarcobatus vermiculatus/Atriplex nuttallii	greasewood/Nuttall's atriplex	S2S3
Sarcobatus vermiculatus/Pascopyrum smithii	greasewood/western wheatgrass	S2S3
Sarcobatus vermiculatus silt dune community	greasewood silt dune community	S1
Shrub Herbaceous		
Artemesia cana/Festuca campestris – Stipa curtiseta	silver sagebrush/mountain rough fescue – western porcupine grass	S1?
Artemesia cana/Festuca idahoensis	silver sagebrush/Idaho fescue	SNR
Artemisia cana/Pascopyrum smithii - Elymus lanceolatus - Atriplex nuttallii	silver sagebrush/wheatgrasses - Nuttall's atriplex	S2S3
Artemisia cana/Pascopyrum smithii - Elymus lanceolatus	silver sagebrush/western wheatgrass - northern wheatgrass	S2S3
Artemisia cana - Sarcobatus vermiculatus/Stipa comata	silver sagebrush - greasewood/needle-and-thread	S1S2
Artemisia cana/Stipa comata - Calamovilfa longifolia	silver sagebrush/needle-and-thread - sand grass	S3
Artemisia cana/Stipa comata - Pascopyrum smithii - Bouteloua gracilis	silver sagebrush/ needle-and-thread - western wheatgrass - blue grama	S2?
Artemisia cana/Stipa curtiseta - Elymus lanceolatus	silver sagebrush/western porcupine grass - northern wheatgrass	S1S2
Sarcobatus vermiculatus/Distichlis stricta - Pascopyrum smithii	greasewood/salt grass - western wheatgrass	S2
Symphoricarpos occidentalis/Elymus lanceolatus - Stipa comata	buckbrush/northern wheatgrass - needle-and-thread	S2
Symphoricarpos occidentalis/Elymus piperi	buckbrush/giant wild rye	S2S3
Symphoricarpos occidentalis/Stipa comata - Calamovilfa longifolia - Carex stenophylla	buckbrush/needle-and-thread - sand grass - low sedge	S2
Herbaceous		
Aristida purpurea grassland	red three-awn grassland	S1
Bouteloua gracilis - Distichlis stricta - Stipa comata	blue grama - salt grass - needle-and-thread	S2S3
Calamovilfa longifolia - Stipa comata	sand grass - needle-and-thread	S3, G3
Carex nebrascensis community	Nebraska sedge community	S2
Danthonia californica – Carex brevior	California oat grass – slender-beaked sedge	S2
Danthonia unispicata - Elymus lanceolatus - Pascopyrum smithii	one-spike oat grass - northern wheatgrass - western wheatgrass	S2
Distichlis stricta - Pascopyrum smithii	salt grass - western wheatgrass	S2
Elymus lanceolatus - Muhlenbergia cuspidata	northern wheatgrass - plains muhly	SNR
Elymus lanceolatus - Pascopyrum smithii	northern wheatgrass - western wheatgrass	S2?
Elymus lanceolatus - Stipa comata	northern wheatgrass - needle-and-thread	S2
Festuca hallii – Stipa curtiseta grassland	plains rough fescue – western porcupine grass grassland	S2S3
Glyceria striata community	fowl manna grass community	SU

Scientific Names	Common Names	Provincial and Global Ranks[1]
Muhlenbergia asperifolia - Scirpus nevadensis - Distichlis stricta	scratch grass - Nevada bulrush - salt grass	S1S2
Pascopyrum smithii - Artemisia frigida - Opuntia polyacantha grassland	western wheatgrass - pasture sagewort - prickly-pear grassland	S2S3
Pascopyrum smithii - Artemisia ludoviciana	western wheatgrass - prairie sagewort	S1S2
Pascopyrum smithii - Bouteloua gracilis	western wheatgrass - blue grama	S2?
Pascopyrum smithii - Carex stenophylla	western wheatgrass - low sedge	S2S3
Puccinellia nuttalliana community	Nuttall's salt-meadow grass community	S3?, G3?
Rumex venosus sand dune community	wild begonia sand dune community	S2S3
Salix ambygdaloides woodland	peach-leaved willow woodland	S1S2, G3
Schizachyrium scoparium - Calamovilfa longifolia	little bluestem - sand grass	S2
Schizachyrium scoparium - Festuca campestris	little bluestem - mountain rough fescue	S1?
Stipa comata - Festuca spp.	needle-and-thread - fescues	S1
Sparsely Vegetated		
Artemisia cana - Atriplex nuttallii	silver sagebrush -Nuttall's atriplex	S2S3
Artemesia longifolia bare shale community	long-leaved sagewort bare shale community	S1S2
Artemisia longifolia - Calamovilfa longifolia badland community	long-leaved sagewort - sand grass badland community	S1S2, G3G4
Artemisia longifolia - Chrysothamnus nauseosus	long-leaved sagewort - rabbitbrush	S1
Erigeron radicatus - Phlox hoodii - Eriogonum flavum	dwarf fleabane - moss phlox - yellow umbrella-plant	S1
Eurotia lanata/ Schedonnardus paniculatus ephemeral drainage	winter-fat/tumble grass ephemeral drainage	S1S2
Juniperus horizontalis/Carex pensylvanica - Eriogonum flavum	creeping juniper/sun-loving sedge - yellow umbrella-plant	S1S2
Oryzopsis hymenoides - Leymus canadensis	Indian rice grass - hairy wild rye	S2?
Pascopyrum smithii - Atriplex nuttallii	western wheatgrass - atriplex	S1
*Populus angustifolia/*recent alluvial	narrow-leaf cottonwood/recent alluvial	S2S3
*Populus deltoides/*recent alluvial	plains cottonwood/recent alluvial	S1S3
Salicornia rubra emergent marsh	samphire emergent marsh	S2, G2G3
Scirpus nevadensis - (Triglochin maritima)	Nevada bulrush - (seaside arrow-grass)	S2S3
Spartina gracilis - (Pascopyrum smithii)	alkali cord grass - (western wheatgrass)	S2S3
Sporobolus cryptandrus semi-active dune	sand dropseed semi-active dune	S2
Suaeda moquinii - Atriplex suckleyi sparsely vegetated badland slopes	Moquin's sea-blite - endolepis sparsely vegetated badland slopes	S2?
Triglochin maritima emergent marsh	seaside arrow-grass emergent marsh	S2?
Aquatic		
Hippuris vulgaris - Ranunculus circinatus - Callitriche sp.	common mare's-tail - white water crowfoot - water-starwort	SU
Ruppia cirrhosa aquatic community	widgeon-grass aquatic community	S1

Source: Allen 2012

Notes:

1. Provincial (S) and Global (G) ratings range from S1 (five or fewer occurrences or very few remaining hectares) to S5 (demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery). Ranks may be combined (*e.g.*, S1S2). This indicates a larger margin of error than ranks assigned a "?" qualifier. Ratings that are not of concern (4-5) are not included, unless they are part of a range rank (*e.g.*, G3G4).

   ? = Element is not yet ranked (*i.e.*, S?) or has an inexact numerical rank (*e.g.*, S1?).

   U = Unrankable: currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

   Q = Denotes questionable taxonomy or classification of the type.

   NR = Unranked: provincial conservation status not yet assessed.

APPENDIX C

WILDLIFE SPECIES WITH SPECIAL CONSERVATION STATUS WITH POTENTIAL TO OCCUR IN THE VICINITY OF THE PROPOSED METHANEX MEDICINE HAT PLANT EXPANSION

Scientific Name	Common Name	Habitat	Provincial Designations	Federal/Global Designations
MAMMALS				
Antilocapra americana	pronghorn	Open grasslands.	S3S4 (W)[1] Sensitive[3]	--
Perognathus fasciatus	olive-backed pocket mouse	Open grasslands, especially where there is sandy soil.	S2S3 (T)[1] Sensitive[3]	--
Taxidea taxus taxus	American badger, *taxus* subspecies	Open grasslands and aspen parkland.	S4 (W)[1] Sensitive[3]	Special Concern[6]
BIRDS				
Ammodramus bairdii	Baird's sparrow	Ungrazed or lightly grazed native prairie and requires a tangle of grasses for nesting.	S3 (T)[1] Sensitive[3]	Special Concern[6]
Ammodramus savannarum	grasshopper sparrow	Grasslands with tufted grass interspersed with open, bare ground and lacking shrub cover.	S3S4 (W)[1] Sensitive[3]	--
Anas acuta	northern pintail	Open areas with seasonal, shallow ponds, marshes and reedy, shallow lakes with drier margins.	S4S5 (W)[1] Sensitive[3]	--
Anthus spragueii	Sprague's pipit	Open, native grasslands of intermediate height and low shrub density.	S3S4 (T)[1] Special Concern[2] Sensitive[3]	Threatened[5,6]
Asio flammeus	short-eared owl	Open meadows, marshes and clear cuts adjacent to cover and hunting areas.	S3 (T)[1] May Be At Risk[3]	Special Concern[5,6]
Athene cunicularia	burrowing owl	Level, open, short grass prairie with burrows for nesting.	S2 (T)[1] Endangered[2] At Risk[3]	Endangered[5,6]
Bartramia longicauda	upland sandpiper	Open, grassy uplands, hay fields, pastures, wet meadows and old fields with minimal shrub or tree growth.	S3 (W)[1] Sensitive[3]	--
Buteo regalis	ferruginous hawk	Sparsely treed, dry, mixed grass prairie.	S2S3 (T)[1] Endangered[2] At Risk[3]	Threatened[5,6]
Buteo swainsoni	Swainson's hawk	Open areas with tall shrubs or low trees for nesting.	S4 (W)[1] Sensitive[3]	--
Calcarius mccownii	McCown's longspur	Shortgrass prairie, overgrazed pastures and cultivated fields.	S3S4 (T)[1]	Special Concern[5,6]
Calcarius ornatus	chestnut-collared longspur	Native pastures, grazed grasslands and haylands.	S5[1] Sensitive[3]	Threatened[5,6]
Chordeiles minor	common nighthawk	Open forest and forest clearings (*e.g.,* logged or burned areas, natural woodland clearings), grasslands, rock outcrops and flat gravel rooftops of buildings. Typically nest in open areas near logs, boulders, grassy clumps and shrubs.	S4 (T)[1] Sensitive[3]	Threatened[5,6]
Circus cyaneus	northern harrier	Open areas near wetlands or marshy meadows.	S5 (W)[1] Sensitive[3]	--
Dolichonyx oryzivorus	bobolink	Open grassland areas; prefers large hayfields, moist meadows and weedy fields dominated by tall grasses.	S2S3 (W)[1] Sensitive[3]	Threatened[6]
Falco sparverius	American kestrel	Open or partly open habitats (*e.g.,* grasslands, farmland, watercourses) with scattered trees or woodlands.	S5 (W)[1] Sensitive[3]	--
Hirundo rustica	barn swallow	Open areas near water. Often nests in overhangs of man-made structures (*e.g.,* barns, bridges), cliffs or caves.	S4 (W)[1] Sensitive[3]	Threatened[6]
Numenius americanus	long-billed curlew	Large tracts of open grassland with low vegetative cover for nesting.	S3 (T)[1] Special Concern[2] Sensitive[3]	Special Concern[5,6]
Spizella breweri	Brewer's sparrow	Grassland subregions (prairie subspecies): semi-arid plains with short grass and low shrubs (mainly sage brush). Mountain subregions (mountain subspecies): meadows with thickets of dwarf birch and willow.	S3S4 (W)[1] Sensitive[3]	--
Tympanuchus phasianellus	sharp-tailed grouse	Open prairie, shrubby sandhills, coulees and margins of watercourses.	S3S4 (W)[1] Sensitive[3]	--

Scientific Name	Common Name	Habitat	Provincial Designations	Federal/Global Designations
REPTILES				
Crotalus viridis	prairie rattlesnake	Grassland and sage brush areas.	S2S3 (T.h)[1] May Be At Risk[3]	--
Heterodon nasicus nasicus	plains hognose snake	Short prairie grass and sandy or gravelly areas with low growing plants, sandhills and dry stream bottoms often near areas of water in typical badlands country.	S2 (T.h)[1] May Be At Risk[3]	--
Pituophis catenifer	gopher snake	Drier areas of grassland or sagebrush and farmlands/fields.	S3 (W)[1] Sensitive[3]	--
Thamnophis elegans	wandering garter snake	Broad habitat preference. Frequents (but not restricted to) ponds, marshes, ditches or dugouts in all habitat types.	S4 (T.h)[1] Sensitive[3]	--
Thamnophis radix	plains garter snake	Broad habitat preferences. Frequents (but not restricted to) ponds, lakes, dugouts or marshes in short-grass prairie, aspen parkland and marginally boreal forest.	S4 (W)[1] Sensitive[3]	--

Sources: ACIMS 2012b,c, 2013, AESRD 2012, Alberta Natural Heritage Information Centre 2007, ASRD 2011, Banfield 1974, COSEWIC 2013, Federation of Alberta Naturalists 2007, Government of Canada 2012, NatureServe 2012a,b, Russell and Bauer 1993, Semenchuk 1992, Smith 1993, Stebbins 1966

Notes:

1. Provincial (S) ranks are assigned by the provincial and federal CDC[s]; in cases of conflict or missing data, the provincial CDC will have preference. Ranks range from 1 (five or fewer occurrences) to 5 (demonstrably secure under present conditions); definitions below are adapted from NatureServe (2012b) unless noted otherwise.

   S1 = Critically Imperilled: due to extreme rarity or some factor(s) making it especially vulnerable to extirpation. Typically five or fewer occurrences or very few remaining individuals (<1,000).

   S2 = Imperilled: due to rarity or some factor(s) making it very vulnerable to extirpation. Typically 6-20 occurrences or few remaining individuals (1,000-3,000).

   S3 = Vulnerable: rare and uncommon or found in a restricted range (even if abundant at some locations) or due to other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.

   S4 = Apparently Secure: uncommon, however, not rare and are usually widespread in the province. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals.

   S5 = Secure: common, widespread and abundant in the province. Essentially ineradicable under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals.

   S#S# = Range Rank: a numeric range rank (*e.g.*, S2S3) is used to indicate the range of uncertainty about the exact status of the element.

   SU = Unrankable: currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

   Q = Questionable taxonomy: taxonomic status is questionable; numeric rank may change with taxonomy.

   T = Designates a rank associated with a subspecies.

   (W) = Watch List: elements that are not currently considered as high conservation concern, however, there is some information to suggest that they may become rare should there be significant alterations to the element's habitats or population. Data for watch listed elements are collected by ACIMS (2012b).

   NR = Unranked: rank not yet assessed.

   (T) = Tracking List: elements for which ACIMS is actively collecting information on and processing element occurrences for as they are elements that current information suggests are rare or of conservation concern due to threats to populations or habitats or documented declines (ACIMS 2012b).

   (T.h) = Tracking List - hibernacula: elements for which ACIMS is collecting detailed information on known locations of hibernacula only (ACIMS 2012c).

2. Alberta's *Wildlife Act*. A species legislated as Endangered or Threatened under the *Wildlife Act* or designated Special Concern by the Endangered Species Conservation Committee using definitions based on those used by COSEWIC (AESRD 2012) (see Note 6).

3. Status designation assigned in the 2010 General Status of Alberta Wild Species (ASRD 2011). Only 'At Risk', 'May Be At Risk' and 'Sensitive' status designations are included herein. Definitions below are from AESRD (ASRD 2011).

   At Risk: any species known to be 'At Risk' after formal detailed status assessment and legal designation as Endangered or Threatened in Alberta.

   May Be At Risk: any species that 'May Be At Risk' of extinction or extirpation and is, therefore, a candidate for detailed risk assessment.

   Sensitive: any species that is not at risk of extinction or extirpation but may require special attention or protection to prevent it from becoming at risk.

4. Global (G) ranks are based on species status world-wide and follow a system parallel to that for Provincial Ranks (Note 1), ranging from 1 (five or fewer occurrences) to 5 (demonstrably secure under present conditions). Only Global Ranks of concern (G1 to G3) or questionable ranks are displayed, range ranks (G#G#) which include a G1 to G3 ranking are also included (*e.g.* G3G4) (NatureServe 2012b).

5. *SARA*. The *Act* establishes Schedule 1 as the list of species to be protected on all federal lands in Canada. The *Act* also applies to all lands in Canada for Schedule 1 bird species cited in the *Migratory Birds Convention Act* and Schedule 1 aquatic species as determined by Fisheries and Oceans Canada.

   Endangered: a species that is facing imminent extirpation or extinction.

   Threatened: a species that is likely to become an Endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

   Special Concern: a species that is particularly sensitive to human activities or natural events, however, is not an Endangered or Threatened species.

6. COSEWIC (2013). Species listed as 'Extirpated', 'Not at Risk' or 'Data Deficient' were generally not included in the table without other noteworthy factors being present.

   Endangered: a species facing imminent extirpation or extinction.

   Threatened: a species likely to become Endangered if limiting factors are not reversed.

   Special Concern: a species that is particularly sensitive to human activities or natural events, however, is not an Endangered or Threatened species.

APPENDIX D

PHOTOPLATES

Plate 1 View southeast of the native prairie located within the Project area (April 4, 2013).

Plate 2 View south of the existing Methanex methanol plant located directly south of the proposed plant expansion area (April 4, 2013).

Plate 3 View northeast of the storm water pond located on the east side of the proposed expansion area. Invasive plant species can be seen throughout the area and on the soil pile in the background. The Canadian Fertilizers Ltd. plant is also visible in the background, located approximately 265 m northeast of the Project area (April 4, 2013).