Shaunavon Interconnect Project Environmental and Socio-Economic Assessment

July 2020

Prepared for:

Many Islands Pipe Lines (Canada) Limited
Regina, SK

Prepared by:

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Executive Summary

Many Islands Pipe Lines (Canada) Limited (MIPL) is a wholly owned subsidiary of SaskEnergy Incorporated (SaskEnergy). MIPL pipelines are used to transport transmission pressure natural gas interprovincially and internationally.

MIPL is applying for approval under section 214 of the *Canadian Energy Regulator Act (*CER Act) to construct and operate the Shaunavon Interconnect Project (the Project), located near Shaunavon, Saskatchewan. The Project will include the construction and operation of an approximately 2.25 kilometre (km)-long nominal pipe size (NPS) 16 pipeline within a 30 m-wide right-of-way (ROW). It also includes the construction of a new meter station. The Project will be located entirely on private, cultivated land. The new pipeline segment will originate at a proposed Foothills Pipe Lines Ltd. (Foothills) meter station located in SE-16-07-18 W3M and proceed west to the proposed MIPL meter station and tie-in with the existing MIPL Loomis-Herbert NPS 16 pipeline at SE-17-07-18 W3M.

Pending regulatory approval, construction is scheduled to begin in August 2020 with an anticipated in-service date of December 2020. Once in service, the Project is estimated to have an operating lifespan of at least 40 years. A work force of approximately 35 workers will be required during peak times to construct the Project. A temporary camp is not planned; instead workers will be housed in local commercial accommodations.

This Environmental and Socio-economic Assessment (ESA) has been completed to meet the requirements of the NEB Filing Manual 2017-01 (NEB 2017) and the Interim Filing Guidance and Early Engagement Guide (NEB 2019). The ESA focuses on valued components (VCs) that may be affected by the Project. These are: soil capability; vegetation and wetlands; wildlife and wildlife habitat; surface water and groundwater quality and quantity; greenhouse gas emissions; and human occupancy and resource use. Potential effects of the environment on the Project, as well as potential accident and malfunction scenarios, are also assessed in the ESA.

Soil Capability

Soil capability was selected as a VC because construction activities may affect soil quality. The focus of the assessment is on construction, since operation is expected to result in limited further disturbance to soils. A desktop review of publicly available provincial and federal soil survey data and other pedological resources was conducted to determine the existing conditions for soil capability that may be present in the Project Development Area (PDA), which was confirmed with a soil assessment conducted in the fall of 2016. A supplementary soil assessment was completed in spring 2020.

With the implementation of mitigation measures, residual Project effects on soil quality are likely to occur, and are predicted to be adverse in direction, low in magnitude, short- to long-term in duration and reversible. The contribution of the Project to existing cumulative effects on soils is considered negligible at the regional scale, hence a further quantitative cumulative effects assessment was not undertaken. With

the application of mitigation and environmental protection measures, residual effects on soil capability are predicted to be not significant. Residual effects will not alter soils in such a manner that the soils cannot support similar land uses following reclamation.

Vegetation and Wetlands

Vegetation and wetlands were selected a VC because Project construction activities have the potential to affect upland vegetation and wetlands, including plant species of management concern (SOMC). Operation of the Project is not predicted to interact with vegetation and wetlands, as there will be limited further physical disturbance following post-construction reclamation activities.

The Project is primarily located within agricultural land (i.e., cropland) with some wetlands of various permanency and developed areas (e.g., road allowance). Native grasslands were avoided during route and site selection. There are no historical occurrences of designated critical habitat for any provincially or federally-listed plant species at risk (i.e., species listed on *Species At Risk Act* (SARA) *or The Wildlife Act* within 5 km of the Project. A rare plant survey completed in spring 2020 revealed no observations of species at risk. The rare plant survey found two patches of a provincially listed SOMC, plains rough fescue (*Festuca hallii*), ranked in Saskatchewan as S3 or vulnerable. These patches were located outside of the PDA and within the local assessment area (LAA).

With the implementation of standard industry practices and avoidance measures, along with Project-specific mitigation measures outlined in the Environmental Protection Plan (EPP), residual Project effects on vegetation communities and vegetation species are unlikely. If they occur, residual effects are predicted to be adverse in direction, negligible in magnitude, short-term in duration and reversible. Residual effects on wetland function are likely to occur, and are predicted to be adverse in direction, low in magnitude, medium- to long-term in duration and reversible.

Existing environmental conditions (i.e., baseline) reflect cumulative effects on the environment from past projects and activities, which include agriculture, infrastructure, linear development and rural residential development; these activities have already affected the distribution and abundance of native vegetation. No future cumulative effects are predicted. The contribution of the Project to the existing cumulative effects on native vegetation communities and species is considered negligible at the regional assessment area (RAA); therefore, a further quantitative assessment of cumulative effects on vegetation is not warranted. Residual cumulative effects on wetland function are likely to occur and are predicted to be moderate in magnitude, extend to the RAA, will be medium-term (i.e., pipelines) to long-term (i.e., meter station) in duration, and are considered reversible. The Project, once reclamation is complete, will make a negligible contribution to the cumulative loss or alteration of wetland function at the RAA scale.

With the application of mitigation measures, residual Project effects and residual cumulative effects on vegetation and wetlands are predicted to be not significant.

Wildlife and Wildlife Habitat

Wildlife and wildlife habitat were selected as a VC because the Project has the potential to cause changes in wildlife habitat and mortality risk of wildlife, which may include species at risk and SOMC. The construction and operation of the Project has the potential to directly (i.e., vegetation clearing and ground disturbance) and indirectly (i.e., sensory disturbance) affect habitat (i.e., use or occupancy). Construction activities could result in the direct mortality of less mobile individuals or destruction of animal residences (e.g., dens, nests), as well as indirect mortality through avoidance of familiar home ranges and dispersal into lower quality habitat types. Wildlife mortality risk may increase due to increased traffic volume and the use of heavy equipment along local roads, which could result in vehicle-wildlife collisions.

The assessment of wildlife and wildlife habitat is based on a combination of a review of publicly available data and baseline field surveys completed for the Project. Initial baseline biophysical reconnaissance and wildlife surveys were conducted in August through December 2016 with follow-up surveys in May through June 2020 to confirm the presence and location of potential wildlife habitat (i.e., native grassland, tame pasture, wetland) in the LAA.

The Project is in the Mixed Grassland ecoregion and is comprised primarily of agricultural cropland which provides limited wildlife habitat. Some modified grassland, narrow planted shelterbelts and wetlands are also found in the PDA, as well as native grassland in the LAA, which provide habitat for a variety of wildlife species, including mammals, birds, amphibians and reptiles. The LAA has the potential to provide habitat for several wildlife SOMC, including species at risk (SAR,) such Sprague's pipit (*Anthus spragueii*), common nighthawk (*Chordeiles minor*), and northern leopard frog (*Lithobates pipiens*). There is no designated critical habitat for SAR within the LAA or RAA.

With the application of mitigation measures, residual Project effects on wildlife habitat are likely occur. If they occur, residual effects on wildlife habitat are predicted to be adverse, negligible (for direct effects) to low (for sensory disturbance) in magnitude, limited to the LAA (for sensory disturbance), short-term (for sensory disturbance), medium-term (for disturbance to planted shelterbelt, modified grassland, and nearby native grassland-related habitat), and long-term (for disturbance at the meter station footprint) in duration and reversible following post-construction reclamation and future decommissioning of the site.

Adverse residual effects on wildlife mortality risk during construction are unlikely to occur. If they occur, residual effects on wildlife mortality risk are predicted to be adverse, negligible in magnitude, limited to the LAA, short-term in duration and reversible following post-construction reclamation. The contribution of the Project to the existing cumulative effects on wildlife and wildlife habitat are predicted to be negligible and do not pose a threat to the long-term sustainability of wildlife species, including SAR and SOMC in the RAA.

Surface Water and Groundwater Quality and Quantity

Surface water and groundwater quality and quantity was selected as a VC because Project construction activities have the potential to affect surface water and groundwater quality and quantity. Operation of the

Project is not predicted to interact with surface water and groundwater quality and quantity, as there will be limited further physical disturbance following post-construction reclamation activities.

The PDA drains to the Old Wives Lake watershed (WSC sub basin 05JB000) and crosses Grassy Creek. The Shaunavon Aquifer, an extensive aquifer in southwest Saskatchewan of approximately 2,600 km^2, underlies the RAA (Meneley 1983). It is expected that the shallow groundwater flow systems, including the water table, reflect local topographic relief with areas of groundwater discharge next to creeks, rivers, and lakes. Deeper groundwater systems reflect the more regional southwest to northeast topographic gradient. Generally, groundwater movement appears to flow towards the low area of Grassy Creek. No shallow water wells were identified within the LAA. Five deeper domestic wells were identified within the LAA; these wells ranged from 96.01 metres below ground surface (mbgs) to 134.11 mbgs (SKWSA 2019).

Pipeline construction could affect surface water quality through localized vegetation removal (e.g., mowing of standing crops if present), soil stripping, grading and excavation, and where temporary access and pipeline watercourse crossings are constructed. Construction of the meter station could affect surface water quality through soil stripping, resulting in localized increased risk of erosion and sediment transport, which could flow into wetlands. The Project component could interact with groundwater quality or quantity because of potential changes in water level or quality related to shallow excavation during Project construction activities.

With the implementation of standard industry practices and avoidance measures, along with Project-specific mitigation measures outlined in the EPP, residual effects from pipeline construction on surface water quality and quantity are likely and are predicted to be adverse in direction, low in magnitude, extend to the LAA, be short-term to medium-term (for directly affected wetlands) in duration and reversible once construction is complete. Residual effects meter station construction on surface water quality and quantity are likely to occur, and are predicted to be adverse in direction, low in magnitude, limited to the PDA, long-term in duration, and reversible following final abandonment.

With the implementation of the mitigation measures contained in the EPP (Appendix A) and associated contingency measures, residual effects on groundwater quality and quantity arising from construction of the Project are unlikely to occur. If they occur, residual effects may extend to the LAA, will be low in magnitude, short-term in duration and reversible following completion of construction activities.

Past and present projects and physical activities that have been or are being carried out have influenced the existing conditions for surface water and groundwater quality and quantity. Projects in the reasonably foreseeable future are expected to abide with respective provincial and federal legislation for construction activities. The contribution of the Project to residual cumulative effects on surface water and groundwater quality and quantity resources is considered negligible.

With the application of mitigation measures, residual Project effects on surface water and groundwater quality and quantity are predicted to be not significant.

Greenhouse Gas Emissions

Direct GHG emissions were estimated for construction and operation of the Project. Following implementation of mitigation measures, direct Project contributions to GHG emissions arising from the construction and operation phases are estimated to be 0.00030% (construction) and 0.000016% (operation) of the Canada GHG emissions total, 0.0027% (construction) and 0.00015% (operation) of the Saskatchewan GHG emission total and 0.021 (construction) and 0.0012% (operation) of the Canadian sector emission total. The GHGs released annually during operation of the Project comprise 0.000023% of the Government of Canada's emission reduction target.

Upstream GHG emissions were also estimated. Annual estimated upstream emissions are estimated to be less than 500 kt CO_2e per year. As the annual upstream emissions are estimated to be below 500 kt CO_2e per year, and in accordance with the Interim Filing Guidance (NEB 2019), no further assessment of upstream GHG emissions is required.

Human Occupancy and Resource Use

Human occupancy and resource use was selected as a VC because the Project might change existing land use patterns. The Project is located in the Rural Municipality of Grassy Creek No. 78. Land uses in the region include agriculture, oil and gas developments, and small communities. Mitigation measures will be implemented for human occupancy and resource use, as described in the Project-specific EPP (Appendix A).

Predicted residual effects on land use include minor localized disruption of agricultural uses during construction prior to completion of reclamation and longer-term change to land use at the meter station site. Other land users may experience temporary, localized access restrictions, and some sensory disturbance during construction.

Following implementation of mitigation measures, residual effects on human occupancy and resource use for the pipeline are likely to occur, and are predicted to be adverse in direction, low in magnitude, extend to the LAA, short-term in duration, and reversible following completion of construction activities or decommissioning and final reclamation of the Project at the end of operations.

Following the implementation of mitigation measures, residual effects on human occupancy and resource use during construction of the meter station likely to occur, and are predicted to be adverse, low in magnitude, extend to the LAA, will be short-term (in temporary work space) and reversible following completion of construction activities to long-term (in the meter station footprint) and reversible following final decommissioning of the meter station.

Following the implementation of mitigation measures, residual effects on human occupancy and resource use during operation of the meter station are likely to occur, and are predicted to be adverse in direction, low in magnitude, extend to the LAA, long-term in duration, will occur continuously, and will be reversible following decommissioning of the Project.

Future foreseeable future projects or physical activities have been identified in the RAA, including a Foothills meter station and the Keystone XL pipeline and associated pump station. From a regional perspective it is assumed that the operation of the Foothills meter station and Keystone XL pump station will likely result in further long-term effects on land use within the RAA. It is reasonable to assume that TC Energy will implement mitigation measures to reduce potential effects on land use and that following pipeline construction, reclamation will be undertaken for disturbed areas.

With the implementation of mitigation measures, residual effects of the Project on human occupancy and resource use are predicted to be not significant

Effects of the Environment on the Project

Potential effects of the environment on the Project that were assessed include extreme temperatures, heavy precipitation events and flooding, heavy snow and ice events, lightning, high winds or tornados, and wildfires. The Project will be constructed and operated in accordance with all governing regulatory requirements, permit conditions and other approvals, including the Onshore Pipeline Regulations (OPR) (SOR/99294) and CSA Group (CSA) Z662-19, Oil and Gas Pipeline Systems (CSA 2019). Potential effects of the environment on the Project will be managed through site selection, Project design, environmental management, contingency planning, a Project-specific ERP, and health and safety plans. With the application of mitigation measures, no residual effects of the environment on the Project are predicted.

Accidents and Malfunctions

Accidents and malfunctions are unplanned events that can occur during any Project phase. The assessment of potential effects of accidents and malfunctions considers five scenarios: pipeline release or rupture; hazardous materials release; fire; vehicle accident; and, damage to existing utilities. Project planning and design, and the implementation of mitigation measures as outlined in the EPP (Appendix A) and MIPL's existing Emergency Response Plan (ERP) will reduce the potential for accidents and malfunctions to occur, and will enable MIPL to quickly deal with any resultant effects should such an event occur. Overall, effects of all Project-related accidents, malfunctions and other unplanned events on all VCs are predicted to be not significant.

Conclusion

The conclusion of this ESA is that, with the design of the Project and implementation of mitigation measures, residual environmental and socio-economic effects of the Project are predicted to be not significant. The contribution of the Project to existing cumulative effects is considered negligible.

Abbreviations

AAFC	Agriculture and Agri-Food Canada
AHPP	Aquatic Habitat Protection Permit
CACs	Criteria Air Contaminants
CAPP	Canadian Association of Petroleum Producers
CEPA	Canadian Energy Pipeline Association
CER	Canada Energy Regulator
CGA	Canadian Gas Association
CH_4	methane
CO_2	carbon dioxide
COSEWIC	Committee on the Status of Endangered Wildlife Species in Canada
CSA	Canadian Standards Association
DFO	Fisheries and Oceans Canada
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
ESA	Environmental and Socio-economic Assessment
GBA+	Gender Based Analysis Plus
GHG	greenhouse gas
GIS	Geographic Information System
GOC	Government of Canada

GOS	Government of Saskatchewan
GWP	Global Warming Potential
HABISask	Hunting, Angling, and Biodiversity Information Saskatchewan
HAZOP	Hazards and Operability Analysis
HCB	Saskatchewan Heritage Conservation Branch
IMP	Integrity Management Plan
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
kt	kilowatt
kt/y	kilotonnes/year
LAA	Local Assessment Area
LSRS	Land Suitability Rating System
MBCA	*Migratory Bird Convention Act*
mbg	meters below ground
mbgs	metres below ground surface
MER	Ministry of Energy and Resources
MFLNRO	Ministry of Forests Lands and Resource Operations
MHI	Ministry of Highways and Infrastructure
MIPL	Many Islands Pipe Lines (Canada) Limited
MoA	Ministry of Agriculture
MSDS	Material Safety Data Sheet
N_2O	nitrous oxide
NEB	National Energy Board

NIR	National Inventory Report
NPS	Nominal Pipe Size
NRC	Natural Resources Canada
NTS	National Topographic System
OPR	Onshore Pipeline Regulations
PDA	Project Development Area
PPE	Personal Protective Equipment
RAA	Regional Assessment Area
REO	Report Everything Online
RESR	Rare and Endangered Species Report
ROW	Right-of-Way
SAAQS	Saskatchewan Ambient Air Quality Standards
SAR	Species at Risk
SARA	*Species at Risk Act*
SaskEnergy	SaskEnergy Incorporated
SGIC	Saskatchewan Geospatial Imagery Collaborative
SKCDC	Saskatchewan Conservation Data Center
SK MOE	Saskatchewan Ministry of Environment
SKSID	Saskatchewan Soil Information Database
SKSIS	Saskatchewan Soil Information System
SKWSA	Saskatchewan Water Security Agency
SO_2	sulphur dioxide
SOMC	Species of Management Concern

TGL	TransGas Limited
TSS	Total Suspended Solids
TWS	Temporary Workspace
UNFCCC	United Nations Framework Convention on Climate Change
VC	Valued Component
WHMIS	Workplace Hazardous Materials Information System
WMZ	Wildlife Management Zones
WSC	Water Survey of Canada

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOS

LIST OF APPENDICES

1.0 INTRODUCTION

Many Islands Pipe Lines (Canada) Limited (MIPL) is a wholly owned subsidiary of SaskEnergy Incorporated (SaskEnergy). MIPL pipelines are used to transport transmission pressure natural gas interprovincially and internationally. TransGas Limited (TGL), a second wholly owned subsidiary of SaskEnergy, transports transmission pressure natural gas within the province. TGL provides engineering, operational and other services to MIPL on a contract basis.

MIPL is applying to the Canada Energy Regulator (CER) under section 214 of the *Canadian Energy Regulator Act* (CER Act) for approval to construct and operate the Shaunavon Interconnect Project (the Project), located near Shaunavon, Saskatchewan.

The Project will include the construction and operation of an approximately 2.25 kilometre (km)-long nominal pipe size (NPS) 16 inch pipeline within a 30 m-wide right-of-way (ROW). It also includes the construction of a new meter station. The Project will be located on private, cultivated land. The new pipeline segment will originate at a proposed Foothills meter station located in SE-16-07-18 W3M and proceed west to the proposed MIPL meter station and tie-in with the existing MIPL Loomis-Herbert NPS 16 pipeline in SE-17-07-18 W3M (Figure 1-1).

Temporary work space (TWS) is required for the pipe and material laydown, and to facilitate equipment movement. A work force of approximately 35 workers will be required to construct the Project at peak times. Temporary construction camps are not required to support Project construction; instead workers will be housed in local commercial accommodations.

Pending regulatory approval, construction is scheduled to begin in August 2020 with an anticipated in-service date of December 2020. Once in service, the Project is estimated to have an operating lifespan of at least 40 years.

1.1 ENVIRONMENTAL OBLIGATIONS AND APPLICABLE LEGISLATION

The Project does not require an environmental assessment under the *Impact Assessment Act* as it is not an activity listed in the Physical Activities Regulations (SOR/2019-285).

MIPL is applying to the CER, pursuant to section 214 of the CER Act, for an Order approving the construction and operation of the Project.

As noted in the National Energy Board's (NEB) Interim Filing Guidance and Early Engagement Guide (Interim Filing Guidance; NEB 2019), Canada has extensive environmental obligations, which are set out in federal legislation and regulations, with which compliance is required. In addition, Canada also has numerous environmental policies and programs that guide the protection of the natural environment.

The Project will adhere to the requirements set out in applicable federal and provincial environmental acts and regulations and will follow the guidance set out in applicable federal environmental policies and

programs. Table 1-1 lists environmental acts, regulations, policies and programs that are applicable to the Project, adherence to which assists the Government of Canada (GOC) achieve or adhere to its environmental obligations. Table 1-1 also identifies where further information about applicable environmental regulations and policies is provided.

These acts, regulations and policies were used to set the scope of the assessment for applicable valued components (VCs) and were considered during characterization and determination of significance of adverse residual environmental effects, where appropriate.

In addition to federal regulations and guidance, the Project must also comply with provincial environmental regulatory requirements, including, but not limited to those listed in Table 1-2. No municipal environmental regulatory requirements have been identified.

Table 1-1 Federal Environmental Obligations Applicable to the Project

Environmental Legislation, Regulation or Policy Area	Responsible Agency	Requirement or Guidance Provided	ESA Section with Further Information
Federal Sustainable Development Strategy for Canada (2019 to 2022)	Environment and Climate Change Canada (ECCC)	The Federal Sustainable Development Strategy (GOC 2019) sets out the GOC's environmental sustainability priorities, establishes goals and targets, and identifies actions to achieve them. It outlines what the GOC will do across government to promote clean growth, ensure healthy ecosystems and build safe, secure and sustainable communities over a 3-year period.	N/A
Species at Risk Act (SARA)	ECCC/Fisheries and Oceans Canada (DFO)	Protects species listed as extirpated, endangered and threatened on federally regulated land or designated critical habitat. • Section 32 prohibits killing, harming, or taking species at risk • Section 33 prohibits damage or destruction of residences of species at risk The status of species is assessed and designated by the Committee on the Status of Endangered Wildlife Species in Canada (COSEWIC).	7.0, 8.0
Migratory Bird Convention Act (MBCA)	ECCC	Protects and conserves migratory bird populations and individuals and their nests in Canada. Section 6 of the *Migratory Birds Regulations* prohibits the disturbance, destruction, or taking of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird without authorization. Since there are no authorizations to allow construction-related effects on migratory birds and their nests, best management practices will be followed to comply with the MBCA.	8.0

Table 1-1 Federal Environmental Obligations Applicable to the Project

Environmental Legislation, Regulation or Policy Area	Responsible Agency	Requirement or Guidance Provided	ESA Section with Further Information
Fisheries Act	CER/DFO	The *Fisheries Act* prohibits activities that result in the death of fish by means other than fishing (subsection 34.4(1)) or that result in the harmful alteration, disruption or destruction (HADD) of fish habitat (subsection 35(1)). Subsection 34.3 makes provisions for the maintenance of flows and fish passage and section 36 prohibits the introduction of unauthorized deleterious substances into waters frequented by fish. DFO has published guidance documents in support of the *Fisheries Act*, including the Fish and Fish Habitat Protection Policy Statement (DFO 2019a), Measures to Protect Fish and Fish Habitat (DFO 2019b), and interim codes of practice (DFO 2020). Through a Memorandum of Understanding (MOU), the CER reviews the effects assessment to determine likelihood of HADD of fish habitat and the DFO issues authorizations under the *Fisheries Act* for pipelines subject to the CER Act.	4.0
Canadian Navigable Waters Act (CNWA)	CER	Per sections 218 and 219 of the CER Act, a certificate issued by the CER is required to construct or operate a pipeline that passes in, on, over, under, through or across a navigable water as defined by the CNWA. The CER considers the effects of the issuance of a certificate on navigation, including navigation safety. The watercourses crossed by the Project are not on the CNWA List of Scheduled Waters; however, the public right to navigate applies to all navigable watercourses, including non-scheduled waters.	N/A
The Federal Policy on Wetland Conservation (GOC 1991)	ECCC	Includes the principle of no net loss of wetland function and applies to: • projects occurring on federal land and waters or those that receive federal funds; and • wetlands of international importance, as determined by the Ramsar Convention, Ramsar Convention on Wetlands (1971). Although no wetlands of international importance will be affected by the Project (Ramsar Convention Secretariat 2019), this policy is used as guidance to maintain consistency with national priorities for wetland conservation.	7.0

Table 1-1 Federal Environmental Obligations Applicable to the Project

Environmental Legislation, Regulation or Policy Area	Responsible Agency	Requirement or Guidance Provided	ESA Section with Further Information
Greenhouse Gases	ECCC	Canada and other countries agreed to limit global average temperature rise to less than 2°C as part of the Paris Agreement. In anticipation of the Paris Climate Conference, each country publicly outlined the climate actions it intended to take; these actions are known as their Intended Nationally Determined Contribution (INDC). Canada's INDC included a 2030 target of 30% below the 2005 GHG emission levels (UNFCCC 2015). To meet this target, Canada has established the Pan-Canadian Framework on Clean Growth and Climate Change (GOC 2016). As part of the Pan-Canadian Framework, ECCC has released Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector) (ECCC 2019c), which require the management of methane emissions from the operation of natural gas pipeline systems.	10.0

Table 1-2 Applicable Provincial Environmental Regulations and Policy Guidance

Regulation or Policy Area	Requirements or Guidance Provided
The Environmental Assessment Act	*The Environmental Assessment Act* legislates environmental assessment in Saskatchewan, including the scope of assessments, methods for conducting assessments and the dissemination of information to other regulatory bodies. Oil and gas projects with the potential for minor environmental effects are reviewed by the Fish, Wildlife and Lands Branch of the Saskatchewan Ministry of Environment (SK MOE). Projects with the potential for significant environmental effects are reviewed by the Environmental Assessment and Stewardship Branch of SK MOE.
The Environmental Management and Protection Act	*The Environmental Management and Protection Act* legislates environmental management and protection, including environmental standards in the Saskatchewan Environmental Code (Chapter C.1). The Environmental Code provides guidance for the release of hydrostatic test water to the environment from hydrostatic testing of petroleum liquid and gas pipelines.
	The Environmental Management and Protection Act legislates the reporting of any release or emergency that might cause, is causing or has caused an adverse effect to the environment.
	The Environmental Management and Protection Act protects aquatic habitat from impacts that may arise from development projects or activities, large or small, that are conducted in or near water in Saskatchewan. Aquatic Habitat Protection Permits (AHPPs) are intended to provide guidance to protect aquatic habitat that is vulnerable from a variety of potential development related threats and are required for the development or alteration of waterbodies, watercourse, and wetlands (Saskatchewan Water Security Agency (SKWSA) 2019). For oil and gas projects, AHPPs are issued by SK MOE. Any work that occurs in the bed, bank, or boundary of a water body or watercourse, or any discharge with adverse effects on water, is subject to *The Environmental Management and Protection Act* and requires that an AHPP is obtained prior to beginning work.
The Provincial Land Act, 2016	*The Provincial Lands Act, 2016* legislates the issuance of dispositions and permits for projects on provincial land.
The Water Security Agency Act	The Water Security Agency is a crown corporation that manages Saskatchewan's water resources under *The Water Security Agency Act*.
The Wildlife Act	*The Wildlife Act* is provincial legislation that classifies species at risk (legally designates them as endangered or threatened) and provides immediate legal protection against harm. The *Wildlife Act* legislates requirements including the completion of wildlife and rare plant species detection surveys, wildlife collection, handling, call playback surveys, and plant voucher specimen collection.
	In Saskatchewan, hunting and trapping is regulated by the Wildlife Regulations, 1981 (GOS 1981), which is governed under *The Wildlife Act* and administered by the SK MOE. Hunting is regulated using provincial wildlife management zones (WMZs) within which there are restrictions and seasons for each species.
The Weed Control Act (Chapter W-11.1)	The *Weed Control Act* (Chapter W-11.1) is an Act respecting Prohibited, Noxious and Nuisance Weeds. This Act legislates weed status and weed control measures.
Heritage Properties Act	The *Heritage Property Act* is provincial legislation that addresses the preservation and protection of cultural heritage properties, archaeological sites and palaeontological sites in the province of Saskatchewan.

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Data Sources: Base features produced under license with the Government of Saskatchewan and the Government of Canada.
3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Access Road
- Meter Station
- Many Islands Pipe Lines (Canada) Limited Parcel
- ROW
- Road Allowance
- Temporary Work Space
- Minor Road
- Section

0 250 500 Metres

(At original document size of 8.5x11)
1:15,000

N

Stantec

Many Islands Pipe Lines (Canada) Limited

Project Location	Prepared by MDW on 2020-01-09
Near Shaunavon,	TR by JH on 2020-01-09
Saskatchewan	IR Review by NC on 2020-01-09

Client/Project 113254323-001 REVD

Many Islands Pipe Lines (Canada) Limited
Shaunovan Interconnect Project
Environmental and Socio-Economic Assessment

Figure No.

1-1

Title

Project Overview

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1.2 ASSESSMENT SCOPE

This Environmental and Socio-Economic Assessment (ESA) has been prepared to meet the requirements of the NEB Filing Manual, 2017-01 (NEB 2017) and Interim Filing Guidance (NEB 2019). Pursuant to Section A.2 of the NEB Filing Manual, the level of detail provided in the ESA corresponds to the Project's scale and scope, its anticipated environmental and socio-economic effects, and the level of public interest.

Table 1-3 provides the concordance between the ESA and the NEB Filing Manual, 2017-01 requirements for biophysical and socio-economic elements (NEB 2017, Guide A, Tables A-2 and A-3 and Appendix 1). It also provides concordance to the Interim Filing Guidance (NEB 2019). Section 4 outlines which VCs listed in Tables A-2 and A-3 have been included in this ESA and provides rationale for either including or scoping out each VC. Potential effects of the environment on the Project (see Section 12) are assessed, as are potential effects related to accidents and malfunctions (see Section 13).

Table 1-3 Concordance with the NEB Filing Manual, 2017-01 and Interim Filing Guidance

Filing Requirements	Report Section(s)
NEB Filing Manual, Guide A	
A.2.5 Description of the Environmental and Socio-Economic Setting	2.2, 6.2, 7.2, 8.2, 9.2, 10.2, 11.2
A.2.6 Effects Assessment	
A.2.6.1 Identification and Analysis of Effects	6.1, 7.1, 8.1, 9.1, 10.1, 11.1, 12.1, 13.1
A.2.6.2 Mitigation Measures	6.4, 7.4, 8.4, 9.4, 10.4, 11.4. 12.2, 13.2
A.2.6.3 Evaluation of Significance	6.7, 7.7, 8.7, 9.7, 10.7, 11.7, 12.3, 13.3
A.2.7 Cumulative Effects Assessment	
A.2.7.1 Scoping and Analysis of Cumulative Effects	6.6, 7.6, 8.6, 9.6, 10.6, 11.6
A.2.7.2 Mitigation Measures for Cumulative Effects	7.6, 8.6, 11.6
A.2.7.3 Applicant's Evaluation of Significance of Cumulative Effects	7.7, 8.7, 11.7
A.2.8 Inspection, Monitoring, and Follow-Up	6.9, 7.9, 8.9, 9.9, 10.9, 11.9
Interim Filing Guidance	
i. GHG Emissions and Climate Change	10.0
ii. Environmental Obligations	1.1
iii. Gender-Based Analysis Plus (GBA+)	4.0
iv. Rights of Indigenous Peoples	4.0

2.0 PROJECT DESCRIPTION

2.1 PURPOSE AND NEED FOR THE PROJECT

Delivery demand growth in southern Saskatchewan is forecasted to continue for the next five to ten years. A supply expansion is required to meet customer requirements and future-dated gas transportation contracts. Declining Saskatchewan gas production is further increasing requirements for Alberta gas supply imports. The most recent contract sees TGL as a shipper of up to 70 TJ/day from an Alberta source, along the Foothills NPS 42 pipeline, commencing in November 2020.

Additional supply at Shaunavon is recommended to meet southern area delivery growth and is the preferred solution due to its proximity to preferred delivery points and comparatively low facility cost of addition of such gas supplies.

2.1.1 Alternatives to the Project

Alternatives to the Project are defined under the Filing Manual (NEB 2017) as other technically, economically and environmentally-feasible ways to meet the need of the Project that are within the purview of the project proponent. Alternatives were reviewed and assessed as options for increasing the supply of natural gas for the Province of Saskatchewan. These alternatives considered included:

- Intra-provincial supply
- Interconnects to the Nova Gas Transmission Ltd. (NGTL) system
- Interconnects to the TC Energy (TransCanada Pipelines Ltd. (TCPL)) Canadian Mainline, and
- Potential imports from North Dakota.

2.1.1.1 Intra-provincial supply

Intra-provincial supply has been in a steady decline for the last ten years, and is now primarily limited to the southeast corner of Saskatchewan. This gas supply is less reliable and presents gas quality issues. In addition, the region is currently constrained with limited take-away capacity. Increasing capacity this way would be costly and would require larger-scale land disturbances.

2.1.1.2 Interconnects to the NGTL system

Existing interconnects with NGTL are nearing the available capacity of the NGTL system. The MIPL Pierceland Supply Project (currently before the CER) represents the pursuit of this alternative, and leverages the current limit of this source of supply.

2.1.1.3 Interconnects to the TCPL Canadian Mainline

Transportation on the TCPL Canadian Mainline is more expensive than transportation on the Foothills pipeline. There is currently no long-term, renewable capacity available for delivery to Saskatchewan. By

contrast, Foothills (SK) is currently an underutilized pipeline as North Dakota Bakken gas is displacing flows which previously travelled down the Foothills pipeline.

2.1.1.4 Imports from North Dakota

Potential imports from North Dakota are challenging for some of the same reasons as intra-provincial supply. North Dakota gas may be available south of existing pipeline constraints in southeast Saskatchewan. Securing this supply would require similar downstream capacity improvements and additional upstream development as intra-provincial supply.

2.1.1.5 Summary

This Project as proposed, is the lowest cost option for both transportation and facility development. The relatively small facility development provides the added benefit of reduced land-disturbance. By utilizing available capacity on the Foothills pipeline system, this project generates minimal incremental upstream and downstream development.

2.2 PROJECT LOCATION AND CURRENT LAND USE

The Project is located in the Rural Municipality of Grassy Creek No. 78. The nearest community is Shaunavon, Saskatchewan, located approximately 8.5 km north of the Project at its closest point.

The Project Development Area (PDA) is located on private land within Saskatchewan. Land use within the PDA is agricultural (cultivation) and the Project will cross Grassy Creek. The creek is typically an ephemeral to seasonal drainage that is recharged by runoff in the immediate area because of an upstream berms (i.e., earthen dams) and dugouts that function as flow collection points intercept runoff from a broader drainage basin.

Representative photos along the PDA of the crossing at Grassy Creek (Photo 2-1), a strong slope east of Grassy Creek (Photo 2-2), and landcover (Photo 2-3) are included. Additionally, Photo 2-4 is a representative photo of the native grassland adjacent to and north of the PDA.

Photo 2-1 View facing north at the Class IV semi-permanent wetland associated with Grassy Creek. Photo location is north of the PDA.

Photo 2-2 View facing south at a strong slope crossed by the PDA east of Grassy Creek

Photo 2-3 View facing southeast along the PDA at the typical landcover (cultivated) associated with PDA

Photo 2-4 View facing north at native grassland adjacent to and north of the PDA

2.3 PROJECT COMPONENTS

The Project includes the construction, installation and operation of the following Project components:

- Approximately 2.25 km of NPS 16 inch pipeline within a 30 m-wide ROW between the MIPL Herbert-Loomis Pipeline in SE-17-7-18 W3M and the Foothills pipeline in SE-16-07-18 W3M, which includes:
    - An inline block valve at the MIPL Loomis to Herbert pipeline, and
    - A NPS 16 pigging riser (above-ground structure) within the ROW adjacent to the south side of the Foothills proposed meter station in SE-16-07-18 W3M.
- A 30 m x 40 m meter station at the connection point to the MIPL Herbert-Loomis in SE-17-7-18 W3M; including a 410 m long x 4.5 m wide access road.

The PDA encompasses the components listed above and TWS. No temporary construction camps are required for the Project. The PDA encompasses approximately 8.7 ha, as shown in Figures 1-1 and 7-1 and described in Table 2-1. The PDA is located on private land with the exception of a provincial government road allowance crossing that makes up less than 1% of the PDA. One planned narrow, ephemeral to seasonal watercourse crossing (Grassy Creek) will be installed via trenched methods. This crossing is summarized in Table 2-2.

The operational footprint of the meter station will be fenced and graveled. The pipeline ROW, portions of the meter station not encompassed by the fenced area, and TWS will be reclaimed, as required, following completion of construction activities.

Table 2-1 Project Development Area

Project Component	Area (ha)
Pipeline ROW	6.8
Meter Station	0.1
TWS	1.7
Total PDA	**8.7**

Table 2-2 Watercourse Crossing Summary

Crossing ID	Location	Crossing Name	Primary Crossing Method	Contingency Crossing Method
WX-01	SW-16-07-18 W3M	Grassy Creek	Isolate if flowing, open cut if dry or frozen to bottom	N/A

2.4 PROJECT ACTIVITIES

Planned activities associated with each phase of the Project are summarized below.

2.4.1 Construction

Activities that will be undertaken during Project construction are described in Table 2-3.

Table 2-3 Project Construction Activities

Activity	Associated Activities and Equipment
Pipeline	
Transportation of Equipment	Equipment will be transported by truck to the Project site along public roads and existing access roads. Contractors will be instructed to meet all road use requirements (e.g., signage, load restrictions, haul routes).
Right-of-Way Preparation	ROW preparation involves survey and staking of ROW boundaries, identification of temporary ROW access (e.g., shoo-fly's), and staking of centerline. These activities include the use of trucks and ATVs for surveying and staking. Vegetation, including trees, brush and standing crops, will be cleared for the Project, as needed, to accommodate the pipeline, meter station, and TWS. Equipment used during clearing activities may include chain saws, mower or mulchers, as well as dozers and excavators.
Soil Handling	Topsoil will be salvaged from agricultural land in the PDA, including areas where grading is necessary to facilitate a level and safe working surface. The width and depth of soil salvage will depend on site specific conditions and landowner/occupant requests. Typical equipment used during stripping and grading activities may include graders, dozers, and excavators, as required.
Pipe Preparation and Inspection	These activities include stringing, bending, welding of the pipe, non-destructive welding inspections and repairs, field coating of welds, coating inspection, and repairs. These activities include the use of semi-trailer transport trucks to move pipe from stockpile areas to the ROW, side booms to move and align pipe for welding, bending machines for field bends, welding trucks, x-ray equipment for weld inspections, and transportation for workers to and along the ROW (as required).
Pipe Installation	Includes trenching, trench padding (if necessary), lowering-in of the pipe, installation of watercourse and road crossings, backfill of the trench and establishment of rough grade, and as-built survey. Equipment used includes excavators and wheel ditchers for trenching, side booms for lowering in, dozers and excavators for backfilling and establishment of rough grade.
Hydrostatic Testing and In-line Inspection	Pressure testing of the pipeline is conducted using water and pressurizing the pipe to exceed maximum operating pressure. Tie-in final connections of the pipeline are completed after water has been removed. In-line inspection runs are conducted after hydrostatic testing to detect any pipe non-conformities (e.g., dents) in the pipe. Specialized equipment is used for this phase of pipeline construction. Hydrostatic testing will be undertaken using water sourced in accordance with applicable permits, licenses, or access rights. Following hydrostatic testing, the water will be collected, tested, and disposed of appropriately.
ROW Cleanup and Reclamation	This phase of pipeline construction involves final re-grading and contouring of subsoils and replacement of topsoil on all disturbed portions of the ROW. Clean-up

Table 2-3 Project Construction Activities

Activity	Associated Activities and Equipment
	operations are completed to reclaim disturbed areas to pre-construction or compatible land use condition. Reclamation of the ROW in non-cultivated or undeveloped areas (i.e., the Grassy Creek crossing) includes use of natural vegetation recovery. If natural recovery is not suitable, seeding of the disturbed area will be completed per site requirements and as specified by the Environmental Monitor(s) or designate(s). Equipment involved in this phase of pipeline construction includes dozers, graders and excavators to restore grade and replace topsoil. Reclamation typically includes use of agricultural equipment (e.g., harrows, diskers) for final finishing on cultivated lands. As required or deemed necessary, seed will be applied and/or additional erosion and sediment control techniques or structures will be installed to promote site stability, mitigate off-ROW sediment transfer, and enhance plant establishment.
Meter Station	
Site Preparation	Vegetation (i.e., agronomic crops, if present) will be cleared as needed to accommodate the meter station, TWS and access construction. Equipment used during clearing activities may include mowers, dozers and excavators. Topsoil will be salvaged from the areas of new disturbance within the PDA and retained in stockpiles for recovery and use during post-construction or final (i.e., post-decommissioning) reclamation. Grading may be required to prepare (i.e., level) the site for infrastructure installation.
Borrow Source Development (if necessary)	If the need for additional fill material at the meter site or access road is identified during site preparation, development of a borrow source may be necessary. Prior to borrow source development, topsoil and upper subsoil will be salvaged from the PDA and retained in stockpiles for recovery and use during reclamation. Approved use of nearby existing borrow sites or purchasing material from area suppliers will be considered first and before creation of a new off-site borrow.
Infrastructure Installation	Once the site is graded and pilings are in place, skid/modular buildings and piping racks/trays, as well as other fabricated connections and components will be installed. Equipment used during this activity includes cranes, semi-trailer units, and trucks. All piping will be pressure tested. Valves and piping will be shop (fabricator) and/or site tested. If site hydrostatic testing is required, it will be undertaken using water sourced in accordance with applicable permits, licenses, or access rights. Following hydrostatic testing, the water will be collected, tested and disposed of accordingly.
Cleanup and Reclamation	Once construction activities are complete, a final grade will be established and clean-up will be initiated using dozers, excavators, and graders. Garbage or debris will be removed and disposed of in compliance with applicable local regulations. A gravel surface will be placed over portions of the meter station site and access road where all-season access is required during operation. Following clean-up, portions of the site where all-season access will not be required during operation (i.e., outside of the meter site fenceline and access travel lane) will be contoured to a stable profile and topsoil replaced to allow pre-construction land use (e.g., cultivation).

MIPL is committed to limiting disruptions (e.g., excess noise, traffic, dust) during Project construction. MIPL recognizes that these activities may affect the public and is committed to working with affected stakeholders to address issues or concerns. Construction activities will be closely monitored by MIPL's inspectors to determine compliance with construction and quality standards and CER regulations.

2.4.2 Operation

Once in service, the Project is expected to operate for at least 40 years. MIPL will operate the Project in accordance with all governing regulatory requirements, permit conditions and other approvals, including the Onshore Pipeline Regulations (OPR) and CSA Group (CSA) Z662-19: Oil and Gas Pipeline Systems (CSA 2019). The SaskEnergy Operations Control Centre in Regina monitors and controls system operation.

MIPL will implement a comprehensive Integrity Management Program (IMP) to monitor and protect the integrity of the Project. The IMP uses advanced inspection and mitigation techniques applied within a comprehensive risk-based methodology. The IMP will be implemented in the operation phase to contribute to reducing environmental effects, protecting installed pipelines and facilities, maintaining reliability and protecting the safety of the public and personnel.

2.4.3 Decommissioning or Abandonment

At the end of Project life, the facility operator will apply to the CER to decommission or abandon the pipeline and meter station, as applicable, according to the regulations in force at the time. As specified in Section A.2.6.1 of the NEB Filling Manual (2017-01), a separate environmental and socio-economic assessment, specific to decommissioning or abandonment activities will be undertaken when the Project is ready to be decommissioned or abandoned. Mitigation measures will be implemented to reduce effects on VCs while undertaking decommissioning or abandonment activities. Accordingly, decommissioning and abandonment are not considered further in this assessment.

2.5 PROJECT SCHEDULE

Pending regulatory approval, construction of the Project will commence in August 2020. The Project's targeted in-service date is in December 2020.

2.6 PROJECT WORK FORCE

The Project construction workforce will require approximately 35 workers at the peak of construction. Worker accommodation is anticipated to be provided through existing lodging (e.g., hotels, motels, rental units and campgrounds) primarily in nearby Shaunavon, Saskatchewan, and to a lesser extent, Swift Current, Saskatchewan. As such, no work camps will be required for the Project.

3.0 ENGAGEMENT

MIPL has undertaken public and Indigenous engagement to inform potentially affected parties about the Project, and to hear and understand concerns or issues that may arise from the proposed development. The following sections outline MIPL's corporate engagement process, summarize Project-specific engagement activities, and environmental and socio-economic concerns or issues that have been raised, which have influenced the scope of this ESA.

3.1 OVERVIEW OF MIPL ENGAGEMENT PROGRAM

MIPL's corporate engagement process is intended to integrate company programs such as safety, environmental protection, and public awareness in order to align engagement within the overall management system. MIPL follows SaskEnergy corporate policies, as these policies generally apply to the Corporation and to all wholly-owned subsidiaries. These corporate policies are used to support the overall principles and goals applied to each project and are reflected and included in the engagement process.

The main purpose of the process is to inform, build and maintain a dialogue with persons or groups that may be affected by a proposed project. When initiating engagement activities, the process should include the following:

- Identifying and documenting the potential effects the project may have on each affected person or community and discussing options that could enhance positive effects and mitigate adverse effects;
- Identifying and documenting comments and concerns raised during the environmental and socio-economic studies conducted including Gender Biased Analysis Plus (GBA+); and
- Documenting concerns and comments raised throughout the engagement and how they were responded to, including measures made to address concerns, and how they were considered and incorporate concerns into project planning.

MIPL shall inform, build, and maintain a dialogue with landowners, Indigenous peoples and communities, interested individuals, and the general public about proposed projects, throughout the project's life cycle.

3.2 OVERVIEW OF PROJECT-SPECIFIC ENGAGEMENT ACTIVITIES

MIPL's corporate engagement process provides that the preparation of project-specific engagement will involve the refinement of practices, identification of particular characteristics that surround a project, and consideration of the effect it may bring to potentially affected persons or groups.

3.2.1 Identification of Potentially Affected Persons or Communities

In alignment with MIPL's corporate engagement policy, identification of project-specific stakeholders can include a person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or activity.

Engagement

An initial list of potentially affected persons and communities was compiled and will be updated as engagement progresses. The initial list was compiled based on CER requirements for proponents to identify persons or communities who may be potentially affected by the Project including:

- Indigenous peoples
- People with an interest in lands affected by the Project
- Commercial and industrial organizations affected by the Project,
- People potentially affected by the Project, and
- Government authorities.

On September 20, 2019, MIPL submitted a request to CER for a Traditional Territory Analysis for the Project. On October 2, 2019, the CER issued the results of that analysis, which included identification of Indigenous communities having known or asserted traditional territory that may be impacted by the Project. The Indigenous communities identified by the CER were:

- Métis Nation – Saskatchewan
- Nekaneet Cree Nation
- Pasqua First Nation
- Stoney Nakoda Nations
- Wood Mountain Lakota First Nation

On January 21, 2020 MIPL was advised of another Indigenous community to add to the List of Affected Persons for the Project:

- George Gordon First Nation (GGFN) (Wicehtowak Limnos Consulting Services LP has also been included on communications to GGFN as this company is wholly owned by GGFN and has been appointed by Chief and Council to lead engagement regarding regulated projects that may impact GGFN's traditional use of land or impacts to Indigenous rights. In response to the CER's Information Request No.1 received on May 14, 2020, MIPL included Métis Nation – Saskatchewan, Western Region III on the List of Affected Persons for the Project.

In response to the CER's Information Request No.1 received on May 14, 2020, MIPL included Métis Nation – Saskatchewan, Western Region III on the List of Affected Persons for the Project.

Additionally, MIPL, identified the following potentially affected persons or communities.

- the landowner at NE-17-17-18-W3M with whom MIPL has been negotiating the purchase of land for the meter station
- Registered Interests on Title of affected quarter sections

Government authorities and Agency Authorities:

- Local Member of Legislative Assembly (MLA) and Member of Parliament
- Utilities

Engagement

- Crown Corporations
- Ministry of Energy and Resources (SK MER)
- Ministry of Highways and Infrastructure (SK MHI)
- SK MOE
- Ministry of Agriculture (SK MOA)
- SKWSA
- RM of Grassy Creek #78
- Town of Shaunavon
- Local Spill Response Cooperative
- Water Management Companies
- Local Fire Departments / Medical / Police

3.2.2 Engagement Methods

MIPL's policies and goals established for the Project include providing clear, relevant and timely information, building and maintaining a dialogue with all potentially affected persons or communities, about the Project.

During the early engagement phase, MIPL completed the following engagement activities regarding the Project:

- A public Open House was held in Shaunavon on November 6, 2019 to provide information about the project and discuss any concerns raised by attendees. Invitations were mailed October 16, 2019. See additional information below.
- A notification package dated December 20, 2019 containing information regarding the Project was developed and distributed to all of the potentially affected persons, groups, and Indigenous communities. See additional information regarding the notification package below.
- Follow up phone calls with the Town of Shaunavon and RM of Grassy Creek were completed to confirm receipt of notification letter, and discuss how they would like to be engaged and kept up to date on this Project.
- MIPL's Integrated Public Awareness Program connected with first responders to see if they have any questions, would like additional information, and/or if they would like to meet.

3.2.2.1 Public Open House

A public open house was held on November 6, 2019 from 2:00 to 8:00 PM at the Grand Coteau Heritage and Cultural Centre in Shaunavon, Saskatchewan. Advertisements to the public open house were run in the Shaunavon Standard newspaper. Additionally, invitation letters were sent to landowners within a two kilometre radius of the Project, identified Indigenous communities, the RMs of Grassy Creek and Wise Creek, and the local MLA. All of the Indigenous communities initially identified by CER, namely Métis

Engagement

Nation – Saskatchewan, Nekaneet Cree Nation, Stoney Nakoda First Nation, Wood Mountain Lakota First Nation, and Piapot First Nation received an invitation to the Open House (mailed October 16, 2019). This level of engagement is based on MIPL's construction and operating experience, existing relationships with these communities, project size and location, current land use and tenure, proximity of the Project to these communities and, therefore, MIPL's understanding of Indigenous community interests near the Project.

Over the course of the afternoon, 16 people attended the open house including, the Chief Administrative Officer and a Councilor from the Town of Shaunavon, two members of the Shaunavon Economic Development Committee, the Reeve and an Administrator from the RM of Grassy Creek, a representative from MLA Doug Steele's office, local newspaper and radio representatives, landowners, and the public.

An information package was provided to each participant that included:

- a Project Frequent Asked Question (FAQ) sheet
- a Project open house evaluation and Project feedback form with a self-addressed envelope to allow participants to fill in the form at their convenience
- brochures, including:
    - Landowner Guide June 2019 (NEB)
    - Living and Working Near Pipelines (NEB)
    - Damage Prevention Pipeline Facts and Myths (NEB)
    - Information for Proposed Pipeline or Power Line Projects that Do Not Involve a Hearing (NEB)
    - Pipeline Damage Prevention Regulations (CER)
    - Preventing damage to pipelines during agricultural activities (Canadian Energy Pipeline Association)
    - Guide for Landowners and the Public: Safety and Damage Prevention (TransGas Limited, MIPL, SaskEnergy Incorporated)

Storyboards were set up around the room providing information about the proponent, the Project, including location, schedule, environmental assessment, and regulatory requirements. Additional displays included a damaged pipe for people to touch and hold, and a display on pipeline safety including dial before you dig information. Project Team contact information was also provided for those interested in learning more about the Project, being added to the Project's mailing list, or to communicate questions or comments.

3.2.2.2 Project Notification Letter and Information Package

As per the CER requirements, a Project notification letter and information package was mailed via registered mail to potentially affected persons or communities on December 20, 2019. In addition, though not identified in the Traditional Territory Analysis, CER subsequently requested, via letter dated January

21, 2020 that MIPL also provide George Gordon First Nation with an information package and this was senton or about February 24, 2020.

Letters were also sent to Métis Nation - Saskatchewan Métis Nation - Saskatchewan – Western Region III on May 27, 2020 and included the information described in Section 3.2.2.3.

The package included information outlining MIPL's intention to file an application with CER for the Project, the expected timing of filing the application, and an overview of the Project that included proposed timing and duration of construction, Project components, location, and expected benefits. Information was also provided on the ESA and EPP process, site reclamation, considerations for public safety, emergency contact information, and information on how to participate in the ongoing engagement process. NEB/CER brochures included in the package were:

- Information for Proposed Pipeline or Power Line Projects that Do Not Involve a Hearing
- Living and Working Near Pipelines
- Pipeline Facts and Myths

3.2.2.3 Follow-up Letters

Follow up letters providing an update regarding the progress of the Project application; proposed construction timelines; and an invitation to share information related to potential effects of the Project on the rights of Indigenous peoples were sent by mail to the Indigenous communities listed below on May 27, 2020:

- Métis Nation – Saskatchewan
- Métis Nation – Saskatchewan – Western Region III (included information package from December 20, 2020)
- Nekaneet Cree Nation
- Stoney Nakoda First Nation
- Wood Mountain Lakota First Nation
- Piapot First Nation
- George Gordon First Nation, including Wicehtowak Limnos Consulting Services LP

3.2.2.4 Landowner Questionnaire

On June 12, 2020, MIPL sent a questionnaire to all landowners whose properties are intersected by the Project. The intent of the questionnaire was to collect additional information on land access, recreational and traditional uses, and heritage resources as part of the assessment process. The questionnaire posed the following questions:

Engagement

1. Are you aware of recreational clubs accessing the property? (This may include any recreational vehicles clubs, rifle or shooting clubs, exercise clubs, nature or naturalist clubs, camping or outdoors clubs and youth organizations or clubs).

2. Do you allow recreational clubs to access the property?

3. Are you aware of hunters accessing the property? (This may include any hunting of ungulates, water fowl, game birds, rabbits, ground squirrels or other animals and rodents).

4. Do you allow hunters to access the property?

5. Are you aware of Indigenous groups or persons accessing the property for traditional activities? (This may include hunting, fishing, trapping, gathering of plants or spiritual activities).

6. Do you allow Indigenous groups or persons to access the property for traditional activities?

7. Are you aware of any historical or archaeological sites, or other sensitive areas on the property? (This may include any tee-pee rings, found arrow heads or stone hammers, bison rubs, cairns or markers).

8. Have there been discussions or negotiations in the last six months regarding a possible sale of the property to a First Nation band or representative?

3.3 OUTCOMES OF PROJECT-SPECIFIC ENGAGEMENT ACTIVITIES

3.3.1 Indigenous Engagement

3.3.1.1 Stoney Nakoda First Nation

On January 7, 2020, MIPL received a response from Stoney Nakoda First Nation that included a letter of acknowledgement, an information request, and a Traditional Territory and Title Case Map. On February 20, 2020, MIPL provided a response to the information request submitted by Stoney Nakoda First Nation and also included copies of the previously provided information package that accompanied the open house invitation (mailed October 16, 2020), and the project information package provided on December 20, 2019.

CER received a letter of concern from Stoney Nakoda dated May 13, 2020 maintaining that additional work is needed to identify knowledge, values and interests in the Project area including more details regarding the Project engagement plan, capacity support for an in-person meeting and to investigate potential Project effects. MIPL responded with a letter to Stoney Nakoda on May 27, 2020 reviewing engagement activities to date, including a Project update and an invitation for continued engagement and information sharing.

3.3.1.2 George Gordon First Nation and Wicehtowak Limnos Consulting Services LP

CER received a letter of concern from Wicehtowak Limnos Consulting Services LP on behalf of George Gordon First Nation dated March 23, 2020 extending an invitation to engage with George Gordon First Nation and to finalize the ESA filing. On April 24, 2020, a letter was sent to George Gordon First Nation and Wichetowak Limnos Consulting Services LP. The letter provided Project information, outlined earlier communications including an in-person meeting on February 24, 2020, and indicated MIPL continues to assess the level of engagement that may be needed to be consistent with the requirements identified by the CER.

On May 27, 2020, a letter was sent to George Gordon First Nation and Wichetowak Limnos Consulting Services LP addressing the matters raised in the March 23rd filing. The package was sent by email and regular mail and included the following:

1. the conclusion of MIPL's assessment is given the design of the Project and implementation of mitigation measures, residual effects of the Project are predicted to be not significant; and

2. MIPL invited that George Gordon First Nation and Wichetowak Limnos Consulting Services LP share their knowledge related to traditional land use/exercise of treaty or Indigenous rights in the Project region.

On June 11, 2020 MIPL met with George Gordon First Nation and Wichetowak Limnos Consulting Services LP over the phone to further discuss the Project. George Gordon First Nation expressed concern about how MIPL was leading engagement and felt they were not included early enough. MIPL explained George Gordon First Nation was not on the list initially reviewed by the CER in September 2019 and was added to the list of potentially affected groups in January 2020, as soon as that direction was received. There was also a discussion about whether the ESA would be made available. Going forward, if additional traditional land use/exercise of treaty or Indigenous rights details are provided by George Gordon First Nation, Wichetowak Limnos Consulting Services LP, or other Indigenous communities, that impact earlier conclusions about the Project, MIPL will respond as the context requires including amending the ESA or EPP as required.

MIPL remains available to discuss the Project with the identified Indigenous communities and organizations. MIPL will remain open to exploring requests from other potentially affected Indigenous communities throughout the application phase of the Project, in alignment with the overall engagement approach of the Project.

3.3.2 Landowner and Public Engagement

Attendees at the open house held on November 6, 2019 were positive about the Project and appreciated the economic activity that it was expected to bring to the community. Most of the discussions with attendees focused on general Project information, potential impact on the economy and job creation, and where the natural gas will be coming from and going to.

Engagement

Documented comments and questions included:

- Where is the gas coming from? Will the gas come from Canada?
- Where is the gas going to be consumed? Will the gas be used in Canada?
- The PDF of the map in the open house invitation was hard to open.
- This economic activity is good for the community because people with jobs are able to move back to Shaunavon and raise families.
- Money in the area means that farms are passed down and can afford new equipment.
- The RM Economic Development Committee is happy to help with the Project.
- MIPL should come to one of the RM meetings.
- Interest in road improvements
- Questions about the compatibility of pipelines and power lines (in the same ROW)
- How do you determine who would be affected by the Project?
- How many construction workers are needed for the Project?
- How is MIPL related to SaskEnergy?
- What will the Project permit and prevent?

Engagement with the landowner of the parcel where the meter station is proposed has been ongoing. The landowner was also in attendance at the open house. Discussions with the landowner throughout the engagement process and during the open house centers around compensation, siting of the meter station on the quarter section, biosecurity, and land access. The landowner has requested that any power lines be installed underground and the access road to be kept to a lower grade.

These concerns ultimately influenced where MIPL sited the Project. There were no other environment-related concerns or issues received from any landowners, agencies or interest groups during the Project's Engagement Program prior to the filing date.

3.3.2.1 Landowner Questionnaire Results

MIPL received responses from all of the landowners whose properties are intersected by the Project. The results were all 'No' with the exception of one landowner that responded 'Yes' to question numbers 3 and 4, indicating that they are aware of hunters accessing the property and that they allow hunters to access the property.

3.3.3 Regulatory Engagement

To date, no concerns about the Project have been identified through engagement with project regulators. MIPL will continue ongoing engagement with governmental agencies. All required permits will be obtained, and associated conditions and mitigations will be implemented.

3.4 ONGOING ENGAGEMENT

MIPL is committed to sharing information and addressing questions and concerns from potentially affected persons or communities throughout the construction, operation, and decommissioning phases of the Project.

Project information continues to be available on the MIPL website (https://www.miplcl.com/projects/), including a fact sheet and map of the Project. Contact information for MIPL, including telephone (1-306-460-7410), email (manyislands@saskenergy.com), and mailing address (P.O. Box 2168, Kindersley, SK S0L 0Y0) is provided on the fact sheet and website for stakeholders to follow up with further questions or concerns.

MIPL will continue to engage with identified potentially affected landowners, stakeholders, Indigenous communities, and stakeholders that self-identify as interested parties, via mail outs, or telephone calls to announce Project milestones, changes to Project scope or schedule, receipt of CER approval, prior to beginning construction and upon completion of the Project.

4.0 SELECTION OF VALUED COMPONENTS

The ESA focuses on Valued Components (VCs), which are environmental elements of potential value or interest to regulators, Indigenous communities, the public, and other parties. These are identified based on the biophysical and socio-economic elements listed in Table A-1 of the NEB Filing Manual, 2017-01 (NEB 2017) and additional guidance provided in the Interim Filing Guidance (NEB 2019).

The VCs that were selected:

- represent a broad environmental, ecological or human environment component that might be affected by the Project
- are a part of the heritage of Indigenous peoples[1] or a part of their current use of lands for traditional purposes
- are of scientific, historical, or archaeological importance, or
- have been identified as important issues or concerns by stakeholders or Indigenous peoples or in other effects assessments in the region

The rationale for selecting each VC is explained in Table 4-1 and further detailed in the applicable VC sections (see Section 6 through Section 11).

[1] As defined by the *Constitution Act, 1982*

Table 4-1 Valued Components and Rationale for Inclusion or Exclusion in the ESA

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in the ESA	Rationale for Inclusion or Exclusion in the ESA	Section(s) where Addressed in the ESA
Physical and Meteorological Environment	✓	–	Excluded as a VC, although the physical and meteorological environment is discussed in other VC chapters, as it could interact with the Project, either having effects on the Project, or being affected by it. The Project is not within areas of permafrost, or acid rock drainage. Potential effects associated with erosion potential are discussed as they relate to soil capability. Potential effects associated with extreme weather events are discussed in the context of effects of the environment on the Project.	Soil Capability (Section 6) Effects of the Environment on the Project (Section 12)
Soil and Soil Productivity	✓	✓	Included because the Project could affect soil capability as a result of soil handling, storage and through vehicle and equipment movement in the workspace during construction.	Soil Capability (Section 6)
Vegetation	✓	✓	Included although the Project will be constructed within cultivated land, which does not contain native vegetation communities, a portion of the pipeline will be constructed directly adjacent to native grassland. No direct effects on native vegetation are predicted; however, there is the potential for construction-related indirect effects (e.g., weeds) on native vegetation communities and species, including species at risk and species of management concern.	Vegetation and Wetlands (Section 7)

Table 4-1 Valued Components and Rationale for Inclusion or Exclusion in the ESA

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in the ESA	Rationale for Inclusion or Exclusion in the ESA	Section(s) where Addressed in the ESA
Surface water and groundwater quality and quantity	✓	✓	Included because the Project has the potential to affect surface water and groundwater quality and quantity. Surface water is included because Grassy Creek is intersected by the PDA. As well, water withdrawals may be required to hydrotest the pipeline. Groundwater is included. Excavation to install the pipeline and meter station piping could affect shallow subsurface flow, and/or dewatering may be required. These in turn, could affect water quality or quantity in nearby shallow water wells or wetlands. Potential effects of accidental releases on surface and groundwater are assessed in Accidents and Malfunctions.	Surface Water and Groundwater Quality and Quantity (Section 9) Accidents and Malfunctions (Section 13)
Fish and Fish Habitat	✓	–	Excluded as a VC, although the Project crosses Grassy Creek, fish and fish habitat has been excluded because a desktop review has not identified direct drainage connections to fish bearing channels or waterbodies. It appears as though multiple berms have been installed, likely limiting fish passage and/or connectivity to fish-bearing areas. As a result, interactions between the Project and fish and fish habitat are not predicted. A fish and fish habitat assessment was conducted in spring 2020 and confirmed that the Project is not predicted to interact with fish or fish habitat.	Not discussed further

Table 4-1 Valued Components and Rationale for Inclusion or Exclusion in the ESA

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in the ESA	Rationale for Inclusion or Exclusion in the ESA	Section(s) where Addressed in the ESA
Wetlands	✓	✓	Included because the natural gas pipeline intersects four Class II temporary wetlands and two Class IV semi-permanent wetlands. The meter station overlaps no wetlands. There is the potential for effects on wetland area or wetland class arising from vegetation clearing and ground disturbance or indirect effects arising from changes in surface or groundwater.	Vegetation and Wetlands (Section 7)
Wildlife and Wildlife Habitat, including federally-listed (*Species at Risk Act*), provincially- listed species at risk and other identified wildlife species of management concern	✓	✓	Included although the Project will be constructed within cultivated fields, which provides wildlife habitat with limited value, a portion of the pipeline will be constructed directly adjacent to native grassland. There is the potential for construction-related indirect habitat effects (e.g., sensory disturbance) on wildlife species, including species at risk and species of management concern. There is also the potential for vehicle-wildlife collisions and nesting birds to be disturbed, resulting in increased wildlife mortality risk.	Wildlife and Wildlife Habitat (Section 8)
Air Quality	✓	–	Excluded as a VC, air contaminant emissions are excluded from further assessment because they will be limited, transient, and short-term during construction. No emissions are predicted during operations. Air emissions from construction equipment will be addressed through the use of codified practices, proven effective mitigation measures, and best management practices. Standard mitigation measures include ensuring vehicles are well maintained and reducing idling of equipment.	Not discussed further
GHG Emissions	✓	✓	Included because greenhouse gas (GHG) emissions will be released from Project vehicles and equipment operated during construction. As well, direct (fugitive) emissions may be emitted from the meter station during operations, and third-party emissions due to electrical demand may be emitted.	Greenhouse Gas Emissions (Section 10)

Table 4-1 Valued Components and Rationale for Inclusion or Exclusion in the ESA

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in the ESA	Rationale for Inclusion or Exclusion in the ESA	Section(s) where Addressed in the ESA
Acoustic Environment	✓	–	Excluded as a VC, as the only sources of noise are from Project vehicles and equipment during construction activities. Any change in noise levels will be limited, transient and short-term. Interactions with the acoustic environment will be addressed using codified practices, proven effective mitigation measures, and best management practices. Standard mitigation measures include maintaining noise abatement equipment on machinery, such as mufflers.	Not discussed further
Human Occupancy and Resource Use	✓	✓	Included because the Project might result in access or sensory disturbance to other land users (e.g., agriculture, recreation) during construction and operation. The Project has the potential to affect access to lands used for agriculture, recreation, etc. during construction and operation. The Project is located on cultivated, private land that will be purchased and leased by MIPL.	Human Occupancy and Resource Use (Section 11)
Heritage Resources	✓	–	Excluded as a VC. Heritage Resource Referral Review Forms were submitted to the Heritage Conservation Branch (HCB) of the Saskatchewan Ministry of Parks, Culture and Sport Heritage on October 11, 2019 and November 26, 2019. Responses from the HCB were received on October 28 and December 2, 2019 indicating that the HCB has no concern and no further work is required for the Project.	Not discussed further
Navigation and Navigation Safety	–	–	Excluded as a VC because the Project is not near a navigable waterway. Grassy Creek at the site of the crossing, is shallow, may have intermittent flows and is blocked by multiple berms.	Not discussed further
Traditional Land and Resource Use	–	–	Excluded as a VC because all Project activities will occur on privately-owned, previously-disturbed land. MIPL has not been made aware of any current access agreements with landowners or leaseholders for the practice of traditional activities. To date, no specific concerns regarding the Project have raised by Indigenous groups. No interaction with traditional land and resource use is predicted.	Not discussed further

Table 4-1 Valued Components and Rationale for Inclusion or Exclusion in the ESA

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in the ESA	Rationale for Inclusion or Exclusion in the ESA	Section(s) where Addressed in the ESA
Social and Cultural Well-Being	✓	–	Excluded as a VC because the Project has a limited scope, relatively small workforce requirements (up to 35 workers), and short duration of construction (up to four months, based on current schedule). No temporary work camps are required; all workers will be housed in existing, commercial accommodations, likely in Shaunavon, SK.	Not discussed further
Human Health and Aesthetics	–	–	Excluded as a VC because there are no anticipated interactions with human health and aesthetics. Limited, transient and short-term construction-phase effects on air quality and the acoustic environment are anticipated.	Not discussed further
Infrastructure and Services	✓	–	Excluded as a VC because the Project has a limited scope, relatively small workforce requirements (up to 35 workers), and short duration of construction (up to four months). Existing capacity of infrastructure and services in Shaunavon, SK and the nearby area, and existing third-party accommodations (e.g., hotels) are assumed to be able to accommodate the Project's anticipated workforce. There are limited anticipated interactions with community services and infrastructure. As existing community services and infrastructure are sufficient, and as no concerns related to infrastructure and services were raised during the engagement program, it is unlikely that the Project will result in inequitable distribution of effects amongst sub-groups of the population.	Not discussed further
Employment and Economy	✓	–	Excluded as a VC because the Project has a limited scope, relatively small workforce requirements (up to 35 workers), and short duration of construction (up to five months). Any effects are expected to be positive but not large enough to result in changes to local employment or economy. It is unlikely that the Project will result in inequitable distribution of effects amongst sub-groups of the population.	Not discussed further

Table 4-1 Valued Components and Rationale for Inclusion or Exclusion in the ESA

Biophysical and Socio-economic Element	Potential Project Interaction	Valued Component in the ESA	Rationale for Inclusion or Exclusion in the ESA	Section(s) where Addressed in the ESA
Rights of Indigenous Peoples	-	-	Excluded as a VC because MIPL did not identify potential Project-related impacts to the rights of Indigenous peoples. No specific concerns have been raised to date by Indigenous communities engaged for the Project. Project activities will be conducted within the boundary of Treaty 4, 1874 and within the traditional homeland of the Métis Nation of Saskatchewan; however, since the Project is located within privately-owned land with no third-party access and since Project-related environmental effects are well understood and manageable, the Project is not anticipated to impact the exercise or practice of Indigenous and Treaty rights. As a result, a further assessment of the potential effects on the rights of Indigenous peoples has not been included.	Not addressed further

NOTES:
✓ Indicates an identified interaction or valued component in the ESA
– Indicates no identified interaction or valued component in the ESA

Selection of Valued Components

Based on the discussion provided in Table 4-1, VCs included in this assessment are:

- soil capability
- vegetation and wetlands
- wildlife and wildlife habitat
- surface water and groundwater quality and quantity
- greenhouse gas emissions
- human occupancy and resource use

Additionally, changes to the Project that may be caused by the environment (Section 12) and potential effects related to accident and malfunction scenarios (Section 13) are also assessed.

As noted in Table 4-1, VCs identified in Table A-1 of the NEB Filing Manual and in the Interim Filing Guidance that are not carried forward in this assessment are:

- physical and meteorological environment
- air emissions
- acoustic environment
- heritage resources
- navigation and navigation safety
- traditional land and resource use
- social and cultural well-being
- human health and aesthetics
- infrastructure and services, and
- employment and economy
- rights of Indigenous peoples

5.0 ASSESSMENT METHODS

The ESA was completed to meet the requirements of the NEB Filing Manual 2017-01 (NEB 2017) and the Interim Filing Guidance (NEB 2019). The approach applied a framework for assessing potential project-specific environmental effects, including accidents and malfunctions, as well as potential cumulative effects likely to result from the Project, in combination with other projects or activities that have been or will be carried out. For the purposes of this assessment, the term *environment* refers broadly to biophysical and socio-economic elements.

Project-related and cumulative environmental effects are assessed sequentially in each VC chapter. Potential project-related environmental effects and the mechanisms through which they act are discussed first, taking into account design and mitigation measures that help to reduce or avoid the effect. Residual Project-related environmental effects are characterized using specific criteria (e.g., direction, magnitude, geographic extent, duration, frequency, likelihood) defined for each VC. If there is an identified potential for residual environmental effects of the Project to interact cumulatively with the residual environmental effects of other projects or physical activities, these cumulative environmental effects are also assessed. The significance of Project-related environmental effects is then determined based on the pre-defined criteria or thresholds.

5.1 SCOPING THE ASSESSMENT

To focus VC chapters on matters of relevance, likely interactions of the Project with the surrounding biophysical and socio-economic environment are identified using a variety of sources, including:

- Federal and provincial regulatory requirements
- Input from the Project's engagement activities, as applicable (see Section 3)
- Existing regional information and documentation regarding environmental components found in the vicinity of the Project (e.g., species of management concern including species at risk)
- Documentation relating to other projects and activities in the vicinity of the Project
- Professional judgment of the environmental assessment practitioners, based on experience with similar projects elsewhere and other projects and activities in Saskatchewan
- MIPL's experience with similar projects

5.1.1 Potential Effects, Effects Pathways, and Measurable Parameters

The assessment of each VC begins with a description of the pathways whereby specific project activities and actions could result in an environmental effect (i.e., the effects pathways). For each VC, the Project's potential effects are identified and assessed in the context of the VC's existing condition, as well as its biophysical or socio-economic characteristics, regulatory context, and any input received from the engagement process.

Once effect pathways are identified, one or more measurable parameter(s) are selected to facilitate quantitative (where possible) and qualitative assessment of residual project effects and residual cumulative effects. Measurable parameters provide defensible and acceptable means to characterize change in a VC attributable to the Project and contribute to the determination of the significance of those effects.

5.1.2 Boundaries

5.1.2.1 Spatial Boundaries

Spatial boundaries for assessing Project and cumulative effects include:

- **Project Disturbance Area (PDA)** - Encompasses the anticipated area of physical disturbance associated with the construction and operation of the Project. For this Project, the PDA (a total of approximately 8.7 ha) includes the ROW (6.8 ha), meter station (0.1 ha), and TWS (1.7 ha).
- **Local Assessment Area (LAA)** - Encompasses the area in which Project-related effects (direct or indirect) are predicted to occur. The LAA encompasses the PDA and is VC specific.
- **Regional Assessment Area (RAA)** - The area within which potential cumulative effects – the predicted likely residual effects from the Project in combination with those of past, present and reasonably foreseeable future projects and physical activities – are assessed. The RAA encompasses the PDA and the LAA and is VC specific.

LAA and RAA boundaries for each VC included in the assessment are outlined in in Table 5-1 and illustrated in Figure 5-1.

Table 5-1 Study Area Boundaries for VCs included in the Assessment

VC	LAA	RAA
Soil Capability	The LAA for soil capability is the same area as the PDA.	Extends 5 km beyond the PDA (aligns with the wildlife assessment).
Vegetation and Wetlands	Includes the PDA with a 100 m buffer which encompasses the recommended 30 m setback for provincially-listed plant species of management concern plus an additional buffer.	Extends 5 km beyond the PDA (aligns with the wildlife assessment).
Wildlife and Wildlife Habitat	Includes the PDA with a 1 km buffer. The LAA was developed with consideration of potential zones of influence (i.e., area of reduced use or avoidance) and prescribed or recommended maximum setback distances for species of management concern and certain wildlife features (e.g., 1 km for active ferruginous hawk nests).	Extends 5 km beyond the PDA. The RAA was developed through past experience and professional judgment, with consideration of home ranges for wildlife species of management concern, including species at risk.

Table 5-1 Study Area Boundaries for VCs included in the Assessment

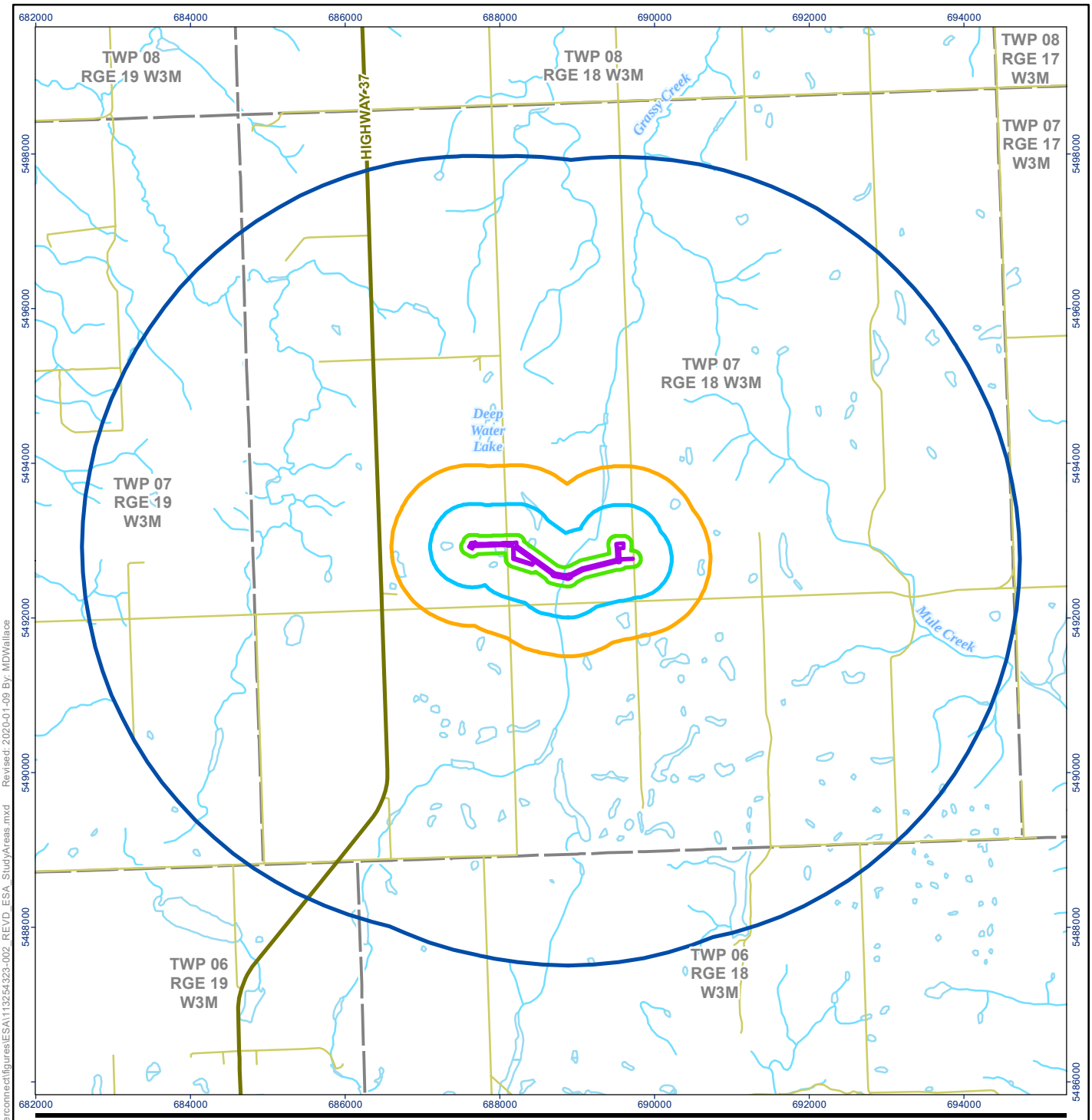
VC	LAA	RAA
Surface Water and Groundwater Quality and Quantity	The LAA for surface water includes the PDA and an area that extends 100 m upstream from each watercourse crossing and 300 m downstream from the crossing. It also includes drainages (with no defined channels) and all other surface water bodies (e.g., wetlands) within a 100 m buffer of the PDA. The LAA for groundwater includes the PDA and a 500 m buffer centered on the PDA. The LAA encompass the maximum area in which the Project could interact with groundwater resources under normal conditions during construction and operation.	Extends 5 km beyond the PDA, ending at the upstream watershed boundary if less than 5 km from the PDA.
Greenhouse Gas Emissions	No local or regional spatial boundaries are used for the assessment of GHGs, as the environmental effect associated with GHG emissions is a global phenomenon. This is based on GHGs mixing in the atmosphere and dispersing from their emission sources (IPCC 2013). However, as a reference point, this assessment will consider the volume of the release of GHGs during Project construction relative to provincial and federal GHG inventories. Administrative provincial and federal boundaries are hence selected to create a context for the Project's GHG emissions. It is noted though, that the emissions disperse beyond these administrative boundaries.	
Human Occupancy and Resource Use	A 1 km buffer around the PDA (aligns with the wildlife assessment).	A 5 km buffer around the PDA (aligns with the wildlife assessment).

5.1.2.2 Temporal Boundaries

Temporal boundaries identify when an environmental effect will be evaluated in relation to specific Project phases and activities. Pending regulatory approval, temporal boundaries for this assessment include:

- **Construction**: Project construction is scheduled to last up to five months, with construction beginning in August 2020
- **Operation**: The Project has an anticipated in-service date of December 2020 and will operate for at least 40 years

At this time, there is no plan to decommission or abandon the Project. As discussed in Section 2.4.3, at the end of the Project's life-span, the facility operator will apply to the CER to decommission or abandon it, as applicable, according to the regulations in force at the time. Accordingly, decommissioning and abandonment are not considered further in this assessment.



Legend

- Project Development Area (PDA)/ Soil Capability Local Assessment Area (LAA)
- Vegetation and Wetlands/ Surface Water LAA (100 m)
- Groundwater LAA (500 m)
- Wildlife and Wildlife Habitat/ Human Occupation and Resource Use LAA (1 km)
- Regional Assessment Area
- Major Road
- Minor Road
- Watercourse
- Township
- Waterbody

0 0.5 1 Kilometers
(At original document size of 8.5x11)
1:75,000

N

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Data Sources: Base features produced under license with the Government of Saskatchewan and the Government of Canada.

Stantec

Many Islands Pipe Lines (Canada) Limited

Project Location
Near Shaunavon, Saskatchewan

Prepared by MDW on 2020-01-09
TR by JH on 2020-01-09
IR Review by NC on 2020-01-09

Client/Project
113254323-002 REVD
Many Islands Pipe Lines (Canada) Limited
Shaunovan Interconnect Project
Environmental and Socio-Economic Assessment

Figure No.
5-1

Title
Study Areas

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5.2 EXISTING CONDITIONS

The existing conditions of the VC are based on data collected during desktop and associated field programs. Each VC section contains a description of relevant baseline information that is used as the basis to assess Project and cumulative effects.

5.3 PROJECT–VC INTERACTIONS

Each VC section includes a table showing Project physical activities during each Project phase that have the potential to interact with the VC, resulting in environmental effects. Physical activities that do not interact with the VC are also identified and rationale provided for their exclusion.

5.4 MITIGATION OF PROJECT EFFECTS

Mitigation is defined by the NEB Filing Manual, 2017-01 (NEB 2017, p. 14) as:

> "In respect of a project, the elimination, reduction, or control of the adverse environmental effects of the Project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation, or any other means."

Measures are identified, as necessary, to mitigate the potential effects of project construction and operation on each VC. These measures include site-specific and standard industry practices, compliance with legislation, regulations and guidelines, planning considerations, and other measures applicable to the Project. These measures and their links to effects and interactions are discussed.

Both standard and project-specific mitigation measures are outlined in the Project's EPP (Appendix A).

5.5 ASSESSMENT OF PROJECT EFFECTS

For each VC, the Project's potential effects are identified and assessed in the context of the VC's existing conditions, as well as its biophysical or socio-economic requirements and characteristics. The methods used to assess the effects are presented in each VC section. The Project's potential effects are then discussed in the context of the following:

- **Pathways for Potential Project Effects:** The assessment of each potential Project effect begins with a description of the pathways whereby specific project activities and actions could result in an environmental effect.
- **Mitigation for Potential Project Effects:** Mitigation measures that assist in reducing or avoiding potential environmental effects are identified for each effect pathway.
- **Assessment of Residual Effects:** Available data are analyzed to quantify (where possible) and qualify the residual effects of project interactions with each VC. Residual effects (i.e., the effects that remain after mitigation has been applied) are described, taking into account how the proposed mitigation will alter or reduce the effect. Effects are reviewed on a Project-wide basis and, where

relevant to the assessment, a discussion of possible site-specific effects is presented. The residual effects assessment considers both positive and adverse effects after mitigation and other management measures are implemented.

- **Characterization of Residual Effects:** If positive residual effects are identified, they are not characterized further. Adverse residual effects are characterized in terms of magnitude, geographic extent, frequency, duration, reversibility and likelihood. Where possible, these characteristics are described quantitatively for each residual effect. Where these characteristics cannot be expressed quantitatively, they are described using qualitative terms that are defined specifically for the VC or effect.

Detailed definitions of the effects description criteria for each VC included in the assessment (except for GHG Emissions; see below) are provided in Table 5-2.

The release of GHGs to the atmosphere from a Project poses a challenge to the Government of Canada's reduction targets and international obligations in respect of GHGs and climate change. Rather than characterizing residual effects arising from Project-related GHG emissions in terms of likelihood, direction, magnitude, frequency, duration and reversibility, the focus of the GHG assessment in this ESA is to quantify the direct emissions arising from the Project and compare them to provincial, national and sector-based emission totals, and to the Government of Canada's GHG reduction targets. This adheres to the guidance for GHG assessments outlined in the Interim Filing Guidance (NEB 2019).

Table 5-2 Characterization of Residual Effects for VCs included in the Assessment

Characterization	Quantitative Measure or Definition of Qualitative Categories				
	Soil Capability	**Vegetation and Wetlands**	**Wildlife and Wildlife Habitat**	**Surface Water and Groundwater Quality and Quantity**	**Human Occupancy and Resource Use**
Direction	Positive - an effect that moves measurable parameters in a direction beneficial to the VC relative to baseline Adverse - an effect that moves measurable parameters in a direction detrimental to the VC relative to baseline Neutral - no net change in measurable parameters for the VC relative to baseline				
Magnitude	Negligible – no measurable change Low – a measurable change in soil parameters (e.g., change in soil structure) but no change in soil capability[1] Moderate – a change in soil capability (e.g., partial loss of topsoil) but no change in capability class[1] High – a change in soil parameters (e.g., admixing of topsoil and subsoil) which results in a change in capability class[1]	Negligible – no measurable change Low – a measurable change to native upland communities, wetlands, or plant species of management concern but unlikely to affect their sustainability in the LAA, and no effect on plant species at risk Moderate – a measurable change to native upland communities, wetlands, or plant species of management concern, including plant species at risk, in the LAA, but unlikely to affect their sustainability in the RAA High - effect would on its own, or as a substantial contribution in combination with other sources, affect the sustainability of native upland communities, wetlands, or plant species of management concern, including plant species at risk in the RAA	Negligible – no measurable change Low – a measurable change in abundance of wildlife in the LAA is unlikely, although temporary local shifts in distributions might occur Moderate – a measurable change in the abundance and distribution of wildlife in the LAA is possible, but a measurable change on the abundance of wildlife in the RAA is unlikely High – a measurable change in the abundance of wildlife in the RAA is possible	**Surface Water Quantity and Quality** Negligible – no measurable change Low – a measurable change is detectable, but within normal variability of baseline conditions and does not exceed regulatory limits and goals Moderate – a measurable change that exceeds regulatory limits and goals but does not result in an alteration or loss of surface water supply for existing users High – a measurable change that exceeds regulatory limits and goals and results in an alteration or loss of surface water supply for existing users **Groundwater Quantity and Quality** Negligible – no measurable change Low - a measurable change is detectable, but within normal variability of baseline conditions and does not exceed regulatory limits and goals Moderate – a measurable change that exceeds regulatory limits and goals but does not result in an alteration or loss of groundwater supply for existing users High – a measurable change that exceeds regulatory limits and goals and results in an alteration or loss of supply of groundwater supply for existing users	Negligible – no measurable change Low – a measurable but limited change in land use pattern Moderate – a measurable change in land use pattern, but will not prevent activities from continuing elsewhere in the LAA High – a measurable change in land use pattern that will likely affect either the sustainability of land resource use and/or displace land use activities that cannot be accommodated elsewhere in the LAA
Geographic Extent	PDA - residual effect is restricted to the PDA LAA - residual effect extends into the LAA. For soil capability, the LAA is the same as the PDA. RAA - residual effect extends into the RAA				
Duration	Short-term - residual effect is restricted to construction Medium-term - residual effect extends through construction and up to 10 years during operation Long-term - residual effect extends beyond 10 years				
Frequency	Single event Multiple irregular event - occurs on no set schedule Multiple regular event - occurs at regular intervals Continuous - occurs continuously				
Reversibility	Reversible - the effect is likely to be reversed after activity completion and reclamation Irreversible - the effect is unlikely to be reversed				
Likelihood	Unlikely – residual effect is not likely to occur Possible – residual effect may occur but is not likely Likely – residual effect is likely to occur				

NOTE:
[1] Refers to Land Suitability Rating System (LSRS) for Agricultural Crops ratings (Agriculture and Agri-food Canada (AAFC) 2009, GOC 2013).

5.6 ASSESSMENT OF CUMULATIVE EFFECTS

In addition to assessing Project-related residual effects, section A.2.7 of the NEB Filing Manual, 2017-01 (NEB 2017) requires that the assessment consider cumulative environmental effects predicted to result from the Project's residual effects in combination with the residual effects of other past, present, or reasonably foreseeable future projects or activities.

Existing environmental conditions reflect cumulative effects that have already occurred on the environment from past projects and activities. Past and existing physical activities that have been or are being carried out have influenced the baseline conditions. The effects of other past and existing physical activities in combination with the effects of the Project are therefore considered in the assessment of the residual environmental effects of the Project (Section 5.5). Reasonably foreseeable future projects and physical activities (as defined in Section 5.6.1) are considered, in combination with the Project, during the cumulative effects assessment, which takes into account the existing conditions (i.e., baseline conditions) for the VC.

Two conditions must be met to pursue an assessment of cumulative environmental effects:

1. There are adverse residual Project effects on the VC, and
2. The adverse residual Project effects act cumulatively with effects of other past, present and reasonably foreseeable future projects or physical activities

Where either the first or second of these conditions are not met, there is no expectation that the Project will contribute cumulatively to residual effects, and further assessment is not warranted. If both of the two conditions are met, then the assessment of cumulative effects continues within the VC section following assessment of residual Project effects.

5.6.1 Project and Activity Inclusion List

Where a cumulative effects assessment is completed for a VC, the focus is on those other projects and physical activities that could result in a similar residual environmental effect to the environmental effects being considered for the Project. The project and physical activity inclusion list includes all past, present and reasonably foreseeable future projects and physical activities with residual environmental effects that could overlap spatially and temporally with the Project. Reasonably foreseeable future projects and physical activities are defined as those that: (a) have been publicly announced with a defined schedule and sufficient project details that allow for a meaningful assessment; (b) are currently undergoing an environmental assessment; (c) are in a permitting process; or, (d) are approved but not yet operational.

A search was conducted using available information and online databases for existing and reasonably foreseeable future projects and physical activities within the vegetation and wetlands, wildlife and wildlife habitat, surface water and groundwater quality and quantity, and human occupancy and resource use RAA (henceforth referred to as the "biophysical RAA" for simplicity; 5 km buffer of the PDA) (Figure 5-1).

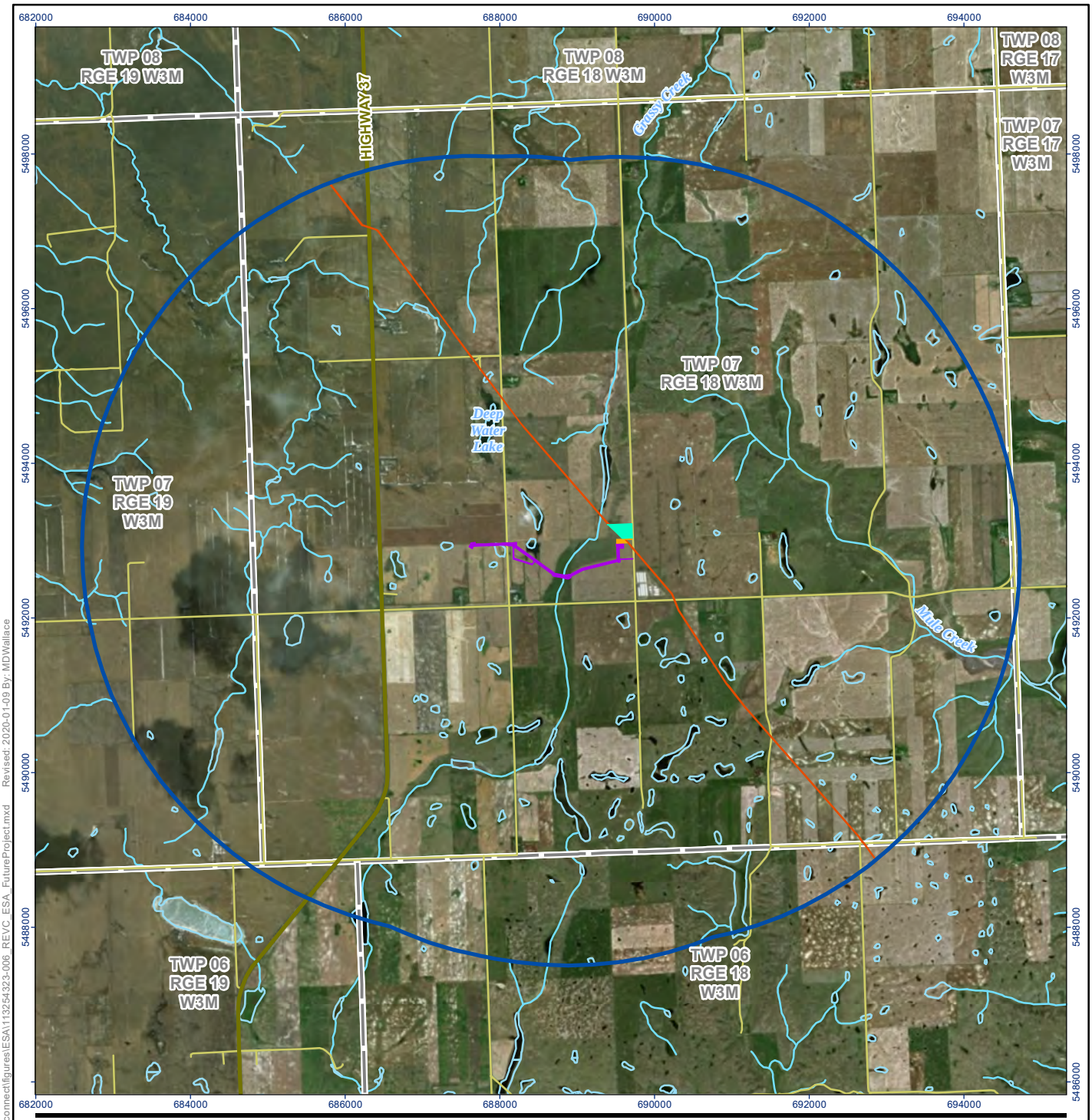
For the biophysical RAA, reasonably foreseeable future projects and physical activities were identified from a search of the Government of Saskatchewan's environmental assessment project's list (Government of Saskatchewan (GOS) 2019a) and the CER Regulatory Document Index (CER 2019).

Existing land uses in the region include agriculture, oil and gas developments, and rural residential developments. Other land uses in the PDA include the existing MIPL Herbert-Loomis pipeline and ROW and cultivated agriculture. Power infrastructure operated by SaskPower, gas infrastructure operated by SaskEnergy, and telecommunications infrastructure operated by SaskTel also occur in the LAA. As of November 2019, three projects were identified within the biophysical RAA including a meter station at the tie in point to the Foothills pipeline, as well as the TC Energy Keystone XL project (Keystone XL) pipeline and an associated pumping station (Figure 5-2).

Reasonably foreseeable future projects and physical activities within the biophysical RAA include the following projects listed in Table 5-3, as of November 2019.

Table 5-3 Project Inclusion List

Type of Project	Project	Developer
Past and Present Projects, Physical Activities and Land Use		
Agriculture	Existing and past agricultural practices including grazing	-
Infrastructure	Roads and highways	-
Residential	Rural developments	-
Linear Development	Existing linear features (e.g., fibre-optic and power lines)	-
Industrial Activities	Other resource extraction activities (e.g., , aggregate development)	-
Oil and Gas	Herbert-Loomis Pipeline	MIPL
Oil and Gas	Foothills Pipeline	Foothills Pipe Lines Ltd.
Future (Reasonably Foreseeable) Projects and Physical Activities		
Oil and Gas	Keystone XL pipeline (proposed)	TC Energy
Oil and Gas	Keystone XL pumping station	TC Energy
Oil and Gas	Foothills Pipeline meter station (proposed)	Foothills Pipe Lines Ltd.



Legend

- Project Development Area (PDA)
- Regional Assessment Area (RAA)
- TC Energy Keystone XL Pipeline Right-of-way (Proposed)
- TC Energy Keystone XL Pumping Station (Proposed)
- TC Energy Meter Station (Proposed)
- Major Road
- Minor Road
- Watercourse
- Township
- Waterbody

0 0.5 1 Kilometers
(At original document size of 8.5x11)
1:75,000

N

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Data Sources: Base features produced under license with the Government of Saskatchewan and the Government of Canada.

Stantec

Many Islands Pipe Lines (Canada) Limited

Project Location
Near Shaunavon, Saskatchewan

Prepared by MDW on 2020-01-09
TR by JH on 2020-01-09
IR Review by NC on 2020-01-09

Client/Project
113254323-006 REVC

Many Islands Pipe Lines (Canada) Limited
Shaunovan Interconnect Project
Environmental and Socio-Economic Assessment

Figure No.
5-2

Title
Future Projects and Physical Activities in the RAA

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5.6.3 Assessment of Residual Cumulative Effects

Once it is determined that the potential for a cumulative effect on a VC exists, the assessment of cumulative effects is discussed in the context of the following:

- **Pathways for Potential Cumulative Effects:** The assessment of each potential cumulative effect includes a description of the pathways whereby the Project's residual effects interact with those of other projects and physical activities.
- **Mitigation for Potential Cumulative Effects:** Mitigation measures that assist in reducing or avoiding potential cumulative effects are identified for each effect, where they differ from mitigation for project effects. Those measures that help to reduce or avoid the interaction of the residual Project effect with the same residual effects from other projects and physical activities are identified, and may include regional initiatives or collaboration with other entities (e.g., industrial proponents, municipalities).
- **Assessment of Residual Cumulative Effects:** Available data are analyzed to quantify (where possible) and qualify the residual cumulative effects. Residual cumulative effects (i.e., the effect of all past, present, and reasonably foreseeable future projects and physical activities in combination with the residual effect of the Project) are described, taking into account how the proposed mitigation will alter or reduce the effect. The Project's contribution to the residual cumulative effect is also described.
- **Characterization of Residual Cumulative Effects:** Each residual cumulative environmental effect is described using the residual effects characterizations for the VC (Table 5-2). The discussion of each residual cumulative effect concludes with a statement that summarizes the effect in the context of existing environmental conditions of the RAA.

5.7 DETERMINATION OF SIGNIFICANCE

Per the guidance of the NEB Filing Manual, 2017-01 (NEB 2017), the assessment evaluates the significance of residual project effects and residual cumulative effects. Residual project and residual cumulative effects are evaluated in the context of changes relative to existing conditions in the RAA.

The assessment establishes a significance definition, which is used to determine the significance of residual effects. The determination of significance involves applying the established threshold criteria beyond which a residual effect on a VC would be considered significant. The criteria for determining significance for each residual cumulative effect are described for VCs included in the assessment in Table 5-4 (except for GHG Emissions; see below).

The Project and cumulative residual effects assessments consider both positive and adverse effects. However, a significance determination is provided only for adverse effects.

If a residual adverse Project effect or residual adverse cumulative effect is determined to be significant, per the guidance of the NEB Filing Manual (NEB 2017), the likelihood of the significant effect is evaluated.

Table 5-4 Significance Definitions for VCs included in the Assessment

VC	Significance Definition
Soil Capability	A significant adverse residual effect on soil capability is defined as a permanent change in soil quality that, following the application of mitigation measures, reduces soil capability such that existing land uses (in this case, agriculture) cannot continue at or close to current levels.
Vegetation and Wetlands	A significant adverse residual effect on vegetation is defined as one that, following the application of avoidance and mitigation measures, results in: • potential contravention of SARA or the Saskatchewan *Wildlife Act* • effects on a plant species of management concern such that the long-term viability is compromised in the RAA, or • A net loss of wetland area that cannot be mitigated or compensated for, or, is otherwise in contravention of wetland policies or regulations.
Wildlife and Wildlife Habitat	A significant adverse residual effect on wildlife and wildlife habitat is defined as one that, following the application of avoidance and mitigation measures: • threatens the long-term persistence or viability of species of management concern (including a species at risk with a Special Concern status designation) in the RAA, or • causes a conservation-based threshold (e.g., habitat) specified in a recovery strategy or action plan to be exceeded, or incrementally contributes to an already exceeded target for a species at risk with a Threatened or Endangered status designation.
Surface Water and Groundwater Quality and Quantity	A significant residual effect on surface water quality or quantity is one that, following the application of avoidance and mitigation measures, results in the following: • a change in surface water quality that is not within applicable water quality guidelines and is a concern for potentially susceptible receptors (e.g., humans, aquatic life, wildlife), or • a change in surface water quantity that negatively impacts potentially susceptible receptors (e.g., causes flooding of upland areas or reduces quantity below instream flow needs) A significant residual environmental effect on groundwater quality or quantity is one that, following the application of avoidance and mitigation measures, results in: • a change in groundwater quality that is not within the applicable guidelines and is a concern for receptors (e.g., humans, aquatic life, wildlife), or • a change in groundwater quantity that materially impacts receptors (e.g., recharge areas, water wells users).
Human Occupancy and Resource Use	A significant adverse residual effect for human occupancy and resource use is defined as one that, following application of mitigation, results in the following: • the Project does not comply with established land use plans or policies, or • the Project will create a change or disruption that widely restricts or degrades present land use to a point where the activities cannot continue at or near current levels in the RAA, and which cannot be offset through compensation measures.

As identified in guidance provided in the CEA Agency's Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (CEA Agency 2003), "the contribution of an individual project to climate change cannot be measured". The NEB Filing Manual, 2017-01 (NEB 2017a), confirms the applicability of the CEA Agency guidance. As the effect on climate change from the contribution of a single project cannot be accurately measured or attributed, it is not reasonable to conclude a significant adverse residual effect on atmospheric GHG concentrations or climate change from a single project's GHG emissions. Instead, evaluation of residual Project effects focuses on estimation of GHG releases, mitigation and evaluation of Project GHG releases in relation to provincial, national and Canadian sector (i.e., ECCC – Oil and Natural Gas Transmission) GHG totals and the Government of Canada's GHG reduction targets.

5.8 MONITORING

Monitoring procedures and follow-up programs are identified for each VC where these programs provide greater certainty regarding mitigation implementation, mitigation effectiveness, and assessment accuracy. Details of monitoring approaches are included in the project-specific EPP (Appendix A).

6.0 ASSESSMENT OF POTENTIAL EFFECTS ON SOIL CAPABILITY

6.1 SCOPE OF ASSESSMENT

Soils support a variety of terrestrial ecosystem elements and functions, including natural vegetation, wildlife habitat and nutrient cycling, as well as land uses such as agriculture. The NEB Filing Manual (NEB 2017) lists soil and soil productivity as a biophysical element that must be considered in ESAs. For this assessment, the term soil capability has been selected as the VC to represent soil and soil productivity. While soil productivity is primarily focused on agricultural crop production, the term soil capability is relevant to a broader range of land use applications such as recreational use and wildlife habitat.

The scope of this assessment has been influenced by:

- provincial and federal regulations and policy guidance (see Section 1.1)
- the nature, scope, and extent of the Project and its activities (see Section 2), and
- the environmental setting of the Project (see Section 6.2)

The primary focus of the soil capability assessment is to identify important soil resources and reclamation constraints; mitigate potential adverse effects to soils during construction; and assist in conserving soil resources for successful interim and final reclamation.

6.1.1 Potential Effects, Pathways and Measurable Parameters

Potential effects, effect pathways and the measurable parameters used to characterize and assess effects on soil capability are provided in Table 6-1.

Table 6-1 Potential Effects, Pathways and Measurable Parameters for Soil Capability

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in soil quality	• Loss or alteration (e.g., admixing) of topsoil during vegetation clearing, soil handling and storage • Compaction, rutting, or loss of soil structure through vehicle and equipment movement • Soil loss through wind or water erosion • Increase in extent and/or severity of soil salinity due to land management (i.e., dewatering) • Introduction or spread of soil pathogens	• Depth of topsoil (cm) • Compaction and rutting risk • Wind and water erosion risk • Land Suitability Ratings for Agricultural Crops • Soil salinity • Occurrences of clubroot (*Plasmodiophora brassicae*)

6.2 EXISTING CONDITIONS FOR SOIL CAPABILITY

6.2.1 Methods

6.2.1.1 Desktop

A baseline desktop review of pre-existing soil surveys, satellite imagery, and geographic information system (GIS) mapping information was conducted to determine the types of landforms, surficial materials, geomorphic processes, soil types, slopes and drainage that may be present on the PDA. The assessment also reviewed the following sources:

- Aerial imagery, survey plans, and ground-based photographs (Google Earth Pro 2016)
- Historical soil survey data for the region (Saskatchewan Soil Information System (SKSIS) 2019)
- Saskatchewan Soil Information Database Version 4.0 (SKSID 4.0) (AAFC 2009)
- Historical occurrences of clubroot (*Plasmodiophora brassicae*) within the region (GOS 2020)
- Soil Capability Classification of Agriculture (AAFC 2009, GOC 2013)
- Topsoil depth (GIS4AG 2017)

6.2.1.2 Field Survey

Existing soil conditions were confirmed and augmented through a soil survey. A soil survey was completed in the fall of 2016, to obtain information to guide construction planning and inform any site-specific mitigation that may be required. A supplementary field survey was completed in the spring of 2020. Landform and soil descriptions were documented at each soil inspection site. All soil descriptions were completed using The Canadian System for Soil Classification (AAFC 2009). The following information was documented for each soil inspection site:

- soil horizon type and depth
- thickness of horizons
- soil texture
- rock/gravel encountered on the ground surface and/or in soil pits
- soil colour
- chemical properties of each horizon (e.g., presence of mottling, gleying, salts, or calcareousness)
- topography and slope position

Samples from the fall 2016 soil survey were collected from each major soil horizon (i.e., A, B, and C horizons) to trench depth or to refusal (i.e., auger stopped due to rocks). Representative samples were submitted to Maxxam Laboratories (Maxxam) for salinity and texture analysis to confirm the presence or absence of saline and/or sodic soils or other characteristics that may require mitigation. Additionally, macronutrient analyses were completed by Maxxam for samples to ensure macronutrient values are consistent before and after the Project.

6.2.2 Overview

6.2.2.1 Desktop

Historical soil maps of the area (SKSIS 2019, AAFC 2009) indicate that the PDA is within the Dark Brown soil zone and is comprised of Amulet, Scotsguard, Wymark, Alluvium, and Hillwash soil series. The characteristics of the soils throughout the PDA are summarized below:

- Complexes of Scotsguard and Wymark soil series are found at the meter station site in SE 17-07-18 W3M and NE 17-07-18 W3M (12.1% of the PDA) (AAFC 2009). This soil complex is a mixture of loamy glacial till and silty loessial materials underlain by glacial till (SKSIS 2019). Soil complexes of Scotsguard and Wymark are Dark Brown Chernozemic soils, have a surface soil texture of clay loam, and are slightly stony (SKSIS 2019, AAFC 2019). These clay loam soils have a moderate risk of compaction, a low risk of being susceptible to wind erosion, and a low to moderate risk of being susceptible to water erosion (AAFC 2009). Scotsguard and Wymark soil complexes have a Class 3 rating for land suitability for agricultural crops, indicating moderately severe limitations that restrict the range of crops or require special conservation practices (AAFC 2009, GOC 2013).
- Complexes of Amulet and Scotsguard soil series are found at the east side of the meter station site and the west end of the pipeline ROW in SE 17-07-18 W3M and SW 16-07-18 W3M (23.4% of the PDA) (AAFC 2009). This soil complex is a mixture of clay loam glacial till and loamy glacial till (SKSIS 2019). Soil complexes of Amulet and Scotsguard are Dark Brown Chernozemic soils, have a surface soil texture of clay loam, and are moderately stony (SKSIS 2019, AAFC 2009). These clay loam soils have a moderate risk of compaction, a low risk of being susceptible to wind erosion, and a moderate risk of being susceptible to water erosion (AAFC 2009). Amulet and Scotsguard soil complexes have a Class 3 rating for land suitability for agricultural crops, indicating moderately severe limitations that restrict the range of crops or require special conservation practices (AAFC 2009, GOC 2013).
- Complexes of Amulet and Wymark soil series are found along the pipeline ROW in SW 16-07-18 W3M and in the eastern portion of SE 16-07-18 W3M (29.5% of the PDA) (AAFC 2009). This soil complex is a mixture of clay loam glacial till and silty loessial materials underlain by glacial till (SKSIS 2019). Soil complexes of Amulet and Wymark are Dark Brown Chernozemic soils, have a surface soil texture of clay loam, and are moderately stony (SKSIS 2019, AAFC 2009). These soils have a moderate risk of compaction, a moderate risk of being susceptible to wind erosion, and a low to high risk of being susceptible to water erosion (AAFC 2009). Amulet and Wymark soil complexes have a Class 3 or Class 4 rating for land suitability for agricultural crops, indicating moderately severe to severe limitations that restrict the range of crops or require special conservation practices (AAFC 2009, GOC 2013).
- Alluvium soils are found along the pipeline ROW in the eastern portion of SW 16-07-18 W3M, at the base of the strong slopes in SE 16-07-18 W3M (17.8% of the PDA) (AAFC 2009). Alluvium soils are a complex of variable alluvial material (SKSIS 2019). These soils are a mixture of orthic, calcareous, solonetzic, saline, and carbonated soils, have a surface soil texture of loam, and are slightly stony (SKSIS 2019, AAFC 2009). These loam soils have a low risk of compaction, a low risk of being susceptible to wind erosion, and a low risk of being susceptible to water erosion (AAFC 2009). These

Alluvium soils have a Class 3 rating for land suitability for agricultural crops, indicating moderately severe limitations that restrict the range of crops or require special conservation practices (AAFC 2009, GOC 2013).

- The Hillwash soil series is limited to the strong slopes in the pipeline ROW in SE 16-07-18 W3M (17.2% of the PDA) (AAFC 2009). These soils are depositional and are thus highly variable in classification, texture, and stoniness (SKSIS 2019, AAFC 2009). Due to being highly variable in classification, these soils are unclassified for compaction risk or for susceptibility to wind or water erosion (AAFC 2009). The Hillwash soils have a Class 5 rating for land suitability for agricultural crops, indicating their capability in producing perennial forage crops has very severe limitations but improvement practices are feasible (AAFC 2009, GOC 2013).

Topsoil depth within the PDA is variable depending on slope position, soil type, and land management. The historical average topsoil depth within the PDA is 12 cm (GIS4AG 2017).

Slopes within the PDA range from gentle slopes (2.0 – 5.0%) to strong slopes (10.0 - 15.0%). Gentle slopes (2.0 – 5.0%) (29.9% of PDA) are found at the meter station site and in the eastern portion of the pipeline ROW in SW 16-07-18 W3M. Moderate slopes (5.0-10.0%) (49.3% of PDA) are found throughout the pipeline PDA. Strong slopes (20.8% of PDA) are found in a drainage channel in the western portion of the pipeline ROW in SW 16-07-18 W3M and at the Grassy Creek crossing in the western portion of SE 16-07-18 W3M.

Salinity ratings for soils in the PDA range from non-saline to moderately saline. Non-saline soils (12.1% of the PDA) are found at the meter station and the western end of the pipeline ROW. Weakly saline soils (23.4% of the PDA) are found at the western portion of the pipeline ROW. Moderately saline soils (64.5% of the PDA) are found along the pipeline ROW. Saline impacted soils occur throughout the bottoms of depressions and sloughs (AAFC 2009).

Historical occurrences of clubroot have not been documented within the PDA or the rural municipality crossed by the Project (GOS 2020).

6.2.2.2 Field Surveys

During the field surveys, a total of thirteen soil inspection sites were examined within the pipeline and meter station portions of the PDA. Topsoil depths for the PDA range from 7 cm to 30 cm, with an average topsoil depth of approximately 19 cm. Topsoil (A horizon) in the meter station site has a measured depth of 30 cm. For the pipeline portion of the PDA, upper subsoil (B horizon) depths range from 30 cm to 100 cm, with an average depth that was greater than 50 cm. The upper subsoil (B horizon) at the meter station site has a measured depth of greater than 75 cm. No bedrock was encountered during the field survey.

Topsoil texture observed within the pipeline and meter station portions of the PDA included sandy loam, clay loam, and sandy clay loam but is predominantly loam. The upper subsoil (B horizon) ranges from clay to sandy clay loam but is predominantly clay loam. The lower subsoil (C horizon) is clay loam. The higher proportion of clay in the upper subsoil makes it easily identifiable. Soil inspection sites throughout

the PDA were found to have some stones present (<5%) but not enough to hinder cultivation or construction.

The colour change between the topsoil and the upper subsoil within pipeline and meter station portions of the PDA is well defined with the topsoil having a darker colour than the upper subsoil. The colour change between the upper subsoil and the lower subsoil in the PDA is well defined; the upper subsoil is typically darker in colour than the lower subsoil.

No gleysolic soils were encountered within pipeline or meter station portions of the PDA. No saline or sodic affected soils were found were encountered within the PDA. Specifically, conductivity ranged from 0.1 to 0.8 ds/m and sodium adsorption ratio ranged from 0.2 to 0.6. Soils were found to be relatively neutral, ranging from pH 4.73 to 8.02 with the average pH of 6.92. Soils ranged from not calcareous to moderately calcareous. Calcareousness was variable throughout the PDA and soil horizons.

Slopes encountered pipeline and meter station portions of the PDA during the field survey were consistent with the slopes indicated by the Saskatchewan Soil Information Database Version 4.0 (SKSID 4.0) (AAFC 2009). Slopes range from gentle slopes (2.0 - 5.0%) to strong slopes (10.0 - 15.0%), with the strong slopes being found in the western portion of SE 16-07-18 W3M (AAFC 2009).

Along the pipeline and meter station portions of the PDA, topsoil typically has a loam texture. Soils with a loam texture are susceptible to wind erosion when the soil structure is lost (i.e., stripped and stockpiled). These moderately coarse textured soils have a low risk of being susceptible to water erosion. However, in the areas with moderate or strong slopes (5.0 to 15.0%), the susceptibility to water erosion is higher.

A Phase I Environmental Site Assessment (Phase I) was completed for the MIPL meter site and block valve location adjacent to the proposed Foothills meter site in the fall of 2019. The Phase I did not recommend further investigation.

6.3 PROJECT INTERACTIONS WITH SOIL CAPABILITY

Table 6-2 identifies, for each potential effect, the physical activities that might interact with soil capability and result in the identified environmental effect. Check marks indicate these interactions, which are discussed in detail in Section 6.5 in the context of effects pathways, standard and project-specific mitigation, and residual effects. A justification for no interaction (no checkmark) is provided following the table.

Table 6-2 Project Interactions with Soil Capability

Physical Activities	Potential Effects
	Change in soil quality
Pipeline	
Construction	✓
Operation	-
Meter Station	

Assessment of Potential Effects on Soil Capability

Construction	✓
Operation	-
NOTES: ✓ = Potential interaction - = No interaction	

Upon completion of pipeline construction and reclamation, there will be limited potential for further effects on soil capability. During operation, disturbance will be limited to occasional integrity digs, for which MIPL will submit notifications to the CER following the Operations and Maintenance Guidelines (NEB 2018). Activities associated with operation of the meter station will be restricted to the graveled Project footprint. Limited additional soil disturbance is planned following completion of construction activities; therefore, operation phase effects are not assessed further.

6.4 MITIGATION

Standard industry practices and avoidance measures, along with Project-specific mitigation measures outlined in the EPP (Appendix A) will be implemented during construction to reduce potential environmental effects on soil capability. Key mitigation measures have been developed and adapted from the EPP (Appendix A) and the SaskEnergy/TransGas *Environmental Protection Standards* (SaskEnergy 2017) and are summarized in Table 6-3.

Table 6-3 Mitigation Measures for Soil Capability

Potential Effect	Effect Pathway	Mitigation Measures	Applicable Project Component	
			Pipeline	Meter Station
Change in soil quality	• Loss or alteration (e.g., admixing) of topsoil during vegetation clearing, soil handling and storage	• Material excavated from the construction site that is not suitable as backfill, such as large rocks, will be temporarily stored along the edge of the construction site and then hauled off site and disposed of in an approved location.	✓	✓
		• Stripping depth for topsoil salvage on all areas will be based on colour change. If colour change is not evident, soil stripping depth will be dictated by soil survey results or predetermined by the Environmental Monitor. Topsoil will not be used as padding material or for creating temporary or long-term ramps and approaches unless otherwise approved by the Chief Inspector, Environmental Monitor, and Environment & Sustainability Lead.	✓	✓
		• Soil handling is to remain within the confines of the designated ROW, TWS, and MIPL owned lands containing the meter site and access road.	✓	✓
		• Topsoil stripped from the ROW or other work areas will be stored in such a way as to reduce admixing with graded or excavated subsoils.	✓	✓
		• Salvaged topsoil/organic material and graded or excavated subsoils will not be stored in drainage runs or adjacent to low-lying areas, wetlands or defined watercourses.	✓	✓
		• Weather and soil conditions permitting, clean-up and reclamation of the construction site and any temporary access will take place as soon as feasible following completion of construction.	✓	✓
		• Topsoil on agricultural lands will be salvaged from the trench and spoil area. If compaction or excessive soil pulverization is anticipated, or of requested by the landowner, the entire ROW width will be stripped.	✓	-
		• Soil handling will be suspended at the discretion of the Chief Inspector and/or Environmental Monitor if soils within the ROW/TWS are excessively wet and during dry, windy conditions.	✓	✓
		• Where possible, the ROW will be two-toned to restrict the need for deep cuts and additional ROW on steep side hills.	✓	-
		• Where tie-in or crossing bellholes are required, topsoil will be stripped and stockpiled separately from any spoil to avoid admixing. After the pipe is tied in or installed, the bellhole will be filled with spoil and compacted. After all spoil is replaced and compacted, the topsoil will be placed over the excavation.	✓	-
		• Where necessary, openings will be made in salvaged topsoil and graded subsoil windrows to permit the passage of surface water across and/or off the ROW.	✓	-
		• If the ROW crosses rocky subsoils, proper separation of the topsoil and subsoil will be maintained and may require three-lift excavation. Large rocks will be removed from the spoil before it is replaced in the trench. Removed rocks will be placed in location (e.g., existing rock piles, hauled off-site) so as not to impede landowner/occupant activities post-construction.	✓	-
		• Grade changes requiring excessive cuts and fills will be reduced to the extent feasible. Grading will occur only as required to provide a safe and adequate surface for construction equipment operation, to maintain a vertical trench, and allow over bends and sags to be made within permissible bending limits.	✓	-
		• Construction is expected to be completed by the early fall. However, with the exception of the Grassy Creek crossing, if frozen topsoil conditions occur, soils will not be replaced until thawed and, if necessary, delayed until the following spring.	✓	-
		• The trench will be backfilled and compacted in a manner that minimizes any below grade settlement.	✓	-
		• After backfilling, graded subsoils will be replaced/recontoured prior to replacing topsoil.	✓	-
		• Salvaged topsoil will be evenly spread over the previously stripped and recontoured portions of the ROW. Topsoil replacement will be during dry and low wind weather conditions. The ROW will not be graded to obtain borrow or replacement topsoil.	✓	-
		• If erodible areas are encountered, efforts will be employed to minimize soil work and, as required, appropriate erosion and sediment control measures will be installed.	✓	-
		• If deemed necessary because of soil conditions or compaction constraints, the replaced trench spoil will be crowned (roached) to compensate for potential settlement prior to topsoil spreading. Crowns will be low profile with wide, gently tapered sides to avoid impairments to land use and significant alteration to natural runoff patterns. Gaps will be left in the crown at obvious cross ROW drainage runs to avoid altering the natural drainage patterns.	✓	-
		• Rock excavated from the trench may be placed back in the trench as long as the rock is deep enough (30 cm) not to affect cultivation but at the same time not to damage the pipe coating. The density and size of rocks remaining on surface will be similar to, or less than, those of adjacent areas.	✓	-
		• Topsoil will be returned to those areas that will not be graveled during operation or placed in long-term storage areas adjacent to the meter station.	-	✓
		• Long term soil storage areas (e.g., elongated, low profile berms) remaining in place once meter station construction is complete will be marked on as built drawings, including volumes, dimensions and locations. Soil berms will be seeded to prevent erosion. Alternatively, if salvaged topsoil is spread over intact topsoil on the perimeter of the meter station workspace as a means of long-term storage, the depth, volume, dimensions and locations will be clearly marked and delineated on as built drawings.	-	✓
	• Compaction, rutting, or loss of soil structure through vehicle and equipment movement	• Soil handling will be temporarily halted during excessively wet soils conditions to reduce potential for soil structure damage through rutting or compaction.	✓	✓
		• Topsoil will not be stripped from the TWS or other designated work areas (e.g., perimeter of the meter station, laydown sites) provided measures are in place to address the risk of compaction and rutting. These include working in suitably dry conditions, use of protective matting, and/or use of low ground pressure equipment. Alternatively topsoil on areas of the workspace that present compaction and rutting risks may be temporarily stripped and stored for replacement once construction is complete	✓	✓

Table 6-3 Mitigation Measures for Soil Capability

Potential Effect	Effect Pathway	Mitigation Measures	Applicable Project Component	
			Pipeline	Meter Station
		• Equipment which will reduce potential for surface disturbance, soil compaction, and loss of topsoil will be used. Such equipment includes low ground pressure tracks or tires.	✓	✓
		• Topsoil and/or subsoil compaction will be reduced, as appropriate, using a scarifier, deep tillage, or breaking discs on areas that will be returned to cultivated land use.	✓	✓
	• Soil loss through wind or water erosion	• Soil handling will be suspended during high wind events to prevent loss of topsoil. Where persistent high winds are eroding topsoil piles, erosion control measures will be used to stabilize the soil, such as the application of water, mulch, clean straw or soil tackifiers, installing wind breaks (e.g., snow fence) or covering small piles with secured tarping.	✓	✓
		• Sediment barriers will be installed where necessary. Barriers may be constructed of materials such as sediment fence, staked straw bales, compacted subsoil berms, sandbags, or equivalent material.	✓	✓
		• Sediment barriers will be inspected regularly to ensure proper functioning and maintenance. Barriers will be inspected and maintained on a weekly basis throughout construction and within 24 hours following storm events.	✓	✓
		• Drainage from construction areas will be managed or regulated to prevent off-site erosion and sedimentation. Sediment barriers will be left in place until the ROW and non-operations area of the meter site are reclaimed.	✓	✓
		• Considering majority of the Project footprint is on cultivated land, temporary sediment barriers will be removed before the subsequent seeding season unless otherwise agreed upon with the landowner.	✓	✓
		• Salvaged topsoil will not be stored where it may interfere with surface drainage or enter a wetland.	✓	✓
		• Weather and soil conditions permitting, clean-up and reclamation will take place as soon as possible following completion of construction.	✓	✓
		• Final grade on all lands will ensure that the surface flow of water is not impeded.	✓	✓
		• Majority of the Project is on cultivated land; however, if erosion is a concern, following engagement with the landowner, the reclaimed areas may be seeded with an annual cover crop such as rye, oats or barley.	✓	✓
		• New or existing road ditches will be seeded with rapidly growing grasses and, if needed, an annual nurse crop such as fall rye, oats, or barley to provide short-term stabilize of erosion prone soils until the desired perennial grasses establish.	✓	✓
	• Increase in extent and/or severity of soil salinity due to land management (i.e., dewatering)	• Discharge of saline impacted water due to dewatering of saturated saline soils during construction will be contained to the previously impacted areas as to not increase the extent of the saline effected soils.	✓	✓
		• Care will be taken to not change the drainage patterns in the region as this will affect groundwater discharge and recharge, which has the potential to impact soil salinity.	✓	✓
	• Introduction or spreading of soil pathogens	• Equipment must arrive to the Project site in a clean condition free of remnant soil and organic debris to minimize the risk of soil pathogen introduction and spread. This will include an application of a mild bleach wash.	✓	✓
		• Equipment arriving on-site will be inspected for cleanliness by MIPL before allowed entry on to the Project work site.	✓	✓
		• Cleaning stations will be established at strategic points within the Project footprint if deemed necessary.	✓	✓

NOTES:
✓ Mitigation measure is applicable to the project component
- Mitigation measure is not applicable to the project component

6.5 ASSESSMENT OF RESIDUAL EFFECTS ON SOIL CAPABILITY

6.5.1 Change in Soil Quality

Residual effects on soil capability associated with construction of the Project may occur as a result of the following effect pathways:

- loss or alteration (e.g., admixing) of topsoil during vegetation clearing, soil handling and storage
- compaction, rutting, or loss of soil structure through vehicle and equipment movement
- soil loss through wind or water erosion,
- increase in extent and/or severity of soil salinity due to land management (i.e., dewatering), and
- introduction or spread of soil pathogens.

A range of proven mitigation measures outlined in Section 6.4 and the EPP (Appendix A) will be implemented during construction to reduce Project effects on soil capability as a result of the pathways listed above. Following mitigation, residual effects on soil capability will likely occur within the PDA during construction, as described below.

Loss or alteration of topsoil during vegetation clearing, soil handling and storage may affect soil capability in agricultural areas during construction activities. Topsoil stripped from areas of the PDA required for operation (i.e., the meter station footprint) will be stored in stockpiles and stabilized. Long-term (greater than 20 years) storage of topsoil in stockpiles has the potential to change soil nutrient and organic matter levels through anaerobic decomposition. The degraded nutrient and organic matter composition of the topsoil may limit revegetation during future reclamation (Abdul-Kareem and McRae 1984; Naeth et al. 2013). However, these potential effects may be mitigated through the addition of amendments prior to final reclamation. Residual effects on soil quality will persist at a low level into the operation phase due to potential degradation of stockpiled topsoil. Residual effects will be mitigated during final reclamation following decommissioning or abandonment; gravel or geotextile materials used to stabilize the meter station PDA during operation will be removed and subsoil will be de-compacted as required prior to salvaged topsoil being replaced. Mitigation measures outlined in Section 6.4 are expected to reduce adverse effects on soil capability through the loss or alteration of topsoil; any residual effects will be restricted to the PDA.

Compaction, rutting, or loss of soil structure through vehicle and equipment movement may occur during construction in localized areas within the PDA with vehicle access, or where heavy equipment operates. Mitigation measures outlined in Section 6.4 are expected to reduce adverse effects on soil capability as a result of topsoil compaction and rutting.

Soil loss through wind or water erosion may decrease soil capability in agricultural areas during construction activities. Mitigation measures outlined in Section 6.4 are expected to reduce adverse effects on soil capability through soil loss due to wind or water erosion; any residual effects will be restricted to the PDA.

Increase in extent and/or severity of soil salinity due to land management may occur as salts within saline soils are soluble, therefore dewatering saline soils during construction has the potential to impact the discharge area. Additionally, changes to grading may result in changes to groundwater recharge and discharge, which has the potential to impact soil salinity. Mitigation measures outlined in Section 6.4 are expected to reduce adverse effects on soil salinity extent and/or severity.

Introduction or the spread of soil pathogens may decrease soil capability in agricultural areas within the PDA. Mitigation measures outlined in Section 6.4 are expected to reduce adverse effects on soil capability as a result of the introduction or spreading of soil pathogens.

It is expected that equivalent soil capability will be maintained as a result of the mitigation measures implemented for the Project. With the implementation of mitigation measures, residual effects of the natural gas pipeline on soil capability are likely to occur, and are predicted to be low in magnitude, confined to the PDA, short-term in duration, and will be reversed with the completion of the Project activities and associated reclamation. With the implementation of mitigation measures, residual effects of the meter station on soil capability are likely to occur, and are predicted to be low in magnitude, confined to the PDA, short- to long-term in duration, and will be reversed following post-construction reclamation (for TWS) or following final decommissioning and reclamation (for the meter station)

6.5.2 Summary of Residual Project Effects

Residual Project effects on soil capability are summarized in **Error! Reference source not found.**.

Table 6-4 Residual Project Effects on Soil Capability

Residual Effect		Residual Effects Characterization						
		Direction	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Likelihood**
Change in Soil Quality								
Pipeline	Construction	A	L	PDA	ST	S	R	L
Meter Station	Construction	A	L	PDA	ST/LT	S/C	R	L

KEY

See Table 5-2 for detailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area

Duration

ST Short-term
MT Medium-term
LT Long-term

N/A Not applicable

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Likelihood

U Unlikely
P Possible
L Likely

6.6 ASSESSMENT OF CUMULATIVE EFFECTS ON SOIL CAPABILITY

Past and ongoing agricultural, residential, and oil and gas development have modified soil resources in the RAA. Project related residual effects on soils are considered a very minor incremental change within this context. Road upgrades as well as the construction and operation of the Keystone XL Project and a meter station connecting to the Foothills pipeline are projects and physical activities that will occur in the reasonably foreseeable future that will occur in the RAA (5 km buffer from the PDA). It is expected that mitigation measures listed in the EPPs for these Projects will be implemented to reduce Project-related effects, and thus limit their contribution to cumulative effects.

While there are historical and ongoing regional changes in soil capability, the Project contribution to these trends is considered negligible. Any residual effects will be reversed during reclamation of the PDA, either following construction, or following decommissioning of the meter station. Reclamation will be completed such that equivalent land capability will be achieved. As a result, a further quantitative assessment of cumulative effects on soils is not warranted.

6.7 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

With the application of mitigation and environmental protection measures, residual Project effects on soil capability are predicted to be not significant.

Prediction confidence is high, based on professional judgement and the past effectiveness of proposed mitigation measures.

6.8 MONITORING

The Project will follow MIPL's post-construction monitoring program, which monitors compliance with specific reclamation performance expectations and conditions. Areas on the PDA that are susceptible to erosion, are difficult to revegetate or result in poor/reduced crop and forage production will be identified, and records maintained of remedial measures implemented and the success of these measures. This information will be made available to MIPL supervisors for use during operation and maintenance activities to allow implementation of adaptive mitigation strategies to reduce effects on soil capability.

7.0 ASSESSMENT OF POTENTIAL EFFECTS ON VEGETATION AND WETLANDS

7.1 SCOPE OF ASSESSMENT

Vegetation and wetlands were selected as a VC because Project construction activities have the potential to affect native upland vegetation and wetlands, including plant species of management concern.

The scope of this assessment has been influenced by:

- provincial and federal regulations and policy guidance (see Section 1.1)
- the nature, scope and extent of the Project and its activities (see Section 2.0)
- input received through the engagement program (i.e., concern regarding weed management; see Section 3.0), and
- the environmental setting of the Project (see Section 7.2)

7.1.1 Potential Effects, Pathways and Measurable Parameters

Potential effects, effects pathways and the measurable parameters used to characterize and assess effects on vegetation and wetlands are provided in Table 7-1.

Table 7-1 Potential Effects, Pathways and Measurable Parameters for Vegetation and Wetlands

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in vegetation communities	• Direct loss or alteration of native vegetation communities arising from vegetation clearing and ground disturbance • Indirect alteration of native vegetation communities from the introduction or establishment of regulated weeds and invasive species or deposition of dust	• Area (ha) of native upland and wetland plant communities lost or altered • Increase in number of occurrences of prohibited, noxious, or nuisance weed species
Change in vegetation species	• Direct loss or alteration of plant species of management concern, including species at risk, arising from vegetation clearing and ground disturbance • Indirect effects on plant species of management concern from herbicide application to control the spread of regulated weeds or deposition of dust	• Number of occurrences of plant species at risk or species of management concern potentially lost or altered • Increase in number of occurrences of prohibited, noxious, or nuisance weed species

Table 7-1 Potential Effects, Pathways and Measurable Parameters for Vegetation and Wetlands

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in wetland function	• Direct loss or alteration of wetland area or change in wetland class arising from vegetation clearing and ground disturbance • Direct effects from wetland function including altered water levels or flow, or increased erosion and sedimentation • Indirect loss or alteration of wetland area or change in wetland class because of changes in surface or groundwater	• Area (ha) or class of wetlands lost or altered • Changes in wetland hydrology are assessed qualitatively

7.2 EXISTING CONDITIONS FOR VEGETATION AND WETLANDS

7.2.1 Methods

7.2.1.1 Desktop Review

7.2.1.1.1 Species of Management Concern

For the purpose of this ESA, plant species at risk (SAR) are defined as federally and provincially protected species that are:

- listed under Schedule 1, Schedule 2, or Schedule 3 of the SARA (GOC 2002) as endangered, threatened, or special concern (GOC 2019), or
- listed in *The Wildlife Act* (GOS 1998) as endangered, threatened, or vulnerable.

The assessment also considers a wider group of species of management concern (SOMC) that includes species at risk, as well as wildlife species identified in federal or provincial tracking lists and activity guidelines that are:

- listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened, or special concern (GOC 2019)
- assigned a ranking of S1, S2, or S3 (or a combination of these rankings) by the Saskatchewan Conservation Data Center (SKCDC) (SKCDC 2019a); or
- included in the Saskatchewan Activity Restriction Guidelines for Sensitive Species (GOS 2017).

A desktop review of available information was completed to provide historical information on plant SOMC with the potential to occur within the PDA and LAA. The following data sources were used:

- Species At Risk Public Registry database for SARA- and COSEWIC-listed species (GOC 2019)

- SKCDC HABISask online mapping application to run the Rare and Endangered Species Report (RESR) to determine historical plant SOMC occurrences within 1 km of the PDA (SKCDC 2019b), and
- SKCDC Tracked Vascular Plant Species by Ecoregion (SKCDC 2019b).

iMapInvasives was used to search for historical records of regulated weed species within the RAA (NatureServe 2019).

7.2.1.1.2 Land Cover Mapping

A desktop review of aerial imagery and publicly available land cover datasets were conducted to identify and map existing land cover conditions in LAA. The following data sources were reviewed:

- ESRI World Imagery (ESRI 2013, 2014 images)
- Google Earth Pro™ (2011 image)
- Agriculture and Agri-Food Canada (AAFC) - Canada Crop Inventory/Landcover (GOC 2018b)
- The Ecoregions of Saskatchewan (Acton et al. 1998)

Mapping was conducted at 1:3,000 scale. The land cover classes were based on the AAFC classes (GOC 2015) (Table 7-2). It is our experience that the AAFC underestimates the number and size of wetlands on the landscape. Therefore, additional potential wetland polygons were identified in the LAA using aerial imagery. Wetlands were classified according to Stewart and Kantrud (1971).

Upland and wetland mapping and classification in the RAA, outside of the LAA, is from publicly available data provided by AAFC (GOC 2018b).

Table 7-2 Land Cover Classification Modified from AAFC Definitions

Land Cover Class	Description[1]
Broadleaf	Tall woody perennial species (deciduous), greater than 10 m tall, predominantly broadleaf forests or treed areas.
Cropland	Dominated by a seeded annual and perennial species, usually a monoculture.
Drainage	Flowing water or channel with intermittent/seasonal flow.
Dugout	Man-made wetland, functions as a Class V (permanent) wetland for wildlife species.
Native Grassland	Dominated by native grass species (≥51% native species).
Shrubland	Predominantly woody perennial species. May include grass or wetlands with woody vegetation or regenerating forest.
Tame Pasture/Hayland	Dominated by either intentionally seeded or invaded perennial species, i.e., grasses and legumes. Generally ploughed at one point in time. Either used for grazing or as hayland.
Urban/Developed	Land that is predominately built up or developed and vegetation associated with these land covers. This includes houses, farms, road surfaces, railway surfaces, buildings and paved surfaces, urban areas, industrial sites, mine structures, golf courses, etc.
Water	Waterbodies

Land Cover Class	Description[1]
Wetland	Land with a water table near/at/above soil surface for enough time to promote wetland or aquatic processes including (hydrophytic vegetation and, poorly drained soils, i.e., gleysols, etc.).
[1] Modified from AAFC (GOC 2015) definitions to include tame pasture/hayland instead of pasture/forages.	

7.2.1.2 Field Surveys

7.2.1.2.1 Reconnaissance

A field survey was completed on November 14, 2016, which included a land cover validation, vegetation community, weed, and wetland survey. The vegetation community and weed survey occurred outside the growing season and therefore conditions were difficult for plant identification. Due to survey timing, the list of identified plant species was not comprehensive, but the general vegetation community was confirmed. A 1 m^2 quadrat was used to document the vascular plant species (e.g., desiccated biomass) canopy cover within non-cultivated and wetland areas along the centerline, as well the native grassland north of the PDA. Weed species observed within the quadrats, when identifiable, were also recorded.

Wetland surveys were completed along the proposed pipeline ROW and in the meter station site to confirm the wetland class according to Stewart and Kantrud (1971) and map the wetland boundary.

7.2.1.2.2 Rare Plant Survey

An early rare plant survey was completed on June 15 and 16, 2020 in accordance with Saskatchewan's *The Wildlife Act* following the provincial Species Detection Survey Protocol (SDSP) 20.0 Rare Vascular Plant March 2019 Update (GOS 2019b). The objective of the early rare plant survey is to capture the early-blooming vascular plant SOMC. The late rare plant survey is scheduled for August 2020 and the objective is to capture the late blooming species. The survey targeted areas of potential plant SOMC habitat within 100 m of the PDA in accordance to the Saskatchewan Activity Restriction Guidelines for Sensitive Species (GOS 2017).

Four transects were selected using ArcGIS prior to field surveys based on the suitable habitat for plant SOMC including grasslands, tame pasture, broadleaf forest, shrubland, and wetlands. The transects ranged in length from 200 m to 500 m in length and 5 m wide. All transects were placed a minimum of 10 m apart. Transect search speed was no faster than 4 km/h. Data was collected using Collector for ArcGIS (© 2018-2020 Esri Inc. version 20.2.2) and Survey123 for ArcGIS (© 2020 Esri Inc version 4.2.80) applications on an Apple device. Data collected included UTM coordinates of the start and end of the transect, the legal subdivision, environmental conditions, representative photographs, and a complete vascular plant species inventory including weeds listed under *The Weed Control Act* (GOS 2010). If a plant SOMC was encountered, data was collected including the UTM coordinates, the number of individuals, the area occupied, and representative photographs.

To acquire additional data and detail on the abundance of vascular plant species within the LAA, the vegetation cover within 1m^2 quadrat was assessed at the start of each transect. The percent cover of vascular plant species, bryophytes, lichens, litter, water, and bare ground was recorded for each transect.

7.2.2 Overview

The Project is in the Wood Mountain Plateau of the Mixed Grassland ecoregion of southern Saskatchewan. The Wood Mountain Plateau is typified by extensive areas of native mixed-grass prairie and plateaus ranging in elevations from 800 to 850 m with a large network of gullies and creeks (Acton et al. 1998). Most of the Wood Mountain Plateau is used as rangeland for cattle grazing, as the topography and soils limit cropland (Acton et al. 1998).

7.2.2.1 Desktop Results

7.2.2.1.1 Plant Species of Management Concern

There are no historical occurrences or designated critical habitat for any provincially- or federally-listed plant species at risk (i.e., species listed on SARA *or The Wildlife Act*).

The results of the RESR identified no historical occurrences of plant SOMC within the PDA or LAA. Based on the RESR, there are three historical occurrences of plant SOMC in 11 locations within the RAA, including blue-leaved cinquefoil (*Potentilla glaucophylla* var. *glaucophylla*; S1), clustered oreocarya (*Cryptantha celosioides*; S2), and flat-head larkspur (*Delphinium bicolor* ssp. *bicolor*; S3).

7.2.2.1.2 Prohibited, Noxious and Nuisance Weed Species

Results from iMapInvasives revealed no historical records of prohibited, noxious or nuisance weeds within the PDA, LAA or RAA.

7.2.2.1.3 Vegetation and Wetland Cover

Anthropogenic land cover is the largest land class cover in the PDA (8.2 ha or 94.6%) and in the LAA 55.2 ha (81.3%) (Table 7-3, Figure 7-1). Agriculture covers 8.2 ha (94.3%) of the PDA and 54.4 ha (81.2%) of the LAA. Urban/developed land cover (roads and rural dwellings) comprise a small amount of the anthropogenic land cover in the PDA (<0.1 ha or 0.2%) and the LAA (0.4 ha or 0.5%; Table 7-3). The meter station is located entirely in cropland.

There is <0.1 ha of shelterbelts (planted broadleaf trees for erosion control and snow capture) along the ROW. In the LAA, the upland native vegetation consists of native grassland (7.1 ha, 10.6%), which borders Grassy Creek, and native grassland in the north half of SE 16-07-18 W3M.

There are 0.5 ha of wetlands within the PDA of which 0.2 ha is Class II temporary wetlands and 0.3 ha is Class IV semi-permanent wetland. One the semi-permanent wetlands is part of Grassy Creek. All wetlands are embedded in cropland. In the LAA, wetlands occupy 4.7 ha (7.0%) and consist of Class I to IV wetlands (Table 7-3).

Table 7-3 Land Cover in the PDA and LAA

Landcover Classification[1],[2]	ROW		Meter Station		TWS		PDA		LAA	
	Area (ha)	Percent of the PDA (%)	Area (ha)	Percent of the PDA (%)	Area (ha)	Percent of the PDA (%)	Area (ha)	Percent of the PDA (%)	Area (ha)	Percent of the LAA (%)
Upland										
Grassland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	10.6
Subtotal[1]	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**7.1**	**10.6**
Wetland										
1 - Ephemeral wetland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.6
2 - Temporary wetland	0.2	2.0	0.0	0.0	<0.1	0.3	0.2	2.3	1.0	1.4
3 - Seasonal wetland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.1
4 - Semi-permanent wetland	0.2	2.1	0.0	0.0	0.1	1.1	0.3	2.9	3.2	4.8
Wetland Subotal[1]	**0.4**	**4.2**	**0.0**	**0.0**	**0.1**	**1.4**	**0.5**	**5.2**	**4.6**	**7.0**
Anthropogenic										
Cropland	6.4	74.0	0.1	1.1	1.6	18.4	8.2	94.3	54.4	81.3
Shelterbelt	<0.1	<0.1	0.0	0.0	<0.1	0.1	<0.1	0.1	0.4	0.6
Urban/Developed	<0.1	0.2	0.0	0.0	0.0	0.0	<0.1	0.2	0.4	0.5
Anthropogenic Subtotal[2]	**6.4**	**74.2**	**0.1**	**1.1**	**1.6**	**18.5**	**8.2**	**94.6**	**55.2**	**82.4**
Total Area[2]	**6.8**	**78.4**	**0.1**	**1.1**	**1.7**	**19.5**	**8.7**	**100.0**	**66.8**	**100.0**

[1] Totals may not add up due to rounding errors

[2] Classification was based on a combination of Stewart and Kantrud (1971).

7.2.2.2 Field Surveys

7.2.2.2.1 Vegetation Communities

A total of 11 vegetation plots were surveyed, four in upland native grassland and seven in wetlands. Plots surveyed in upland native grassland were located outside of the PDA and within the LAA. Ten plots were located within loam ecosites, which are considered stable well-drained sites with medium to fine-textured soils (Thorpe 2014). Most of the upland sites were invaded by non-native invasive species including caragana (*Caragana arborescens*), smooth brome (*Bromus inermis*), and crested wheatgrass (*Agropyron cristatum* ssp. *pectinatum*). One plot in the LAA on native grassland was in a thin soil ecosite. Thin ecosites are sites with a landscape that has predominantly steep slopes (>20%) with truncated soil profiles due to high natural levels of erosion (Thorpe 2014). Thin ecosites generally have a high potential for plant SOMC because these areas have typically not been subject to agricultural disturbance due to steep slopes and difficult access.

7.2.2.2.2 Rare Plant Survey

A total of four transects were surveyed (three 200 m and one 500 m in length) in the LAA during the early rare plant survey. A total of 67 vascular plant species were observed during the early rare plant survey including one SOMC, plains rough fescue (*Festuca hallii*) ranked S3 (Appendix B Table B-1). The plains rough fescue was observed in the SE 16-07-18 W3M in two patches (89 m^2 and 1,181 m^2) on northwest-facing grassland slopes in the LAA (Figure 7-1). No SAR were observed. The grassland was dominated by native grass species including low sedge (*Carex duriscula*), June grass (*Koeleria macrantha*), needle-and-thread grass (*Hesperostipa comata* ssp. *comata*), western wheat grass (*Pascopyrum smithii*), Canby blue grass (*Poa secunda* ssp. *secunda*), and pasture sagewort (*Artemisia frigida*). Some transects were also co-dominated by some non-native species including alfalfa (*Medicago sativa* ssp. *sativa*) and crested wheat grass. One transect was completed along a class IV wetland and was dominated by narrow-leaved cattail (*Typha angustifolia*).

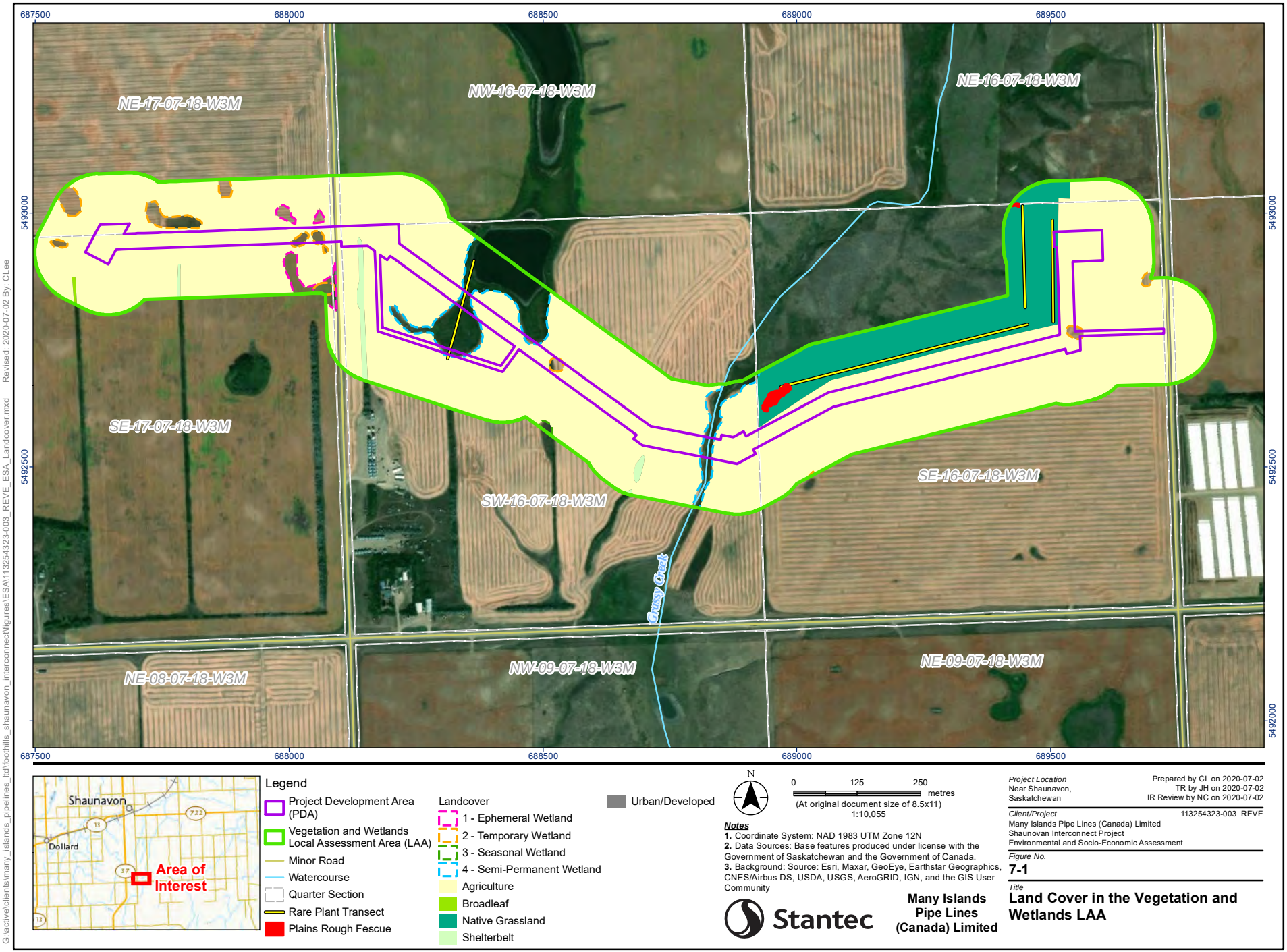
7.2.2.2.3 Prohibited, Noxious, and Nuisance Weed Species

During the field surveys on November 14, 2016, regulated weeds listed under *The Weed Control Act* (GOS 2010) were observed including the noxious weed species scentless chamomile (*Tripleurospermum inodorum*) and Canada thistle (*Cirsium arvense*) and the nuisance weed species foxtail barley (*Hordeum jubatum*). During the early rare plant survey, the noxious Canada thistle and perennial sow-thistle (*Sonchus arvesis* ssp. *arvesis*) and the nuisance common dandelion (*Taraxacum officinale* ssp. *officinale*) were observed.

7.2.2.2.4 Wetlands

The natural gas pipeline ROW intersects six wetlands (embedded within agricultural areas): two Class IV semi-permanent wetlands and four cultivated Class II temporary wetlands. One the semi-permanent wetlands is part of Grassy Creek. The small portions of the two Class IV wetlands (0.3 ha; Table 7-3) that intersect the PDA were shallow marsh zones (i.e., the open water zones are avoided) and were partially

cultivated. There are no wetlands present where the meter station is situated. During the wetland surveys, six vegetation community plots were located in wetlands. The dominant plant species at wetland sites included foxtail barley, reed canary grass (*Phalaris arundinacea*), scentless chamomile, and meadow popcorn-flower (*Plagiobothrys scouleri* var. *hispidulus*).



Legend

- Project Development Area (PDA)
- Vegetation and Wetlands Local Assessment Area (LAA)
- Minor Road
- Watercourse
- Quarter Section
- Rare Plant Transect
- Plains Rough Fescue

Landcover

- 1 - Ephemeral Wetland
- 2 - Temporary Wetland
- 3 - Seasonal Wetland
- 4 - Semi-Permanent Wetland
- Agriculture
- Broadleaf
- Native Grassland
- Shelterbelt
- Urban/Developed

N

0 125 250 metres

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1:10,055

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Data Sources: Base features produced under license with the Government of Saskatchewan and the Government of Canada.
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Stantec

Many Islands Pipe Lines (Canada) Limited

Project Location
Near Shaunavon, Saskatchewan

Prepared by CL on 2020-07-02
TR by JH on 2020-07-02
IR Review by NC on 2020-07-02

Client/Project
Many Islands Pipe Lines (Canada) Limited
Shaunovan Interconnect Project
Environmental and Socio-Economic Assessment

113254323-003 REVE

Figure No.
7-1

Title
Land Cover in the Vegetation and Wetlands LAA

G:\act\vel\clients\many_islands_pipelines_ltd\foothills_shaunavon_interconnect\figures\ESA\113254323-003_REVE_ESA_Landcover.mxd Revised: 2020-07-02 By: CLee

7.3 PROJECT INTERACTIONS WITH VEGETATION AND WETLANDS

Table 7-4 identifies, for each potential effect, the physical activities that might interact with vegetation and wetlands and result in the identified environmental effect. These interactions are indicated by check marks and are discussed in detail in Section 7.5 in the context of effects pathways, standard and Project-specific mitigation, and residual effects. A justification for no interaction (no checkmark) is provided following the table.

Table 7-4 Project Interactions with Vegetation and Wetlands

Physical Activities	Potential Effects		
	Change in vegetation communities	**Change in vegetation species**	**Change in wetland function**
Pipeline			
Construction	✓	✓	✓
Operation	-	-	-
Meter Station			
Construction	-	-	✓
Operation	-	-	-
NOTES: ✓ = Potential interaction – = No interaction			

As the meter station is located on and surrounded by cultivated lands, and wetlands in the PDA were all cultivated, there are no anticipated effects on vegetation communities or species or on wetlands during construction or operation. Activities associated with operation of the meter station will be restricted to the graveled Project footprint.

Upon completion of pipeline construction and reclamation, there will be limited potential for further effects on vegetation or wetlands. During operation, disturbance will be limited to occasional integrity digs, for which MIPL will submit notifications to the CER following the Operations and Maintenance Guidelines (NEB 2018). Wetlands will be avoided during operation where possible.

Limited additional disturbance to vegetation or wetlands is planned following completion of construction activities; therefore, operation phase effects are not assessed further.

7.4 MITIGATION

Standard industry practices and avoidance measures, along with Project-specific mitigation measures outlined in the EPP will be implemented during construction to reduce effects on vegetation and wetlands. Key mitigation measures are summarized in Table 7-5.

Table 7-5 Mitigation Measures for Vegetation and Wetlands

Potential Effect	Effect Pathway	Mitigation Measures	Applicable Project Component	
			Pipeline	Meter Station
Change in vegetation communities or vegetation species	• Direct loss or alteration of native vegetation communities arising from vegetation clearing and ground disturbance • Direct loss or alteration of plant species of management concern, including species at risk, arising from vegetation clearing and ground disturbance	• Land will be cleared only within the marked limits of the construction site and limited to the minimal area necessary to safely construct the natural gas pipeline and construct/operate the meter station to help prevent erosion and loss of habitat.	✓	✓
		Any occurrences of previously unidentified plant SOMC are to be reported to the Environment & Sustainability Lead to confirm regulations and requirements related to SOMC. If rare plants are encountered, MIPL will follow the appropriate setbacks or develop appropriate mitigation in consultation with applicable regulatory agencies.	✓	✓
		• Weather and soil conditions permitting, clean-up and reclamation of the ROW, TWS, any temporary access (e.g., shoo-fly's) and laydown/pipe yard will take place as soon as possible following completion of construction.	✓	✓
		• After construction on cultivated lands, the landowner will seed and fertilize the ROW and TWS as part of their normal farming operations.	✓	✓
		• All proposed seed mixes will be certified (i.e., analyzed for the species and percentage of prohibited and noxious weeds). Seed certificates will be reviewed and approved by Environment & Sustainability prior to application and retained on file. Appropriate seed mixes will be applied as needed to assist in the re-establishment of pre-disturbance construction conditions and ecological function, as to comply with applicable government agency requirements, or Project-specific environmental instructions.	✓	✓
		• Seeding disturbed areas will be completed in accordance with the recommended seed mixes, rates, and dates. Seeding is not required in actively cultivated croplands unless requested by the landowner.	✓	✓
		• On non-cultivated lands, vegetation growth will be inspected regularly to confirm a self-sustaining vegetation cover is established and maintained. Any sites with sparse growth will be re-seeded, including implementation of any other remedial measures to enhance plant establishment.	✓	✓
		• Salvaged topsoil that is stored in short-term piles/berms during duration of construction may be seeded with a nurse/cover crop non-aggressive annual cereal (e.g., winter wheat, oats, barley) or forage (e.g., fall or annual rye) for rapid and short-term erosion protection.	-	✓
		• If salvage topsoil is stored in long-term piles/berms for the life of the meter station, soil will be seeded with a non-aggressive, low maintenance perennial grasses.	-	✓
	• Indirect alteration of native vegetation communities from the introduction or establishment of regulated weeds and invasive species or deposition of dust • Indirect effects on plant species of management concern from herbicide application to control the spread of regulated weeds	• Equipment will arrive to the Project site in a condition free of remnant soil or plant material to reduce the risk soil/plant pathogens and weed introduction. Equipment that arrives containing loose or compacted soil and plant material will not be allowed on the construction site until it has been cleaned using brooms, brushes, shovels, high pressure water, or compressed air at designated and contained wash/cleaning stations.	✓	✓
		• Pre and post construction weed control measures will be developed in conjunction with the landowner/occupant and in alignment with MIPL's Vegetation Control Plan and Reclamation Inspection Program.	✓	✓
		• Pre-construction surveys will be conducted to identify occurrence of prohibited, noxious, and nuisance weeds which construction equipment could carry forward from an infested to a clean area. If avoidance is not possible, Environment & Sustainability will be contacted for assistance and/or direction on potential mitigation strategies.	✓	✓
		• Appropriate mitigations will be applied for any locations identified as having prohibited or noxious weed infestations.	✓	✓
		• Dust suppressants (e.g., water, calcium chloride, or tree lignin based dust suppressant) will be applied on the ROW or access roads as required. Calcium chloride will not be used on agricultural fields. Local road authorities will be informed prior to application of dust suppressants on roads. Watering for dust control must not result in the formation of puddles, rutting by equipment or vehicles, the tracking of mud onto roads, or the siltation of watercourses.	✓	✓
		• Use of pesticides/herbicides will be restricted in areas of known plant SOMC occurrences.	✓	✓
Change in wetland function	• Direct loss or alteration of wetland area or change in wetland class arising from vegetation clearing and ground disturbance • Indirect loss or alteration of wetland area or change in wetland class because of changes in surface or groundwater	• Wetland boundaries will be marked in the field with signs and/or flagging.	✓	-
		• Any wetland boundaries present within 10 m of the PDA will be marked and protected using a suitable sediment barrier (e.g., embedded silt fence) prior to the start of construction	✓	-
		• MIPL will notify or obtain approvals from the appropriate agencies prior to the commencement of work in a wetland or drainage, and will complete work in accordance with regulatory permit conditions.	✓	-

		• Sediment barriers will be installed before or immediately after initial ground disturbance at the following locations: a) Within the ROW at the edge of the boundary between wetland and upland b) Along the edge of the ROW, where the ROW slopes toward a wetland, to protect any adjacent off ROW wetlands c) Along the edge of the ROW, as necessary, to contain spoil and sediment within the ROW through wetlands	✓	-
		• Sediment barriers and fences should be constructed on level ground or at toe-slopes whenever possible. Sediment barriers and fences constructed at lower- or mid-slope positions can collapse when the weight of the sediment exceeds the holding capacity of the fence or barrier. Alternatively, if they don't interfere with construction or during reclamation, a series of sediment barriers and fences can be installed a various slope positions to break-up slope length and associated size of the potential sediment source area.	✓	-
		• Sediment barriers will be inspected and maintained on a weekly basis throughout construction and within 24 hours following storm events.	✓	-
		• Sediment barriers will be maintained until reclamation measures are successful and pre-construction land use (i.e., cultivation) resumes..	✓	-
		• Construction activities (including equipment use, materials staging, spoil storage and designated TWS) will be located a minimum of 10 m away from wetland boundaries, if practical.	✓	-
		• Salvaged topsoil and graded subsoils will not be stored where they may interfere with surface drainage or enter a wetland.	✓	-
		• If the Project is delayed into or until the fall or winter months and wetland margins freeze or harden overnight due to cold temperatures, construction in these areas should be scheduled for early morning, prior to ground thawing.	✓	-
		• Use of vehicles and equipment within wetlands intersected by the ROW or designated workspace will be minimized, as practical.	✓	-
		• If standing water or saturated soils are present, or if construction equipment causes excessive rutting in wetlands, low-ground-weight construction equipment will be used and/or equipment will operate off prefabricated equipment mats. Construction traffic in wetlands will be limited to only that required for construction activity. Upland access roads, trails of designated travel routes (e.g., shoo-fly's) around wetlands will be used where available to reduce vehicle traffic.	✓	-
		• In wetland areas where the spoil is situated adjacent to the trench, backfill will be replaced by low ground pressure equipment or long reach trackhoes working off stable ground.	✓	-
		• The length of time that the trench is left open in wetlands will be reduced to the extent feasible.	✓	-
		• Trenching operations will not be allowed to drain wetlands and other bodies of standing water unless permission has been granted by SKWSA and SK MOE. Pumping water off ROW requires permission from the landowner.	✓	-
		• Equipment and machinery will not be washed in or near wetlands.	✓	-
		• Dewatering of the construction site will not discharge directly into wetlands. Trench plugs or other seal trench bottom sealing will be installed as necessary to maintain the original wetland hydrology at locations where the natural gas pipeline trench may act as a drain.	✓	-
		• The original contours and drainage patterns will be re-established to all disturbed wetland areas, and/or drainage areas. Operation of construction equipment will be prohibited close to the banks of wetlands where there is a risk of bank collapse or damage, failure of the vehicle crossing, or flooding of the work area.	✓	-
		• If precipitation results in erosion or sedimentation toward or into wetlands or slopes in the construction area as a result of construction, appropriate stabilization and reclamation measures will be implemented.	✓	-
		• Seed and fertilizers will not be applied in wetlands. Restrict the use of fertilizer within 30 m of wetlands. The construction site in wetland areas will not be seeded unless specified by the appropriate government agency (i.e., promote natural regeneration of the plant community).	✓	-

NOTES:
✓ Mitigation measure is applicable to the project component
- Mitigation measure is not applicable to the project component

7.5 ASSESSMENT OF RESIDUAL EFFECTS ON VEGETATION AND WETLANDS

7.5.1 Change in Vegetation Communities

The PDA primarily occurs on anthropogenically altered land including agriculture, previously disturbed pipeline ROWs, and rural land cover. During construction, vegetation clearing (e.g., mowing crops), grading and other activities (e.g., vehicle movement, excavation) will result in disturbance to 8.2 ha of cultivated land, which does not comprise native vegetation communities. The Project is predicted to have negligible direct effects on native vegetation communities.

Indirect effects on native vegetation communities within the LAA may occur from vehicle and heavy equipment use during construction including the spread of regulated weeds and non-native invasive species and dust deposition. Equipment will arrive to the project site clean and free of soil or vegetative debris. Weed inspections and control measures, as listed in Table 7-5 will be ongoing during construction and reclamation, as required. Dust deposition can alter plant productivity and change vegetation community structure (Farmer 1993). Dust control measures will include stopping topsoil stripping during high winds. In addition, dust suppressants will be applied on the pipeline ROW or access roads where required.

The potential effects on soil and vegetation of heat generated by buried pipelines have been documented in a limited number of previous studies including literature reviews (Dunn et al. 2008; Stantec 2014; Trans Mountain Pipeline ULC 2014), field measurements (Dunn et al. 2008), thermal modelling (Keystone XL Pipeline 2009), laboratory experiments (Lake et al. 2016), and anecdotal information from pipeline owners and landowners (Trans Mountain Pipeline ULC 2014). These sources all agree that heat from both natural gas and oil pipelines can affect the temperature of soil surrounding the pipeline. They also indicate that pipeline-related heating can manifest at the surface in effects such as localized winter snowmelt, earlier germination or green-up of vegetation in spring, and taller plant growth over the pipeline (note that other variables, such as differences in soil texture or moisture-holding capacity over the trench-line, may be contributing or causal factors for such observations). Nonetheless, observable effects tend to be focused on a narrow band of vegetation over the trench-line and are particularly noticeable in parcels immediately downstream of compressor or pump stations. However, no negative effects on vegetation growth and land use, including agriculture, as a result of this heating effect were reported in the studies reviewed in preparing this information request response. In addition, the Trans Mountain review (Trans Mountain Pipeline ULC 2014) noted that temperature-related crop damage was not raised as a concern by landowners in relation to existing or proposed Trans Mountain pipelines, an observation echoed during conversations with several midstream operator representatives consulted confidentially in preparing this response.

With the implementation of mitigation measures, residual effects of natural gas pipeline and meter station construction and operation on native vegetation communities are predicted to be negligible, short-term in duration, will extend to the Vegetation LAA (for regulated weed/dust spread) and will be reversed following post-construction reclamation.

7.5.2 Change in Vegetation Species

The PDA is sited within agricultural lands and native grassland will be avoided including the two patches of the plant SOMC plains rough fescue. A change in vegetation species may occur through the indirect loss or alteration of plant SOMC, if present in the LAA, due to edge effects that arise from the introduction or spread of regulated weeds or non-native invasive species.

No federally-listed SAR or their designated critical habitat were identified within the PDA or LAA therefore they are not anticipated to be affected by the Project. There are historical occurrences of three plant SOMC within the RAA. The plant SOMC plains rough fescue observed during the early rare plant survey in 2020 is located in the LAA. The late rare plant survey will be conducted in the Project LAA in the summer of 2020. If plant SOMC are found on the PDA during 2020 field surveys or are discovered during construction, MIPL will implement mitigation measures identified in the EPP (Appendix A).

Four regulated weeds listed under *The Weed Control Act* (GOS 2010) were identified in the PDA during field surveys. These species can invade native vegetation communities, especially in wet meadow zones and can have indirect effects on plant vegetation species. Equipment will arrive to the Project clean and free of soil or vegetative debris. In addition, weed inspections and control measures, as listed in Table 7-5 will be ongoing during construction and reclamation, as required.

Indirect effects on during construction from dust may also affect plant SOMC by altering plant productivity e.g., fruit setting, pollen germination (Farmer 1993). Henderson (2011) states that plant species at risk require a minimum 30 m buffer from disturbance to avoid the negative effects from construction including dust deposition. Dust control measures will include stopping topsoil stripping during high winds. In addition, dust suppressants will be applied on the pipeline ROW or access roads where required.

Plant SOMC could be affected by vegetation management (e.g., herbicide application). Herbicide application will be restricted in areas of known plant species of management concern occurrences.

With the implementation of mitigation measures, residual effects of natural gas pipeline and meter station construction and operation on vegetation species are unlikely. If they occur, residual effects of Project construction are predicted to be negligible, short-term in duration, will extend to the Vegetation LAA for regulated weed/dust spread and will be reversed following post-construction reclamation.

7.5.3 Change in Wetland Function

7.5.3.1 Pipeline

Alteration of wetlands during construction activities may occur during vegetation removal, trench excavation, or through vehicle and equipment movement. Temporary effects on wetland function could include altered water levels or flow, or increased erosion and sedimentation, which could in turn affect plant and wildlife habitat.

The Project will contribute to temporary loss or alteration of approximately 0.5 ha of wetlands within the natural gas pipeline PDA (Table 7-3). There are six wetlands intersected by the natural gas pipeline ROW including four cultivated Class II temporary wetlands and two Class IV semi-permanent wetlands (Figure 7-1). The portions of the wetlands that the natural gas pipeline ROW intersects have all been cultivated through in the past. The open water zones of the Class IV wetlands are avoided by the pipeline ROW. The most westerly Class IV wetland is intersected for approximately 56 m along the pipeline ROW within the shallow marsh/wet meadow zone. The Class IV wetland associated with Grassy Creek is intersected for approximately 24 m along the shallow marsh zone, which has been cultivated through in the past (Photo 2-1). A permit application will be submitted to the SK MOE for disturbance of these wetlands.

Changes in any surface or groundwater recharge and discharge associated with wetlands in and near the PDA are not expected. Mitigation measures will be implemented to manage sedimentation and erosion from the PDA. Dewatering, if required during construction, will be small in scale, short-term and will discharge to a suitable stable site within the same sub-basin. Wetlands intersected by the proposed pipeline ROW will be reclaimed to pre-construction topography and hydrological conditions immediately following construction. They are then expected to develop wetland characteristics, including hydrophytic (water-loving) vegetation and hydric soils over time.

Regulated weeds and non-native invasive species establishment and spread could occur through vehicle and equipment movement. Equipment will arrive to the project site clean and free of soil or vegetative debris. Vegetation management may be required in some areas of the PDA to control weed species. Weed management may extend into the operation phase, with the need determined through ongoing site inspections and consultation with the landowners.

With the implementation of mitigation measures, residual effects of natural gas pipeline construction on wetland function along the natural gas pipeline ROW are likely to occur, are predicted to be adverse in direction, low in magnitude, extend to the Wetland LAA, will be medium-term in duration and will be reversible following completion of construction activities and reclamation of the PDA.

7.5.4 Summary of Residual Project Effects

Residual Project effects on vegetation and wetlands are summarized in Table 7-6**Error! Reference source not found.**.

Table 7-6 Residual Project Effects on Vegetation and Wetlands

Residual Effect		Residual Effects Characterization						
		Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Change in Vegetation Communities								
Natural Gas Pipeline	Construction	A	N	LAA	ST	S	R	U
Change in Vegetation Species								
Natural Gas Pipeline	Construction	A	N	LAA	ST	S	R	U
Change in Wetland Function								
Natural Gas Pipeline	Construction	A	L	LAA	MT	S	R	L

KEY

See Table 5-2 for detailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area
LAA Local Assessment Area
RAA Regional Assessment Area

Duration

ST Short-term
MT Medium-term
LT Long-term

N/A Not applicable

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Likelihood

U Unlikely
P Possible
L Likely

7.6 ASSESSMENT OF CUMULATIVE EFFECTS ON VEGETATION AND WETLANDS

Past and present land use practices, Projects and physical activities have influenced the baseline conditions for native vegetation communities in the RAA (5 km buffer from the PDA). The contribution of the Project to the existing cumulative effects on native vegetation communities and species is considered negligible at the RAA (5 km buffer from the PDA); therefore, a further quantitative assessment of cumulative effects on vegetation is not warranted. Road upgrades and the construction and operation of the Keystone XL Project and a meter station connecting to the Foothills system pipeline are projects and physical activities that will occur in the reasonably foreseeable future that will occur in the RAA (5 km buffer from the PDA), no additional cumulative effects on vegetation are predicted.

Past and present Projects and physical activities have influenced the baseline conditions for wetlands in the RAA. The Project will make a negligible contribution to the existing cumulative effect on wetlands within the RAA. Road upgrades and the construction and operation of the Keystone XL Project and a meter station connecting to the Foothills system pipeline are projects and physical activities that will occur in the reasonably foreseeable future that will occur in the RAA, no additional cumulative effects on wetlands are predicted.

Table 7-7 presents project and physical activities inclusion list, which identifies other past, present and reasonably foreseeable future projects and physical activities that have the potential to interact cumulatively with those arising from the Project. Where residual environmental effects from the Project act cumulatively with those from other past, present, and reasonably foreseeable future projects and physical activities, a cumulative effects assessment is undertaken to determine their significance.

Table 7-7 Interactions with the Potential to Contribute to Cumulative Effects on Vegetation and Wetlands

Other Projects and Physical Activities with Potential for Cumulative Effects	Potential Effects
	Change in Wetland Function
Past and Present Projects, Physical Activities and Land Use	
Agriculture	✓
Infrastructure	✓
Residential	✓
Linear Developments	✓
Industrial Activities	✓
Project-Related Physical Activities	✓
Future (Reasonably Foreseeable) Projects and Physical Activities	
TC Energy Keystone XL Pump Station	✓
TC Energy Keystone XL Pipeline	✓
Foothills Pipe Lines Ltd. Meter Station	✓
NOTES:	

Table 7-7 Interactions with the Potential to Contribute to Cumulative Effects on Vegetation and Wetlands

Other Projects and Physical Activities with Potential for Cumulative Effects	Potential Effects
	Change in Wetland Function
✓ Other projects and physical activities whose residual effects are likely to interact cumulatively with Project residual effects.	

7.6.1 Change in Wetland Function

Potential cumulative effects on wetland function are those arising from past, present, and reasonably foreseeable future projects and physical activities and have the same effect pathways as those resulting from the Project, including the direct loss or alteration of wetland area or change in wetland class and indirectly from reduced water quality because of changes in surface or groundwater.

The current landscape where the Project is located has already been extensively altered by anthropogenic disturbance including agricultural conversion, roads, and linear development. These activities have contributed to an existing cumulative effect on wetland function. At Baseline Case, the Project RAA is composed of 1.6% wetlands, based on the AAFC annual crop inventory (Table 7-8). However, the AAFC annual crop inventory underestimates the number and area of wetlands in the RAA. Therefore, direct effects on wetland classes from the Project are not reflected in Table 7-8.

As discussed in the residual effects Section 7.5.3, the Project will result temporary effects to wetlands along the natural gas pipeline ROW. The Project will result in a change in 0.5 ha of wetlands that intersect the natural gas pipeline ROW and TWS (Table 7-9).

The construction and operation of the proposed Keystone XL pipeline and pump station and the Foothills meter station are the only foreseeable future projects and physical activity identified within the Project RAA. The Keystone XL project will likely result in further effects on wetland function in the RAA, however, the area calculations presented in Table 7-8 do not reflect this assumed change because the mapping available (i.e., the AAFC annual crop inventory) under-represents wetlands. Based on a review of aerial imagery, the Keystone XL pipeline crosses several Class III shallow-marsh and higher wetlands. It is reasonable to assume that Keystone XL will implement mitigation measures to reduce potential effects on wetland function and that following pipeline construction, reclamation will be undertaken for affected wetlands.

Residual cumulative effects on wetland function are likely to occur and are predicted to be moderate in magnitude, extend to the RAA, will be medium-term (i.e., pipelines) to long-term (i.e., meter station, pump station) in duration, and are considered reversible. The Project, once reclamation is complete, will make a negligible contribution to the cumulative loss or alteration of wetland function at the RAA scale.

Table 7-9 summarizes residual cumulative environmental effects on wetland function.

Table 7-8 Change in Land Cover in the Project RAA for Baseline Case, Application Case and Future Case

Land Cover Class [1]	Vegetation Cover Types in the RAA									
	Baseline Case		Application Case		Change from Baseline to Application Case		Future Case		Change from Baseline to Future Case	
	Area (ha)	% RAA	Area (ha)	% RAA	Area Change (ha)	% Change in Cover Type	Area (ha)	% RAA	Area Change (ha)	% Change in Cover Type
Upland										
Broadleaf	27.8	0.3	27.8	0.3	0.0	0.0	27.8	0.3	0.0	0.0
Coniferous	1.3	0.0	1.3	0.0	0.0	0.0	1.3	0.0	0.0	0.0
Native grassland	2,768.6	27.3	2,768.2	27.3	0.4	0.0	2,765.0	27.2	-3.6	0.0
Shrubland	91.1	28.4	91.1	28.4	0.0	0.0	91.1	28.4	0.0	0.0
***Subtotal*[1]	**2,888.8**	**28.4**	**2,888.4**	**28.4**	**0.4**	**0.0**	**2,885.2**	**28.4**	**-3.6**	**0.0**
Wetland										
Wetland	158.5	1.6	158.5	1.6	0.0	0.0	158.3	1.6	-0.2	0.0
Water	34.0	0.3	34.0	0.3	0.0	0.0	34.0	0.3	0.0	0.0
***Wetland Subotal*[1]	**192.5**	**1.9**	**192.5**	**1.9**	**0.0**	**0.0**	**192.3**	**1.9**	**-0.2**	**0.0**
Anthropogenic										
Cropland	6,240.0	61.4	6,231.9	61.3	8.1	0.1	6,216.2	61.2	-23.8	-0.2
Exposed Land and Barren	61.0	0.6	69.3	0.7	-8.3	-0.1	84.5	0.8	23.5	0.2
Tame Pasture/Hayland	591.8	5.8	591.8	5.8	0.0	0.0	591.0	5.8	-0.8	0.0
Urban/Developed	184.2	1.8	184.4	1.8	-0.2	0.0	189.0	1.9	4.8	0.0
***Anthropogenic Subtotal*[2]	**7,077.0**	**69.7**	**7,077.4**	**69.7**	**-0.4**	**0.0**	**7,080.7**	**69.7**	**3.7**	**0.0**
Total Area[2]	**10,158.3**	**100.0**	**10,158.3**	**100.0**	**0.0**	**0.0**	**10,158.2**	**100.0**	**-0.1**	**0.0**

[1] Totals may not add up due to rounding errors

Table 7-9 Residual Cumulative Effects on Vegetation and Wetlands

Residual Cumulative Effect	Residual Cumulative Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Change in Wetland Function							
Residual cumulative effect	A	M	RAA	MT/LT	IR	R	L
Contribution from the Project to the residual cumulative effect	The PDA (8.7 ha) is on previously disturbed agricultural land and will result in disturbance to 0.5 ha of wetlands, most of which have been previously cultivated through. With mitigation and post-construction reclamation, the contribution of the Project to cumulative effects on wetland function are expected to be negligible in magnitude.						

KEY

Refer to Table 5-2 for detailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area
LAA Local Assessment Area
RAA Regional Assessment Area

Duration

ST Short-term
MT Medium-term
LT Long-term

N/A Not applicable

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Likelihood

U Unlikely
P Possible
L Likely

7.7 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

With the application of mitigation measures, residual Project effects and residual cumulative effects on vegetation and wetlands are predicted to be not significant.

Experience with similar projects, and confidence in the effectiveness of mitigation measures in the EPP, which reflect accepted best industry practice indicates high prediction confidence in predicted reclamation success. However, prediction confidence in the plant SOMC data within the LAA is moderate until the field survey has been completed. Once the late rare plant field survey has been completed (summer 2020), confidence is expected to increase. It is unlikely that plant SOMC will be found or have sustainable populations in chronically disturbed agricultural areas and therefore the prediction confidence is high for the PDA.

7.8 MONITORING

Construction, monitoring and inspection will follow MIPL's construction monitoring program. During construction, an Environmental Monitor or designate will be onsite during construction to monitor activities for compliance with regulatory commitments and mitigation measures, as outlined in the EPP.

8.0 ASSESSMENT OF POTENTIAL EFFECTS ON WILDLIFE AND WILDLIFE HABITAT

8.1 SCOPE OF ASSESSMENT

Wildlife and wildlife habitat was selected as a VC because the Project has the potential to cause changes in wildlife habitat and mortality risk. The wildlife and wildlife habitat VC represents the broad range of wildlife species that are known to occur or have the potential to occur regionally. The focus of this assessment is on SAR and SOMC. For a definition of SAR and SOMC see Section 8.1.1.

The scope of this assessment has been influenced by:

- provincial and federal regulations and policy guidance (see Section 1.1)
- the nature, scope and extent of the Project and its activities (see Section 2), and
- the environmental setting of the Project (see Section 8.2)

8.1.1 Potential Effects, Pathways and Measurable Parameters

Potential effects, effect pathways and the measurable parameters used to characterize and assess effects on wildlife and wildlife habitat are provided in Table 8-1.

Table 8-1 Potential Effects, Pathways and Measurable Parameters for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathways	Measurable Parameter(s) and Units of Measurement
Change in Habitat	• Direct habitat loss or alteration through vegetation clearing and ground disturbance, including habitat and residences for SAR • Indirect habitat loss or alteration through sensory disturbance and/or edge effects	• Amount (ha) of land cover classes directly disturbed by the Project • Habitat loss because of reduced habitat effectiveness (e.g., sensory disturbance) is addressed qualitatively • Amount of habitat (ha) for species at risk that is directly lost or altered by the Project (including critical habitat and residences) • Number of habitat features for species at risk and species of management concern observed within the PDA or recommended setback (including SAR residences, if present)

Table 8-1 Potential Effects, Pathways and Measurable Parameters for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathways	Measurable Parameter(s) and Units of Measurement
Change in Mortality Risk	• Project-related works and activities resulting in physical destruction of key habitat features (e.g., nests, dens, roosts, hibernacula) • Project-related works and activities resulting in accidental mortality of small, less mobile species or individuals (e.g., amphibians, juvenile birds) • Vehicle-wildlife collisions • Wildlife-human conflict (e.g., removal of nuisance animals) • Entrapment within the pipeline trench or open excavations	• Estimated change in mortality risk is assessed qualitatively

8.1.1.1 Species of Management Concern and Species at Risk

For the purpose of this ESA, wildlife SAR are defined as federally and provincially legislated SAR that are:

- listed on Schedule 1, Schedule 2, or Schedule 3 of the federal *Species at Risk Act* (SARA) (GOC 2002) as *endangered*, *threatened*, or *special concern* (GOC 2019)
- listed in *The Wildlife Act* (GOS 1998) as *endangered*, *threatened*, or *vulnerable*

The assessment also considers a wider group of SOMC that includes SAR, as well as wildlife species identified in federal or provincial tracking lists and activity guidelines that are:

- listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened, or special concern (GOC 2019),
- assigned a ranking of S1, S2, or S3 (or a combination of these rankings) by the Saskatchewan Conservation Data Center (SKCDC) (SKCDC 2019b), and
- included in the Saskatchewan Activity Restriction Guidelines for Sensitive Species (GOS 2017).

Appendix C provides a list of SOMC, including SAR that have the potential to occur in the RAA, which were used to focus the assessment on wildlife and wildlife habitat.

8.2 EXISTING CONDITIONS FOR WILDLIFE AND WILDLIFE HABITAT

8.2.1 Methods

8.2.1.1 Desktop Review

Existing information from provincial and federal databases, satellite imagery, literature sources, and field reconnaissance surveys were used to characterize wildlife and wildlife habitat in the LAA and RAA. A focus was placed on identifying known occurrences of wildlife SAR and SOMC and availability of their habitats within the LAA and RAA. Habitat suitability was evaluated to determine whether wildlife SAR and SOMC have potential to occur in the LAA and RAA.

The following sources of information were reviewed:

- HABISask Application database search for historical records of SOMC (see Figure 8-1) (SKCDC 2019a)
- SKCDC taxa lists (SKCDC 2019b)
- SARA Public Registry database for SARA- and COSEWIC-listed species (GOC 2019)
- Birds of North America Online database (Cornell Lab of Ornithology and the American Ornithologists' Union 2019)
- satellite imagery such as ESRI World Imagery (Digital Globe 2016), FlySask (SGIC 2008-2013), and Google Earth (Google Earth Pro 2018), and
- publicly available geographic information system (GIS) spatial layers of protected and designated lands (e.g., conservation easements, provincial park and national parks, national wildlife areas, community pastures, ecological reserves, Saskatchewan watershed authority lands, special management areas, *Wildlife Habitat Protection Act* lands, migratory bird sanctuaries, wildlife refuges, fish and wildlife development fund lands, migratory bird concentration sites, and game preserves) (SKCDC 2019a).

These data sources provided information about potential and historical wildlife SAR and SOMC occurrences, sensitive wildlife habitat features (e.g., migratory bird concentration sites), and habitat types (i.e., land cover classes) present within the wildlife LAA and RAA. Existing information compiled during the desktop review, along with baseline availability of wildlife habitat in the LAA and RAA, was used to develop a list of wildlife SAR and SOMC with potential to be affected by the Project. Because land cover classes represent broad habitat types (i.e., at a coarse scale), a wildlife-habitat association approach was used to estimate habitat availability. Specifically, each land cover class was evaluated to determine whether it provided suitable habitat using knowledge of seasonal habitat requirements for wildlife, including wildlife SAR and SOMC.

8.2.1.2 Field Surveys

Baseline biophysical reconnaissance and preliminary wildlife surveys were conducted between late August and mid-November 2016 to confirm the presence and location of potential wildlife habitat (i.e.,

native grassland, wetland) in the LAA. The PDA was revised between the August and November surveys. As a result, an additional reconnaissance survey were conducted in November 2016 and the wildlife survey locations were completed within the revised LAA.

Visual overwintering amphibian surveys, habitat suitability surveys, and fall bird movement surveys were conducted between August and November 2016 (see Figure 8-2 for survey locations and SOMC observations) and followed protocols developed by Stantec that are consistent with established and recognized survey methods. It is anticipated that raptor stick nest, breeding bird, burrowing owl, and breeding amphibian field surveys will be conducted in spring/summer 2020. Survey methods used to complete the fieldwork are summarized below.

8.2.1.2.1 Habitat Suitability Surveys

Roadside prairie wildlife habitat suitability surveys were conducted for all quarter sections within the LAA between late August and mid-November 2016 to assess availability and suitability of habitat for SOMC. It is not feasible to assess all SOMC that may occur in the LAA, therefore SOMC with the potential to occur in the RAA were assessed based on whether or not suitable habitat existed within the LAA. Habitat suitability was assessed for 15 SOMC and included: loggerhead shrike (*Lanius ludovicianus excubitorides*), Sprague's pipit (*Anthus spragueii*), Baird's sparrow (*Centronyx bairdii*), long-billed curlew (*Numenius americanus*), northern leopard frog (*Lithobates pipiens*), short-eared owl (*Asio flammeus*), burrowing owl (*Athene cunicularia*), swift fox (*Vulpes velox*), and raptors.

At each quarter section, habitat suitability was assessed for each SOMC to determine if the species was likely to occur in the area. Habitat suitability for each species was ranked from none to high. Land use was confirmed for each quarter section and any raptor stick nests found were recorded.

8.2.1.2.2 Sharp-tailed Grouse Lek Surveys

Sharp-tailed grouse lek surveys were conducted to detect the presence of leks (i.e., traditional dancing grounds used by sharp-tailed grouse during mating season). One visit was conducted in mid-May 2020. The survey began one half hour before sunrise and concluded three hours after sunrise, under appropriate weather conditions (i.e., winds less than 20 km/h, no precipitation). At each site, there was a two-minute waiting period upon arrival to allow disturbance associated with site access to subside. This was followed by a five-minute observation period during which the observer scanned the horizon with binoculars looking for grouse. If a lek was observed, the number of male and female grouse were recorded as well as information about the surrounding habitat (ESRD 2013).

8.2.1.2.3 Raptor Stick Nest Surveys

Raptor stick nest surveys were conducted to identify potential raptor nest sites. Two survey visits were conducted between mid-May and early June 2020. Surveys were conducted during daylight hours when visibility was good (i.e., no precipitation or fog). Observers used binoculars and scanned trees, shrubs, and shelterbelts looking for stick nests. If a stick nest was found, the observer documented the species,

presence of adults and/or young, behaviour (e.g., defensive display, feeding young), nest size, location, and habitat (ESRD 2013).

8.2.1.2.4 Nocturnal Amphibian Surveys

Nocturnal amphibian surveys were conducted between mid-May and early-June to detect potential breeding ponds for amphibian SAR and SOMC. Two survey visits were conducted between a half hour after sunset until 01:00 am. There was a two-minute waiting period upon arrival to allow disturbance associated with site access to subside at each site. This was followed by a three-minute observation period during which the observer recorded the species, abundance, direction, and bearing for all amphibian observations (SKMOE 2020a).

8.2.1.2.5 Breeding Bird Surveys

One survey visit to detect the presence of breeding bird species, particularly SAR and SOMC, and their associated habitat were conducted in early-June 2019. Surveys were conducted between sunrise and no more than four hours after sunrise under appropriate weather conditions (i.e., air temperature above 0ºC, wind not greater than 20 km/h) (SKMOE 2020b). At each survey location, there was a two-minute waiting period upon arrival to allow disturbance associated with site access to subside. This was followed by a five-minute observation period during which all birds detected by sight and/or sound were recorded. Detection efforts were focused on a 100 m radius from the centre point of the survey location. Birds detected outside the 100 m radius were recorded as incidental observations. For each observation point, the habitat composition within the 100 m radius was recorded.

8.2.1.2.6 Visual Overwintering Amphibian Surveys

Visual overwintering amphibian surveys were conducted to identify potential overwintering wetlands (i.e., Class IV (Stuart and Kantrud 1971)) for northern leopard frogs. The surveys were conducted by visually searching for amphibians while slowly walking (i.e., approximately 2 km/h) along the edge of suitable wetlands, within 1 to 3 m of the water line. Surveys were conducted twice in the fall (i.e., August and November) prior to freeze-up during weather conditions suitable for basking behaviour (i.e., when wind was less than 20 km/h and air and water temperatures were above 0ºC). All amphibians observed during the survey were recorded.

8.2.1.2.7 Fall Bird Movement Surveys

Fall bird movement surveys were conducted to document species, flight path (i.e., height and direction) and habitat use during migration in the fall. Surveys were conducted at two sites within the LAA. Sites 1 and 2 were established in cultivated land near large Class IV wetlands to document if waterbirds were using the wetlands as a staging area. Sites 1 and 2 were surveyed in late-August. Due to changes in the Project layout in early September, the sites were moved to capture potential bird movement in the revised LAA and renamed, Site 3 and 4. Sites 3 and 4 were surveyed in mid-September. Site 3 was established at the top of a coulee valley overlooking native grassland, cultivated land and Grassy Creek. Site 4 was established in cultivated land near a large Class IV wetland, near Site 2.

Each survey consisted of a 30-minute observation period where observations of birds in flight were recorded out to a 1 km radius from the survey point. Surveys targeted two distinct bird groups: waterbirds (e.g., pelicans, sandpipers, herons, gulls, ducks, geese) and landbirds (e.g., sparrows, blackbirds, warblers, corvids). Waterbirds and landbirds were surveyed twice during each visit (i.e., 1 hour total): once in the early morning, a half hour before sunrise to one hour after sunrise, and once in the evening, one hour before sunset to a half hour after sunset. For all birds observed within a 1 km radius during the movement survey, the species, number of individuals, flight path and behaviour (e.g., flapping, perched, soaring) were recorded. Observations of birds outside the 1 km radius were recorded as incidental observations.

8.2.1.2.8 Incidental Wildlife Observations

Wildlife SAR and SOMC observed incidentally during field surveys (i.e., not observed during a specific targeted survey) were recorded.

8.2.2 Overview

8.2.2.1 Desktop Review

The Project is in the Wood Mountain Plateau of the Mixed Grassland ecoregion of southern Saskatchewan. Due to the semi-arid climate, approximately 50% of the ecoregion remains uncultivated providing extensive open grassland habitat for wildlife SAR and SOMC (Acton et al. 1998).

The PDA is predominantly comprised of cropland (8.2 ha, 94.3%), which provides limited habitat for most wildlife species. Potential wildlife habitat in the PDA is limited to wetlands (0.5 ha, 5.2%), grassland (<0.1 ha or 0.5%), and broadleaf (<0.1 ha, 0.1%). There are 0.5 ha of wetlands within the PDA of which 0.2 ha is Class II temporary wetlands and 0.3 ha is Class IV semi-permanent wetland. One the semi-permanent wetlands is part of Grassy Creek. All wetlands are embedded in cropland and provide limited wildlife habitat, especially for SAR and SOMC. The small portions of the two Class IV wetlands (0.3 ha; Table 7-3) that intersect the PDA were shallow marsh zones (i.e., the open water zones are avoided), which were partially cultivated and provide limited wildlife habitat. There is <0.1 ha of grassland identified within the pipeline PDA in SE 16-07-18 W3M.

The wildlife LAA is comprised of agriculture (663.4 ha, 82.1%), wetlands (45.0 ha, 5.5%), native grassland (36.3 ha, 4.0%), tame pasture/hayland (27.3 ha, 3.4%), and broadleaf (5.3 ha, 0.7%) (Table 8-2). Overall, wildlife habitat in the Project PDA and LAA is limited due to the high proportion of anthropogenic disturbance (e.g., residential development, infrastructure, agriculture), which reduce the habitat value to most wildlife species, and particularly for SAR and SOMC.

Table 8-2 Land Cover in the PDA and Wildlife LAA and RAA

Land Cover	PDA		LAA		RAA[1]	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
Native Grassland	0.0	0.0	36.3	4.0	2768.6	27.3
Tame Pasture/Hayland	0.0	0.0	27.3	3.4	591.8	5.8
Broadleaf	<0.1	0.6	8.9	1.1	27.8	0.3
Coniferous	0.0	0.0	0.0	0.0	1.3	0.0
Shrubland	0.0	0.0	0.0	0.0	91.1	0.9
Exposed Land/Barren	0.0	0.0	0.0	0.0	61.0	0.6
Cropland	8.2	94.3	663.4	82.1	6240.0	61.4
Urban/Developed[2]	<0.1	0.2	29.8	3.7	184.2	1.8
Wetland[3]	0.5	5.2	45.4	5.6	192.5	1.9
Total[4]	**8.7**	**100.0**	**811.1**	**100.0**	**10158.2**	**100.0**

NOTES:

[1] RAA land cover based on the Agriculture and Agri-Food Canada's Annual Crop Inventory land cover classification (AAFC 2018).

[2] Urban/Developed includes the Seeded Ditch along roadsides.

[3] Wetland includes Class I through V, Drainage, Dugout, and Water.

[4] Numbers may not add up due to rounding.

The RAA contains more potential wildlife habitat than the PDA or LAA and is comprised of 61.4% agriculture, 27.3% native grassland, 5.8% tame pasture/hayland, 0.3% broadleaf, and 1.9% wetland.

Native grassland can provide breeding and foraging habitat for several SAR and SOMC including Sprague's pipit, ferruginous hawk (*Buteo regalis*), Chestnut-collared longspur (*Calcarius ornatus)*, lark bunting (*Calamospiza melanocorys*), Baird's Sparrow, and burrowing owl. Tame pasture and hayland can provide breeding and foraging habitat for bobolink (*Dolichonyx oryzivorus*), Baird's sparrow, and American badger (*Taxidea taxus taxus*). Wetlands can be areas with high biological diversity and may be used as breeding and/or rearing grounds for waterfowl and amphibians, staging areas for migratory birds, and refuge for a variety of wildlife moving through a landscape largely modified by agriculture (Semlitsch 2002). Wetlands provide habitat for SAR and SOMC and migratory birds including northern leopard frog (, Canadian toad (*Anaxyrus hemiophrys*), and horned grebe (*Podiceps auritus*). Broadleaf, primarily associated with shelterbelts, can provide habitat for migratory songbirds (e.g., loggerhead shrike, clay-coloured sparrow (*Spizella pallida*), tree swallow (*Tachycineta bicolor*)), tree-nesting raptors (e.g., Swainson's hawk (*Buteo swainsoni*) and red-tailed hawk (*Buteo jamaicensis*)), and tree-roosting bats (e.g., hoary bat (*Lasiurus cinereus*)).

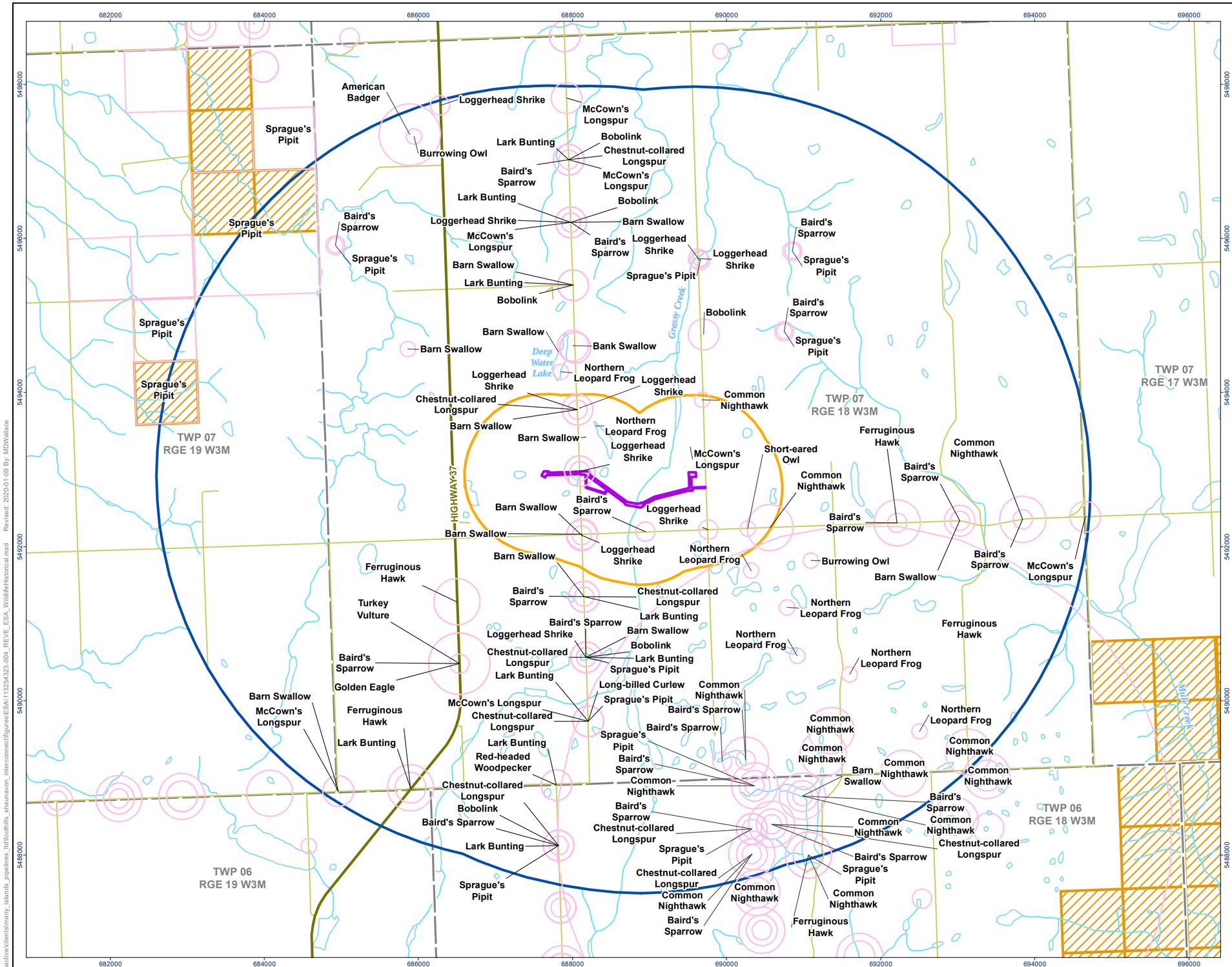
Based on historical records and current range extents, the RAA has potential to provide habitat for 70 SOMC, including 37 SARA-listed species: 10 invertebrate species, 10 herptile species, 41 bird species, and 9 mammal species (GOC 2019, Appendix C). No designated federal or provincial critical habitat for

SAR occurs within the RAA. Two quarter sections of land protected under the *Wildlife Habitat Protection Act* occur in the northwest portion of the RAA. The LAA contains records for four SAR/SOMC including barn swallow (*Hirundo rustica*), chestnut-collared longspur, lark bunting, and loggerhead shrike. The LAA contains records for 10 SAR (see Table 8-3). The RAA contains records for 19 SAR (see Table 8-3). As described above, the PDA and LAA are in an area with widespread existing disturbance and habitat conversion and are predominantly on agricultural land; there is limited suitable SAR and SOMC habitat within the PDA or LAA.

Table 8-3 Historic Wildlife Species at Risk and Species of Management Concern Observations in the PDA and Wildlife LAA and RAA

Common Name	Scientific Name	Number of Historic SAR/SOMC Observations[1]		
		PDA	LAA	RAA[2]
Northern leopard frog	*Lithobates pipiens*	0	1	7
Ferruginous hawk	*Buteo regalis*	0	1	5
Short-eared owl	*Asio flammeus*	0	1	1
Burrowing owl	*Athene cunicularia*	0	0	2
Common nighthawk	*Chordeiles minor*	0	2	15
Bank swallow	*Riparia riparia*	0	0	1
Barn swallow	*Hirundo rustica*	1	5	15
Loggerhead shrike	*Lanius ludovicianus excubitorides*	1	5	10
Baird's sparrow	*Centronyx bairdii*	0	1	20
Sprague's pipit	*Anthus spragueii*	0	0	14
Chestnut-collared longspur	*Calcarius ornatus*	1	2	11
McCown's longspur	*Rhynchophanes mccownii*	0	1	7
Bobolink	*Dolichonyx oryzivorus*	0	0	7
American badger	*Taxidea taxus taxus*	0	0	1
Lark bunting	*Calamospiza melanocorys*	1	1	10
Golden eagle	*Aquila chrysaetos*	0	0	1
Long-billed curlew	*Numenius americanus*	0	0	1
Red-headed woodpecker	*Melanerpes erythrocephalus*	0	0	1
Turkey vulture	*Cathartes aura*	0	0	1

[1] From HABISask Application database (SKCDC 2019a)
[2] Observations in the RAA include the LAA



Stantec

Many Islands Pipe Lines (Canada) Limited

Legend

- Project Development Area (PDA)
- Wildlife and Wildlife Habitat Local Assessment Area (LAA)
- Regional Assessment Area
- Major Road
- Minor Road
- Watercourse
- Township
- Waterbody
- *Wildlife Habitat Protection Act Land* (WHPA)
- Historical Wildlife Species of Management Concern (SOMC) or Species at Risk (SAR) Observation

N

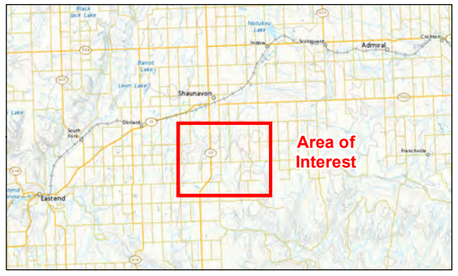
0 500 1,000 metres

(At original document size of 11x17) 1:50,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N

2. Data Sources: Base features produced under license with the Government of Saskatchewan and the Government of Canada.



Project Location
Near Shaunovan, Saskatchewan

Prepared by MDW on 2020-01-09
TR by JH on 2020-01-09
IR Review by NC on 2020-01-09

Client/Project
113254323-004 REVE
Many Islands Pipe Lines (Canada) Limited
Shaunovan Interconnect Project
Environmental and Socio-Economic Assessment

Figure No.
8-1

Title
Historical Wildlife SAR and SOMC Observations in the Wildlife and Wildlife Habitat LAA and RAA

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8.2.2.2 Field Surveys

8.2.2.2.1 Habitat Suitability Surveys

A prairie habitat suitability assessment was completed for the 12 quarter sections within the wildlife LAA. Overall the LAA had habitat ranked as medium to high suitability for tree nesting raptors, loggerhead shrike, waterfowl, and northern leopard frog breeding/overwintering wetlands. No potential swift fox habitat was observed in the LAA.

SE and NE 16-07-18 W3M, which are in the LAA, contain native grassland ranked as medium to high quality habitat for grassland birds including Sprague's pipit, Baird's sparrow, chestnut-collared longspur and burrowing owl. They also ranked as medium to high quality habitat for short-eared owl and common nighthawk (*Chordeiles minor*). The southern half of SE 16-07-18 W3M is cultivated and the northern half is native grassland. The Project PDA crosses SE 16-07-18 W3M in the cultivated half, approximately 15 m south of the native grassland portion.

8.2.2.2.2 Sharp-tailed Grouse Lek Surveys

One sharp-tailed grouse and no active leks were observed during this survey.

8.2.2.2.3 Raptor Stick Nest Surveys

No raptor nests were detected during these targeted surveys.

8.2.2.2.4 Nocturnal Amphibian Surveys

No amphibian SAR or SOMC were detected during the surveys.

8.2.2.2.5 Breeding Bird Surveys

Eighteen species were detected during breeding bird surveys within the LAA, none of which were SAR or SOMC.

8.2.2.2.6 Visual Overwintering Amphibian Surveys

Visual overwintering amphibian surveys were conducted at two Class IV wetlands within the LAA. Two adult northern leopard frogs were observed in NW 16-07-18 W3M. However, insufficient information is available to conclude that the wetland is an overwintering site. Survey sites are illustrated in Figure 8-2.

8.2.2.2.7 Fall Bird Movement Surveys

A total of 19 bird species and 634 individuals were observed during the fall bird movement surveys (Table 8-4) including one SAR (barn swallow). The most frequently observed species were common wetland obligate species and included red-winged blackbird (146 individuals, *Agelaius phoeniceus*), blue-winged teal (94 individuals, *Spatula discors*), and Franklin's gull (60 individuals, *Spatula discors*). Sites 1, 2, and 4 which were all sited near a Class IV wetland and had a similar number of bird observations (189 to 214

individuals). Site 3, located in the upland above a coulee valley with native grassland and a Class IV wetland, had the lowest number of bird observations with 26 individuals. No primary flight corridors were observed during the fall bird movement survey. Survey sites are illustrated in Figure 8-2.

Table 8-4 Bird Species Observed During Fall Bird Movement Surveys

Common Name[1,2]	Scientific Name	No. of Individuals Observed				
		Site 1	Site 2	Site 3	Site 4	Total
WATERBIRD SURVEY[3]						
Canada goose	*Branta canadensis*	0	23	0	0	23
blue-winged teal	*Spatula discors*	62	20	2	10	94
northern shoveler	*Spatula clypeata*	10	0	0	0	10
gadwall	*Mareca strepera*	14	12	0	0	26
mallard	*Anas platyrhynchos*	13	16	0	8	37
redhead	*Aythya americana*	0	0	0	54	54
lesser scaup	*Aythya affinis*	0	0	0	44	44
ruddy duck	*Oxyura jamaicensis*	0	0	0	8	8
duck species	n/a	70	0	0	0	70
Franklin's gull	*Leucophaeus pipixcan*	0	60	0	0	60
American coot	*Fulica americana*	0	6	0	0	6
killdeer	*Charadrius vociferus*	1	3	0	0	4
willet	*Tringa semipalmata*	0	0	1	0	1
greater yellowlegs	*Tringa melanoleuca*	17	0	0	0	17
Waterbird Total		**187**	**140**	**3**	**124**	**454**
LANDBIRD SURVEY[4]						
horned lark	*Eremophila alpestris*	2	6	0	0	8
Barn swallow	***Hirundo rustica***	0	2	0	0	2
western meadowlark	*Sturnella neglecta*	0	1	5	0	6
red-winged blackbird	*Agelaius phoeniceus*	0	56	0	90	146
Brewer's blackbird	*Euphagus cyanocephalus*	0	0	17	0	17
American goldfinch	*Carduelis tristis*	0	0	1	0	1
Landbird Total		**2**	**65**	**23**	**90**	180
Grand Total		**189**	**205**	**26**	**214**	**634**

NOTES:

[1] Only targeted species observed during the appropriate timing interval are included (i.e., ducks are only counted if observed during the waterbird survey interval). Non-targeted species are included under incidental wildlife observations.

[2] Bold names indicate a SAR and/or SOMC.

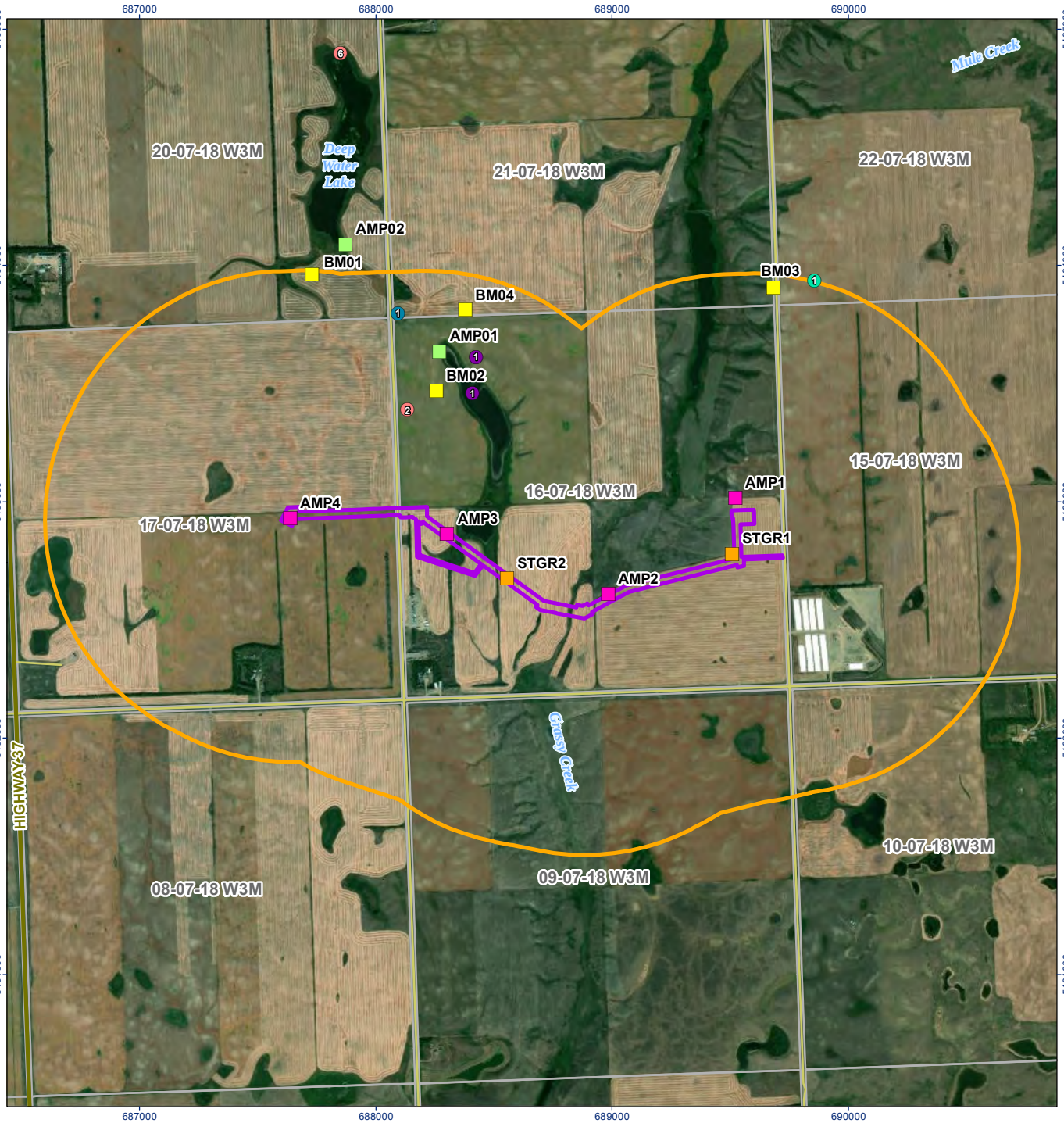
[3] Waterbird survey includes ducks, geese, gulls, terns, herons, plovers, and sandpiper species.

[4] Landbird survey includes passerines, corvids, and gamebirds.

8.2.2.2.8 Incidental Wildlife Observations

Incidental wildlife SAR and SOMC observations recorded during wildlife and reconnaissance surveys in 2016 included:

- Six barn swallows foraging above the Class IV wetland in NE-20-07-18 W3M
- One common nighthawk foraging in NE-16-07-18 W3M, and
- One loggerhead shrike in SW-21-07-18 W3M.



Legend

- Project Development Area (PDA)
- Wildlife and Wildlife Habitat Local Assessment Area (LAA) (1 km)
- Major Road
- Minor Road
- Section

Wildlife Species of Management Concern or Species at Risk Observation * with Observation Count

- Barn swallow
- Common nighthawk
- Loggerhead shrike
- Northern leopard frog

2020 Wildlife Survey Locations*

- Amphibian
- Sharp-Tailed Grouse Lek

2016 Wildlife Survey Locations*

- Overwintering Amphibian
- Fall Bird Movement

0 250 500 Meters
(At original document size of 8.5x11)
1:25,000

N

Notes

* Point locations have been shifted for cartographic purposes.

1. Coordinate System: NAD 1983 UTM Zone 12N

2. Data Sources: Base features produced under license with the Government of Saskatchewan and the Government of Canada.

3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,

Stantec

Many Islands Pipe Lines (Canada) Limited

Project Location
Near Shaunavon, Saskatchewan

Prepared by CL on 2020-07-02
TR by JH on 2020-07-02
IR Review by NC on 2020-07-02

Client/Project
113254323-005 REVF
Many Islands Pipe Lines (Canada) Limited
Shaunovan Interconnect Project
Environmental and Socio-Economic Assessment

Figure No.
8-2

Title
Wildlife Survey Locations and Results

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8.3 PROJECT INTERACTIONS WITH WILDLIFE AND WILDLIFE HABITAT

Table 8-5 identifies, for each potential effect, the physical activities that might interact with wildlife and wildlife habitat and result in the identified environmental effect. These interactions are indicated by check marks and are discussed in detail in Section 8.5 in the context of effects pathways, standard and project-specific mitigation, and residual effects. A justification for no interaction (no checkmark) is provided following the table.

Table 8-5 Project Interactions with Wildlife and Wildlife Habitat

Physical Activities	Potential Effects	
	Change in habitat	Change in mortality risk
Pipeline		
Construction	✓	✓
Operation	-	-
Meter Station		
Construction	✓	✓
Operation	-	-
NOTES: ✓ = Potential interaction - = No interaction		

During operation, no further changes to wildlife habitat are predicted and there is very limited potential for further changes to mortality risk (e.g., destruction of wildlife residences, vehicle collisions), as the PDA provides minimal to low suitability wildlife habitat and limited further ground disturbance is anticipated to be required for Project operations. During operation, disturbance will be limited to occasional integrity digs, for which MIPL will submit notifications to the CER following the Operations and Maintenance Guidelines (NEB 2018). Additionally, no operational noise emissions or sensory disturbances are anticipated during operation of the new meter station. As a result, Project operation is not anticipated to result in a change to wildlife habitat or mortality risk and will not be assessed further.

8.4 MITIGATION

Standard industry practices and avoidance measures, along with Project-specific mitigation measures outlined in the EPP (Appendix A) will be implemented during construction to reduce effects on wildlife and wildlife habitat. Key mitigation measures are summarized in Table 8-6.

Recommended provincial and federal restricted activity periods and setback distances for SAR and SOMC with the potential to occur within the RAA are summarized in Appendix C. Mitigation measures described in the vegetation and wetlands assessment (Section 7.4) will also reduce or avoid potential effects on wildlife and wildlife habitat.

Table 8-6 Mitigation Measures for Wildlife and Wildlife Habitat

Potential Effect	Effect Pathway	Key Mitigation Measures	Applicable Project Component	
			Pipeline	Meter Station
Change in Habitat	• Direct habitat loss or alteration through vegetation clearing and ground disturbance, including habitat and residences for SAR • Indirect habitat loss or alteration through sensory disturbance and/or edge effects	• Vehicular traffic and construction activities will be restricted to the designated construction footprint and approved work spaces. If boundary stakes are inadvertently damaged or destroyed, they will be replaced immediately. Wildlife features (e.g., wetlands, nests) will be flagged and/or fenced in the field, as specified by Project environmental permits and approvals and related environmental instructions, prior to commencement of construction.	✓	✓
		• Any previously unidentified sensitive habitat features are to be reported to the Environment & Sustainability Lead who will report the information to relevant government agency personnel, as required. A mitigation plan will be developed in consultation with the government agency, if required.	✓	✓
		• MIPL is proposing to start construction during the late summer/early fall. This timeframe is near the end of the Primary Nesting Period (PNP) for migratory birds (Zone B4; April 26 to August 15; GOC 2018). If construction commences in August, nest searches and/or avian use surveys (occurrence of territorial or nesting behavior) will be completed prior to work starting and as directed by the Environment & Sustainability Lead.	✓	✓
		• Construction will occur during daylight hours to avoid disturbance to crepuscular and nocturnal species.	✓	✓
		• Construction is scheduled between late August through December to avoid critical breeding and rearing periods for birds, amphibians, and most reptiles and mammals.	✓	✓
		• Where possible, construction equipment will use mufflers and/or dampeners and yard lights will be limited.	✓	✓
		• Land will be cleared only within the marked limits of the construction site. Clearing within the surveyed boundaries will be minimized where possible to prevent or reduce habitat loss and/or alteration.	✓	✓
Change in Mortality Risk	• Project-related works and activities resulting in physical destruction of key habitat features (e.g., nests, dens, roosts, hibernacula) • Project-related works and activities resulting in accidental mortality of small, less mobile species or individuals (e.g., amphibians, juvenile birds) • Vehicle-wildlife collisions • Wildlife-human conflict (e.g., removal of nuisance animals) • Entrapment within the pipeline trench or open excavations	• The speed limit on secondary roads or trails used to access the Project will be a maximum of 40 km/hr and may be lowered where specific wildlife concerns have been identified.	✓	✓
		• Recreational use of all-terrain vehicles or snowmobiles by construction personnel will be prohibited on the construction site.	✓	✓
		• Construction will occur during daylight hours when visibility is good to reduce vehicle – wildlife collisions.	✓	✓
		• Vegetation clearing and topsoil stripping will occur outside the Primary Nesting Period (PNP) for migratory birds (Zone B4; April 26 to August 15; GOC 2018) to reduce the potential for bird mortality through the disturbance/destruction of active nests.	✓	✓
		• Fencing will be erected around open bellholes, point excavations, and/or trenches to exclude wildlife. Bellholes left overnight will also have keyed stairs and trench ends will be sloped to provide escape routes for mobile terrestrial species.	✓	✓
		• If amphibians or reptiles are observed onsite near open excavations, sediment fencing may be required to prevent amphibians from entering the work area or excavation.	✓	✓
		• Project-related wildlife deaths and nuisance animals will be immediately reported to the Environment & Sustainability Lead and appropriate authorities.	✓	✓
		• Construction personnel are not permitted to have pets at the construction site.	✓	✓
		• If construction occurs outside of frozen conditions, the Environmental Monitor will conduct an amphibian and reptile search along the meter site construction area and ROW immediately prior to vegetation clearing and/or topsoil stripping to remove any species from the ROW. Sediment fencing will be used as required to prevent amphibians or reptiles from becoming trapped in open excavations or entering active work areas.	✓	✓
		• Good housekeeping practices and garbage disposal will be mandated to avoid attracting scavenger species. Construction personnel will not feed, lure or harass wildlife.	✓	✓
		• The Chief Inspector will be contacted to determine the amount of continuous open trench that may be allowable, the location of plugs and the corresponding location and size of gaps in the spoil pile.	✓	✓
		• Backfilling will occur immediately after lowering-in to reduce the length of open trench.	✓	✓

NOTES:
✓ Mitigation measure is applicable to the project component
- Mitigation measure is not applicable to the project component

8.5 ASSESSMENT OF RESIDUAL EFFECTS ON WILDLIFE AND WILDLIFE HABITAT

8.5.1 Change in Habitat

Habitat can be defined as an area with a combination of resources (e.g., forage, structural components for nests or dens, security protection from predators, thermal protection for overwintering) and environmental conditions (e.g., presence or absence of predators and competitors) that enables individuals to survive and reproduce (Morrison et al. 2006). Changes to suitable wildlife habitat can alter a species' ability to carry out basic life requisites such as breeding and overwintering. Construction of the Project has potential to interact directly (i.e., vegetation clearing and ground disturbance) and indirectly (i.e., habitat avoidance due to sensory disturbance) with wildlife habitat (Table 8-2).

A direct change in wildlife habitat has the potential to occur during the construction phase of the Project. Vegetation clearing within the PDA is the primary pathway for direct habitat loss during construction. Potential suitable wildlife habitat in the PDA is limited to wetlands (0.5 ha, 5.2%) and broadleaf (<0.1 ha, 0.1%) (i.e., shelterbelts) (Table 8-2). Potential suitable habitat within the PDA is further limited because the dominant wetlands intersected by the PDA are cultivated and provide limited wildlife habitat. Additionally, the open water zone of the two Class IV wetlands intersected by the PDA will be avoided and the overlap between the PDA and the Class IV wetland will be restricted to the shallow marsh zone, which was partially cultivated and provides limited wildlife habitat.

Habitat loss along the pipeline ROW and in TWS will be temporary as vegetation will allowed to regrow in the few non-cultivated areas upon completion of construction activities. Habitat loss at the meter station will be long-term and includes less than 0.8 ha (<5% of the total PDA) of potential wildlife habitat. Suitable wildlife habitat in the meter station is limited to broadleaf (<0.1 ha) because the wetlands have been cultivated and provide limited wildlife habitat.

Sensory disturbances associated with construction (e.g., noise from increased vehicle traffic, heavy equipment, lights) have the potential to result in indirect habitat loss due to reduced habitat effectiveness (i.e., avoidance). Wildlife species that reside near the Project may be deterred from using nearby habitats during the construction of the Project. Construction can affect breeding and rearing success for some wildlife species (Bayne et al. 2008, Francis and Barber 2013) if construction occurs during the breeding season. Construction is currently planned to begin in late-August 2020, outside of the primary nesting period for migratory birds (April 26 to August 15; GOC 2018) and is expected to be completed by December 2020. Responses of wildlife to construction will vary and are species-specific. Some species may display avoidance behaviours in the LAA during construction because of noise, vibrations, and increased human activity (Habib et al. 2007). Despite these expected responses, indirect habitat loss is expected to be limited because construction will occur outside of the sensitive breeding and rearing period for most wildlife species and construction is expected to be short-term (i.e., pipeline construction expected to be two to four weeks). Additionally, local wildlife species are currently exposed to elevated levels of habitat degradation (i.e., cultivation) and anthropogenic disturbance (i.e., roads, residences) which may lessen the severity of potential Project-related effects during construction. Sensory

disturbances related to construction are not expected to result in the long-term displacement of wildlife species as potentially affected species are already acclimatized to a moderate levels of disturbance in the area.

The Project is predominantly situated on cultivated or developed lands and adjacent to existing sources of anthropogenic disturbance (i.e., agriculture, roads) that provide low habitat suitability at baseline conditions. The Project will follow mitigation measures outlined in Table 8-6 and will adhere to timing and setback restrictions for wildlife species (see Appendix C) to limit direct and indirect changes to wildlife habitat.

With the implementation of mitigation measures, adverse residual effects on wildlife habitat during construction of the natural gas pipeline are likely to occur. If they occur, residual effects on wildlife habitat for direct effects (i.e., vegetation clearing) are predicted to be adverse, negligible in magnitude, limited to the PDA, medium-term in duration, and reversible following post-construction reclamation. Residual effects on wildlife habitat for indirect effects (i.e., sensory disturbances) are predicted to be adverse, low in magnitude, limited to the Wildlife and Wildlife Habitat LAA, short-term in duration and reversible following post-construction reclamation.

With the implementation of mitigation measures, adverse residual effects on wildlife habitat during construction of the meter station are unlikely to occur. If they occur, residual effects on wildlife habitat for direct effects (i.e., vegetation clearing) are predicted to be adverse, negligible in magnitude, limited to the PDA, long-term in duration and reversible following post-construction reclamation. Residual effects on wildlife habitat for indirect effects (i.e., sensory disturbances) are predicted to be adverse, low in magnitude, limited to the Wildlife and Wildlife Habitat LAA, short-term in duration and reversible following post-construction reclamation.

8.5.2 Change in Mortality Risk

Project construction has the potential to result in increased mortality risk for wildlife, including for SAR and SOMC, from vegetation clearing and ground disturbance activities, which can result in the destruction of wildlife features such as bird nests, burrows, or mammal dens. In addition, there might be an increased risk of direct mortality to mammals, birds, and amphibians from increased traffic volume and use of heavy equipment, which could result in accidental wildlife-vehicle collisions during construction (e.g., Fahrig and Rytwinski 2009, Bishop and Brogan 2013). Increased human presence could also increase potential for human-wildlife conflicts.

The Project will follow mitigation measures outlined in Table 8-6 and will adhere to provincial and federal timing and setback restrictions for wildlife species (see Appendix C). Project construction is expected to begin in late-August 2020 and be completed by December 2020. Vegetation clearing is scheduled to occur outside of the breeding and rearing period for most wildlife species including the primary nesting period for migratory birds (April 26 through August 15, GOC 2018). Ground nesting birds are particularly vulnerable during construction in open vegetated habitats (e.g., native grassland, tame pasture) throughout the breeding season. If construction activities are required within the primary nesting period, pre-construction nest searches will be completed to limit mortality risk by identifying, avoiding or otherwise

mitigating effects on active nests. Tree-roosting bats can be adversely impacted by vegetation clearing; however, the trees in the shelterbelt within the PDA are not considered likely roosting habitat.

Wildlife species with limited mobility (i.e., amphibians, small mammals, fledgling birds) are at greater risk of direct mortality from vehicles or machinery if individuals are unable to escape construction activities. This risk will be reduced by adhering to provincial setback and timing restriction (i.e., construction outside of the breeding and rearing period) (GOS 2017). If construction occurs outside frozen conditions, the Environmental Monitor will sweep the ROW for amphibians immediately prior to vegetation clearing and/or topsoil stripping to reduce the mortality risk to amphibians, especially northern leopard frogs which may be moving across the landscape to find overwintering habitat. Additionally, exclusionary fencing will be installed around open excavations and/or trenches, particularly around the wetlands where amphibians may occur, to exclude wildlife and reduce the potential for entrapment. Overwintering amphibians and mammals are also at greater risk as they may come into contact with heavy machinery during ground disturbance activities. Construction activities will avoid the open water zone in the Class IV wetlands (i.e., potential northern leopard frog overwintering habitat) that intersect with the PDA to reduce the risk of amphibian mortality.

Implementation of mitigation measures, including waste management will reduce the potential for wildlife to be attracted to the construction site, thus reducing the potential for mortality risk. Vehicles will abide by posted speed limits and multi-passenger vehicles will be used, where practical, to reduce the potential for wildlife-vehicle collisions. Additionally, vehicle and heavy equipment traffic will be restricted to the ROW and construction activities will be limited to daylight hours.

With the implementation of mitigation measures, adverse residual effects on wildlife mortality risk during construction of the natural gas pipeline and meter station are unlikely to occur. If they occur, residual effects on wildlife mortality risk are predicted to be adverse, negligible in magnitude, limited to the Wildlife and Wildlife Habitat LAA, short-term in duration and reversible following post-construction reclamation.

8.5.3 Summary of Residual Project Effects

Residual Project effects on wildlife and wildlife habitat are summarized in Table 8-7.

Table 8-7 Residual Project Effects on Wildlife and Wildlife Habitat

Residual Effect		Residual Effects Characterization						
		Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Change in Habitat								
Pipeline	Construction	A	L	LAA	ST/MT	S	R	L
Meter Station	Construction	A	L	LAA	ST/MT/LT	S	R	U
Change in Mortality Risk								
Pipeline	Construction	A	N	LAA	ST	IR	R	U
Meter Station	Construction	A	N	LAA	ST	IR	R	U

KEY

See Table 5-2 for detailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area
LAA Local Assessment Area
RAA Regional Assessment Area

Duration

ST Short-term
MT Medium-term
LT Long-term

N/A Not applicable

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Likelihood

U Unlikely
P Possible
L Likely

8.6 ASSESSMENT OF CUMULATIVE EFFECTS ON WILDLIFE AND WILDLIFE HABITAT

Past and present Projects and physical activities have influenced the baseline conditions for wildlife and wildlife habitat in the RAA (5 km buffer from the PDA). Road upgrades and the construction and operation of the Keystone XL Project and a meter station connecting to the Foothills system pipeline are projects and physical activities that will occur in the reasonably foreseeable future that will occur in the RAA (5 km buffer from the PDA); no additional cumulative effects on wildlife and wildlife habitat are predicted. The Project will make a negligible contribution to the cumulative effect on wildlife habitat. As such, the contribution of the Project to the existing cumulative effects of wildlife mortality risk is considered negligible at the RAA; therefore, a further qualitative assessment of cumulative effects on wildlife mortality risk is not warranted. The assessment of cumulative effects focuses on the change in wildlife habitat during construction.

Table 8-8 presents project and physical activities inclusion lists, which identify other past, present and reasonably foreseeable future projects and physical activities that have the potential to interact cumulatively with those arising from the Project.

Table 8-8 Interactions with the Potential to Contribute to Cumulative Effects on Wildlife and Wildlife Habitat

Other Projects and Physical Activities with Potential for Cumulative Effects		Potential Effects
		Change in Habitat
Past and Present Projects, Physical Activities and Land Use		
Agriculture	Existing and past agricultural practices including grazing	✓
Infrastructure	Roads and highways	✓
Residential	Rural developments	✓
Linear Development	Existing linear features (e.g., fibre-optic and power lines)	✓
Industrial Activities	Other resource extraction activities (e.g., aggregate development)	✓
Oil and Gas	Herbert-Loomis Pipeline	✓
Oil and Gas	Foothills Pipeline	✓
Future (Reasonably Foreseeable) Projects and Physical Activities		
Oil and Gas	Keystone XL pipeline (proposed)	✓
Oil and Gas	Keystone XL pumping station	✓
Oil and Gas	Foothills Pipeline meter station (proposed)	✓
NOTES: ✓ Other projects and physical activities whose residual effects are likely to interact cumulatively with Project residual effects.		

8.6.1 Change in Habitat

Potential cumulative effects on wildlife habitat availability arising from past, present and reasonably foreseeable future projects and physical activities have the same effect pathways as those resulting from the Project, including the direct loss or alteration of potential wildlife habitat and indirect loss due to sensory disturbance. The assessment of cumulative effects on wildlife habitat includes consideration of cumulative effects on the abundance and distribution of vegetation communities (see Table 7-8).

Existing and past agricultural conversion, residential development, linear development, and industrial activities (e.g., oil and gas development) have collectively had a high magnitude effect and resulted in the loss of the majority of native vegetation communities (i.e., native grassland, broadleaf, shrubland, wetland), which has reduced habitat availability SAR and SOMC, in the RAA. At baseline, approximately 61.4% of the RAA contains cropland and 1.8% developed land (see Table 7-8). The RAA also contains native grassland (27.3%), tame pasture/hayland (5.8%), broadleaf (0.3%), and wetlands (1.9%).

Direct loss of habitat through changes in land cover from natural land cover types to cropland or developed land cover types, and indirect loss through sensory disturbance from physical activities, affect individual species in specific manners depending on their habitat requirements and life-histories. Wildlife SAR and SOMC that have the potential to occur in the RAA are mostly dependent on native grassland, broadleaf, shrubland, tame pasture, and/or wetlands. The predicted change in land cover in the RAA due to future construction projects is less than 5.0 ha of suitable wildlife habitat.

As discussed in 8.5.1, Project residual changes in wildlife habitat due to direct habitat loss (i.e., vegetation clearing, conversion to developed) are predicted to be negligible and are unlikely to interact with future projects and result in cumulative effects. Changes in wildlife habitat due to indirect habitat loss (i.e., sensory disturbance) during Project construction have the potential to interact with future projects and physical activities and result in a cumulative effect.

Construction of the Keystone XL project including the pipeline and pump station and the Foothills meter station are the only foreseeable future project and physical activity identified within the Project RAA (Table 8-8). These activities will result in the direct loss or alteration of wildlife habitat in the RAA, including native grassland (3.6 ha), tame pasture/hayland (0.7 ha), broadleaf/shrubland (0.1 ha), and wetland (0.2 ha) (Table 7-8). Indirect habitat loss may occur during construction as individuals avoid potential habitat near construction due to sensory disturbances (see Section 8.5.2 for pathways). Although it is unknown what specific mitigation measures will be implemented by Keystone XL, it is reasonable to assume that petroleum industry best management practices including provincial and federal timing and setback restrictions will be implemented to reduce the potential for adverse effects on wildlife and wildlife habitat. If construction of the Project occurs concurrently with future projects the increase in sensory disturbance may result in the temporary displacement of wildlife species.

With the application of mitigation measures, the residual cumulative effects of past, present, and reasonably foreseeable future projects and physical activities, including the Project, on wildlife habitat are possible. Residual cumulative effects on wildlife habitat are predicated to be negligible in magnitude, extend to the RAA, will be short-term (i.e., construction) in duration, and are considered reversible. The

Project, once reclamation is complete, will make a negligible contribution to the cumulative loss, direct and indirect, of wildlife habitat at the RAA scale.

Table 8-9 summarizes residual cumulative environmental effects on wildlife and wildlife habitat.

Table 8-9 Residual Cumulative Effects on Wildlife and Wildlife Habitat

Residual Cumulative Effect	Residual Cumulative Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Change in Habitat							
Residual cumulative effect	A	N	RAA	ST	IR	R	P
Contribution from the Project to the residual cumulative effect	The Project will result in the direct loss or alteration of less than 5.0 ha of suitable wildlife habitat. Indirect effects associated with sensory disturbance (i.e., noise) will result in reduced habitat effectiveness but will be limited in spatial scale, short-term (i.e.., construction), and reversible. The contribution of the Project to residual cumulative effects on habitat is expected to be negligible.						

KEY

Refer to Table 5-2 for detailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area
LAA Local Assessment Area
RAA Regional Assessment Area

Duration

ST Short-term
MT Medium-term
LT Long-term

N/A Not applicable

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Likelihood

U Unlikely
P Possible
L Likely

8.7 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

With the application of mitigation measures, residual Project effects and residual cumulative effects on wildlife and wildlife habitat are predicted to be not significant and will not threaten the long-term persistence or viability of SAR or SOMC in the RAA.

Experience with similar projects, and confidence in the effectiveness of mitigation measures in the EPP, which reflect accepted best industry practice indicates high prediction confidence in predicted reclamation success; however, prediction confidence in the wildlife SAR and SOMC data within the LAA is moderate until field surveys have been completed. Once field surveys have been completed (spring/summer 2020), confidence is expected to increase. It is unlikely that wildlife SAR and/or SOMC will be found in agricultural areas and therefore the prediction confidence is high for the PDA.

8.8 MONITORING

The Environmental Monitor(s) or designate(s) will be onsite during construction to monitor activities for compliance with regulatory commitments and mitigation measures, as outlined in the EPP (Appendix A). The Project will follow MIPL's post-construction monitoring program, which monitors compliance with specific reclamation performance expectations and conditions.

9.0 ASSESSMENT OF POTENTIAL EFFECTS ON SURFACE WATER AND GROUNDWATER QUALITY AND QUANTITY

9.1 SCOPE OF ASSESSMENT

This section of the ESA examines potential effects of the Project on surface water and groundwater quality and quantity.

Surface water quality and quantity encompasses water in ponds, lakes, creeks, rivers, wetlands, and other natural or artificial bodies of water. Potential effects on wetlands are assessed in Section 7 – Vegetation and Wetlands. Water quality refers to the physical, chemical, and biological characteristics and conditions of water and aquatic ecosystems. For this assessment, surface water quantity, also termed hydrology, refers to the evaluation of the movement and distribution of water.

The assessment of groundwater quality and quantity includes consideration of hydrogeological features such as aquifer lithology, aquifer yield, springs, and the presence of water wells. Hydrogeological features potentially affected by the Project through construction activities include high-yield shallow aquifers, springs and nearby water wells.

The scope of this assessment has been influenced by:

- provincial and federal regulations and policy guidance (see Section 1.2)
- the nature, scope and extent of the Project and its activities (see Section 2.4), and
- the environmental setting of the Project (see Section 9.2)

9.1.1 Potential Effects, Pathways and Measurable Parameters

Potential effects, effects pathways and measurable parameters for surface water and groundwater quality and quantity are outlined in Table 9-1, below. The effects of an unplanned release of a deleterious substance into a waterbody are assessed in Section 13 – Accidents and Malfunctions.

Table 9-1 Potential Effects, Pathways and Measurable Parameters for Water Quality and Quantity

Potential Effect	Effect Pathways	Measurable Parameter(s) and Units of Measurement
Change in surface water quality or quantity	• Increased sediment concentrations and transport in surface water due to riparian area and in wetland or drainage construction, vegetation clearing, increased erosion on the Project footprint and release of hydrostatic test water • Construction activity on land adjacent to wetlands resulting in changes in natural flow patterns • Trenching could affect flow at drainage crossings • Temporary diversions for hydrostatic testing or release of test water resulting in change in drainage discharge • Introduction of contaminants from spills or leaks	• Surface water quality parameters (e.g., total suspended solids [TSS]) • Natural drainage (flow or volumes)
Change in groundwater quality or quantity	• Disturbance to physical hydraulic properties of soil and parent material above or below the water table • Alteration of shallow groundwater levels or flow rate through dewatering • Initiation of artesian flow to the surface due to breach of a confining layer during excavation	• Increased TSS, total dissolved solids, and turbidity in nearby groundwater well(s) • Groundwater levels or flow within shallow water well or spring in the immediate vicinity of dewatering • Groundwater flowing to the surface

9.2 EXISTING CONDITIONS FOR SURFACE WATER AND GROUNDWATER QUALITY AND QUANTITY

9.2.1 Methods

9.2.1.1 Surface Water

A desktop assessment was conducted using digital imagery to identify waterbodies crossed or potentially affected by the Project. National Topographic System (NTS) topographic maps (Natural Resources Canada [NRC] 2016 and publicly available satellite imagery were used to identify potential waterbodies. Saskatchewan's State of the Watershed Report (Davies and Hanley 2010) was reviewed for surface water quality conditions in the RAA. Historical surface water quantity data were obtained from hydrometric stations operated by the Water Survey of Canada (WSC) and historical precipitation data were obtained from climate stations operated by ECCC.

9.2.1.2 Groundwater

Existing literature and publicly available maps and provincial databases were reviewed to gather baseline data for the hydrogeological resource features in the LAA. This information was used to identify components of the shallow (i.e., 30 m below ground surface [mbgs] or less) regional hydrogeological system located in the general area of the Project. The physical construction activities considered during this ESA are expected to be shallower than 5 mbgs; therefore, the focus of the assessment was on local hydrogeological data within the upper 5 mbgs.

Desktop information was gathered from the Saskatchewan Resource Council (Simpson and Millard 1997) and the SKWSA Well Database for the locations of documented springs and water well records in the LAA, including wells reported as municipal, domestic, and springs (SKWSA 2019). The drilling reports from the SKWSA water well records were reviewed to identify relevant hydrogeological conditions, such as depth to the static water level, local geology, hydrogeology and high yield water wells.

9.2.2 Overview

9.2.2.1 Surface Water

The PDA drains to the Old Wives Lake watershed (WSC sub basin 05JB000), and crosses one watercourse (Table 9-2).

Table 9-2 Watercourse Crossed by the Shaunavon Interconnect Pipeline

Crossing No.	Watercourse Name	UTM (Zone 12, NAD83)		Legal Location
		Easting	Northing	
WX-01	Grassy Creek	688822	5492636	SW 16-07-18 W3M

No long-term water quality monitoring stations are present within the LAA or RAA. Saskatchewan's State of the Watershed Report (Davies and Hanley 2010) was reviewed to assess water quality in the RAA. The Old Wives Lake watershed has a surface water quality rating of healthy (Davies and Hanley 2010).

The closest WSC hydrometric monitoring stations in the watershed are outside of the RAA and are all seasonal. There are three stations southeast of the Project in Huff Lake (stations 11AC063 and 11AC065) and two northwest of the Project in the Eastend Reservoir (station 11AC055) and Canal (station 11C052). In general, the historical data from the stations indicates that peak flows typically occur from mid-May to early July.

The nearest historical climate stations are present at Shaunavon (Climate ID:4027480; ECCC 2019) with data from 1915 to 1979, Shaunavon 2 (Climate ID:4027485; ECCC 2019) with data from 1971 to 2003, Shaunavon 3 (Climate ID:4027486; ECCC 2019) with data from 1971 to 2008, and Shaunavon CDA EPF (Climate ID: 4027482) with data from 1961 to 1964. Monthly total precipitation records from Shaunavon 3

were used to estimate mean, maximum, and minimum monthly total precipitation (ECCC 2019). Peak precipitation typically occurs in June.

The general trend of highest precipitation in June is consistent with peak flows in mid-May to early July, which would account for spring runoff and peak precipitation in June.

9.2.2.2 Groundwater

Surficial geology within the RAA according to SKWSA (2019) water well reports consists of clay, sandy clay, till, and sand within the top 30 mbgs. The Shaunavon Aquifer, an extensive aquifer in southwest Saskatchewan of approximately 2,600 km^2, underlies the RAA (Meneley 1983). The Shaunavon Aquifer is made up of poorly consolidated sandstone with interbedded silt and silty clay beds, and has an overall average saturated level of approximately 50 mbgs (Meneley 1983).

It is expected that the shallow groundwater flow systems, including the water table, reflect local topographic relief with areas of groundwater discharge next to creeks, rivers, and lakes. Deeper groundwater systems reflect the more regional southwest to northeast topographic gradient. Generally, groundwater flow appears to flow toward low areas associated with Grassy Creek.

A search of SKWSA (2019) was conducted to identify shallow water well records in the LAA to assess local geology and water levels. For the purpose of this evaluation, shallow water wells are defined as those with boreholes equal to or less than 30 mbgs in depth, or where the completion depth was unknown. A depth of 30 mbgs was selected, as water wells completed to greater than 30 mbgs are expected have lower potential to be affected by the Project component.

The water well search area considers the accuracy of the well location information, which is often limited because of how location information is recorded. Water well locations can be spatially referenced to the center of the quarter section, with accuracy of approximately ± 400 m, or to the corner of the quarter section, with an accuracy of approximately ± 565 m. Similarly, water well locations can also be spatially referenced to the center of the section with accuracy of approximately ± 800 m, and to the corner of the section, with an accuracy of ± 1,130 m. Additionally:

- more than one water well might exist at a location
- water wells beyond a certain age might not appear in SKWSA Water Well Information Databases
- water wells that are abandoned or capped might still be registered

No shallow water wells were identified within the LAA. Five deeper domestic wells were identified within the LAA; however, these wells ranged from 96.01 mbgs to 134.11 mbgs (SKWSA 2019).

Dewatering is often required in areas where shallow groundwater is present within a shallow high-yield aquifer. Shallow groundwater levels (i.e., within the anticipated depth of construction activities of less than 5 mbgs) were reported in none of the water wells within the LAA. Groundwater levels reported in the water wells within the LAA ranged from 68.58 mbgs to 91.44 mbgs.

9.3 PROJECT INTERACTIONS WITH SURFACE WATER AND GROUNDWATER QUALITY AND QUANTITY

Table 9-3 identifies, for each potential effect, the physical activities that might interact with surface water and groundwater quality and quantity and result in the identified environmental effect. These interactions are indicated by check marks and are discussed in detail in Section 9.4 in the context of effect pathways, standard and Project specific mitigation, and residual effects. A justification is also provided for non-interactions (no check marks).

Table 9-3 Project Interactions with Surface Water and Groundwater Quality and Quantity

Physical Activities	Potential Effects	
	Change in surface water quality	Change in groundwater quality of quantity
Pipeline		
Construction	✓	✓
Operation	-	-
Meter Station		
Construction	✓	✓
Operation	-	-
NOTES: ✓ = Potential interaction – = No interaction		

Upon completion of pipeline construction and reclamation, there will be limited potential for further effects on surface or groundwater as there will be no further physical disturbance. During operation, disturbance will be limited to occasional integrity digs, for which MIPL will submit notifications to the CER following the Operations and Maintenance Guidelines (NEB 2018). Wetlands and watercourses will be avoided where possible. Activities associated with operation of the meter station will be restricted to the graveled Project footprint. Therefore, operation phase effects are not assessed further.

9.4 MITIGATION

Standard industry practices and avoidance measures, along with Project-specific mitigation measures outlined in the EPP (Appendix A) will be implemented during construction to reduce or avoid environmental effects on surface water and groundwater quality and quantity. key mitigation measures are summarized in Table 9-4.

Table 9-4 Mitigation Measures for Surface Water and Groundwater Quality and Quantity

Potential Effect	Effect Pathway	Key Mitigation Measures	Applicable Project Component	
			Pipeline	Meter Station
Change in surface water quality or quantity	• Increased sediment concentrations and transport in surface water due to riparian area and in wetland or drainage construction, vegetation clearing, increased erosion on the Project footprint and release of hydrostatic test water • Construction activity on land adjacent to wetlands resulting in changes in natural flow patterns • Trenching could affect flow at drainage crossings • Temporary diversions for hydrostatic testing or release of test water resulting in change in drainage discharge • Introduction of contaminants from spills or leaks	• All equipment shall arrive on the Project free of leaks and in good working condition. Any equipment which does not arrive free of leaks and in good working condition shall not be allowed on the construction footprint until it has been repaired, re-inspected by the Environmental Monitor(s) or designate(s) and deemed suitable for use.	✓	✓
		• Ensure pumps, generators, light towers, frost fighters, hand-held fuel containers used within 100 m of a water body have secondary containment that can hold 125% of the fuel tank. This applies to secondary containments constructed on site. Where equipment includes double-walled or Enviro tank in the design, the minimum requirement shall be 110% of the fuel tank.	✓	✓
		• All fuel tanks, hazardous materials and chemicals shall be stored within appropriate secondary containment per requirements outlined in the Environmental Management Plan and corporate procedures.	✓	✓
		• Do not allow fuel, oil, or hazardous material storage within 100 m of a waterbody except where secondary containment is provided.	✓	✓
		• Refueling of mobile construction equipment will occur at a minimum of 100 m from any water body unless approved secondary containment is provided. Refueling activities will be monitored at all times, and vehicles will not be left unattended while being refueled. Containers, hoses, and nozzles will be free of leaks. Fuel nozzles will be equipped with functional automatic shut-offs and spill containment and response material will be stored on site	✓	✓
		• Apply herbicides near open bodies of water using manufacturer specifications and in accordance with responsible government agency regulations.	✓	✓
		• Direct grading away from wetlands. Do not place fill material in a wetland during grading.	✓	✓
		• Install erosion and sediment control at all wetlands as directed by the Environmental Monitor(s) or designate(s).	✓	✓
		• If horizontal directional drilling (HDD) or boring is used, excavate entry and exit sites back from the ordinary high watermark and far enough from the wetland to provide for containment of sediments and other deleterious substances above the high watermark. Vegetation removal for the entry and exit sites is only to occur within the approved construction footprint.	✓	✓
		• Ensure that water from dewatering entry and exit sites with a high sediment load is not discharged or allowed to flow into any wetland. Remove the sediment load (e.g., filter or discharge into a vegetated area) before discharge water is allowed to enter any wetland.	✓	✓
		• Leave gaps in windrows, at visible drainages, on sidehill terrain and wherever seepage occurs to reduce interference with natural drainage patterns.	✓	✓
		• If required, hydrostatic test and construction support water may be obtained from nearby lakes, watercourses, or municipal sources in accordance with applicable permits for the withdrawal of water. Water withdrawal from natural watercourse or water bodies will not exceed maximum withdrawal volumes specified by the Water Security Agency permits or authorization letters.	✓	✓
		• Conduct all hydrostatic testing activities in accordance with all applicable federal and provincial regulations and approval conditions, including the handling, containment and disposal of all test and drying mediums used.	✓	✓
		• Hydrostatic test water with methanol or ethylene glycol will be collected in tanks for appropriate disposal or recycled. Contaminants will not be allowed to enter surface water features or groundwater.	✓	✓
		• Ensure water withdrawal is in compliance with site-specific approval conditions.	✓	✓
		• Prior to discharge of hydrostatic test water, ensure that the appropriate testing and treatment measures are implemented in accordance with local regulatory requirements.	✓	✓
		• Re-establish surface drainage patterns; install drainage and erosion control measures and complete the installation of sedimentation control measures as necessary or required at all wetland crossings or encroachments. If water from a surface hydrological feature (lake, dugout, wetland, river, creek) or groundwater source is to be used for hydrostatic testing or other industrial activity, approval from the SKWSA will be required and obtained. Environment & Sustainability is responsible for managing regulatory notification/reporting under hydrostatic testing requirements. A detailed capture or discharge plan will be provided to Environment & Sustainability in advance of the proposed testing date for review and approval.	✓	✓
Change in groundwater quality or quantity	• Disturbance to physical hydraulic properties of soil and parent material above or below the water table • Alteration of shallow groundwater levels or flow rate through dewatering • Initiation of artesian flow to the surface due	• All equipment shall arrive on the Project free of leaks and in good working condition. Any equipment which does not arrive free of leaks and in good working condition shall not be allowed on the construction footprint until it has been repaired, re-inspected by the Environmental Monitor(s) or designate(s) and deemed suitable for use.	• □	• □
		• Ensure pumps, generators, light towers, frost fighters, hand-held fuel containers used within 100 m of a water body have secondary containment that can hold 125% of the fuel tank. This applies to secondary containments constructed on site. Where equipment includes double-walled or Enviro tank in the design, the minimum requirement shall be 110% of the fuel tank.	• □	• □
		• All fuel tanks, hazardous materials and chemicals shall be stored within appropriate secondary containment per requirements outlined in the Environmental Management Plan and corporate procedures.	• □	• □
		• Do not allow fuel, oil, or hazardous material storage within 100 m of a waterbody except where secondary containment is provided.	• □	• □
		• Refueling of mobile construction equipment will occur at a minimum of 100 m from any water body unless approved secondary containment is provided. Refueling activities will be monitored at all times, and vehicles will not be left unattended while being refueled. Containers, hoses, and nozzles will be free of leaks. Fuel nozzles will be equipped with functional automatic shut-offs and spill containment and response material will be stored on site	• □	• □
		• Apply herbicides near open bodies of water using manufacturer specifications and in accordance with responsible government agency regulations.	• □	• □

Table 9-4 Mitigation Measures for Surface Water and Groundwater Quality and Quantity

Potential Effect	Effect Pathway	Key Mitigation Measures	Applicable Project Component	
			Pipeline	Meter Station
	to breach of a confining layer during excavation	• Direct grading away from wetlands. Do not place fill material in a wetland during grading.	• ✓	• ✓
		• Install erosion and sediment control at all wetlands as directed by the Environmental Monitor(s) or designate(s).	• ✓	• ✓
		• If horizontal directional drilling (HDD) or boring is used, excavate entry and exit sites back from the ordinary high watermark and far enough from the wetland to provide for containment of sediments and other deleterious substances above the high watermark. Vegetation removal for the entry and exit sites is only to occur within the approved construction footprint.	• ✓	• ✓
		• Ensure that water from dewatering entry and exit sites with a high sediment load is not discharged or allowed to flow into any wetland. Remove the sediment load (e.g., filter or discharge into a vegetated area) before discharge water is allowed to enter any wetland.	• ✓	• ✓
		• Leave gaps in windrows, at visible drainages, on sidehill terrain and wherever seepage occurs to reduce interference with natural drainage patterns.	• ✓	• ✓
		• If required, hydrostatic test and construction support water may be obtained from nearby lakes, watercourses, or municipal sources in accordance with applicable permits for the withdrawal of water. Water withdrawal from natural watercourse or water bodies will not exceed maximum withdrawal volumes specified by the SKWSA permits or authorization letters.	• ✓	• ✓
		• Conduct all hydrostatic testing activities in accordance with all applicable federal and provincial regulations and approval conditions, including the handling, containment and disposal of all test and drying mediums used.	• ✓	• ✓
		• Hydrostatic test water with methanol or ethylene glycol will be collected in tanks for appropriate disposal or recycled. Contaminants will not be allowed to enter surface water features or groundwater.	• ✓	• ✓
		• Ensure water withdrawal is in compliance with site-specific approval conditions.	• ✓	• ✓
		• Prior to discharge of hydrostatic test water, ensure that the appropriate testing and treatment measures are implemented in accordance with local regulatory requirements.	• ✓	• ✓
		• Re-establish surface drainage patterns; install drainage and erosion control measures and complete the installation of sedimentation control measures as necessary or required at all wetland crossings or encroachments. If water from a surface hydrological feature (lake, dugout, wetland river, creek) or groundwater source is to be used for hydrostatic testing or other industrial activity, approval from the SKWSA will be required and obtained. Environment & Sustainability is responsible for managing regulatory notification/reporting under hydrostatic testing requirements. A detailed capture or discharge plan will be provided to Environment & Sustainability in advance of the proposed testing date for review and approval.	• ✓ •	• ✓

NOTES:
✓ Mitigation measure is applicable to the project component
- Mitigation measure is not applicable to the project component

9.5 ASSESSMENT OF RESIDUAL EFFECTS ON SURFACE WATER AND GROUNDWATER QUALITY AND QUANTITY

9.5.1 Change in Surface Water Quality or Quantity

9.5.1.1 Pipeline

Project construction could affect surface water quality through vegetation removal, soil stripping, grading and excavation where the pipeline is being trenched, and where temporary access watercourse crossings and pipeline watercourse crossings are constructed.

Trenched construction methods and clearing of riparian vegetation for pipeline watercourse crossing construction can increase total suspended solids (TSS), resulting in changes to surface water quality in a watercourse. Clearing of riparian vegetation and surface disturbance at temporary access crossings could lead to run-off that could affect TSS levels in surface water.

Construction at the pipeline crossing at Grassy Creek and any defined drainages will be timed to avoid flowing conditions. If dry or frozen, they will be crossed using trenched methods without flow isolation. The bed and banks of Grassy Creek and profile of defined drainages will be restored as close as practical to their original preconstruction contours following pipeline installation. Bank reclamation measures at Grassy Creek will be installed as part of backfill operations to re-establish riparian vegetation. Post-construction restoration of instream contours and riparian vegetation can reduce the potential for erosion (Reid and Anderson 1999, Polvi et al. 2014).

If the crossing is flowing at the time of construction, the crossing will use an isolated method. Due to the seasonality of flows through Grassy Creek, it is expected that flows will be generally decreasing after July. Isolated crossings produce short duration sediment pulses when installing and removing isolation structures; however, these pulses are typically small and can be mitigated using the measures described above in Table 9-5 and by following industry best practices (CAPP et al. 2005, 2012) and those listed in the Project EPP (Appendix A). Isolations will be completed in a manner that limits the duration of instream work and a water quality monitoring plan will be implemented during construction.

Construction will temporarily disturb surface water quality in wetlands within the footprint (0.5 ha). Construction could affect the water quality of wetlands in the Surface Water LAA indirectly as a result of soil erosion and sediment entering nearby wetlands.

MIPL will conduct temporary water diversions from watercourses or dugouts for construction and hydrostatic testing. Withdrawal of water will be completed following a Temporary Water Rights Licence issued by the SKWSA. If non-treated hydrostatic test water is released, it will be conducted in following the requirements of the Saskatchewan Environmental Code (Chapter C.3.1) pursuant to *The Environmental Management and Protection Act*. This will mitigate potential effects on water quality as a result of hydrostatic test water disposal.

All applicable regulatory permits and approvals, if required, will be obtained before the start of watercourse crossing construction. Mitigation measures related to pipeline crossings are described above (Table 9-4) and the Project component EPP, and activities within water will be carried out following the requirements of an aquatic habitat protection plan.

With the implementation of mitigation measures, residual effects on surface water quality and quantity arising from construction of the natural gas pipeline are likely and are predicted to be adverse, low in magnitude, will extend to the Surface Water LAA, will be short-term to medium-term (for directly affected waterbodies) in duration and will be reversible once construction and reclamation is complete.

9.5.1.2 Meter Station

Construction of the meter station could affect surface water quality through vegetation removal and soil stripping, resulting in increased risk of erosion and sediment transport, which could flow into wetlands within the LAA. Mitigation measures in the EPP (Appendix A) related to erosion and sediment control, will be implemented to address surface water run-off during construction. Application of appropriate mitigation and reclamation measures will reduce the potential for surface water run-off to affect water quality in wetlands or drainages in the LAA.

Surface water quantity in wetlands in the LAA might be altered if surface flow across the PDA is altered by construction. The EPP has standard mitigation related to maintaining surface water quantity (i.e., flow) on and across the PDA during construction. Reclamation will re-establish drainage patterns in the PDA to conditions similar to existing conditions. Application of appropriate construction mitigation and reclamation measures will limit the potential for surface water flows to be altered in wetlands in the LAA.

With the implementation of mitigation measures, residual effects on surface water quality and quantity arising from construction of the meter station are likely and are predicted to be adverse, negligible in magnitude, will extend to the Surface Water LAA, will be short-term in duration and will be reversible following final abandonment.

9.5.2 Change in Groundwater Quality and Quantity

9.5.2.1 Pipeline

The Project component could interact with groundwater quality or quantity because a change in water level or groundwater quality related to shallow excavation during Project component construction activities could arise.

Given the reported primarily fine-grained lithology and relatively deep associated groundwater levels (>50 mbgs) in the SKWSA (2019) drilling reports, it is unlikely that moderate-yield aquifers may be present within the upper 5 mbgs, where Project component activities are anticipated to occur. It should be noted that aquifer yields were not available for hydrogeological information reviewed.

If they occur, changes to groundwater quality or quantity will be localized to the area immediately around the excavation dewatering. If any changes occur during excavation dewatering, local groundwater levels are expected to re-equilibrate with regional water levels following completion of the dewatering activities and tie-ins. Thus, if they occur, Project component-related changes in groundwater levels are expected to be short-term and reversible.

Following the mitigation measures contained and associated contingency measures, residual effects on groundwater quality and quantity arising from construction of the natural gas pipeline are unlikely to occur. If they occur, residual effects may extend to the Groundwater LAA, will be low in magnitude, short-term in duration and reversible following completion of construction activities.

9.5.2.2 Meter Station

The Project component is not anticipated to interact with groundwater quality or quantity as coarse-grained soils were not identified within the anticipated construction depth, and shallow water wells were not identified within the LAA. Further, limited excavation is required to tie-in the meter station with the pipeline, limiting the potential for disturbance to groundwater.

If any changes occur during construction, local groundwater levels are expected to re-equilibrate with regional water levels following completion of meter station construction. Thus, if changes occur, Project component-related changes in groundwater levels are expected to be short-term and reversible.

Following the mitigation measures and associated contingency measures, residual effects on groundwater quality and quantity arising from construction of the meter station are unlikely to occur. If they occur, residual effects may extend to the Groundwater LAA, will be low in magnitude, short-term in duration and reversible following completion of construction activities.

9.5.3 Summary of Residual Project Effects

Residual Project effects on surface water and groundwater quality and quantity are summarized in Table 9-5.

Table 9-5 Residual Project Effects on Surface Water and Groundwater Quality and Quantity

Residual Effect		Residual Effects Characterization						
		Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Change in Surface Water Quality or Quantity								
Pipeline	Construction	A	L	LAA	ST/MT	S	R	L
Meter Station	Construction	A	L	PDA	LT	S	R	L
Change in Groundwater Quality or Quantity								
Pipeline	Construction	A	L	LAA	ST	S	R	U
Meter Station	Construction	A	L	LAA	ST	S	R	U

KEY

See **Error! Reference source not found.** for d etailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area
LAA Local Assessment Area
RAA Regional Assessment Area

Duration

ST Short-term
MT Medium-term
LT Long-term
N/A Not applicable

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Likelihood

U Unlikely
P Possible
L Likely

9.6 ASSESSMENT OF CUMULATIVE EFFECTS ON SURFACE WATER AND GROUNDWATER QUALITY AND QUANTITY

Past and present Projects and physical activities have influenced the baseline conditions for surface water and groundwater quality and quantity in the RAA. The Project will make a negligible contribution to the existing cumulative effect on surface water and groundwater quality and quantity within the RAA.

Road upgrades and the construction and operation of the Keystone XL Project and a meter station connecting to the Foothills system pipeline are projects and physical activities that will occur in the reasonably foreseeable future that will occur in the RAA. Although construction of the Project and these foreseeable future Projects may overlap temporally, it is unlikely that the effects will overlap spatially. Specifically, the proposed Keystone XL pipeline will also cross Grassy Creek; however, it is reasonable to assume that the Keystone XL Project will implement mitigation measures to reduce potential direct and indirect effects on surface water. Effects to groundwater are unlikely to occur due to deep groundwater levels found within the Groundwater LAA (i.e., >5 mbgs). With the implementation of mitigation measures, including adherence to federal and provincial permitting and codes of practice, residual cumulative effects on surface water and groundwater are unlikely to occur. If they occur, residual cumulative effects are predicted to be negligible in magnitude, short-term in duration, and are considered reversible at the RAA scale. As a result, a further quantitative assessment of cumulative effects on surface water and ground water is not warranted.

9.7 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

With the implementation of mitigation measures, residual Project effects and residual cumulative effects on surface water and groundwater quality and quantity are predicted to be not significant.

Prediction confidence is high based on experience with similar projects and confidence in the effectiveness of mitigation measures in the EPP, which reflect accepted industry best practices (CAPP et al. 2005, 2012).

9.8 MONITORING

During construction, monitoring and inspection will be accomplished through MIPL's environmental inspection program. The Environmental Monitor(s) or designate(s) will be onsite during construction to monitor activities for compliance with regulatory commitments and mitigation measures, as outlined in the EPP (see Appendix A).

10.0 GREENHOUSE GAS EMISSIONS

10.1 SCOPE OF ASSESSMENT

GHG emissions was selected as a VC because the Project has the potential affect the atmospheric environment. GHGs include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHGs are expected to be released from multiple sources during Project construction and operation and will remain in the atmosphere.

The scope of this assessment has been influenced by:

- provincial and federal regulations and policy guidance (see Section 1.1 and 10.1.1)
- the nature, scope and extent of the Project and its activities (see Section 2), and
- the existing conditions for GHGs of the Project (see Section 10.2)

10.1.1 Regulatory and Policy Setting

Effects on the atmospheric environment are subject to regulatory requirements under the CER Act. For all filing requirements related to GHG emissions, see Table A-2 in the NEB Filing Manual, 2017-01 (NEB 2017). The Interim Filing Guidance and Early Engagement Guide (NEB 2019) provides additional considerations regarding the assessment of GHG emissions.

The Interim Filing Guidance and Early Engagement Guide (NEB 2019) requires that assessments consider the following sources of GHG emissions as appropriate:

- Direct GHG emissions for construction and operations, including:
  - point and area sources such as combustion, flaring, incineration, venting, and fugitive emissions, and
  - non-negligible sources, for example, emissions from change in land use and burning of vegetation during land clearing
- Third-party (indirect) GHG emissions arising from electrical or energy requirements to operate a project, and
- Upstream GHG emissions

The Interim Filing Guidance and Early Engagement Guide (NEB 2019) also requires that direct emissions be presented as percentage of total sector-based emissions and as a percentage of provincial and national reported GHG emissions. Further, a discussion of how the Project may hinder or contribute to Canada's efforts to reduce GHG emissions is required.

Canada and other countries agreed to limit global average temperature rise to less than 2°C as part of the Paris Agreement. In anticipation of the Paris Climate Conference, each country publicly outlined the climate actions it intended to take; these actions are known as their Intended Nationally Determined Contribution (INDC). Canada's INDC included a 2030 target of 30% below the 2005 GHG emission levels (UNFCCC 2015). To meet this target, Canada has established the Pan-Canadian Framework on Clean Growth and Climate Change (GOC 2016). As part of the Pan Canadian Framework, ECCC has released Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector) (ECCC 2020) which require the management of methane emissions from the operation of natural gas pipeline systems.

The federal government, through ECCC, requires annual reporting of GHG emissions from facilities that release 10,000 tonnes (10 kt) carbon dioxide equivalent (CO_2e) or more per year from stationary combustion, industrial processes, venting, flaring, fugitives, onsite transportation, waste, and wastewater sources.

The federal carbon pollution pricing system applies to Saskatchewan under the federal GHG Pollution Pricing Act. This act applies to natural gas transmission pipelines sector whose emissions are 50,000 tonnes CO_2e or more on an annual basis in order to reduce annual emissions to meet provincially established targets.

10.1.2 Potential Effects, Pathways and Measurable Parameters

Potential effects, effect pathways, and the measurable parameters used to characterize and assess effects on the atmospheric environment are provided in Table 10-1.

Table 10-1 Potential Effects, Pathways and Measurable Parameters for the Atmospheric Environment

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Release of GHG emissions	• Equipment and vehicles burning hydrocarbon fuel during construction of the pipeline and meter station • Change in land cover, including decay of cleared vegetation during construction of the pipeline and meter station • Release of GHG emissions from flaring of pipeline gas during pipeline tie-in • Release of third-party (indirect) GHG emissions due to electricity consumption during Project construction and meter station operation • Venting emission from hydrocarbon-fueled pneumatics devices during operation • Fugitive component leaks during operation • Release of upstream GHG emissions	• Emissions of GHGs (CO_2, CH_4, and N_2O). Units of Measure: kilotonnes of CO_2 equivalent per year (kt CO_2e).

10.1.3 Spatial Boundaries

No local or regional spatial boundaries are used for the assessment of GHGs, as the environmental effect associated with GHG emissions is a global phenomenon. This is based on GHGs mixing in the atmosphere and dispersing from their emission sources (IPCC 2013).

However, as a reference point, this assessment will consider the volume of the release of GHGs during Project construction relative to provincial and federal GHG inventories. Administrative provincial and federal boundaries are hence selected to create a context for the Project's GHG emissions. It is noted though, that the emissions disperse beyond these administrative boundaries

10.1.4 Residual Effects Description Criteria

The release of GHGs to the atmosphere from a Project poses a challenge to the Government of Canada's reduction targets and international obligations in respect of GHGs and climate change. Rather than characterizing residual effects arising from Project-related GHG emissions in terms of likelihood, direction, magnitude, frequency, duration and reversibility, the focus of the GHG assessment in this ESA is to quantify the direct emissions arising from the Project and compare them to provincial, national and sector-based emission totals, and to the Government of Canada's GHG reduction targets. This adheres to the guidance for GHG assessments outlined in the Interim Filing Guidance (NEB 2019).

10.1.5 Significance Definition

As identified in guidance provided in the CEA Agency's Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (CEA Agency 2003), "the contribution of an individual project to climate change cannot be measured". The NEB Filing Manual, 2017-01 (NEB 2017), confirms the applicability of the CEA Agency guidance. As the effect on climate change from the contribution of a single project cannot be accurately measured or attributed, it is not reasonable to conclude a significant adverse residual effect on atmospheric GHG concentrations or climate change from a single project's GHG emissions. Instead, evaluation of residual Project effects focuses on estimation of GHG releases, mitigation and evaluation of Project GHG releases in relation to provincial, national and Canadian sector (i.e., ECCC – Oil and Natural Gas Transmission) GHG totals and the Government of Canada's GHG reduction targets.

10.2 EXISTING CONDITIONS FOR GREENHOUSE GAS EMISSIONS

The provincial, national, and Canadian sector GHG emissions from all reportable activities in Saskatchewan and Canada for 2017 are provided in Table 10-2. Table 10-2 also provides the Government of Canada's 2030 GHG Reduction Target. Canadian GHG emissions were estimated to be 716,000 kt CO_2e in 2017. Saskatchewan's contribution to national GHG emissions is approximately 11%.

Table 10-2 Canada, Saskatchewan and Sector GHG Emissions and Government of Canada GHG Reduction Target

Region	GHG Emissions (kt CO_2e)
Canada [a]	716,000
Saskatchewan	77,900
Canadian Sector [a,b] (ECCC – Oil and Natural Gas Transmission)	10,000
Government of Canada 2030 GHG Reduction Target	513,000

NOTES:

[a] 2017 Canada, Saskatchewan and Canadian sector GHG emission totals were used for comparison. These represent the most recent data available (ECCC 2019b).

[b] Sector totals from the National Inventory Report (NIR; ECCC 2019b) summarize reported data for the 2017 operating year. In 2017, the ECCC reporting threshold for industry was set at 50,000 t CO_2e/ year. If a single facility's annual emissions were below this threshold, reporting to ECCC would not be required. Further, for linear facility operations (i.e., those commonly included in the Oil & Gas Transmission Subsector), compressor stations are sometimes aggregated into other general Oil & Gas Sector reports. Considering these elements of the 2017 subsector total, it is likely that the subsector emission total of 10,000 kt CO_2e is understated. In future years, it is likely that data will better reflect the Oil & Gas Transmission Subsector, as the ECCC reporting threshold was reduced to 10,000 t CO_2e/ year (capturing more facilities) and operators are now required to identify if a facility is a compressor station in annual reports. These ECCC initiatives will likely allocate more of the Oil & Gas Sector totals to the Transmission Subsector total.

10.3 PROJECT INTERACTIONS WITH GREENHOUSE GAS EMISSIONS

Table 10-3 identifies the physical activities that might release GHG emissions. These interactions are indicated by check marks and are discussed in detail in Section 10.5 in the context of effect pathways, standard and Project-specific mitigation, and residual effects.

Table 10-3 Project Interactions with the Greenhouse Gas Emissions

	Potential Effects
Physical Activities	**Release of GHG emissions**
Construction	✓
Operation	✓

NOTES:
✓ Potential interaction

10.4 MITIGATION

Standard industry practices and avoidance measures, along with Project-specific mitigation measures outlined in the EPP (Appendix A) will be implemented to reduce to reduce GHG emissions. Key mitigation measures are summarized in Table 10-4.

Table 10-4 Key Mitigation Measures for the Greenhouse Gas Emissions

Potential Effect	Effect Pathway	Mitigation Measures
Release of GHG emissions	• Equipment and vehicles burning hydrocarbon fuel during construction of the pipeline and meter station • Change in land cover, including decay of cleared vegetation during construction of the pipeline and meter station	• Company and construction personnel will avoid excessive idling of equipment, where practical to reduce fuel consumption. • Vehicles or equipment are to be turned off when not in use unless required for effective operation of the vehicle or equipment and to reduce fuel consumption. • Combustion equipment will be operated at optimal settings to reduce fuel consumption. • The Contractor will ensure equipment is well-maintained. • Ensure more efficient equipment are used where practical to reduce fuel consumption. • Where practical and applicable, use multi-passenger vehicles for the transport of crews to and from job sites.
	• Flaring of pipeline gas during pipeline tie-in	• Drawdown some gas using Rush Lake Compressor station and then flare the reminder of the gas.
	• Venting emission from hydrocarbon-fueled pneumatics devices during operation • Fugitive component leaks during operation	• Venting activities will adhere to the *Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector) (ECCC 2020).* • Implement the fugitive leak detection and repair program during operation to identify and reduce the fugitive emissions.
	• Release of third-party (indirect) GHG emissions due to electricity consumption during Project construction and meter station operation	N/A
	• Release of upstream GHG emissions	N/A

10.5 ASSESSMENT OF RESIDUAL EFFECTS ON GREENHOUSE GAS EMISSIONS

10.5.1 Methods

10.5.1.1 Direct Emissions

Direct GHG emissions that will be released as a result of construction and operation of the pipeline and meter station have been calculated. During construction, the GHG emissions will be released as a result of construction vehicle and equipment use as well as flaring of pipeline gas during pipeline tie-in. During operation, the GHG emissions will be released from venting and fugitive emissions. The pipeline ROW and meter station site will be cleared, so emissions will arise as a result of change in land use.

A breakdown of the construction and operation activities included in the Project emission inventory, and the calculation methods used to calculate direct emissions estimates are presented in Table 10-5.

Total GHG emissions are normally reported as CO_2e, whereby emissions of each of the specific GHGs are multiplied by their global warming potential (GWP) factors from the Environment and Climate Change Canada (ECCC) website (ECCC 2019a) and are reported as CO_2e. A larger GWP value means the gas absorbs a larger amount of energy over a given time period (United States Environmental Protection Agency 2015). The 100-year GWP for the assessed GHGs are CO_2 = 1.0, CH_4 = 25, and N_2O = 298.

Table 10-5 Calculation Methods for GHG Emission Estimates

Project Activities	Emissions Calculation Method
Direct Emissions - Construction	
Off-road construction equipment	Emissions were quantified using the ECCC national inventory emission factors (ECCC 2019b) in conjunction with a list of representative off-road construction equipment and their operating hours.
On-road construction equipment	Emissions were quantified using the ECCC national inventory emission factors (ECCC 2019b) in conjunction with a list of representative on-road construction equipment and their operating hours.
Land clearing, including decay of cleared vegetation	Emission factors from the Manitoba 2017 National Inventory Report (NRCan 2017) for Subhumid Prairies were used to represent the uproot and decay emissions from the estimated area of land clearing for pipeline and meter station. The emission factors for Subhumid Prairies were assumed to be appropriate for the Project location in Saskatchewan in the absence of equivalent information for Saskatchewan. The land clearing emission factor represents the GHG emissions (in the form of CO_2e/ha) that will be emitted when clearing the lands. The emission calculation assumes no harvest of merchantable timber. As per the Tier 1 approach from the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National GHG Inventories for Agriculture, Forestry and Other Land Use (IPCC 2006), the post-disturbance decay emissions are conservatively assumed to be released within one year of the disturbance.
Flaring of pipeline gas during pipeline tie-in	Emissions were quantified based on the WCI guidance (WCI 2011) using the flared gas volume and their respective gas composition.
Direct Emissions - Operation	
Venting Sources	Emissions were quantified using the WCI guidance (WCI 2011, WCI 2013) and the leak rate from Carbon Competitiveness Incentive Regulation (CCIR) quantification methodology document (ACCO, 2019) and Canadian Energy Partnership for Environmental Innovation (CEPEI) Methodology Manual (Clearstone 2018).
Fugitive Sources	Emissions were quantified using the WCI guidance (WCI 2011, WCI 2013) and average component counts based on CEPEI Methodology Manual (Clearstone 2018).

10.5.1.2 Third Party (Indirect) Emissions

The third-party (indirect) GHG emissions from the electricity consumption of the Project during construction and operation were quantified using the ECCC national inventory emission factors (ECCC 2019b).

10.5.1.3 Upstream Emissions

The upstream emissions associated to the Project were calculated based on the emission factor from the Alberta Carbon Offset Emission Factors Handbook (AEP 2020) and the ECCC emission factor from the Towerbirch Expansion Project (ECCC 2017).

10.5.2 Release of Greenhouse Gas Emissions

GHG emission sources include combustion of fossil fuel in vehicles and equipment used in pipeline and meter station construction. GHG emissions due to a change in land cover along the pipeline ROW and at the meter station site are also included. Some additional GHG emissions arise from venting and fugitive emissions, and from third-party (indirect) emissions. These emissions are anticipated to be minimal but are included for completeness.

10.5.2.1 Direct GHG Emissions – Construction

GHG emission sources include combustion of fossil fuel in vehicles and equipment used in pipeline and meter station construction and those arising from a change in land use, including emissions from decay of cleared vegetation and flaring of pipeline gas during pipeline tie-in. The estimated direct GHG emissions from Project construction are 2.11 kt CO2e (Table 10-6). Land clearing and decay represents approximately 76% of the direct construction GHG emissions.

Using the 2017 Canada, Saskatchewan and Canadian sector (ECCC - Oil and Natural Gas Transmission) GHG emission totals as a baseline[2], Project construction will contribute 0.00030% to the Canada GHG emission total, 0.0027% to the Saskatchewan GHG emission total and 0.021% to the Canadian sector emission total (Table 10-7). As shown in Table 10-7, Project construction will contribute 0.00041% to the Government of Canada 2030 GHG emission reduction target.

Table 10-6 Estimated Direct Project Greenhouse Gas Emissions - Construction

Source	Emission Rate (kt)			
	CO_2	**CH_4**	**N_2O**	**Total CO_2e [a]**
On-road and off-road construction equipment [b]	0.236	0.00000718	0.0000187	0.242
Land clearing and decay	—	—	—	1.60
Pipeline tie-in flaring [c]	0.226	0.00155	0.000000438	0.265
Total Construction Emissions	**0.463**	**0.00156**	**0.0000191**	**2.11**

NOTES:

[a] Values for CO_2e may not exactly match the breakdown to CO_2, CH_4 and N_2O, as values are rounded for presentation in this summary table.

[b] Based on ECCC emission factors provided in Table A6-13 of the National Inventory Report (ECCC 2019b). Emission factors depend on vehicle type and emission control technology.

[c] About 75,000 m^3 of gas is drawdown using Rush Lake Compressor Station and the remaining 120,000 m^3 of gas in pipeline is flared. CO_2 and CH_4 emissions are calculated — No emission factor is available.

[2] The 2017 Canada, Saskatchewan and Canadian sector GHG emissions data represent the most recent data available (ECCC 2019b).

Table 10-7 Comparison of Estimated Direct Project Construction Emissions to Canada, Saskatchewan and Canadian Sector GHG Emissions Totals and to the Federal GHG Emissions Reduction Target

Canada [a]		Saskatchewan [a]		Canadian Sector [a,b] (ECCC – Oil and Natural Gas Transmission)		Government of Canada 2030 GHG Reduction Target	
CO_2e (kt/y)	Project Contribution (%)	CO_2e (kt/y)	Project Contribution (%)	CO_2e (kt/y)	Project Contribution (%)	CO_2e (kt/y)	Project Contribution (%)
716,000	0.00030%	77,900	0.0027%	10,000	0.021%	513,000	0.00041

NOTES:

[a] 2017 Canada, Saskatchewan and Canadian sector GHG emission totals were used for comparison. These represent the most recent data available (ECCC 2019b).

[b] Sector totals from the National Inventory Report (NIR; ECCC 2019b) summarize reported data for the 2017 operating year. In 2017, the ECCC reporting threshold for industry was set at 50,000 t CO_2e/ year. If a single facility's annual emissions were below this threshold, reporting to ECCC would not be required. Further, for linear facility operations (i.e., those commonly included in the Oil & Gas Transmission Subsector), compressor stations are sometimes aggregated into other general Oil & Gas Sector reports. Considering these elements of the 2017 subsector total, it is likely that the subsector emission total of 10,000 kt CO_2e is understated. In future years, it is likely that data will better reflect the Oil & Gas Transmission Subsector, as the ECCC reporting threshold was reduced to 10,000 t CO_2e/ year (capturing more facilities) and operators are now required to identify if a facility is a compressor station in annual reports. These ECCC initiatives will likely allocate more of the Oil & Gas Sector totals to the Transmission Subsector total.

10.5.2.2 Direct GHG Emissions - Operation

The GHG emissions from venting and fugitive leaks categories during operation of pipeline and meter station are estimated to be 0.117 kt CO2e (Table 10-8).

Using the 2017 Canada, Saskatchewan, and Canadian sector (ECCC - Oil and Natural Gas Transmission) GHG emission totals as a baseline[3], Project operation will contribute 0.000016% to the Canada GHG emission total, 0.00015% to the Saskatchewan GHG emission total and 0.0012% to the Canadian sector emission total (Table 10-9). As shown in Table 10-9, Project operation will contribute 0.000023% to the Government of Canada 2030 GHG emission reduction target.

[3] The 2017 Canada, Saskatchewan and Canadian sector GHG emissions data represent the most recent data available (ECCC 2019b).

Table 10-8 Estimated Direct Project Greenhouse Gas Emissions - Operation

Source	Emission Rate (kt)			
	CO_2	CH_4	N_2O	Total CO_2e [a]
Venting Emissions	0.0000832	0.00368	0	0.0921
Fugitive Leaks Emissions	0.0000226	0.00102	0	0.0249
Total Operation Emissions	**0.000106**	**0.00470**	**0**	**0.117**

NOTES:

[a] Values for CO_2e may not exactly match the breakdown to CO_2, CH_4 and N_2O, as values are rounded for presentation in this summary table.

Table 10-9 Comparison of Estimated Direct Project Operations Emissions to Canada, Saskatchewan and Canadian Sector GHG Emissions Totals and to the Federal GHG Emissions Reduction Target

Canada [a]		Saskatchewan [a]		Canadian Sector [a,b] (ECCC – Oil and Natural Gas Transmission)		Government of Canada 2030 GHG Reduction Target	
CO_2e (kt/y)	Project Contribution (%)	CO_2e (kt/y)	Project Contribution (%)	CO_2e (kt/y)	Project Contribution (%)	CO_2e (kt/y)	Project Contribution (%)
716,000	0.000016%	77,900	0.00015%	10,000	0.0012%	513,000	0.000023%

NOTES:

[a] 2017 Canada, Saskatchewan and Canadian sector GHG emission totals were used for comparison. These represent the most recent data available (ECCC 2019b).

[b] Sector totals from the National Inventory Report (NIR; ECCC 2019b) summarize reported data for the 2017 operating year. In 2017, the ECCC reporting threshold for industry was set at 50,000 t CO_2e/ year. If a single facility's annual emissions were below this threshold, reporting to ECCC would not be required. Further, for linear facility operations (i.e., those commonly included in the Oil & Gas Transmission Subsector), compressor stations are sometimes aggregated into other general Oil & Gas Sector reports. Considering these elements of the 2017 subsector total, it is likely that the subsector emission total of 10,000 kt CO_2e is understated. In future years, it is likely that data will better reflect the Oil & Gas Transmission Subsector, as the ECCC reporting threshold was reduced to 10,000 t CO_2e/ year (capturing more facilities) and operators are now required to identify if a facility is a compressor station in annual reports. These ECCC initiatives will likely allocate more of the Oil & Gas Sector totals to the Transmission Subsector total.

10.5.2.3 Third-Party (Indirect) Emissions – Construction and Operation

The estimated third-party GHG emissions from electricity consumption during construction and operation are 0.0000142 kt CO_2e and 0.0622 kt CO_2e per year (Table 10-10).

Table 10-10 Estimated Indirect Project Greenhouse Gas Emissions - Construction and Operation

Period	Annual Electricity Consumption (kWh)	Electricity Consumption Emission Factor (g CO_2e/kWh) [a]	Indirect Emissions (kt CO_2e/y)
Construction	20	710	0.0000142 [b]
Operation	87,600	710	0.0622

NOTE
[a] Electricity Consumption Emission Factor from ECCC 2019b.
[b] Emissions from the Meter Station construction period.

10.5.2.4 Upstream GHG Emissions

The Project will result in transportation of additional natural gas (i.e., 1,800 e^3m^3/day) from the Alberta supply to the existing MIPL Loomis-Herbert Pipeline, to accommodate increasing residential, commercial and industrial demand for natural gas in Saskatchewan. Specifically, the Project will create a new natural gas connection between the Foothills system pipeline and the existing MIPL Loomis-Herbert pipeline. The Project will not be sourcing gas supply from a specific location or play, but rather will provide transportation access to the customers. The incremental increase in throughput may not be directly related to increased upstream development. However, a conservative approach was taken in estimating upstream emissions associated with the Project whereby the incremental increase in throughput for the Project was directly attributed to an increase in upstream development.

Using this conservative approach, annual upstream GHG emissions were estimated and were found to be less than 500 kt CO_2e per year. Calculations were based on emission factors from the Alberta Carbon Offset Emission Factors Handbook (AEP 2020) and the ECCC emission factor from the Towerbirch Expansion Project (ECCC 2017). As the annual upstream emissions are estimated to be below 500 kt CO_2e per year, and in accordance with the Interim Guidance (NEB 2019), no further assessment of upstream GHG emissions is required.

10.5.3 Summary of Greenhouse Gas Emissions

Following the implementation of mitigation measures, direct Project contributions to GHG emissions arising from the construction and operation phases are estimated to be:

- 0.00030% (construction) and 000016% (operation) of the Canada GHG emissions total,
- 0.0027% (construction) and 0.00015% (operation) of the Saskatchewan GHG emission total.
- 0.021% (construction) and 0.0012% (operation) of the Canadian sector emission total.

Annual estimated upstream emissions are estimated to be less than 500 kt CO_2e per year. As the annual upstream emissions are estimated to be below 500 kt CO_2e per year, and in accordance with the Interim Filing Guidance (NEB 2019), no further assessment of upstream GHG emissions is required.

With the implementation of mitigation measures, residual effects on GHG emissions during construction and operation of the Project are likely to occur, and are predicted to be adverse in direction, low in magnitude, long-term in duration, global in extent, continuous, and will be irreversible.

10.6 THE PROJECT AND CANADA'S EFFORTS TO REDUCE GREENHOUSE GAS EMISSIONS

The Project will release GHG emissions during the construction and operation phase. These emissions will be accounted for in annual provincial and federal GHG totals. The GHGs released annually by the Project during operation comprise 0.000023% of the Government of Canada's emission reduction target (Table 10-9). As a result, the Project will not contribute to or notably hinder the Government of Canada's efforts to reduce GHG emissions.

10.7 CLIMATE RESILIENCE

The Project is not situated in a particularly vulnerable location (i.e., does not require a winter road, is not in a permafrost region). In those locations where flooding may be a risk such as a river valley, the pipeline is buried which helps to protect the Project from many of the risks associated with flooding. In addition, where the Project crosses watercourses, the pipeline is designed and installed with a greater depth of cover to mitigate the effects of potential scour and erosion. Owing to planned mitigation measures, Project design, and the small size and nature of the project (i.e., an addition to an existing facility), no additional consideration of the Project's climate resilience is required.

10.8 ASSESSMENT OF CUMULATIVE EFFECTS ON GREENHOUSE GAS EMISSIONS

Cumulative effects associated with the releases of GHGs are a global issue and are not limited to provincial or national borders. GHG sources, sinks, and reservoirs around the world contribute to the cumulative effect. The Intergovernmental Panel on Climate Change (IPCC) forecasts global GHG emissions in various scenarios and determines the impacts of the forecasts. The assessment of cumulative effects is beyond the scope of this Project.

10.9 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

Because the effect on climate change from the contribution of a single project cannot be accurately measured or attributed, it is not reasonable to determine the significance of residual effects on atmospheric GHG concentrations or climate change from a single project's GHG emissions. Instead, evaluation of Project residual effects focuses on estimation of GHG releases, mitigation, and evaluation of Project GHG releases in relation to provincial, national and sector based GHG totals and the Government of Canada's GHG reduction targets.

Prediction confidence of direct and third-party (indirect) GHG emissions is high because estimates are based on published emission factors and manufacturer provided emissions data, and the estimates are considered sufficiently accurate to evaluate and compare the GHG emissions from the Project relative to provincial, national and sector totals and to the Government of Canada's GHG reduction targets.

10.10 MONITORING

During construction, monitoring and inspection will be accomplished through MIPL's environmental inspection program. The Environmental Monitor(s) or designate(s) will be onsite during construction to monitor activities for compliance with regulatory commitments and mitigation measures, as outlined in the EPP (see Appendix A).

11.0 ASSESSMENT OF POTENTIAL EFFECTS ON HUMAN OCCUPANCY AND RESOURCE USE

11.1 SCOPE OF ASSESSMENT

Human occupancy and resource use was selected as a VC because the Project might change existing land use patterns. Potential Project effects on agriculture were the focus of the assessment.

The scope of this assessment has been influenced by:

- provincial and federal regulations and policy guidance (see Section 1.1)
- the nature, scope and extent of the Project and its activities (see Section 2)
- input received through the engagement program (see Section 3.0), and
- the environmental setting of the Project (see Section 11.2)

11.1.1 Potential Effects, Pathways and Measurable Parameters

Potential effects, effects pathways, and the measurable parameters used to characterize and assess effects on human occupancy and resource use are provided in Table 11-1.

Table 11-1 Potential Effects, Pathways and Measurable Parameters for Human Occupancy and Resource Use

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in land use	• Access restrictions or prevention of seasonal farming operations • Sensory disturbance (e.g., noise, dust, air emissions)	• Number and duration of access restrictions • Area (ha) of agricultural land affected • Number of industrial developments affected

11.2 EXISTING CONDITIONS FOR HUMAN OCCUPANCY AND RESOURCE USE

11.2.1 Methods

Desktop data review comprised of examination and review of existing publicly available data and information from the following sources:

- Existing literature, such as government publications, land use surveys, regional studies, resource management plans and land use plans.
- Government databases (e.g., the Fish, Wildlife and Lands Branch of SK MOE)
- Websites for government and non-government agencies and organizations (e.g., Government of Saskatchewan)
- Database analyses for current land use from publicly available data sources including: HABISask (GOS 2017), Saskatchewan Hunters' and Trappers' Guide (GOS 2018c), Saskatchewan Anglers' Guide (GOS 2019c), Agriculture and Agri-Food Canada (AAFC) and Government of Canada (national road network)

11.2.2 Overview

The PDA of the Project covers approximately 8.7 ha and is located on private land with the exception of a government road allowance crossing that makes up less than 1% of the PDA, as shown in Figure 1-1. Anthropogenic land cover is the largest land class cover in the PDA (8.2 ha or 94.1%) and in the LAA (680.0 ha or 83.8%). Agriculture covers 8.2 ha (94.0%) of the PDA and 663.41 ha (81.8%) of the LAA. Urban/developed land cover (roads and rural dwellings) comprise a small amount of the anthropogenic land cover in the PDA (<0.1 ha or 0.2%) and LAA (16.6 ha or 2.1%**Error! Reference source not found.**).

The closest community to the Project is Shaunavon, Saskatchewan, located approximately 8.5 km north of the Project at its closet point. The Project is located in the RM of Grassy Creek No. 78, which does not have zoning bylaws related to pipeline development.

The Project is located within privately-owned land with no third-party access, therefore potential effects to hunting and trapping are not anticipated.

11.2.2.1 Agriculture

Land uses in the region include agriculture, oil and gas developments, and rural residential developments. Agriculture is the primary ongoing land use in the Project area. A review of available land cover data indicates that approximately 8.2 ha or 94.1% of the PDA is agriculture (AAFC 2018), including pasture and cropland (Table 7-3).

During the assessment, introduction or spread of noxious weeds or invasive species through vehicle and equipment movement was considered as a potential effect to land use. See Section 7.2.2.2.2 for discussion of weed management.

11.2.2.2 Oil and Gas and Other Industrial Activities

Other oil and gas and industrial uses in the PDA include the existing MIPL Herbert-Loomis pipeline and ROW. Power infrastructure operated by SaskPower, gas infrastructure operated by SaskEnergy, and telecommunications infrastructure operated by SaskTel also occurs in the LAA. The Foothills Pipeline is located in the LAA.

11.3 PROJECT INTERACTIONS WITH HUMAN OCCUPANCY AND RESOURCE USE

Table 11-2 identifies which Project activities have the potential to result in effects on human occupancy and resource use. These interactions are indicated by check marks, and are discussed in detail in Section 11.5 in the context of effects pathways, standard and project-specific mitigation/enhancement, and residual effects. A justification is also provided for non-interactions (no check marks).

Table 11-2 Project Interactions with Human Occupancy and Resource Use

Physical Activities	Potential Effects
	Change to land use
Pipeline	
Construction	✓
Operation	-
Meter Station	
Construction	✓

Operation	✓
NOTES: ✓ Potential interaction - No interaction	

Operation of the pipeline is not anticipated to interact with human occupancy and resource use, as there will be limited further physical disturbance following construction and post-construction reclamation activities. Following construction, the TWS and ROW will be reclaimed. During operation, disturbance will be limited to occasional integrity digs, for which MIPL will submit notifications to the CER following the Operations and Maintenance Guidelines (NEB 2018). Additionally, no operational noise emissions or sensory disturbances are anticipated during operation of the meter station. As a result, Project effects on human occupancy and resource use during operation of the pipeline are not assessed further.

11.4 MITIGATION

Standard industry practices and avoidance measures, along with Project-specific mitigation measures outlined in the EPP (Appendix A) will be implemented during construction to reduce effects on land use. Key mitigation measures are summarized in Table 11-3.

Refer to the vegetation and wetlands (Section 7), wildlife and wildlife habitat (Section 8), and surface water and groundwater quality and quantity (Section 9) assessments for other mitigation measures to reduce or avoid potential effects on vegetation, wildlife, surface water and groundwater.

Table 11-3 Mitigation Measures for Human Occupancy and Resource Use

Potential Effect	Effect Pathway	Mitigation Measures	Applicable Project Component	
			Pipeline	Meter Station
Change in land use	• Access restrictions or prevention of seasonal farming operations • Sensory disturbance (e.g., noise, dust, air emissions)	• Identified Project stakeholders will be notified in advance of construction activities.	✓	✓
		• Vehicular traffic and construction activities will be restricted to the designated construction footprint, approved work spaces, and access roads/routes. If boundary stakes are inadvertently damaged or destroyed, they will be replaced immediately.	✓	✓
		• Natural gas pipeline construction is scheduled for late summer or fall to minimize disruptions and access to agriculture operations. If construction timing does interrupt agriculture operations, MIPL will work with landowners to limit the interruption.	✓	✓
		• Any fences inadvertently damaged adjacent to or crossed by construction will be repaired immediately. If neighboring fence sections need to be removed to facilitate construction, temporary gates will be installed that bypasses the construction area. Original fencelines will be re-established at the end of construction.	✓	✓
		• Appropriate signs will be posted along access roads, trails, or other points of possible public access in the vicinity of construction activities.	✓	✓
		• Any regulations and/or requirements of Ministry of Highways and Infrastructure and municipalities will be adhered to.	✓	✓
		• All buried and overhead utilities in proximity to the construction site will be clearly identified and marked with warning signs or other structures (e.g., overhead cable goal posts to mark height restrictions)	✓	✓
		• Rocks will be removed from the construction site (meter station and ROW) during site development and again during cleanup; rock picking and removal will occur before and after topsoil replacement on non-operations areas at the meter station and throughout the ROW to ensure that the surface rock on the construction site is comparable to conditions adjacent to the construction site. Rocks will be hauled off site to an approved location.	✓	✓
		• Dust suppressants will be applied (e.g., water, calcium chloride, or tree lignin-based dust suppressant) on the construction sites and access roads/routes as required. Calcium chloride will not be used on agricultural fields. Local road authorities will be informed prior to application of dust suppressants on public roads.	✓	✓
		• Company and construction personnel will avoid excessive idling of vehicles. Vehicles or equipment are to be turned off when not in use unless required for effective operation of the vehicle or equipment.	✓	✓
		• Construction equipment will be maintained in good working order and properly muffled.	✓	✓

NOTES:
✓ Mitigation measure is applicable to the project component
- Mitigation measure is not applicable to the project component

11.5 ASSESSMENT OF RESIDUAL EFFECTS ON HUMAN OCCUPANCY AND RESOURCE USE

11.5.1 Change to Land Use

11.5.1.1 Pipeline

Construction activities have the potential to result in a change to land use through a number of potential pathways, including access restrictions or prevention of seasonal farming activities and sensory disturbance.

The majority of the LAA (81.8%) is within land used for agriculture. Approximately 7.0 ha of agricultural land within the PDA (Table 7-3) will be disturbed during construction. Notification of identified Project stakeholders and Indigenous communities will occur in advance of construction activities. Once construction is complete, the portions of the ROW currently used for cultivation will be reclaimed and returned to agricultural use.

Oil and gas and industrial uses in the PDA include the existing MIPL Herbert-Loomis pipeline and ROW. Power infrastructure operated by SaskPower, gas infrastructure operated by SaskEnergy, and telecommunications infrastructure operated by SaskTel also occurs in the LAA. Construction activities may temporarily affect other industrial users in the LAA by restricting access near third-party facilities through temporary or area road closures. It is anticipated that stakeholder engagement and crossing agreements with prior to construction will further mitigate potential access effects on oil and gas and industrial users. There will be long-term restrictions on oil and gas and other industrial activities along the ROW during operations (e.g., need for proximity agreements, crossing agreements).

It is anticipated that landowners/users, recreational users and local community members will experience some nuisance effects during construction, including localized increases in noise, dust and traffic volumes, as well as visual disruption. These effects will be reduced to the extent possible using measures in the EPP (Appendix A), such as ensuring that noise abatement equipment on machinery is in good working order, and by informing affected stakeholders prior to and during construction about the Project, what effects can be expected and how they will be mitigated.

With the implementation of mitigation measures, residual effects of construction of the natural gas pipeline on land use are likely to occur, and are predicted to be adverse in direction, low in magnitude and extend into the Human Occupancy and Resource Use LAA. Residual effects are predicted to be short term and reversible following completion of construction activities or decommissioning and final reclamation of the natural gas pipeline at the end of operations.

11.5.1.2 Meter Station

The PDA of the meter station is located on private land currently primarily used for agriculture. Construction of the meter station will result in the disturbance up to 7.4 ha of land currently used

for agriculture. Agricultural operations will be affected during construction, while access (safety) restrictions are in place and will be unavailable for use through operation of the meter station. Agricultural activities in the LAA may be temporarily affected as a result of temporary access restrictions on local roads during construction. During operation, land use within the meter station portion of the PDA will remain unavailable for agriculture or future oil and gas development.

It is anticipated that local landowners/users, recreational users and local community members might experience some nuisance effects during construction, including localized increases in noise, dust and traffic volumes, as well as visual disruption. These effects will be reduced using measures in the EPP (Appendix A), such as ensuring that noise abatement equipment on machinery is in good working order, and by informing affected stakeholders prior to and during construction about the Project.

Following the implementation of mitigation measures, residual effects on land use activities during construction of the meter station are likely to occur, and are predicted to be adverse, low in magnitude, extend to the LAA, will be short-term (in temporary workspace) and reversible following completion of construction activities to long-term (in the meter station footprint) and reversible following final decommissioning of the meter station.

With the implementation of mitigation measures, residual effects on land use during operation of the meter station are likely to occur, and are predicted to be adverse in direction, low in magnitude, extend to the Human Occupancy and Resource Use LAA, long-term in duration, will occur continuously, and will be reversible following decommissioning of the meter station.

11.5.2 Summary of Residual Project Effects

Residual Project effects on human occupancy and resource use are summarized in Table 11-4.

Table 11-4 Residual Project Effects on Human Occupancy and Resource Use

Residual Effect		Residual Effects Characterization						
		Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Change in Land Use								
Pipeline	Construction	A	L	LAA	ST	S	R	L
Meter Station	Construction	A	L	LAA	ST-LT	S	R	L
Meter Station	Operation	A	L	LAA	LT	C	R	L

KEY

See Table 5-2 for detailed definitions

Direction

P Positive
A Adverse
N Neutral

Magnitude

N Negligible
L Low
M Moderate
H High

Geographic Extent

PDA Project Development Area
LAA Local Assessment Area
RAA Regional Assessment Area
Global

Duration

ST Short-term
MT Medium-term
LT Long-term

N/A Not applicable

Frequency

S Single event
IR Multiple irregular event
R Multiple regular event
C Continuous

Reversibility

R Reversible
I Irreversible

Likelihood

U Unlikely
P Possible
L Likely

11.6 ASSESSMENT OF CUMULATIVE EFFECTS ON HUMAN OCCUPANCY AND RESOURCE USE

Past and present Projects and physical activities have contributed to the existing pattern of land use in the RAA. The Project will negligibly alter the pattern of land use within the RAA. Road upgrades and the construction and operation of the Keystone XL Project and a meter station connecting to the Foothills system pipeline are projects and physical activities that will occur in the reasonably foreseeable future that will occur in the RAA (5 km buffer from the PDA), no additional cumulative effects on human occupancy and resource use are predicted.

Table 11-5 presents project and physical activities inclusion lists, which identify other past, present and reasonably foreseeable future projects and physical activities that have the potential to interact cumulatively with those arising from the Project.

Table 11-5 Interactions with the Potential to Contribute to Cumulative Effects on Human Occupancy and Resource Use

Other Projects and Physical Activities with Potential for Cumulative Effects	Potential Effects
	Change in Land Use
Past and Present Projects, Physical Activities and Land Use	
Agriculture	✓
Infrastructure	✓
Residential	✓
Linear Developments	✓
Industrial Activities	✓
Project-Related Physical Activities	✓
Future (Reasonably Foreseeable) Projects and Physical Activities	
TC Energy Keystone XL Pump Station	✓
TC Energy Keystone XL Pipeline	✓
Foothills Pipe Lines Ltd. Meter Station	✓

NOTES:
✓ Other projects and physical activities whose residual effects are likely to interact cumulatively with Project residual effects.

11.6.1 Change in Land Use

At Baseline Case, the RAA is composed of 61.4% agricultural land, 28.4% shrubland, and 27.3% native grassland (Table 7-8). During construction, vegetation clearing, grading and other activities (e.g., vehicle movement, excavation) will result in a loss or alteration of 8.2 ha of cultivated land. Following construction, the pipeline ROW and areas used as TWS will be reclaimed and returned to current land use (i.e., agriculture). The PDA of the meter station are located on private land currently used for agriculture. This portion of the PDA will remain unavailable for agriculture during operation of the meter station.

The construction and operation of the proposed Keystone XL project including the pipeline and pump station and the Foothills meter station are the only foreseeable future projects and physical activity identified within the Project RAA. Operation of the Keystone XL pump station and Foothills meter station will likely result in further long-term effects on land use within the RAA (Table 11-6). It is reasonable to assume that TC Energy and Foothills will implement mitigation measures to reduce potential effects on land use and that following pipeline construction, reclamation will be undertaken for disturbed areas.

Existing land uses in the RAA, such as oil and gas operations, agricultural activity or the use of transportation infrastructure are ongoing sources of disturbances such as noise, dust, traffic and visual disruption. Construction of the Project will add incrementally to the existing level of disturbance.

Residual cumulative effects on land use are likely to occur, and are predicted to be adverse, low in magnitude, short-term to long-term in duration, and reversible. The Project, once reclamation is complete, will make a negligible magnitude contribution to cumulative effects on land use at the RAA scale (Table 11-6).

11.6.1.1 Summary of Residual Cumulative Effects

Table 11-7 summarizes residual cumulative environmental effects on land use.

Table 11-6 Residual Cumulative Effects on Land Use

Residual Effect	Residual Cumulative Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood
Change in Land Use							
Residual cumulative effect	A	L	RAA	ST-LT	IR	R	L
Contribution from the Project to the residual cumulative effect	The Project will result in the temporary loss of land available for agriculture. These effects will be limited in spatial scale and reversible. The Project will result in the loss of a small area used for agriculture during operation of the meter station. The contribution from the Project to residual cumulative effects is negligible and is not expected to measurably affect land use in the RAA.						

KEY

Refer to Table 5-2 for detailed definitions

Direction
- P Positive
- A Adverse
- N Neutral

Magnitude
- N Negligible
- L Low
- M Moderate
- H High

Geographic Extent
- PDA Project Development Area
- LAA Local Assessment Area
- RAA Regional Assessment Area

Duration
- ST Short-term
- MT Medium-term
- LT Long-term

N/A Not applicable

Frequency
- S Single event
- IR Multiple irregular event
- R Multiple regular event
- C Continuous

Reversibility
- R Reversible
- I Irreversible

Likelihood
- U Unlikely
- P Possible
- L Likely

11.7 DETERMINATION OF SIGNIFICANCE AND PREDICTION CONFIDENCE

With the implementation of mitigation measures, residual Project effects and residual cumulative effects on human occupancy and resource use are predicted to be not significant.

Prediction confidence is rated as high based on the amount and quality of data available from desktop sources, results of engagement, and confidence in the effectiveness of mitigation measures in the EPP, which reflect accepted best industry practice.

11.8 MONITORING

Monitoring programs for human occupancy and resource use are not anticipated or required at this time.

12.0 ASSESSMENT OF POTENTIAL EFFECTS OF THE ENVIRONMENT ON THE PROJECT

12.1 SCOPE OF ASSESSMENT

The NEB Filing Manual, 2017-01 (NEB 2017) requires consideration of changes to the Project that may be caused by the surrounding environment. Potential effects of the environment on the Project are considered throughout the engineering design phase, so that the Project can withstand these potential effects.

The Project has benefitted from MIPL's experience designing, constructing, and operating facilities. The Project team has applied this experience together with industry best practices when designing and planning the Project. The Project will be designed, constructed, and tested in accordance with industry best practices and the provisions of the CER Act, the Onshore Pipeline Regulations (1999), applicable MIPL specifications and CSA Z662-19.

12.1.1 Project Interactions

The following are the identified potential interactions of the environment with the Project:

- Weather:
  - Extreme Temperatures: During construction or operation, activities could be halted if extreme temperatures result in safety concerns for personnel.
  - Heavy Precipitation Events and Flooding: Heavy precipitation and flooding could suspend construction or operating activities or access to the site. Depending on the timing, location, type and magnitude of the precipitation, increased surface runoff could cause siltation and erosion or isolate work areas from access routes.
  - Heavy Snow and Ice Events: Construction or operating activities could be halted during a heavy snow event or ice storm if personnel safety becomes a concern.
  - Lightning: Lightning storms could cause short delays during construction or operation because of safety concerns, or longer delays if lightning strikes start wildfires.
  - High Winds or Tornados: High winds or tornados may threaten worker safety or cause loss or damage to environmental protection materials, such as soil tackifiers. This could result in the suspension of some construction or operating activities (e.g., if working in an area with wind erosion concerns).
- Wildfires: Wildfires could temporarily suspend construction or facility operation activities, either directly, or as a result of evacuation procedures or travel restrictions imposed by emergency response services.

Geohazards are not assessed because geotechnical studies will be conducted to support the Project and inform siting and design, thus allowing for avoidance of areas of geotechnical hazards. Additionally, extreme geohazards (e.g., earthquake, rockfalls, landslides) areas are not intersected by the Project and are not considered further.

12.1.2 Significance Definition

A significant adverse residual effect of the environment on the Project is defined as one that could result in:

- damage to Project infrastructure resulting in harm to Project workers or the public
- damage to Project infrastructure which precludes completion of planned construction activities or operation
- damage to Project infrastructure that results in harm to the environment based on the significance definitions described herein for each VC (Sections 6 through 11) or,
- a substantial change to the Project schedule by delaying Project activities by one season or resulting in a shutdown of construction or operation for three months or more.

12.2 MITIGATION

Measures that will be employed to reduce the potential for effects on construction and operation activities resulting from environmental factors include:

- detailed site selection (e.g., avoiding areas of concern)
- site-specific design in compliance with applicable regulatory requirements, codes and standards (e.g., CSA Z662-19, OPR)
- construction activity scheduling (e.g., where possible avoiding historical periods of non-optimal weather such as spring break-up)
- suspension of construction activities (e.g., during extreme weather events)
- mitigation measures in the EPP (Appendix A) (e.g., use of erosion control measures, implementation of the *Extreme Weather Contingency Plan*)
- MIPL Project specific safety plans (e.g., ERP, Site Specific Safety Plans), and
- maintenance and inspection activities.

Environmental protection measures that will be implemented to address potential effects of the environment on the Project are included in the project specific EPP (Appendix A). Key mitigation measures, and the environmental conditions to which they apply, are listed in Table 12-1.

Table 12-1 Mitigation Measures for Effects of the Environment on the Project

Environmental Condition	Mitigation
Weather	• As required, the Emergency Response Plan for the Project site will be implemented.
Wildfires	• The location and contact phone numbers of health facilities and community infrastructure (hospital, police, and fire) will be posted at the construction site. • Contractors shall ensure that all necessary fire-fighting equipment is available at the job-site and shall appoint a fire boss (e.g., on-site foreman). • A list of 24-hour fire dispatch coordinators and telephone numbers shall be developed and posted at the job sites. • In the event of a fire, the on-site foreman or MIPL inspector will inspect the fire site immediately and take charge of directing suppression measures. • The on-site foreman or MIPL inspector shall report any fires and relevant information to the company's chief inspector, local fire department, landowner, and any on-site occupants as well as the appropriate government agencies and request assistance as needed. • The on-site fire foreman or MIPL inspector will deploy fire-fighting equipment and or extinguish the fire directly if possible. Necessary equipment and personnel will be made available to control the fire. NOTE: Locates of all underground facilities shall be completed prior to any ground disturbance greater than 300mm (12"). • Movable equipment and materials, including explosives or flammable materials and vehicles, will be promptly moved to a safe location. • For non-natural gas or natural gas related infrastructure fires (e.g., grass and stubble fires), fire suppression measures will continue until the fire is extinguished or until otherwise notified by the local fire department. • The on-site fire foreman or MIPL inspector will ensure that the burn area is monitored and that the fire has been completely extinguished.

12.3 ASSESSMENT OF RESIDUAL EFFECTS OF THE ENVIRONMENT ON THE PROJECT

12.3.1 Weather

For the purposes of this assessment, weather includes extreme temperature, heavy precipitation and the potential for flooding, heavy snow and ice storms, lightning, and high winds or tornados. These weather scenarios are selected because they have the potential to affect planned Project construction and facility operation activities.

The Project is located in an area where cold artic weather can produce extremely cold conditions in winter, and as the air masses shift north and south across Saskatchewan, the temperatures can change rapidly. Similar temperature variations can be seen during the summer months. As a result, there is a potential for rapid freeze or thaw to occur. Where soils have not been stripped, thawing conditions may result in compaction or rutting due to equipment and vehicle traffic. These rapid thawing conditions are managed and mitigated through implementation of contingency planning to address mitigative contingency measures such as, temporary work shutdowns.

Severe weather may result in a delay during construction of the Project components, particularly in areas where topsoil stripping or grading activities have not been completed, or if wet soil conditions create safety or travel concerns.

Severe weather conditions are normally short-term and may cause the temporary suspension of specific activities until they abate. The effects of severe weather can generally be mitigated through adjustments to the timing of construction or operation activities. When avoidance through schedule adjustment is not practical, MIPL will implement site-specific mitigations, such as those identified in the Project EPP (Appendix A), as required.

With the implementation of mitigation, preventative and response measures, residual adverse effects of the environment on the Project are not anticipated.

12.3.1.1 Extreme Temperatures

The daily average temperature at the Shaunavon 2 Monitoring Station from 1981 to 2010, is 3.3°C. January is the coldest month, and July is the warmest (9.7°C and 18.6°C daily average temperature, respectively). Extreme temperatures vary from –42.2°C (December 9, 1968) to 39°C (June 4, 1988) (GOC 2019b). During construction of the Project, which is currently scheduled to occur August through December 2020, the daily extreme temperatures vary from 38.5°C in August to -36.7°C in December (GOC 2019b).

Extreme temperature events may affect the health and safety of workers, but are unlikely to adversely affect operating facilities. During construction, activities will be modified or temporarily halted if extreme temperatures result in safety concerns for personnel; however, delays are expected to be of short duration or apply only to periods of peak (highest or lowest) temperatures. Contingency planning for the Project will address temporary work shutdowns. Given the anticipated short duration of such delays, residual effects of extreme temperatures on the Project are not expected.

12.3.1.2 Heavy Precipitation Events and Flooding

The annual precipitation at the Shaunavon 3 Station from 1981 to 2010 is 408.4 mm, of which 73.7% falls as rain. June is the wettest month (79.7 mm), and winter months are the driest. The extreme daily precipitation is 64.0 mm (June 27, 1980) (GOC 2019b). Storms are generally short-lived, but intense storms may produce enough precipitation to cause localized or regional flooding. Multiple storms of varying intensities may, in combination, also result in flooding.

Flooding and excessive flows could potentially where the Project is located near drainage crossings and in the vicinity of major wetlands. Heavy precipitation events and flooding could cause power outages and affect access to the Project areas during construction and operation. Depending on the severity of the events, construction activities or operational maintenance schedules may be affected; however, delays are expected to be of short duration. Heavy precipitation events and flooding could also cause increased surface runoff, which could result in erosion depending on the timing, location, type and magnitude of the

precipitation. Heavy rainfall or flooding might wash out environmental protection measures in place during construction.

The proposed meter station design includes a gravel pad with a slight crown to control and direct runoff. The proposed pipeline will be designed to withstand potential erosion or scour associated with flood events. Additionally, inspections will be conducted during construction activities and operation, and remedial measures will be implemented to correct any erosion issues caused by precipitation events or flooding. As such, residual effects on the Project are not anticipated from heavy precipitation events or flooding.

12.3.1.3 Heavy Snow and Ice Events

Highest average monthly snowfall measured at the Shaunavon 2 Climate Monitoring Station from 1981 to 2010 typically occurs during the months of January (19.1 cm) and March (20.6 cm) (GOC 2019b). The extreme daily snowfall record is 54 cm (May 28, 1982) (GOC 2019b). Warm weather and low-pressure systems interacting with cold Arctic air can cause heavy snowfall events and ice storms. Heavy snow events are characterized by intense cold, strong winds, and reduced visibility.

Construction activities will be modified or temporarily suspended during a heavy snow event or ice storm if safety is a concern; however, any delays are expected to be of short duration. When practical scheduling of construction activities will also be used to avoid periods of potential heavy snowfall. During operation, heavy snow or ice events could cause power outages, affect the response time for emergency response personnel to Project areas, and could slow or delay maintenance activities; however, emergency response planning activities will take such weather events into account. Regular maintenance schedules may need to be adjusted during heavy snow or ice events, but any delays are expected to be of short duration. Additionally, aboveground facilities are designed to withstand mechanical loads greater than loads potentially caused by heavy snowfall.

Following implementation of appropriate Project design, construction timing and mitigation, residual effects of heavy snow and ice events on the Project are not anticipated.

12.3.1.4 Lightning

Lightning storms could cause short delays during construction or operation because of safety concerns. The likelihood of damage from lightning to equipment is considered low. To reduce the risk of damage from lightning strikes, above-ground facilities will be grounded according to provincial and national building codes. Residual effects are not anticipated to result from lightning. The potential effect of wildfires that may be induced during lightning events is discussed in Section 12.3.2.

12.3.1.5 High Winds and Tornados

Tornados and high winds present a safety concern and may cause damage to construction equipment or environmental protection measures. High winds could result in the suspension of some construction activities, particularly if there are worker safety concerns or soil erosion concerns. Delays, if they occur, are likely to be of short duration. The Project will have specific emergency response, evacuation, and

power outage contingency plans in place during construction and operation to address high wind events. Backup power generation at the meter station will be available during operation in the event of a power outage. Environmental protection measures will be inspected and repaired as necessary after a high wind event. No residual effects on the Project are anticipated associated with high wind events.

12.3.2 Wildfires

There is potential for wildfires to interrupt construction or operation, either directly, or as a result of evacuation procedures or travel restrictions imposed by emergency response services. The severity of the effects associated with a fire depends on the location and size of the event. Construction activities could be temporarily suspended in the event of a of a relatively small wildfire that burns near or directly threatens a Project component, or a more substantial fire that occurs across a wider region and affects access to a Project component for construction and operation staff.

The Project will have an ERP and a fire contingency plan in place during construction and operation to address wildfires. Emergency services in the region are available to deal with wildfires to protect public safety and to reduce the risk of property damage. No residual effects on the Project because of wildfires are anticipated.

12.4 SUMMARY OF RESIDUAL EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Potential effects of the environment on the Project will be managed through site selection, Project design, environmental management, contingency planning, MIPL Project-specific ERP, and health and safety plans. Following implementation of these measures, residual adverse effects of the environment on the Project are not anticipated. As no residual adverse effects of the environment on the Project are predicted, there is no requirement for a determination of significance.

13.0 ACCIDENTS AND MALFUNCTIONS

13.1 SCOPE OF ASSESSMENT

The NEB Filing Manual, 2017-01 (NEB 2017) requires an environmental assessment for a project consider the potential for accidents and malfunctions that might occur. These are rare, unplanned events or conditions that could result from acts of nature, human error, equipment failure, or other possible causes. Project planning and design, equipment selection, hazard analysis and corrective action, emergency response planning, security management, and the implementation established effective environmental protection measures in the EPP and the ERP will reduce the potential for accidents and malfunctions to occur, and reduce the effects of an event if it occurs.

MIPL will implement a comprehensive Integrity Management Plan (IMP) to monitor the integrity of the Project during operations. This process uses advanced inspection and mitigation techniques applied within a comprehensive risk-based methodology.

13.1.1 Identification of Events and Potentially Affected VCs

This assessment considers the following accident and malfunction scenarios:

- **Pipeline accident or malfunction**: Could occur during construction or operation, where the severity of any environmental effect from a pipeline accident or malfunction depends on the location, timing, and the factors surrounding the event. The specific risks associated with a pipeline accident or malfunction are primarily associated with the physical disturbance associated with a release or rupture, and the potential for ignition and explosion.
- **Fire**: Includes an explosion and/or fire that originates in a Project component.
- **Hazardous materials release**: Releases of fuel, petroleum products or other chemicals used on site that could occur during construction, and to a lesser extent, during operation.
- **Vehicle accident**: A Project-related vehicle accident may occur on a road transportation network, including vehicle accidents involving wildlife.
- **Damage to existing utilities**: Damage could occur to existing pipelines and/or foreign utilities during construction.

13.1.2 Project Interactions

Accidents and malfunction scenarios that could affect VCs are outlined in Table 13-1.

Table 13-1 Potential Interactions between VCs and Accidents and Malfunctions

Valued Component	Pipeline Accident or Malfunction	Fire	Hazardous Materials Release	Vehicle Accident	Damage to Existing Utilities
Soil capability	✓	✓	✓	–	✓
Vegetation	✓	✓	✓	–	✓
Wetlands	✓	✓	✓	–	✓
Surface water and groundwater quality and quantity	✓	–	✓	–	–
Fish and fish habitat	–	–	–	–	–
Wildlife and wildlife habitat	✓	✓	✓	✓	✓
Air quality	✓	✓	–	–	✓
Greenhouse gas emissions	✓	✓	–	–	✓
Acoustic environment	–	–	–	–	–
Human occupancy and resource use	✓	✓	✓	–	✓
Heritage resources	–	–	–	–	–
Navigation and navigation safety	–	–	–	–	–
Traditional land and resource use	–	–	–	–	–
Social and cultural well-being	–	–	–	–	–
Human health and aesthetics	✓	✓	✓	✓	–
Infrastructure and services	✓	✓	–	✓	✓
Employment and economy	–	–	–	–	–
Rights of Indigenous peoples	–	–	–	–	–

NOTES:
✓ Potential interaction
– No interaction

13.1.3 Significance Definition

The residual effects characterization and significance thresholds established for the VCs in this assessment have been applied (see Table 5-2 and 5-3). Air quality, human health and aesthetics and infrastructure and services, which otherwise would not be affected by the Project, are considered as part of this assessment, due to the potential for accidents and malfunctions to affect these VCs.

For air quality, a significant adverse residual effect is defined as one that results in ambient concentrations of air quality contaminants of concern (CACs) that exceed the Saskatchewan Ambient Air Quality Standards (SAAQS) and are of concern due to their geographical extent, frequency of occurrence, and the presence of potentially sensitive receptors (e.g., humans, wildlife, vegetation, soils, or waterbodies). The significance determination for human health is based on that of the atmospheric environment.

For infrastructure and services, a significant adverse residual effect is defined as one in which Project activities result in demands on infrastructure and/or services beyond current capacity, such that standards of service are routinely and persistently reduced below current levels for an extended period.

13.2 MITIGATION

MIPL will have an IMP to manage the integrity of the facility for its lifetime and a damage prevention program to mitigate damage from third parties. Regular maintenance and operational procedures will include regular inspection visits, and automated monitoring systems that will alert staff of potential releases or failures. The facility will be continuously controlled and monitored from SaskEnergy's Gas Control Centre. In the event of a release or rupture, MIPL will work with local emergency responders to limit effects on people and the environment by restricting access, evacuating residents if required, and providing ongoing incident management.

MIPL will develop an ERP for the operation phase based on SaskEnergy's Emergency Management System. These plans serve to protect the general public, the environment, company personnel and property, and workers, and are prepared in engagement with appropriate regulatory agencies, municipalities and communities to provide effective and timely response to any potential emergencies.

Additional prevention and response measures that have been effectively implemented for past SaskEnergy projects and that will be implemented for this Project are outlined below. A Hazards and Operability Analysis (HAZOP) for the Project has been performed to reduce the potential for accidents and malfunctions to occur.

Additional prevention and response measures that have been effectively implemented for past MIPL projects and that will be implemented for this Project are outlined in Table 13-2.

Table 13-2 Key Mitigation Measures for Effects of Accidents and Malfunctions

Scenario	Mitigation Measures
Pipeline accident or malfunction	• When in operation, emergency contact information will be clearly posted and communicated to the public in the event there is accidental contact or encroachment with the natural gas pipeline, if gas odor is detected or a rupture or leak is suspected or identified. • MIPL conducts routine internal, external and surface inspection of all their assets to confirm integrity and operation. • In the event of a natural gas pipeline leak, block valves will be turned off to stop the flow of natural gas. Only authorized MIPL/TransGas/SaskEnergy representatives shall operate valves.
Fire	• Contractors shall ensure that all necessary fire-fighting equipment is available at the job-site and shall appoint a fire boss (e.g., on-site foreman). • A list of 24-hour fire dispatch coordinators and telephone numbers shall be developed and posted at the job sites. • In the event of a fire, the on-site foreman will inspect the fire site immediately and take charge of directing suppression measures. • Implement the Emergency Response Plan for the Project site; including the following contingency plans: fire, spill response, extreme weather, contaminated soils, waste management and heritage resource discovery. • The on-site fire foreman will deploy fire-fighting equipment and or extinguish the fire directly if possible. Necessary equipment and personnel will be made available to control the fire. NOTE:

Table 13-2 Key Mitigation Measures for Effects of Accidents and Malfunctions

Scenario	Mitigation Measures
	Locates of all underground facilities will be completed prior to any ground disturbance greater than 300 mm (12"). • Movable equipment and materials, including explosives or flammable materials and vehicles, will be promptly moved to a safe location. • The on-site fire foreman will ensure that the burn area is monitored and that the fire has been completely extinguished. • The on-site foreman shall report any fires and relevant information to the company's Chief Inspector, local fire department, landowner, and any on-site occupants as well as the appropriate government agencies and request assistance as needed.
Hazardous materials release	• On-site supervisory staff shall have a copy of the MIPL Spill Response Procedure, or equivalent. Field staff and contractors shall have knowledge of the Spill Response Procedure, including where response material is located. In any release or spill event, first priority shall be given to the safety of people, second priority shall be the protection of the environment, and third priority shall be the protection of the facility. • The contractor/employee shall have available on all service trucks and both mobile and stationary equipment, a spill response kit suitable for hydrocarbon or other hazardous products spills/releases that may occur on the construction or operation site. The MIPL field staff and contractor employees shall be knowledgeable on the use of the spill kit and handling the material. • The general public, construction personnel, livestock and, to the extent possible wildlife, will be restricted from entering the affected area, if necessary, by fencing or use of other suitable deterrents. • Since impacts from small spot spills can generally be minimized if immediate action is taken; all small spot spills will be cleaned up immediately and then be reported to the Chief Inspector and Environmental Monitor. • Environmental procedures applicable to construction activities in all natural environments apply to spill containment and clean-up. If spill or release material cannot be identified, the Environment & Sustainability Lead will be contacted for further instruction on how to proceed. • Contaminated material (soil, sorbents, etc.) shall be disposed of in accordance with applicable legislation and company standards; information will be provided to Environment & Sustainability for reporting. All spills will be reported in MIPL's Report Everything Online (REO) system, regardless of volume by a company employee. • Environment & Sustainability will be notified by phone if the spill exceeds the reporting thresholds or if the spilled material impacts water. Environment & Sustainability shall immediately notify all external agencies and assist in the notification of landowner(s) and occupant(s). • Environment & Sustainability shall work in collaboration with on-site inspectors, Environmental Monitors, and staff to determine the best method of containment, clean up and remediation. The contact person in the Environment & Sustainability Department is listed in COMP Incident Response - Key Contacts. In addition, the Environment & Sustainability Lead shall conduct regulatory reporting, provide technical advice, complete follow-up reports, and oversee remedial activities. • For non-reportable spills recovery methods shall be determined in collaboration with the MIPL inspectors and contractor supervisor, and by reviewing the MSDS's. • For reportable spills, recovery methods shall be determined in collaboration with the Environment & Sustainability Lead. Recovery methods may include vacuum truck, commercial/improvised sorbent material, and sawdust/straw • In the event of a natural gas pipeline leak, block valves will be turned off to stop the flow of natural gas. Only authorized MIPL/TransGas/SaskEnergy representatives shall operate valves. • If the spill source is from a leaking fuel truck, the tanker will be pumped dry and transferred into another tanker or other appropriate and secure container(s).In the event that hydrostatic test fluid (with additives) is spilled, it will be contained. The Saskatchewan Spill Control Centre, SK Ministry of Energy and Resources, SK MOE, and the Environment & Sustainability Lead, will be notified immediately. Remedial measures specified by the Environment & Sustainability Director and the Spill Control Centre will be immediately undertaken to minimize the effects of the spill.

Table 13-2 Key Mitigation Measures for Effects of Accidents and Malfunctions

Scenario	Mitigation Measures
	• Underground pipelines or utilities will be located by competent personnel prior to ground disturbance if a shallow depression will be excavated or surface berm constructed, in the path of the spill to stop and contain the flow. • Traffic will be avoided on soils contaminated by a spill. • Final clean-up and remediation/reclamation of a contaminated site will be conducted following an assessment of soil and water conditions.
Vehicle accident	• Identify requirements for construction vehicle/access control during construction, such as restricted access areas, gated/manned access, signs, in/out privileges, traffic flows (one-way traffic), crew buses, and speed limits, where required. • Area has good cellular service for 911 calls; the Emergency Response Plan will also contain emergency information and services.
Damage to existing pipelines and/or facilities	• First Call, SaskPower, third party companies, and/or municipalities having utilities or infrastructure/assets in the vicinity of the Project will be notified prior to the commencement of construction. • All buried and overhead utilities in proximity to the construction site will be clearly identified and marked with warning signs or other structures (e.g., overhead cable goal posts to mark height restrictions). • Underground pipelines or utilities will be located by competent personnel prior to ground disturbance then day lighted and clearly marked.

13.3 ASSESSMENT OF THE EFFECTS OF ACCIDENTS AND MALFUNCTIONS

13.3.1 Pipeline Accident or Malfunction

13.3.1.1 Causes and Interaction

Although rare on the MIPL System, a release or rupture could be caused by:

- internal and external corrosion or stress corrosion cracking
- defects associated with either manufacturing or onsite installation
- overpressure events
- natural forces
- third-party damage

An unignited release or rupture would interact with the atmospheric environment through emission of natural gas from the pipeline. As natural gas is lighter than air, it would quickly dissipate in the atmosphere, resulting in minimal risk to the environment or to human health in the vicinity of the release (provided it does not occur in a confined space). There are no SAAQS for methane.

If an ignition source is present, a rupture could lead to a fire or explosion, affecting a wide range of biophysical resources (e.g., atmosphere, soil, vegetation, wildlife habitat, human occupancy and resource use). A fire could result in exceedances of SAAQS for CACs such as $PM_{2.5}$, CO and SO_2, potentially affecting air quality locally or regionally, with associated risks to human health and safety. A release event may require localized evacuation where people may be at risk, and repair or replacement of the affected section of pipeline.

13.3.1.2 Preventative and Response Measures

The Project will be designed, constructed, and operated in a manner that prevents and reduces potential hazards and risks to the safety and security of the public, employees, property, MIPL facilities and the environment from a release or rupture. Through selecting and implementing construction materials and methods that meet or exceed applicable industry standards and regulatory requirements (i.e., legislation, codes, standards, and conditions of approval), MIPL's projects are designed and constructed in a manner that reduces the risk of rupture or release from occurring. Similarly, the risk of an unplanned event occurring during construction and operation is reduced through implementing by MIPL's Spill Contingency Plan in the EPP (Appendix A).

In the unlikely event of rupture or release occurring, such unplanned events are effectively managed during construction through implementing contingency measures in the Project-specific EPPs, and also through implementing MIPL's ERP. A regular maintenance program will be carried out for all equipment at the site. Any malfunction will be noted immediately, and the repairs will be initiated as soon as practical.

13.3.1.3 Residual Effects and Significance

In the absence of ignition source, a release or rupture of the pipeline would result in natural gas being released to the atmosphere. This release would have negligible effects on local and regional air quality, as natural gas is lighter than air and would quickly dissipate into the atmosphere. Natural gas emissions will cease when mainline valves are closed and the affected pipeline section is isolated and shutdown. Natural gas is considered non-toxic and an unignited release would not pose a risk to human heath (unless it occurs in a confined space), though it would contribute greenhouse gases (GHGs) to the atmosphere. The occurrence of a release or rupture is a low probability event of short duration. With the implementation of prevention and response measures, the effects of a release or rupture (without ignition) on the environment are predicted to be not significant.

An ignited release or rupture could lead to a fire or explosion. This could result in CAC (e.g., particulate matter) levels greater than the SAAQS locally and regionally; contributions to GHGs; interactions with soils, vegetation, wetlands, wildlife, human occupancy and resource use and infrastructure and services (including emergency services); and potentially could have consequences for human health. The

occurrence of an ignited release or rupture is a low probability event because of the preventative measures implemented by SaskEnergy across their operations. If an ignited release or rupture did occur, automatic emergency shutdown will occur at the mainline valves and by facility isolation procedures using emergency shut-off valves. These response measures would limit the volume of the potential release and the severity of any consequential explosions. Effects on the atmospheric environment, biophysical resources, infrastructure and services, and human health would be short-term in duration until mainline valves are closed and the fire is contained. With the implementation of prevention and response measures, the effects of an ignited release or rupture on the environment, while potentially of high magnitude within a localized area.

13.3.2 Fire

13.3.2.1 Causes and Interactions

Natural causes, such as a lightning strike, could cause a fire during all phases of the Project. Wildfires are also discussed in Section 12 (Effects of the Environment on the Project). A fire originating from a Project site during construction or operation, in addition to immediate threats to human health and property, might have interactions with soils, vegetation, wetlands, wildlife and wildlife habitat, and human occupancy and resource.

13.3.2.2 Preventative and Response Measures

Construction and operating sites will be maintained to avoid the accumulation of flammable materials. If dry conditions and high fire potential, welding blankets or shacks will be used when necessary during construction. Equipment used on the site will meet applicable codes and standards designed to prevent fires and explosions. MIPL will implement the EPP for the Project, and a regular equipment inspection and maintenance program. Necessary fire-fighting equipment to meet regulatory requirements will be maintained on site and outfitted in vehicles and heavy equipment. MIPL will have a site-specific ERP in place. In the unlikely event of a fire or fire hazard conditions, measures in the EPP and ERP will be followed.

13.3.2.3 Residual Effects and Significance

A large fire could result in effects, including increases in particulate matter levels greater than the ambient air quality standard over several kilometers. Depending on the severity of the fire, there may be consequences for human health, and there will be incremental contributions to GHGs. Fires have potential to affect a range of biophysical and socio-economic VCs (e.g., soil, vegetation, wildlife, human occupancy and resource use). Such fires are not expected to occur because of preventative and response measures implemented by the Project, and by MIPL across their operations. With implementation of prevention and response measures, the effects of a fire originating from Project activities are predicted to be not significant.

13.3.3 Hazardous Materials Release

13.3.3.1 Causes and Interactions

Gasoline, diesel fuel, lubricants and other hazardous materials will be stored and used on site during construction and operation. Improper handling, use, or storage of these materials could result in a release. Most releases are highly localized and can be easily cleaned up by onsite crews using standard equipment. In the event of a substantial release, contamination could affect soil, vegetation, vegetation, wetlands, surface water and/or groundwater, wildlife and wildlife habitat, human (including worker) health, and local land use.

13.3.3.2 Preventative and Response Measures

SaskEnergy's release prevention programs detailed in the EPP have been successful on past projects in preventing releases during construction and ensuring appropriate action and reporting if releases do occur. Contractors working on the construction of the Project will be aware of release response procedures, will be required to have Workplace Hazardous Materials Information System (WHMIS) training, and will abide by all federal, provincial, and local requirements for the storage, handling, transport, disposal, and release reporting requirements for all potentially hazardous products and waste materials.

All equipment at the site will meet applicable codes and equipment operators will follow recommended operational practices. MIPL will implement the EPP for the Project (Appendix A), and a regular equipment inspection and maintenance program. MIPL will have a site-specific ERP that addresses release response procedures, including hazardous materials transport, handling, and storage. Release response equipment and materials will be kept on site.

Response measures will vary depending on the location and nature of a release, and will follow the practices and procedures identified in the EPP (Appendix A). As outlined in the Spill Response Plan, response measures will generally focus on containing and limiting the effects of a release and remediating the area as quickly as possible. For releases in wetlands or watercourses, this may require the use of berms and absorbent materials. For substantial releases, offsite disposal of contaminated material, site assessment, and remediation may be required.

13.3.3.3 Residual Effects and Significance

Hazardous material releases, if they occur, are expected to be limited in volume and area, and can be cleaned up by on-site crews using standard equipment. Site assessment and remediation may be required if a release results in the contamination of soil, vegetation or groundwater. With the implementation of preventative and response measures, the residual effects of a release on VCs considered in this assessment are predicted to be not significant.

13.3.4 Vehicle Accident

13.3.4.1 Causes and Interactions

Vehicle accidents could potentially occur during all phases of the Project, resulting in a need for support from local emergency services. During construction, higher level worker and vehicle traffic to and from the site, and the operation of construction equipment on site increase the potential for vehicle accidents. Increased vehicle use during construction may also increase collision-related mortality risk to wildlife (as discussed in Section 8).

13.3.4.2 Preventative and Response Measures

Traffic will increase during construction. Vehicle accidents may occur along rural roads in proximity to the Project but are most likely to occur on highways that are more heavily used for the Project. There are no specific features of the Project that are expected to substantially increase accident rates or decrease traffic safety. Project personnel, while operating Project-related vehicles, will observe all traffic rules and local, provincial and federal highway regulations. Trucking activity for construction of the Project will take place on designated routes, will observe speed limits and weight restrictions, and will adhere to the measures set out in the EPP, including placement of warning signs and the development of a Transportation Plan, as required (Appendix A).

MIPL requires that contractors and subcontractors have a drug and alcohol program in place. Additionally, MIPL policies prohibit distracted driving by all Project-related vehicle operators. In the event of a vehicle accident, onsite emergency response personnel would coordinate with local emergency service providers.

13.3.4.3 Residual Effects and Significance

Vehicle accidents, if they occur, are expected to be infrequent and of limited severity, and would be more likely during the construction phase due to increased vehicle traffic and personnel movement. The Project will comply with applicable traffic rules and regulations and with SaskEnergy's policies and procedures for traffic management and emergency response. With implementation of preventative and response measures, the residual effects of a vehicle accident are predicted to be not significant.

13.3.5 Damage to Existing Utilities

Oil and gas and industrial uses in the PDA include the existing MIPL Herbert-Loomis pipeline. Power infrastructure operated by SaskPower, gas infrastructure operated by SaskEnergy, and telecommunications infrastructure operated by SaskTel also occurs in the LAA. Accidental damage could occur to other existing nearby facilities during construction. Damage to existing pipelines and/or utilities could result in releases and the temporary loss of use of this infrastructure until repairs are undertaken. Potentially affected VCs include the atmospheric environment if natural gas is released from adjacent pipelines, and human occupancy and resource use if operating utilities are affected. A line strike would

require excavation, repair, or replacement of the affected section of pipeline or utility; such activities could also affect biophysical resources.

13.3.5.1 Preventative and Response Measures

Neighbouring pipelines will be marked and located, following SaskEnergy's ground disturbance policy. All foreign lines and cables will be marked and labelled using Sask 1st Call services before the start of construction to protect the safety of the workers and public. Ramps, decking or rig matting will be placed over workspaces, if required based on site-specific conditions, where equipment will be sited over active pipelines or other buried utilities, per the EPP (Appendix A). Flagging and signage will be used at overhead line crossings to alert equipment operators of hazards. Construction activities near adjacent pipelines will be conducted in compliance with all requirements of CSA Z662-19 and the Onshore Pipeline Regulations for work in proximity to an operating pipeline. Prior to any equipment working on, or crossing over, an adjacent pipeline, a crossing permit will be obtained from the operator for each specific location, detailing the conditions and limitations for each crossing.

In the event of damage to existing infrastructure, Project personnel will contact the appropriate emergency contacts.

13.3.5.2 Residual Effects and Significance

Damage to existing pipelines and foreign utilities is unlikely due to the implementation of mitigations such as SaskEnergy's ground disturbance policy and use of Sask 1st Call service. With implementation of preventative and response measures, residual effects of damage to existing pipelines and/or foreign utilities are predicted to not be significant.

13.4 SUMMARY OF RESIDUAL EFFECTS OF ACCIDENTS AND MALFUNCTIONS

The Project will be designed, constructed and operated in a manner that prevents and reduces potential hazards and risk to the safety and security of the public, employees, property, MIPL facilities and the environment. Careful planning of the Project and the implementation of mitigation measures will reduce the potential for accidents and malfunctions to occur.

Overall, the potential environmental effects of all Project-related accidents and malfunctions on all assessed VCs, during all phases of the Project, are predicted to be not significant.

Although cumulative effects of accidents and malfunctions from other Projects (past, planned or future) in combination with Project-related accidents and malfunctions are possible, these individual events are unlikely to occur and thus highly unlikely to interact. An assessment of cumulative effects of accidents and malfunctions is not warranted.

14.0 CONCLUSION

The ESA has focused primarily on potential interactions between Project activities and components of the biophysical and socio-economic environment. The findings of the ESA are that the adverse residual and cumulative environmental and socio-economic effects associated with Project activities can be mitigated using a combination of standard industry best practices and Project-specific environmental protection measures (see EPP in Appendix A).

In addition, implementation of the mitigation measures presented in the ESA and the EPP, involvement in the design and planning of the Project by environmental specialists, and periodic inspection of the Project will help to maintain compliance with MIPL's environmental commitments and EPP, and reduce the potential for adverse effects.

The conclusion of this assessment is that, with the implementation of standard and Project-specific mitigation, the adverse residual and cumulative environmental and socio-economic effects of the Project are predicted to be not significant.

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APPENDIX A ENVIRONMENTAL PROTECTION PLAN

Shaunavon Interconnect Project
Environmental Protection Plan

Prepared for:
Many Islands Pipe Lines (Canada) Limited
Regina, SK

Prepared by:
Stantec Consulting Ltd.
Saskatoon, SK

July 2020

Table of Contents

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

Many Islands Pipe Lines (Canada) Limited (MIPL) is a wholly owned subsidiary of SaskEnergy Incorporated (SaskEnergy). MIPL pipelines are used to transport transmission pressure natural gas interprovincially and internationally. TransGas Limited (TGL), a second wholly owned subsidiary of SaskEnergy, transports transmission pressure natural gas within the province. TGL provides engineering, operational and other services to MIPL on a contract basis.

MIPL is applying to the Canada Energy Regulator (CER) under section 214 of the *Canadian Energy Regulator Act* (CER Act) for approval to construct and operate the Shaunavon Interconnect Project (the Project), located near Shaunavon, Saskatchewan. The purpose of the Project is to allow MIPL to transport additional natural gas from the Alberta supply to the existing MIPL Loomis-Herbert Pipeline, to accommodate increasing demand for natural gas in Saskatchewan. Specifically, the Project will create a new natural gas connection between the Foothills Pipe Lines Ltd. system and the existing MIPL Loomis-Herbert pipeline.

The Project includes the construction, installation and operation of the following Project components:

- Approximately 2.25 km of NPS 16 inch pipeline within a 30 m-wide right-of-way between the MIPL Herbert-Loomis Pipeline in SE-17-7-18 W3M and the Foothills pipeline in SE-16-07-18 W3M, , which includes:
    - a block valve at the MIPL Loomis to Herbert pipeline, and
    - 410 m-long x 4.5 m-wide access road.
- A 30 m x 40 m meter station at the connection point to the Herbert-Loomis in SE-17-7-18 W3M.
- Temporary workspace that is required for the pipe laydown and to facilitate equipment movement for all Project components.

A work force of approximately 35 workers will be required during the peak of Project construction. Temporary construction camps are not required to support Project construction; instead workers will be housed in local commercial accommodations.

MIPL (the Company) is committed to the protection of the environment. Their commitment to environmental leadership is to reduce the impact of our daily operations on the environment and recognize the role we can play in the stewardship of non-renewable resources.

MIPL considered disruptions to the environment due to the Project during the routing and siting of the Project. Specifically, the Project will be located on private, cultivated land and the pipeline route was selected to reduce the potential to affect steep terrain, native vegetation, wetlands, wildlife and wildlife

habitat, and watercourses. While the Project does cross Grassy Creek in SW-16-07-18 W3M, the crossing location, is within a shallow marsh zone of a Class IV wetland (i.e., the open water zones are avoided) that has been altered by previous agricultural activities (i.e., cultivation) and therefore provides limited suitable habitat for fish and plant and wildlife species of management concern. In addition to careful Project routing and siting, potential interactions with the environment have been further addressed through the proposed mitigation measures outlined in this project specific Environmental Protection Plan (EPP) and supplemented with SaskEnergy's Environmental Protections Standards (May 2017).

An overview of the proposed Project footprint is shown in Figure 1.

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Data Sources: Base features produced under license with the Government of Saskatchewan and the Government of Canada.
3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Access Road
- Meter Station
- Many Islands Pipe Lines (Canada) Limited Parcel
- ROW
- Road Allowance
- Temporary Work Space
- Minor Road
- Section

0 250 500 Metres

(At original document size of 8.5x11)
1:15,000

N

Stantec

Many Islands Pipe Lines (Canada) Limited

Project Location
Near Shaunavon,
Saskatchewan

Prepared by MDW on 2020-02-20
TR by JH on 2020-02-20
IR Review by NC on 2020-02-20

Client/Project 113254323-001 REVE
Many Islands Pipe Lines (Canada) Limited
Shaunovan Interconnect Project
Environmental Protection Plan

Figure No.
1

Title
Project Overview

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1.2 PROJECT SCHEDULE

Subject to regulatory approvals and receipt of signed crossing agreements, and pending weather conditions, MIPL's preferred construction schedule is to construct the Shaunavon Interconnect Project between August and December 2020. These dates align with the economic needs for the Project and avoids sensitive timing windows for migratory birds and species at risk. The anticipated Project in-service date is December 2020.

1.3 COMMUNICATION PLAN

Effective communication during the planning, construction, and post-construction phases of this Project is essential for effective environmental management. This includes both internal communications within MIPL, and external communications with the construction contractor, regulators, and other stakeholders. General communication protocols that will be implemented for the Project are outlined below:

- Prior to the start of construction activity, MIPL will inform the construction contractor of any Project environmental sensitivities and related environmental protection requirements, and will provide the construction contractor with a copy of this EPP, alignment sheets, and any associated approval conditions.
- The Environment & Sustainability Lead will conduct an orientation with Project personnel prior to commencement of construction. This will include discussing the EPP and any related approval conditions.
- Pertinent environmental related information will be stored at the construction site. This information will include:
  - The Project EPP
  - Permit applications and approvals
  - Copy of SaskEnergy's Environmental Protection Standards (May 2017)
  - Relevant Project reference material (e.g., site plans and specifications)
- During construction, open lines of communication will be promoted and maintained between relevant Project personnel and external parties such as regulators, landowners, and other stakeholders.
- Additional Project-specific environmental protocols will be developed as needed or deemed necessary.
- Environmental concerns will be reported immediately to the Chief Inspector and Environment & Sustainability Lead.

1.4 PROJECT CONTACTS AND RESPONSIBILITIES

This section outlines the environmental responsibilities of key project personnel and contact details. Emergency contact information for local authorities, regulators, and service providers, as applicable, are provided in Appendix C.

Title	Name / Contact	Responsibilities
Project Manager	Jamie DeBolt, P.Eng. Phone: 306-777-9207 Email: jdebolt@saskenergy.com	Planning, communication, procurement, and site management
Environment & Sustainability Lead	Daniel Dietrich M.Sc., PAg, EP Phone: 306-777-9647 Email: ddietrich@saskenergy.com	Integrate environmental requirements, manage environmental field work, environmental approvals, and communication
Construction Supervisor	Insert Name Eric Morley Phone: 306-536-6399 Email: emorley@saskenergy.com	Planning, communication, procurement, and site management, implement environmental protection standards and requirements
Chief Inspector/ Project Field Supervisor	To be assigned	Site supervision, stop work authority, and communication
Environmental Inspector/ Environmental Monitor (s)	To be assigned	Environmental protection standards compliance, communication, and reporting

2.0 PRE-CONSTRUCTION

The following measures will be implemented before the initiation of construction activities. Notification of the construction schedule and timing of specific construction activities will facilitate awareness of upcoming activities, and allow landowners, regulatory agencies, and other stakeholders to plan, as appropriate, for construction activities in their area.

Activity/Concern	Mitigation Measure
Environmental Compliance	1. The Construction Supervisor or Chief Inspector will be accountable for ensuring environmental compliance during the construction of their project. 2. All incidents that qualify as being in non-compliance of applicable laws, commitments made by MIPL and/or specific approval conditions by regulators, shall be reported to the Construction Supervisor. The Construction Supervisor shall take necessary steps to rectify the situation through appropriate notification of regulators, implementation of suitable mitigation measures and record keeping of the circumstances that resulted in the noncompliance, any remedial measures taken and any recommendations for future monitoring.
Environmental Inspection	3. The Construction Supervisor or Chief Inspector will ensure the implementation of the EPP during all critical phases (e.g., clearing; topsoil/upper surface material stripping and replacement; grading; erosion control and terrain stability; plowing of pipelines; pressure testing; tie-ins; watercourse, wetland, ditch crossings; and clean-up).
Licenses and Permits	4. All necessary licenses and permits will be obtained prior to commencement of construction. Copies will be maintained by the Project Manager, Environment & Sustainability Lead and the Chief Inspector. Copies of necessary licenses and permits, as well as this EPP and any project specific reports, will also be included in the construction folder for retention on site by the construction contractor. 5. Inconsistencies between conditions of different permits will be rectified prior to construction. Please contact Environment & Sustainability Lead for any concerns.
Notifications	6. Provincial or municipal government agencies with jurisdiction in the project area will be notified prior to construction. In addition, landowners, lessees and other project stakeholders that may be affected by construction will be notified. 7. Notify First Call, SaskPower, third party companies and/or municipalities having utilities or infrastructure/assets in the vicinity of construction prior to the commencement of construction. 8. Confirm the proposed Project construction schedule with responsible authorities before construction activities begin.
Safety Plan	9. The location and contact phone numbers of health facilities and community infrastructure (hospital, police, and fire) will be posted at the construction site. 10. Establish a construction safety program for the Project. All activities for the Project, including health, safety and environmental (HSE) performance will meet applicable laws and regulations. 11. Deliver a health and safety orientation and training to all workers to help prevent and control incidents leading to primary and acute-care needs.
Transportation Plan	12. Develop and implement a transportation plan. The transportation plan will specify, among others, main access routes, signing and flagging at access points to the Project site. 13. Where practical and applicable, include use of multi-passenger vehicles for the transport of crews to and from the job site in the transportation plan. 14. Maintain an open dialogue with responsible authorities during Project construction to review road conditions and any Project-related traffic issues

	15. The speed limit on secondary roads or trails used to access the construction site will be a maximum of 40 km/hr and may be lowered where specific wildlife concerns have been identified. 16. Identify requirements for construction vehicle/access control during construction, such as restricted access areas, gated/manned access, signs, in/out privileges, traffic flows (one way traffic), crew buses, and speed limits, where required.
Pre-job Meeting	17. Prior to the commencement of construction, a pre-job meeting will be held with the Project Manager, Environment & Sustainability Lead, Construction Supervisor, Chief Inspector, and construction contractor leads to address any environmental concerns. Government personnel will be invited to this meeting, if warranted and might include environmental regulatory personnel. This meeting is designed to make supervisory construction personnel aware of the key environmental issues, general environmental concerns, rules and regulations applicable to the construction area. 18. Review the emergency contacts list (see project-specific environmental report) and contingency plans for erosion control and problem soils prior to kicking off construction. All key personnel on the right-of-way or work site should be aware of these plans (see Section 4.0). 19. Depending on scheduling and contractors, separate pre-job meetings may be required.
Pre-construction environmental surveys	20. In the event that vegetation clearing is scheduled to occur within the Primary Nesting Period for migratory birds (Zone B4; May 5 to August 15; ECCC 2017), nest searches and/or avian use surveys (occurrence of territorial or nesting behavior) may be completed in areas of suitable habitat, as directed by the Environment & Sustainability Lead. Other preconstruction surveys for wildlife species at risk will also be completed, as required. 21. Thought no occurrences of clubroot are recorded within the RM of Grassy Creek No. 78, a pre-construction clubroot survey will be completed if requested by the landowners or if deemed necessary by MIPL as part of baseline data collection
Signage and Flagging	22. Appropriate signs will be posted along access roads, trails, or other points of possible public access in the vicinity of construction activities. 23. Any regulations and/or requirements of Ministry of Highways and Infrastructure, and municipalities will be adhered to. 24. Environmentally sensitive features and areas (e.g., nests, wetland boundaries) will be flagged and/or fenced in the field, as specified in this EPP or in regulatory approvals, prior to commencement of construction. 25. All buried and overhead utilities in proximity to the construction site will be clearly identified and marked with warning signs or other structures (e.g., overhead cable goal posts to mark height restrictions).
Timing	26. Specific construction activities will abide by all relevant timing restrictions as required by permit approvals unless otherwise specified. 27. Avoid disruption to agriculture and haying operations and access. 28. Arrange for landowners to harvest crops, if practical. Mow any remaining crops on the right-of-way, temporary work space, access road and meter site area to facilitate topsoil/upper surface material handling. It is preferable to mow outside of the timing constraint of wildlife species of concern that may occur in the area, and the Primary Nesting Period for migratory birds (May 5 – August 15) (ECCC 2017).
Waste Management Plan	29. On-site waste collection facilities will be provided for the disposal of lightweight, non-hazardous materials. Waste will be removed on a daily basis and disposed of at an approved landfill site. 30. Portable toilets/washrooms will be made available at appropriate locations within the work site and secured in place. 31. Labelling of hazardous materials waste must comply with Workplace Hazardous Materials Information System (WHMIS),. Fuels, lubricants, sealants, grease, chemicals, paints, and other dangerous or hazardous products will be stored, handled, and disposed of in accordance with manufacturer's specifications, Occupational Health and Safety requirements, WHMIS, and other requirements.

	32. Waste and debris associated with the construction will be removed from the construction site. Waste includes unused pipe, defective materials, wood skids, and other construction debris. All items that can be recycled should be in order to reduce environmental effects. 33. Spent welding rods will be stored in receptacles for disposal. Spent welding rods will not be left on the ground or on the construction site. 34. If used, methanol, ethylene glycol, and water contaminated by freezing depressants will be collected in tanks and disposed of or recycled in an approved manner. Contaminants will not be allowed to enter the natural environment. 35. Dangerous goods will not be stored near steep slopes, watercourses, waterbodies, ditches or wetlands and will be contained in a manner which will minimize the risk of contaminating water bodies. 36. Shippers, carriers, and receivers of hazardous waste will be licensed and registered with the Ministry of Environment. Current and valid licensing and registration will be a contract requirement for contractors. A copy of licensing and registration documents will be forwarded to the Environment & Sustainability Lead on request. 37. The contractor will keep records of waste dangerous goods generated, transported, stored, and sent for disposal. A copy of such records will be forwarded to the Environment & Sustainability Lead on request.

3.0 PROJECT CONSTRUCTION

3.1 GENERAL ENVIRONMENTAL PROTECTION MEASURES

The general environmental protection measures provided below are applicable to all work areas and activities throughout the construction phase. These general measures are followed by detailed protection measures for each construction activity.

Some procedures are universally applicable, regardless of environmental issue or construction activity. Many of the procedures are industry best practices. Failure to adhere to them often results in unacceptable environmental effects, danger to construction crews, and/or unwanted damage and compensation costs.

Activity/Concern	Mitigation Measure
Discipline	1. Those who show careless or wanton neglect of the environment or disregard the EPP will be removed from the work site.
Access Management	2. Minimize traffic as much as practical as per the Transportation Plan provided in Section 2.0. 3. Vehicular traffic and construction activities will be restricted to the designated right-of-way, construction footprint, approved temporary work spaces, and access roads. If boundary stakes or demarcation fencing are inadvertently damaged or destroyed, they will be replaced or repaired immediately. 4. All roads damaged by construction vehicles will be repaired to preconstruction conditions. All traffic safety and road closure regulations will be followed. 5. Restrict construction traffic to the work side of the right-of-way to reduce the area subjected to potential soil compaction and rutting. 6. MIPL's contractor staff and personnel will limit their use of a right-of-way to the minimum amount and narrowest extent possible to restrict damage to crops, fences, ditches, access trails, and private and public property. 7. Where the right-of-way passes through shelterbelts or windbreaks, or passes under ditches, the width of the right-of-way will be restricted to that required for the safe operation and use of equipment. 8. To minimize excessive crop damage on agricultural land, surveyors will make every effort to stay within the immediate area of the preliminary route when surveying. 9. The use of a reclaimed right-of-way for construction traffic will be avoided. 10. Recreational use of ATVs by construction personnel will be prohibited on the construction site.
Survey Staking and Line of Sight	11. Clearly survey and stake the access road, meter station, pipeline boundaries, temporary work spaces, and pipeline centerline. Travel, and work only within flagged areas. 12. If the staked right-of-way is insufficient to accommodate all activity, spoil piles, cut and fills, or other needs, additional right-of-way will be acquired through proper procedures; required approvals will be obtained. 13. Clearly flag or fence-off areas to exclude identified sensitive site specific features (e.g., archaeological sites, rare plant sites.).
Vegetation Clearing	14. Mow standing crop (if present) and any grassland strips within the staked right-of-way, temporary work space, and meter site. Mower unit must be clean and inspected before use. 15. Following clearing, re-mark all sensitive resources as necessary and supplement markings with signage.

Activity/Concern	Mitigation Measure
Topsoil Salvage - General	16. Initial civil (earthwork) on the meter site, right-of-way, and temporary workspace will be undertaken with equipment which will minimize disturbance of the soil surface such as low ground pressure tracks or tires. 17. Efforts will be employed to minimize topsoil dilution (admixing) and loss during stripping or topsoil disturbance on areas not stripped. 18. Topsoil will not be stripped from the temporary workspace or other designated work areas (e.g., perimeter of the meter station, laydown sites) provided measures are in place to address the risk of compaction and rutting. These include: working in suitably dry conditions, use of protective matting, and/or use of low ground pressure equipment. Alternatively topsoil on areas of the temporary workspace that present compaction and rutting risks may be stripped and stored for replacement once construction is complete. 19. Salvage topsoil on all areas to be stripped based on color change. Assign a person to guide the equipment operator as to the depth of topsoil/upper surface material, if warranted. 20. Salvaged topsoil/organic material and graded or excavated subsoils will not be stored in drainages or adjacent to low-lying areas, wetlands, or defined watercourses 21. Topsoil will be stripped from the right-way, or other work areas, and stored in such a way as to minimize the mixing of topsoil with sub-surface soils until it is returned during clean-up. The amount and width of topsoil to be removed and stored separately from the spoil will depend upon soil conditions, land use, and landowner requests. The width and depth of topsoil removal will be determined on a quarter by quarter basis. 22. Salvage topsoil from the trench and spoil pile area on cultivated and poorly-sodded hay lands (Dwgs. No. 6-11, 14-16 of SaskEnergy's EPS). 23. Salvage a greater width of topsoil at sharp sidebends and at crossings of watercourses, roads, ditches and foreign lines to accommodate a wider and deeper trench. Similarly, strip topsoil/upper surface material from all other areas to be excavated, such as catch pits or foreign line exposures. 24. Strip a wider area of topsoil/upper surface material from areas that are susceptible to unstable trench walls, or where boulders or rocks are anticipated to be encountered at trench depth. The area stripped should be wide enough to ensure that topsoil/subsoil mixing does not occur. 25. Tackify, apply water, or pack the topsoil pile with approved equipment if, in the opinion of the Chief Inspector or Environmental Monitor, the salvaged soils are likely to be prone to wind erosion.
Wet Soil Conditions	26. Implement the Wet Soils Contingency Measures (Section 4.0) if wet soil conditions are encountered adjacent to wetlands, or as a result of precipitation events or construction being delayed until spring conditions.
Erosion and Siltation	27. Sediment barriers will be installed prior to or immediately after initial ground disturbance at the following locations: a) Within the right-of-way at the edge of the boundary between a defined/functioning wetland and upland; b) Along the edge of the right-of-way, where the right-of-way slopes toward a defined/functioning wetland, to protect any adjacent, off right-of-way wetlands. 28. Barriers may be constructed of materials such as sediment fence, staked straw bales, compacted subsoil berms, sandbags, or equivalent material. 29. Sediment barriers should be constructed on level ground or at toe-slopes whenever possible. 30. Sediment barriers will be inspected regularly to ensure proper functioning and maintenance. Barriers will be inspected and maintained on a weekly basis throughout construction and within 24 hours following storm events. 31. On non-cultivated lands, sediment barriers will be left in place until permanent vegetation measures on disturbed areas are successful. 32. Prevent or control soil erosion and water siltation to the satisfaction of the Chief Inspector, Environmental Monitor and the appropriate provincial authority. The Contractor will make

Activity/Concern	Mitigation Measure
	available personnel and equipment to install and maintain erosion controls when warranted. 33. Soil handling will be suspended during high wind events to prevent loss of topsoil. Where persistent high winds are eroding topsoil piles, erosion control measures, such as the application of water, snow fence, mulch, clean straw, soil tackifiers or secured tarping for small piles, will be used to stabilize the topsoil (Drawing No. 19 of SaskEnergy's EPS). 34. Regulate all drainage from construction areas, including ditches and/or berms, to prevent off-site erosion and sedimentation. On non-cultivated lands, sediment barriers will be left in place until permanent vegetation measures are successful. 35. Final grade of agricultural lands will ensure that the surface flow of water is not impeded.
Vegetation Clearing at Watercourses/ Waterbodies	36. Remove only that vegetation adjacent to a watercourse, waterbody and/or ditch that is necessary. 37. Document watercourse crossings with photos prior to any clearing activities and after construction.
Wetlands	38. Any wetland boundaries present within 10 m of the project footprint will be marked and protected as applicable using a suitable sediment barrier (e.g. embedded sediment fence) (Appendix A, Drawings No. 19) prior to the start of construction. 39. Sediment barriers will be inspected and maintained on a weekly basis throughout construction and within 24 hours following storm events. 40. Sediment barriers will be left in place until reclamation measures are successful and upland areas adjacent to wetlands are stabilized. 41. Construction activities (including equipment use and materials staging) should be located a minimum of 10 m away from wetland boundaries, if practical. 42. Narrow down the construction right-of-way and protect the wetland by using fencing; clearly mark the wetland boundaries using flagging and limit traffic in the vicinity of the flagged area. 43. Dewatering of the construction site will not discharge directly into wetlands. 44. Minimize the removal of vegetation and the disturbance of soil adjacent to wetlands. 45. During open water season, spoil stored on wetlands will be minimized. Spoil will be stockpiled at the edge of the wetland in discrete piles, where possible. Additional right-of-way will be acquired adjacent to the wetland to accommodate spoil requirements if required. 46. Use of vehicles and equipment within wetlands will be avoided, if practical. If activities within a wetland are required during construction, provincial permit conditions will be followed. If standing water or saturated soils are present in a wetland, or if construction equipment causes excessive rutting, use low-ground-weight construction equipment or operate equipment within the wetland on prefabricated mats. 47. Equipment and machinery will not be washed in or near wetlands or defined drainages. 48. The original contours and drainage patterns will be re-established to all disturbed wetland and/or drainage areas. 49. Seed, fertilizers, or mulch will not be applied in wetlands. Restrict the use of fertilizer within 10 m of wetlands. The construction site in wetland areas will not be seeded unless specified by the appropriate government agency (i.e., promote natural regeneration of the plant community).
Invasive Species / Weeds	50. Equipment must arrive to the project site in a condition free of remnant soil or plant material to minimize the risk of weed introduction. Equipment that arrives containing loose or compacted soil and plant material will not be allowed on the construction site until it has been cleaned using brooms, brushes, shovels, high pressure water, or compressed air. Ensure any locations used for cleaning of equipment do not permit any further spread of invasive species or weeds. 51. Pre- and post-construction weed control measures will be developed in conjunction with the landowner/occupant. 52. Note any infestations of weeds in construction notes prior to clearing.

Activity/Concern	Mitigation Measure
	53. Monitor weed growth on topsoil/upper surface material piles during the course of construction and corrective measures (i.e., spraying, mowing) will be conducted if warranted. 54. Use of pesticides/herbicides will be restricted in areas of known plant species of management concern occurrences.
Livestock / Pets	55. Construction personnel are not permitted to have pets at the construction site. 56. Harassment of livestock is prohibited.
Wildlife	57. Do not harass or feed wildlife. Any incidents with nuisance wildlife or collisions with wildlife will be reported to Environment & Sustainability Lead as well as the appropriate provincial wildlife authority and the local police detachment. 58. Fencing will be erected around open excavations to exclude wildlife. 59. The speed limit at the construction site will be a maximum of 40 km/hr and may be lowered where specific wildlife concerns have been identified. 60. Wildlife features (e.g., wetlands, nests) will be flagged and/or fenced in the field, as specified by project environmental permits/approvals, and related environmental instructions, prior to commencement of construction. 61. Any previously unidentified sensitive habitat features or potential conflicts with species of concern are to be reported to the Environment & Sustainability Lead who will report the information to applicable provincial/federal agency personnel, as required. A mitigation plan will be developed in consultation with the agency, if required. 62. In the event that construction activities are scheduled to occur within the Primary Nesting Period for migratory birds (Zone B4; May 5 to August 15; ECCC 2017), nest searches and/or avian use surveys (occurrence of territorial or nesting behavior) may be completed, as directed by the Environment & Sustainability Lead. 63. Construction will occur during daylight hours to avoid disturbance to crepuscular and nocturnal species. 64. If wildlife species of management concern are encountered refer to Wildlife Species of Management Concern Contingency Plan (Section 4.0).
Backfilling	65. Backfilling will occur immediately after lowering-in to minimize the length of open trench. Backfilling will be completed to within 1.5 km of the lowering-in operation; rough backfilling will be within 100 m of lowering-in at the end of each day. Generally, this interval should not exceed three days. 66. Subsoil and parent material (spoil) will be backfilled prior to replacing topsoil. 67. When completing trenching and backhoe operations, the trench will be filled with spoil and compacted by passing tracked equipment three times over the trench line. After all spoil is replaced and compacted, the topsoil will be placed over the trench. 68. Do not walk machinery on the topsoil pile while backfilling subsoil. Use equipment (e.g., clean-up bucket) for final pass of backfilling which will minimize scalping and is approved by the Chief Inspector or designate. 69. In wetland areas where the spoil is situated adjacent to the trench, backfill will be replaced either by a backhoe or trackhoe. 70. Install trench plugs and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may act as a drain. 71. Material excavated from the trench that is not suitable as backfill, such as large rocks, will be temporarily stored along the edge of the construction site and then hauled off the site for disposal at an approved location. 72. On cultivated lands, the top 0.3 m of trench will be left free of rocks to prevent interference with farm implements. 73. Topsoil and/or subsoil compaction will be reduced, as appropriate, using a scarifier, deep tillage, or breaking discs on areas that will be returned to cultivated land use.
Topsoil Replacement - General	74. Salvaged topsoil will be evenly spread over the previously stripped portions of the right-of-way. Topsoil will be spread after a low profile and tapered trench crown has been constructed from the replaced backfill, and during dry and low wind weather conditions.

Activity/Concern	Mitigation Measure
	The right-of-way will not be graded to obtain replacement topsoil. Frozen topsoil will not be replaced until thawed, if necessary, by replacing the topsoil the following spring. 75. The non-travel portion of the meter site access road will be cleaned up and reclaimed according to the same procedures followed for clean-up and reclamation of the of meter site. 76. Leave breaks in the trench crown at obvious drainages and wherever seepage occurs to minimize interference with natural drainage. Leave breaks in the crown at frequent intervals where sidehill is encountered.
Revegetation and Reclamation Timing	77. Replaced topsoil in the road crossing bar ditches will be seeded using an approved weed-free reclamation mix as soon as practical. Areas disturbed and reclaimed at the Grassy Creek crossing will be allowed to naturally regenerate via the replaced topsoil seedbank. 78. Vegetation growth on non-cultivated areas will be inspected regularly to confirm a self-sustaining vegetation cover is established and maintained. Any sites with sparse growth will be re-seeded, including implementation of any other remedial measures to enhance plant establishment. 79. Approved seed mixes should be certified and analyzed for the species and percentage of prohibited and noxious weeds in permanent cover applications. Seed certificates of analysis will be obtained and copies made available to the Environment & Sustainability lead for approval prior to application and retained on file. 80. Seeding of cover crops may serve as effective wind and water erosion barriers. For rapid and short term erosion protection or to create safe site for desired species, a nurse/cover crop of non-aggressive annual cereal (e.g., oats, barley) or forage (e.g., fall or annual rye) can be included in the seed mix or seeded on their own. 81. Seed disturbed areas in accordance with the recommended seed mixes, rates, and dates. 82. Seeding is not required in actively cultivated croplands unless requested by the landowner
Air Quality and Noise	83. Dust suppressants will be applied (e.g., water, calcium chloride, or tree lignin based dust suppressant) on the right-of-way or access roads as required. Calcium chloride will not be used on agricultural fields or near wetlands. Local road authorities will be informed prior to application of dust suppressants on roads. Watering for dust control must not result in the formation of puddles, rutting by equipment or vehicles, the tracking of mud onto roads, or the siltation of watercourses. 84. Company and construction personnel will avoid excessive idling of vehicles. Vehicles or equipment are to be turned off when not in use unless required for effective operation of the vehicle or equipment. 85. Construction equipment will be maintained in good working order and properly muffled. 86. High-efficiency, low-NOx reciprocating engines will be utilized. 87. Ensure equipment is well-maintained. 88. Ensure noise abatement equipment on machinery is in good working order.

Activity/Concern	Mitigation Measure
Fuel Storage & Spill Prevention	89. Fueling and lubrication of construction equipment will be carried out in a manner that minimizes the possibility of spills. On-site fuel tanks, if required, will be situated in a designated area and have appropriate secondary containment. 90. All fuel storage and handling operations will be sited at least 100 m from the nearest wetland or defined drainage unless appropriate secondary containment is in place. 91. Refueling activities will be monitored at all times, and vehicles will not be left unattended while being refueled. Containers, hoses, and nozzles will be free of leaks. Fuel nozzles will be equipped with functional automatic shut-offs and spill containment and response material will be stored on site. 92. When refueling, a catch tray of sufficient size and depth will be employed to minimize the risk of accidental spillage of waste products. 93. Spills will be cleaned up immediately and reported to the Environment & Sustainability Lead and the appropriate regulatory agencies.
Vehicle and Equipment Maintenance	94. Vehicles, machinery, and equipment will be free of fluid leaks, and will be equipped with a spill kit and fire extinguisher. 95. Repair and maintenance, of all vehicles and equipment will be restricted to a confined area. An impervious groundsheet will be laid under the equipment or machinery being maintained or repaired to intercept all fluids which might leak or spill. Used oil, filters, and grease cartridges and other products of equipment maintenance will be collected and disposed of at an approved waste site.
Heritage Resources	96. In the event a previously unknown archaeological resource is discovered during construction, work activity in the area of the discovery will be suspended and the Heritage Resource Discovery Contingency Plan (Section 4) will be initiated.
Emergency Response Plans	97. Be familiar with and prepared to implement the Emergency Response Plan for the project site.
Contingency Plans	98. Be familiar with and prepared to implement the Contingency Plans (see Section 4.0) for: wet condition shutdown, fire, spills, extreme weather, heritage resource discovery, contaminated soils, vehicle accident, damage to existing utilities, wildlife species of concern discovery, and rare plant species of concern discovery.
Equipment	99. Equipment used will be appropriate to the size and scale of the pipeline construction program.
Plugs and Gaps	100. The Chief Inspector will be contacted to determine the amount of continuous open trench that may be allowable, the location of plugs, and the corresponding location of gaps in the spoil pile. Plugs and gaps may be required to permit vehicular access, farming equipment and movement of livestock and wildlife from one side of the trench to the other. Recommended minimum width of the plug and gap is 3 m. Plugs and gaps should correspond to gaps in soil windrows. (Appendix A, Drawing No.1).
Fences	101. Fences and gates hindering the construction program will be replaced with temporary fences and gates. Gates will be kept closed when not in use, unless otherwise directed by the landowner/occupant. 102. Any fences inadvertently damaged adjacent to the construction site will be repaired immediately. If neighboring fence sections need to be removed to facilitate construction, temporary fences will be installed that bypasses the construction area (see Drawing No. 3 of SaskEnergy's Environmental Protection Standard (EPS)). Original fenceline will be re-established at the end of construction. 103. In co-operation with the landowner or occupant, arrangements will be made for appropriate timing for the removal of any existing fences or gates, and the temporary replacement of all fences and gates that might have been damaged or removed. Replacement fences will be of a quality comparable to or better than fences or gates damaged or removed. (Appendix A, Drawing No. 2 and Drawing No. 3).

Activity/Concern	Mitigation Measure
	104. Where the contractor requires a suitable, substantial gate or gap in a fence intersected by the proposed pipeline for the passage of construction equipment, the fences will be braced and reinforced on each side of a gap to be opened before the fence is cut. Gates will be constructed to facilitate secure closure and are satisfactory to the occupant's approval.
Garbage	105. Continuously collect and dispose of all construction garbage at an approved facility to avoid the attraction of nuisance animals. Waste containers shall accompany each working unit. No waste shall be disposed of in the trench or excavated areas.

3.2 METER STATION

The following site development and reclamation environmental management and protection measures will be applied for construction of the meter station.

Activity/Concern	Mitigation Measure
Topsoil Salvage – Meter Station Specific	1. Topsoil will be stripped from the meter station and stored in such a way as to minimize the mixing of topsoil with sub-surface soils until it is returned to those parts of the site that will not be graveled during operations or placed in long-term storage areas adjacent to the meter station. Excess topsoil from themeter station will be stored for final reclamation by incorporating it into topsoil on the temporary workspace. 2. Long term soil storage areas (e.g., elongated, low profile berms) remaining in place once meter station construction is complete will be marked on as built drawings, including volumes, dimensions, and locations. 3. If a berm will be used to manage surface water flow and to act as a barrier in the event of an uncontrolled product release, do not exceed 1 m in height, compact soils, and do not use topsoil as a water management berm around the meter station.

3.3 Pipeline Construction and Reclamation

The following site development and reclamation environmental management and protection measures will be applied.

Activity/Concern	Mitigation Measure
Staking – Pipeline Specific	1. Stake both boundaries of the right-of-way and any additional temporary workspace. Do not allow clearing, grading or trespassing beyond the stakes unless additional workspace rights have been obtained. Clearly flag or stake the boundaries of temporary access roads and shoo-flies. 2. Stake the right-of-way so that foreign lines, and roads are crossed perpendicularly or as per crossing agreements.
Topsoil Salvage – Pipeline Specific	3. Leave gaps in the topsoil and spoil windrows at locations where surface drainage will cross the right-of-way. Also leave gaps in continuous soil windrows, where warranted, to allow wildlife and farm equipment to cross the right-of-way. 4. Topsoil will be stripped and stockpiled separately from any spoil. Topsoil will not be mixed with spoil. After the pipe is installed, the trench and any excavated bellholes will be filled with spoil and compacted. After all spoil is replaced and compacted, the topsoil will be placed over the trench or bellhole. Keep spoil pile separate from topsoil/upper surface material pile. Employ efforts to maintain a minimum separation distance of 1 m between topsoil and spoil piles when stored on the same side of the trench.

Grading	5. Grade changes requiring excessive cuts and fills will be minimized. Grading will occur only as required to provide an adequate surface for construction equipment and to allow over bends and sags to be made within permissible bending limits (Drawing No. 15 of EPS). 6. Where possible, the right-of-way will be two-toned to restrict the need for deep cuts and additional right-of-way on steep side hills (Drawing No. 16 of SaskEnergy's EPS).
Foreign Pipelines	7. Construct or install ramps on the work side of the right-of-way over existing foreign pipelines as per crossing agreements.
Trenching	8. Trenching will be suspended at the discretion of the Chief Inspector and/or Environmental Monitor if the soil and right-of-way are excessively wet. 9. Trenching in areas with a high water table will be deferred until just prior to lowering-in to prevent the trench from sloughing. 10. Trenching operations will not be allowed to drain sloughs and other bodies of standing water unless permission has been granted by landowner/occupant, Water Security Agency, and Ministry of Environment. Pumping water off right-of-way requires approval from the Water Security Agency. 11. When severe erodible areas are encountered, grading requirements will be minimized or eliminated by allowing for the bending of pipe to maximum permissible limits.
Hot Line Exposure/ Hydrovac	12. Assign a tow dozer or tractor to assist the hydrovac through localized wet areas to minimize the risk of rutting or install access matting prior to entry if suspected soft ground conditions 13. Develop a plan for disposal of hydrovac materials on to approved locations (e.g., at road crossings where topsoil has been stripped) in consultation with landowner or land manager. Ensure hydrovac material is contained (i.e., will not migrate to topsoil/upper surface material, wetlands, ditches or waterways).
Stringing, Welding, Trenching and Lowering-in	14. A gap of at least 3 m wide will be left between pipe joints to allow vehicle access or livestock/wildlife to cross the right-of-way. These gaps should coincide with trench plugs and gaps left in topsoil and spoil piles. The Environmental Monitor will determine the frequency and location of gaps in sensitive habitats. 15. Lowering-in will occur as soon as possible to minimize the length and duration of open trench. 16. Weld up pipe prior to trenching at locations with soils prone to sloughing in order to minimize the time the trench is left open. Equip trenching wheel with slope cutters or V-bucket, if warranted, to minimize the risk of trench sloughing. 17. Suspend trenching and strip a wider area of topsoil/upper surface material if the trench walls slough into the ditch and the potential for topsoil/subsoil mixing exists. Back slope the trench walls until stable. 18. Dewater the trench, if warranted, when laying pipe in areas with high water tables. Pump water onto stable and well vegetated areas, tarpaulins or sheeting in a manner that does not cause erosion or any unfiltered or silted water to directly re-enter a watercourse. Place pumps on polyethylene sheeting above the high water mark of the watercourse/wetland. 19.
Recontour Right-of-Way	20. Recontour the right-of-way and restore the preconstruction grades and drainage profiles. 21. Right-of-way left in a condition to allow unimpeded and unimpaired resumption of preconstruction land use.

3.4 Water Crossings

The following general mitigation measures will be applied during construction activities at the Grassy Creek crossing location.

Activity/Concern	Mitigation Measure
General	1. It is not expected that fish will be encountered at the Grassy Creek crossing due to a lack of suitable habitat, however, if a fish are encountered adhere to Measures to avoid harmful alteration, disruption, or destruction to Fish and Fish Habitat. (Appendix B)
Isolated Crossings	2. Water from flumes, pump-around, diversions, or other methods used to maintain downstream flow must not cause erosion or introduce sediment into the channel. 3. Earthen berms should not be used for isolation. All berms and materials must be completely removed from the channel and streambed, and bank profiles must be returned to preconstruction conditions at the end of the project. 4. Sediment laden water in the work area must be discharged to an upland vegetated area prior to removal of the isolation dams.
Open Cut	5. Open cut crossings are carried out on small watercourses with limited to no water flow (Drawing No. 40 of SaskEnergy's EPS).
Vehicle Crossings	6. Ensure the appropriate vehicle crossing technique is employed (e.g., access mats). Use existing vehicle access across watercourses when possible.

3.5 HYDROSTATIC TESTING

The following general environmental management protection measures will be applied during hydrostatic testing.

Activity/Concern	Mitigation Measure
Pre-Testing	1. Warning signs will be placed at strategic locations to notify the public that the line is under test.
Permitting and Regulatory Compliance	2. If water from a natural surface, dugout or groundwater source is to be temporarily used for hydrostatic testing, application to the Water Security Agency will be required. 3. Environment & Sustainability is responsible for managing regulatory notification/reporting under hydrostatic testing requirements. A detailed discharge plan is required from Engineering and Construction for Environment & Sustainability. Please ensure that this plan is provided to Environment & Sustainability at least 15 days in advance of the proposed testing date.
Source Water	4. Hydrostatic test water may be obtained from nearby lakes, watercourses, municipal sources, or surface water features, including dugouts, in accordance with applicable permits for the withdrawal of water. Water withdrawal from natural water bodies will not exceed maximum withdrawal rates specified by the Water Security Agency permits or authorization letters. 5. All water withdrawal will adhere to the following requirements: a) If the source water is fish-bearing, screen the source water intake in a manner that prevents fish passage or impingement at the intake b) Ensure that when removing source water: i. biota that does not naturally occur in the source water is not transferred to the source water ii. any substance that may cause an adverse effect to the aquatic or terrestrial environment is not transferred to the source water iii. the bed, bank or boundary of any watercourse or water body is not altered

Activity/Concern	Mitigation Measure
	iv. any sand, gravel or other material is not removed, displaced or added to the bed, bank or boundary of the watercourse/waterbody v. vegetation is not removed from the bed, bank or boundary of the watercourse/waterbody 6. Photographs will be taken of the surface sources prior to, during and following water extraction. 7. Hydrostatic test waters will be sampled and analyzed for inorganic, metal, and physical water quality parameters specified in the Project-specific construction plans.
Chemical Additives	8. Chemical additives will not be used in hydrostatic test water. All waters in which methanol has been added will be disposed of at an appropriate waste disposal facility or recycled.
Discharge	9. Discharge will be to an approved handling facility or to land only – discharge to waterbodies is not generally permitted unless authorized. 10. All discharge of hydrostatic test water to land will meet the following requirements: a) Prior written consent will be obtained from the landowner where the discharge is to occur, as will the consent of landowners whose lands may be affected by the discharge b) Discharge sites will be determined early in the project to allow for proper planning: i. The same discharge location will not be used more than once in any 12 month period ii. Discharge sites should be well-vegetated to limit likelihood of erosion, and away from wetlands/waterbodies where possible – water will not be discharged directly to waterbodies/watercourses. iii. Test waters will be verified for compliance with water quality limits set out in the Project-specific construction plans. Only waters within the Hydrostatic Testing Chapter's quality limits for discharge to land may be released to land (Government of Saskatchewan 2014). Water not within quality limits will be disposed of into a licensed treatment facility or, if quality is compatible with existing environmental conditions, to land following consent from Ministry of Environment and relevant landowners. 11. All reasonable measures must be taken to limit erosion at the dewatering site and adjacent area. The rate of discharge shall not cause erosion issues. 12. At dewatering points, piping will be free of leaks and properly anchored to prevent bouncing or snaking during surging. 13. The rate of discharge should not exceed the rate of discharge approved by Qualified Personnel in the EPP or in any application to regulators under which a permit was issued for the project. 14. Hydrostatic test water should be discharged through a suitable energy dissipater to prevent surface erosion and filter cloth to catch pipe scale, rust or other foreign material. This filter cloth is to be disposed of at a licensed disposal facility. 15. Photographs of all discharge sites to be taken before, during, and after discharge.

4.0 MANAGEMENT AND CONTINGENCY PLANS

The following contingency plans and measures have been developed to minimize the risk of adverse impacts on the environment, public health, and safety in the event of accidents or unplanned events. Contingency measure requirements for individual construction projects will vary with the scope and location of the project and risk of events. MIPL's contractors will develop contingency plans to deal with accidental spills, stream damage, fire, and other hazards which might arise in spite of efforts to avoid such hazards. These contingency plans will be filed with MIPL and included in any Emergency Response Plan. The Chief Inspector/ Project Field Supervisor is responsible for site supervision, stop work authority, and communication.

Activity/Concern	Mitigation Measure
Wet Condition Shutdown	1. Suspend or postpone construction activities if adverse weather or ground conditions cause, or may cause, adverse effects (e.g., excessive erosion, mixing, rutting, loss or degradation of surface soil, sedimentation of watercourses [see Section 4.0]) 2. Initiate contingency measures once one of the following indicators occurs: a. Rutting occurs when topsoil is mixed with subsoil for a length of 5 m or greater or otherwise defined by permit; b. Excessive wheel slip that creates a rut 30 cm in depth and greater than 5 m in length; c. Formation of water saturated soil with standing visible water (puddles); or d. Tracking of mud greater than 0.5 cm thick on to primary and secondary highway roads when vehicles exit the right-of-way; 3. Employ the following contingency measures progressively or individually as warranted if the above indicators occur: a. Prevent rubber-tired traffic from driving on the right-of-way or work site; b. Install geotextiles or matting to increase the load bearing capacity of wet ground; or c. Restrict construction vehicle traffic to subsoil or use low pressure tires on vehicles to reduce admixing and compaction if the soil is saturated and construction must proceed. 4. Salvage topsoil or upper surface material from full right-of-way to prevent mixing and rutting (note that full right-of-way stripping cannot be conducted when soils are excessively wet). 5. The wet conditions shut-down decision will be made by the Chief Inspector and/or Environmental Monitor. 6. Do not allow access off right-of-way to avoid wet areas. Do not allow braiding of access roads/trails on the travel side of the right-of-way.
Fire Contingency Plan	7. Contractors shall ensure that all necessary fire-fighting equipment is available at the job-site and shall appoint a fire boss (e.g. on-site foreman). 8. A list of 24-hour fire dispatch coordinators and telephone numbers shall be developed and posted at the job sites. 9. In the event of a fire, the fire boss will inspect the fire site immediately and take charge of directing suppression measures. 10. The fire boss shall report any fires and relevant information to the Chief Inspector, local fire department, landowner, and any on-site occupants as well as the appropriate government agencies and request assistance as needed.
Spill Contingency Plan	11. Contractor and MIPL field staff will be trained in spill containment procedures.

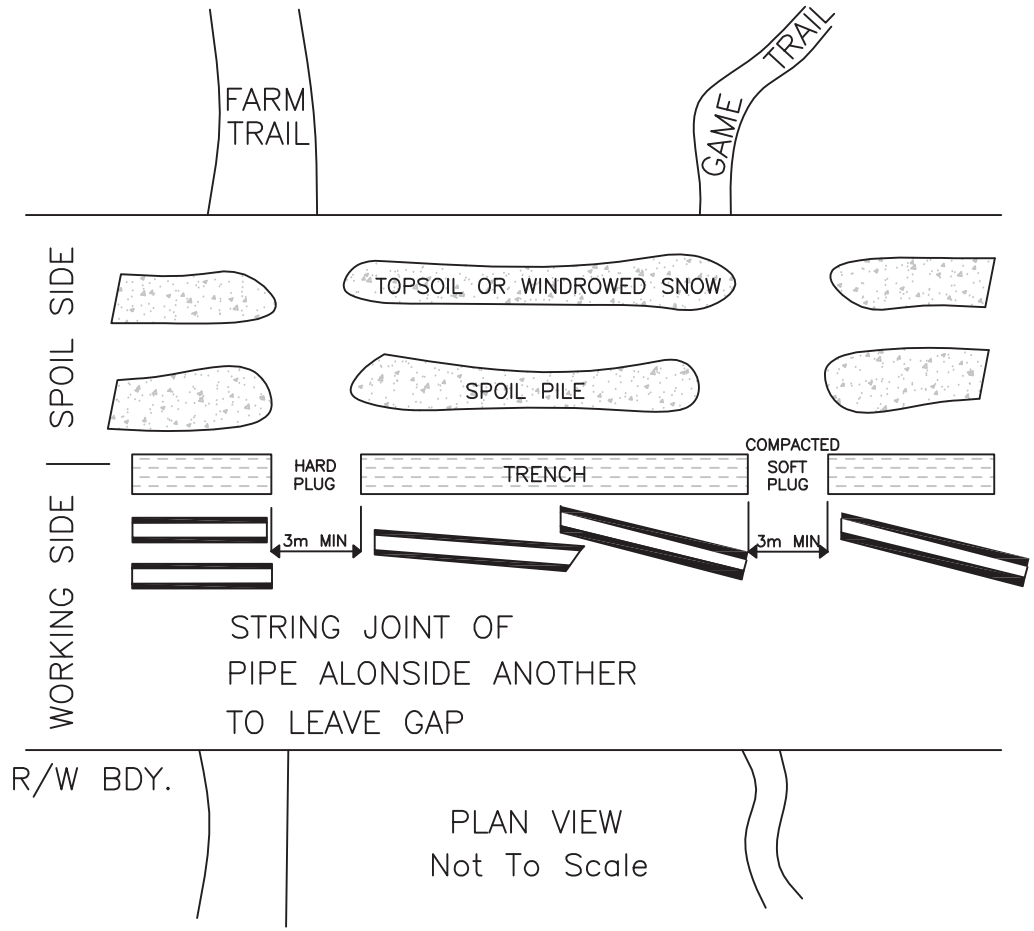
Activity/Concern	Mitigation Measure
	12. The contractor shall have available on all service trucks and equipment a spill response kit suitable for spills of hazardous products that may occur on the construction site. 13. The contractor employees shall be knowledgeable on the use of the spill kit. 14. Vacate the spill area and proceed to a safe location that is well ventilated and upwind of the spill. 15. If a hazardous substance is spilled, the following safety precautions must be observed: a) Refer to container labels and Material Safety Data Sheet to identify any potential health or flammability hazards b) Wear and use appropriate personal protective equipment when handling or working near hazardous substances c) If the substance is flammable, eliminate ignition sources and secure the area d) Record details of the event as they are known and actions as they are implemented. Photos will be taken to capture the events. e) Notify MIPL's supervisor/inspector and provide all known details f) If a supervisor/inspector cannot be reached, secure the area from public access by establishing a safe perimeter. Evacuate the immediate area, and the area downwind and remove any ignition sources. 16. Notify MIPL's supervisor/inspector and provide all known details which may include: a) Time of spill b) Location of spill c) Type and volume / quantity of materials spilled d) Distance to nearest waterbody, well or dugout e) Your name and phone number f) Any other risks or issues posed by the spill/release 17. If no company designate is available, a Contractor shall immediately contact Gas Control if a natural gas release or leak is detected (1-888-7000-427). 18. In any release or spill event, first priority shall be given to the safety of people, second priority shall be the protection of the environment, and third priority shall be the protection of equipment or facility. 19. No action to open/ close valves or operate any TransGas/SaskEnergy/MIPL Facilities without direction from the Company Operations Management or designate. 20. If it is safe to proceed, stop the flow and contain the spilled material. 21. Contaminated material (soil, sorbents, etc.) shall be collected and disposed of in accordance with applicable legislation and company standards. 22. Documented spill locations will be inspected to confirm they were adequately cleaned-up or remediated in accordance with established regulatory guidance (e.g., Directive PNG 018 *Detailed Site Assessment Requirements*, Government of Saskatchewan, 2015).
Extreme Weather Contingency Plan	23. Monitor existing erosion control measures to determine adequacy in the event of an extreme precipitation event. 24. Construct berms of subsoil, sandbags, or straw bales on approach slopes to divert runoff off the construction site and onto well vegetated lands or established storm water collection points.

Activity/Concern	Mitigation Measure
	25. Import sand bags and place strategically to help stabilize and add height to banks to prevent flooding of nearby areas, especially where vegetation has been removed. 26. Following periods of excessive rainfall or saturated soil conditions, construction will be suspended until suitable soil conditions return. 27. If extreme precipitation has impacted wetlands or slopes in the construction area, appropriate stabilization, and reclamation measures will be implemented. 28. Once the extreme weather event has passed, remove any installed erosion control and flood control measures.
Heritage Resource Discovery Contingency Plan	29. Suspend work immediately in the area of any newly discovered resource of significance. 30. Notify the Chief Inspector and Environmental Monitor, who in turn will notify the Environment & Sustainability lead. The appropriate government agencies and relevant MIPL department and managers (e.g., Aboriginal Relations) will be notified by the Environment & Sustainability Lead. 31. Heritage Resource Specialists will assess the site, as required, and develop appropriate mitigation plans in consultation with the Environment & Sustainability Lead MIPL and government agencies. 32. Construction at the site may resume once permission has been granted by the Heritage Resource Specialist, Environment & Sustainability Lead, or government agency. 33. If skeletal remains are found that appear to be human, the RCMP, as well as the Heritage Conservation Branch (HCB), are to be contacted. Work activity in the area of the discovery will be suspended, the site secured (e.g., fenced off) and no human skeletal remains are to be interfered with or removed. 34. If the discovery is on the construction site and cannot be avoided, construction in the immediate vicinity of the site will be suspended and will only resume upon the approval from the HCB. 35. If the site is not on the construction site or can be avoided, the site is to be marked for avoidance and protected as set out above. Construction can continue. Notification is still to occur as set out below: a. The Chief Inspector will be immediately notified of the discovery of the site and given location information; and b. The Chief Inspector will immediately notify the Project Leader and Environmental & Sustainability lead who will in turn immediately notify the Director of Environment & Sustainability, the Manager of Aboriginal Relations and HCB.
Contaminated Soils Contingency Plan	36. The contractor or construction personnel will immediately inform the Environment & Sustainability Lead that contaminated soil has been encountered or suspected. The company will retain expert advice on assessing and developing a soil sampling, handling, and remediation plan in accordance with the *SaskEnergy/TransGas Safety Manual.* 37. The company will inform the appropriate government agencies if the soil is deemed to be contaminated. 38. The company will erect signage to warn site personnel and the public of the contaminated area. Construction equipment will be removed from the area. 39. Soil suspected of contamination will be isolated using fencing when required.
Vehicle accident - All Project components	40. Identify requirements for construction vehicle/access control during construction, such as restricted access areas, gated/manned access, signs, in/out privileges, traffic flows (one-way traffic), crew buses, and speed limits, where required.

Activity/Concern	Mitigation Measure
Damage to existing utilities - All Project components	41. Notify First Call, SaskPower, third party companies and/or municipalities having utilities or infrastructure/assets in the vicinity of construction prior to the commencement of construction. 42. All buried and overhead utilities in proximity to the construction site will be clearly identified and marked with warning signs or other structures (e.g., overhead cable goal posts to mark height restrictions). 43. Underground pipelines or utilities will be located by competent personnel prior to ground disturbance.
Wildlife Species of Management Concern	44. Construction scheduled to occur outside of the sensitive breeding and rearing periods for most wildlife and project components avoids key natural habitat types. Nonetheless, any occurrences of wildlife species of management concern or wildlife conflicts in general are to be reported to the Environmental Monitor and Environment & Sustainability Lead to confirm regulations and mitigation requirements. 45. Amphibians observed in proximity to the project are to be reported immediately to the Environmental Monitor and Environment & Sustainability Lead. Northern leopard frogs (*Lithobates pipiens*) may be present along the Project. Northern leopard frogs are listed as *Special Concern* by the Committee on the Status of Endangered Wildlife in Canada and their breeding and overwintering habitat has a recommended year-round disturbance setback of 500 m for construction and construction activity. Construction personnel will be instructed not to handle any observed northern leopard frogs or other wildlife. 46. The Environmental Monitor will conduct regular wildlife inspections throughout the project work area. If leopard frogs are observed moving towards overwintering sites, appropriate mitigation and protection measures will be determined in consultation with the Environment & Sustainability Lead and regulatory agencies. This may include exclusion fencing, spotters walking in front of moving equipment, and confirming there are unimpeded passageways across the right-of-way at strategic locations. 47. Birds and raptors observed in proximity to the project are to be reported to the Environmental Monitor and Environment & Sustainability Lead. There are historical occurrences of 17 bird and raptor species of management concern in the region of the Project (5 km buffer of project). The Environment & Sustainability Lead will confirm species specific setbacks and any necessary mitigation that may be required. 48. If potential conflicts with wildlife are identified, the Environmental & Sustainability Lead will contact the appropriate regulatory agencies to discuss concerns and proposed mitigation. This may include temporary shut-down of construction until concerns are addressed or are no longer present.
Plants Species of Management Concern	49. Any occurrences of previously unidentified plant species of management concern are to be reported to the Environment & Sustainability Lead to confirm regulations and requirements related to species of management concern.

Appendix A TYPICAL DRAWINGS

A.1 PLUGS AND GAPS IN PIPE STRINGING



NOTES:

1. Leave gaps in pipe stringing to permit vehicular access or movement of livestock/wildlife across the right–of–way.

2. Gaps in strung pipe should conincide with gaps left in snow berms, topsoil, spoil piles, and with hard and soft plugs in trench.

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DATE APPROVED

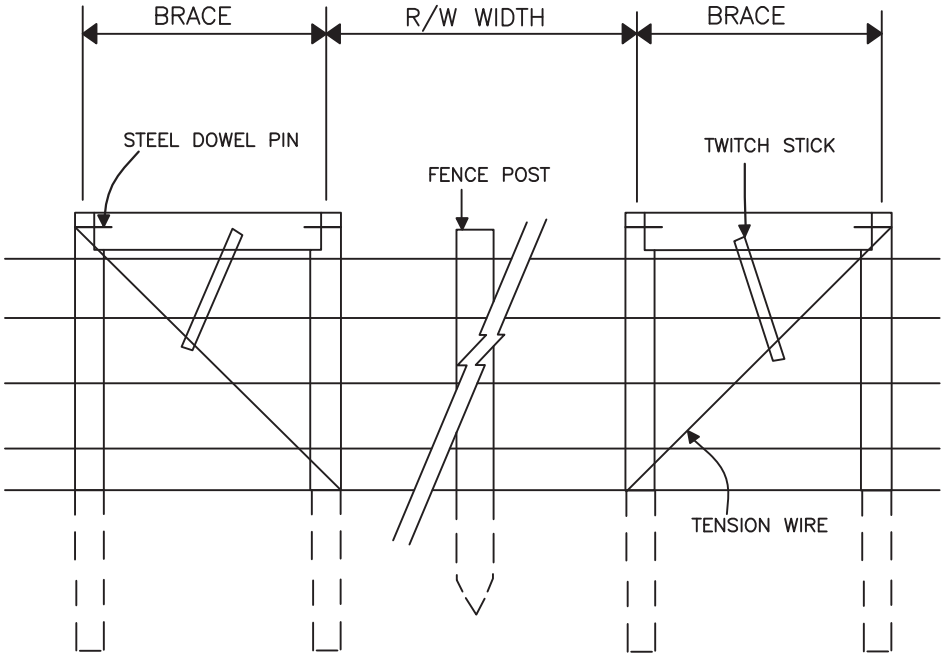
SaskEnergy

PLUGS AND GAPS
IN PIPE STRINGING

TransGas
A SaskEnergy Company

ACAD FILE: F0701
DRAWING No.
DWG. NO. 1
SHEET 1 OF 1
REV. DATE: November 2013
REV. B

A.2 POST AND WIRE FENCE DWG NO.2



PROFILE
Not To Scale

NOTES:

1. Where the right–of–way crosses existing fences, obtain consent of landowner and tenant prior to cutting the fence. Cut fence prior to any subsequent construction activity.

2. Brace fence on each side of right–of–way and tension each wire before cutting fence. Use material of equal or better quality for the brace. Salvage posts and wire if in good condition.

3. Install temporary gate if required.

4. Following construction, remove temporary gate and replace with new fence of equal or better quality. Retain braces as permanent part of fence structure. If ground is frozen, use metal posts and replace with wood posts when soil conditions permit. Where appropriate, maintain a minimum bottom wire elevation of 40 cm to accomodate passage of antelope under fence.

5. Inspect fence for 100 m in both directions for slack when tensioning the wires.

6. Remove all excess wood, wire, staples, and other waste.

Source: Drawing adapted from Union Gas Limited, 1982.

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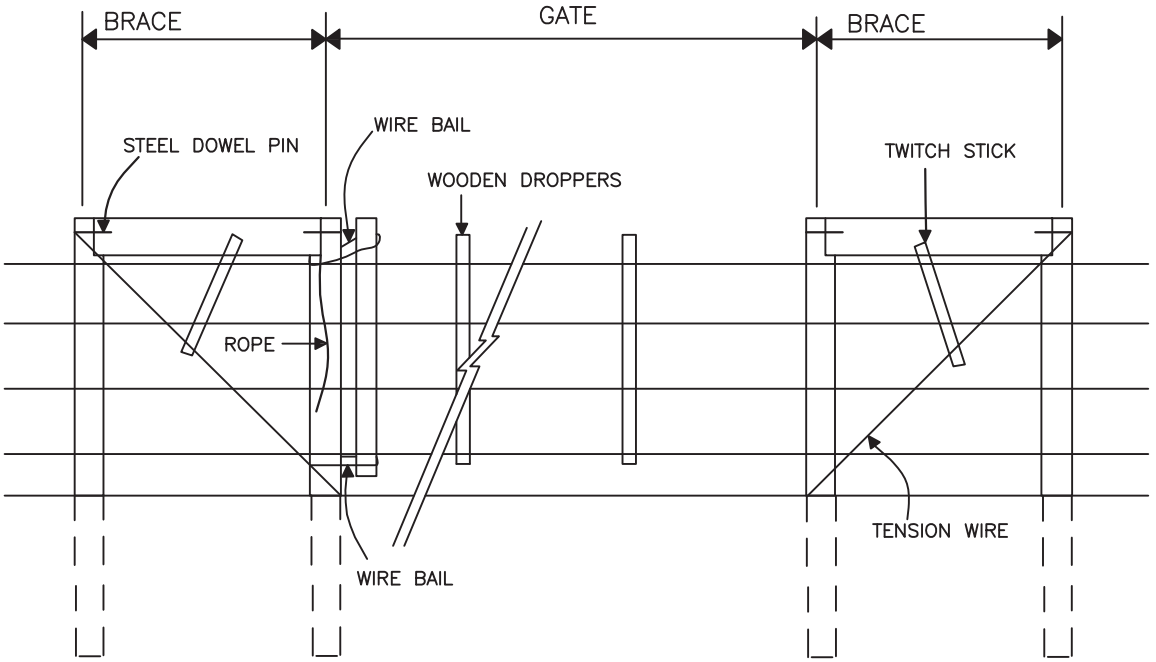
SaskEnergy

POST AND WIRE FENCE

TransGas
A SaskEnergy Company

ACAD FILE: F0702
DRAWING No. DWG. NO. 2
SHEET 1 OF 1
REV. DATE: April 2010
REV. B

A.3 TEMPORARY WIRE GATE DWG NO.3



PROFILE
Not To Scale

NOTES:

1. Install temporary gate where required, using equal or better quality material than original fence.

2. Keep gate closed at all times except during passage of men and equipment to prevent livestock from entering or leaving the property. If necessary, assign a watchperson to ensure gate closure.

3. Remove temporary gate and replace fence following construction unless otherwise requested by landowner.

Source: Drawing adapted from TransCanada Pipelines, 1979.

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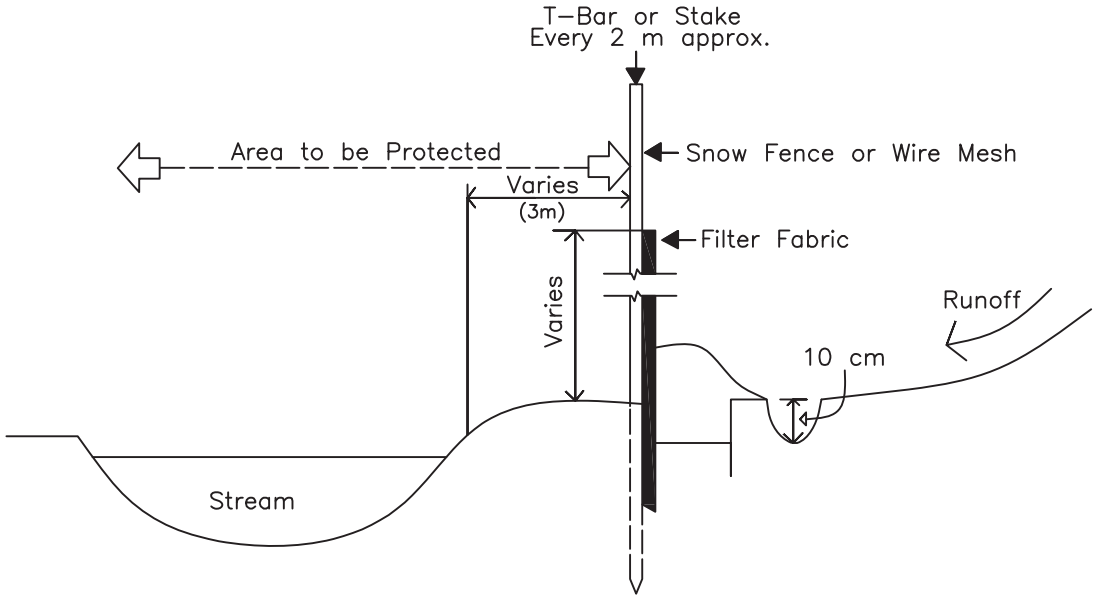
SaskEnergy

TEMPORARY WIRE GATE

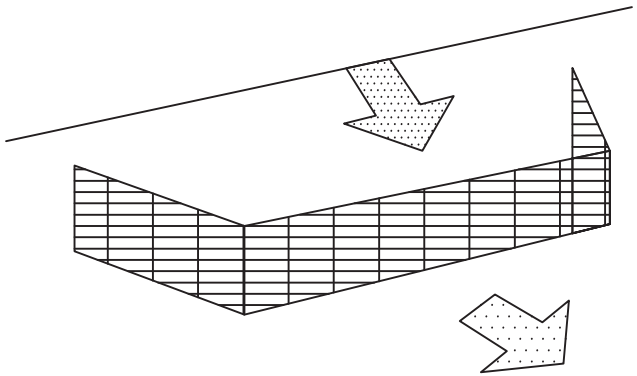
TransGas
A SaskEnergy Company

ACAD FILE: F0703
DRAWING No. DWG. NO. 3
SHEET 1 OF 1
REV. DATE: April 2010
REV. B

A.4 SEDIMENT CONTROL: TYPICAL SEDIMENT FENCES DWG. NO. 19



Side View of Sediment Fence



Oblique View

NOTES

1. Watercourses that are fish–bearing or potentially fish–bearing and/or have steep approach slopes at the proposed crossings may need sediment fences during construction, as determined by the Environmental Monitor and regulatory agencies.
2. Install sediment fences at the base of approach slopes following clearing and grading using the method and materials above or other approved designs.
3. Ensure sediment fence is keyed into the substrate. Excavate a narrow trench, place the base of the sediment fence in the trench, and place the fill back into the trench, securing the fence in place.
4. Place silt fences a minimum 2 m, if feasible, from the toe of the slope in order to increase ponding volume.
5. Maintain sediment fences throughout construction.
6. Ensure that sediment fences, if removed or damaged, are reinstalled or repaired prior to the end of the work day.
7. Maintain sediment fences in place at the base of the approach slopes until revegetation of the right of way is complete.
8. In areas with frequent traffic, install two or more sediment fences in a staggered and overlapped configuration to allow vehicle passage without removal or opening of the sediment fence.

Source: Adapted from TERA 1998, Alliance 1997

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SEDIMENT CONTROL: TYPICAL SEDIMENT FENCES

TransGas
A SaskEnergy Company

ACAD FILE: F0719

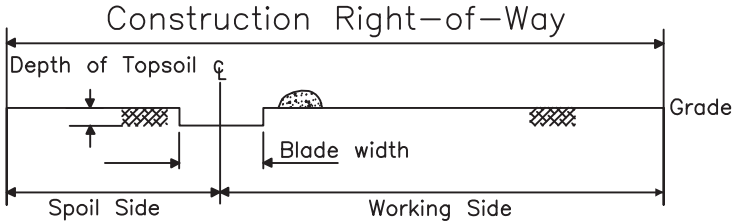
DRAWING No.
DWG. NO. 19
SHEET 1 OF 1

REV. DATE: November 2013
REV. C

A.5 TOPSOIL CONSERVATION: BLADE WIDTH DWG. NO. 8

GRADE

Strip topsoil for blade width over ditchline and stockpile on working side.

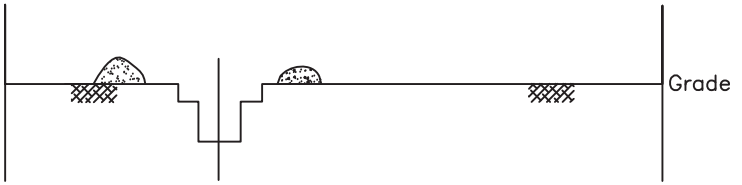


NOTES:

Special attention is necessary to ensure separation of topsoil and subsoil at side bends and foreign pipeline crossings.

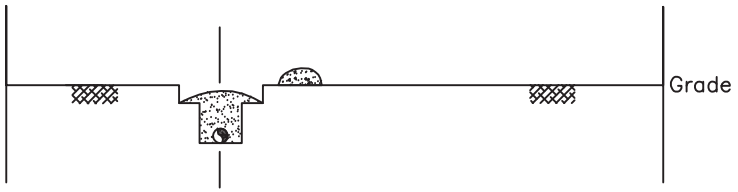
DITCH

Subsoil to be stockpiled on spoil side. Pipe may be strung on topsoil.



BACKFILL & MACHINE CLEAN–UP

Replace topsoil and cultivate where directed.



FINAL CLEAN–UP

Replace topsoil and cultivate where directed.

APPLICATION:

1) Pasture and where directed on alignment sheets.

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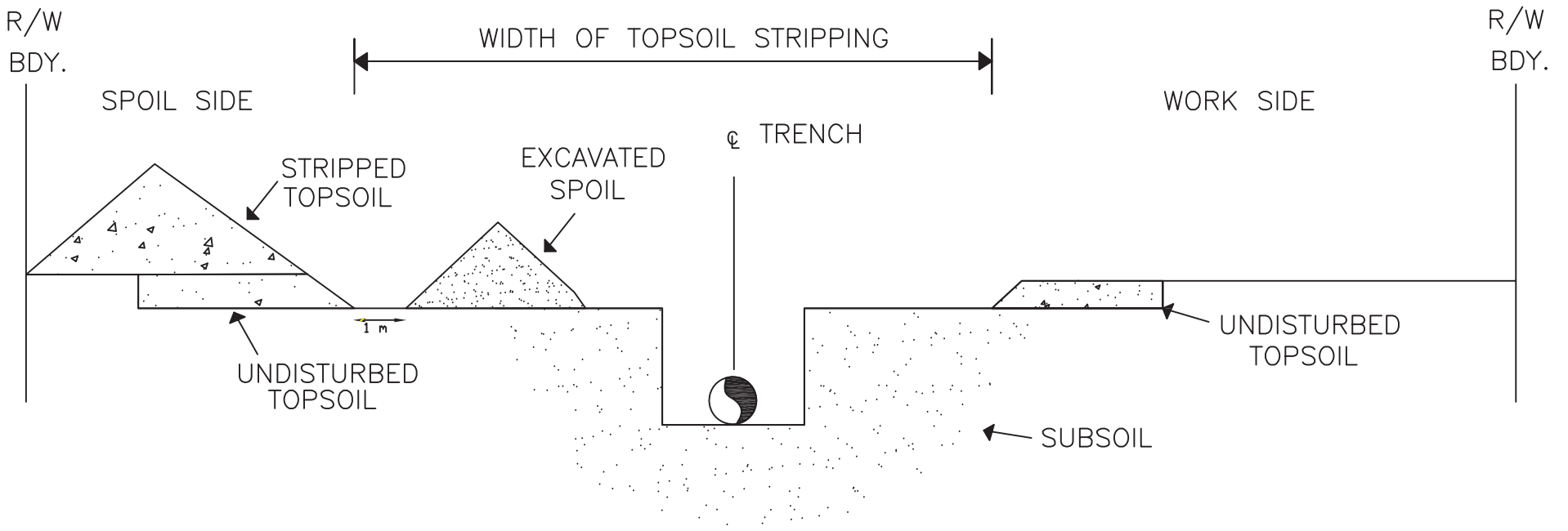
TOPSOIL CONSERVATION:
BLADE WIDTH

TransGas
A SaskEnergy Company

ACAD FILE: F0708
DRAWING No. DWG. NO. 8
SHEET 1 OF 1
REV. DATE: April 2010
REV. B

A.6 TOPSOIL STRIPPING; TRENCH AND SPOIL SIDE DWG. NO. 9



PROFILE
Not To Scale

NOTES:

1. Remove topsoil from over the trench and under the spoil pile. Stripped width will be approximately 6–8 m. Store topsoil on spoil side adjacent to stripped area.
2. Excavate trench subsoil and store on spoil side adjacent to the trench. Allow for a minimium 1 m separation between the topsoil pile and the trench spoil.
3. Return trench spoil to trench and compact. Feather out excess spoil over stripped area leaving a low roach centered over the trench. Alleviate compaction of clay rich subsoils over the stripped area.
4. Return topsoil evenly over the stripped area after trench has sufficiently settled or has been compacted.
5. Alleviate compaction of topsoil over entire right–of–way.

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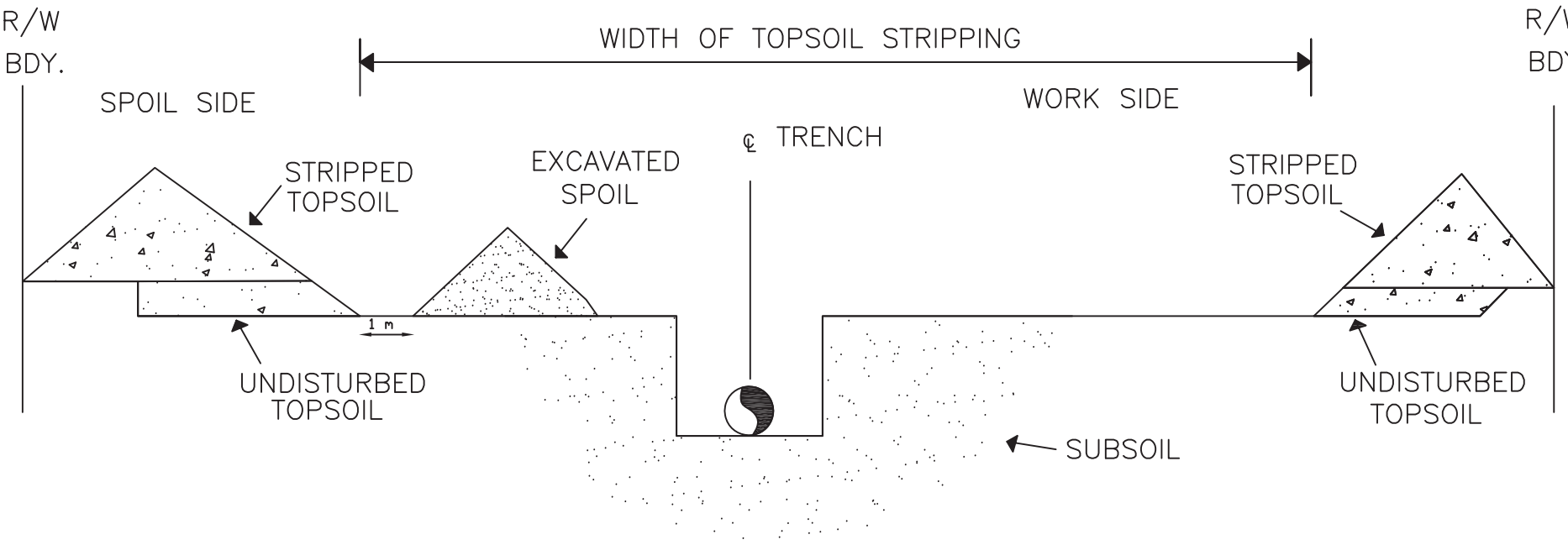
SaskEnergy

TOPSOIL STRIPPING: TRENCH AND SPOIL SIDE

TransGas
A SaskEnergy Company

ACAD FILE: F0709
DRAWING No. DWG. NO. 9
SHEET 1 OF 1
REV. DATE: April 2010
REV. B

A.7 TOPSOIL STRIPPING: TRENCH, SPOIL AND WORK AREA DWG NO 10



NOTES:

1. Remove topsoil from the trench, spoil storage, and work areas. Store topsoil on both sides of the right–of–way adjacent to the stripped area.
2. Excavate trench subsoil and store on spoil side adjacent to trench. Allow for a minimum 1 m separation between the topsoil pile and the trench spoil.
3. Return trench spoil to trench and compact. Feather out excess spoil over stripped area leaving a low roach centered over the trench. Rip or cultivate to reduce compaction and restore soil permeability capacity of clay rich soils.
4. Return topsoil evenly over the stripped area after trench has sufficiently settled or has been compacted.
5. Restore topsoil to seedbed condition, over entire right–of–way.

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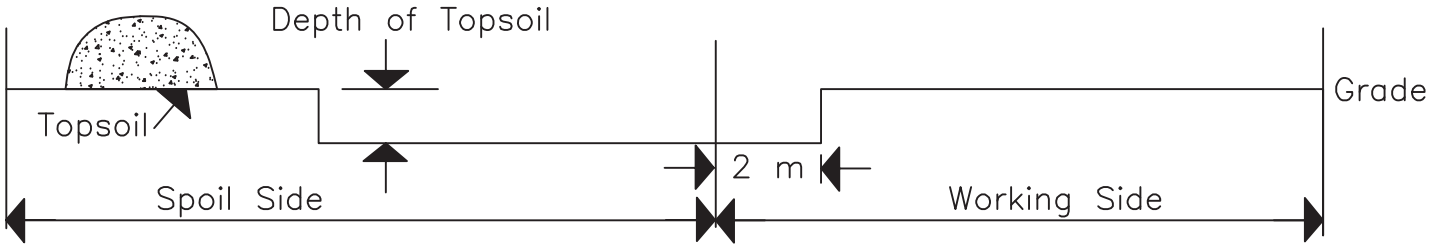
TOPSOIL STRIPPING: TRENCH, SPOIL, AND WORK AREA

TransGas
A SaskEnergy Company

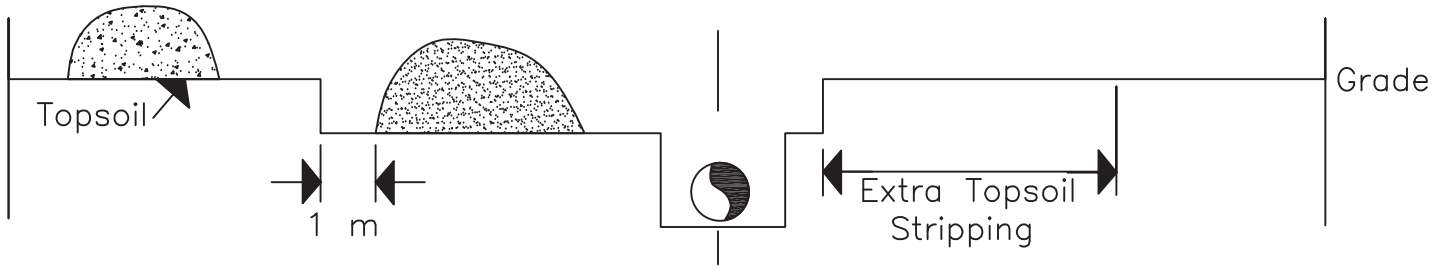
ACAD FILE: F07010
DRAWING No. DWG. NO. 10
SHEET 1 OF 1
REV. DATE: April 2010
REV. B

A.8 SECONDARY STRIPPING FOR SOIL DISPLACEMENT DWG. NO 11

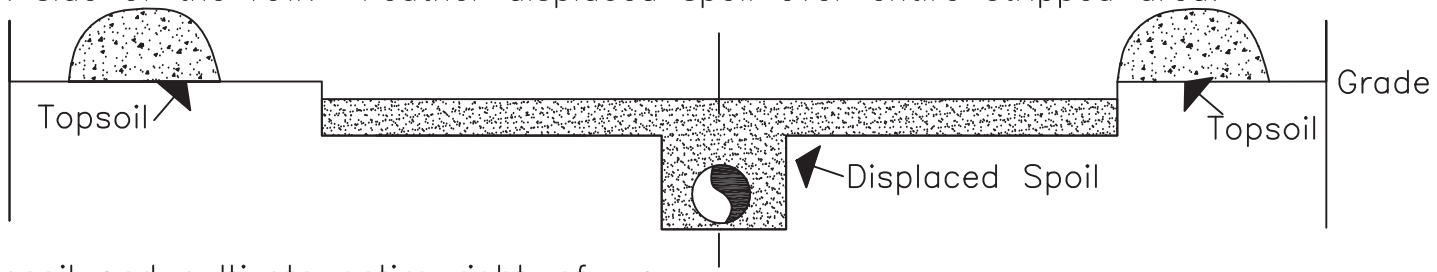
1) Strip topsoil and stockpile at edge of right–of–way. At foreign crossings topsoil may be used for ramping.



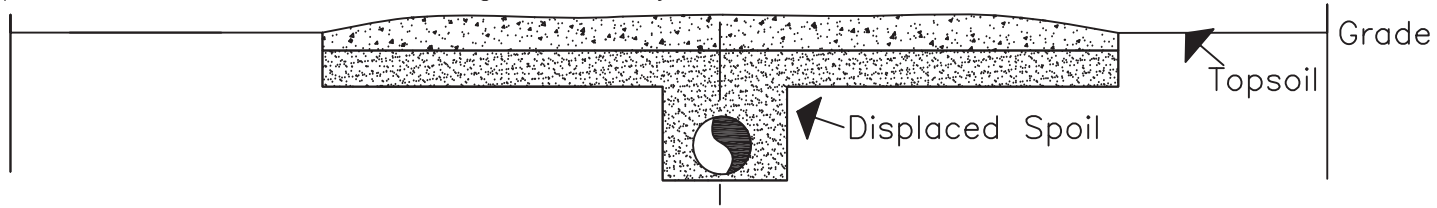
2) As subsoil is stockpiled, maintain minimun 1 m clearance between topsoil and subsoil piles.



3) Perform backfill. If amount of displaced spoil is too thick over prestripped area, strip additional space on work side of the row. Feather displaced spoil over entire stripped area.



4) Replace topsoil and cultivate entire right–of–way.



APPLICATION:

1) Cultivated land and where directed on alignment sheets.
2) At side bends and foreign pipeline crossings in cultivated land.

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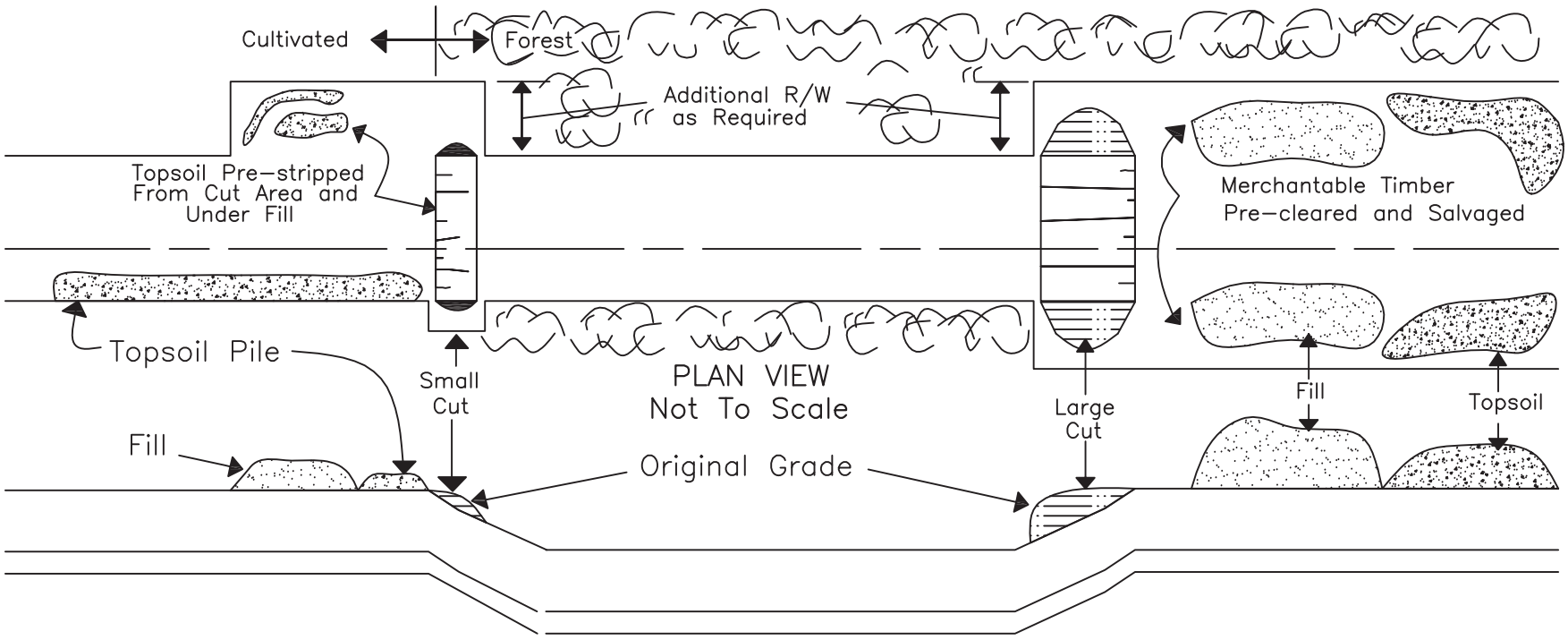
SaskEnergy

SECONDARY STRIPPING FOR SPOIL DISPLACEMENT

TransGas
A SaskEnergy Company

ACAD FILE: F0711
DRAWING No. DWG. NO. 11
SHEET 1 OF 1
REV. DATE: April 2010
REV. B

A.9 GRADING THE RIGHT-OF-WAY DWG. NO. 15



PROFILE
Not To Scale

NOTES:

1. Grade only as necessary to provide adequate surface for construction equipment and allow overbends and sagbends to be made within permissible bending limits. On winter projects, use snow to smooth out the working side if possible.
2. Identify areas where additional right-of-way is required to accomodate cuts and fills. Salvage merchantable timber and topsoil. Maintain a minimum of 1 m separation between topsoil and spoil piles.
3. Slope cuts sufficiently to minimize instability and resultant erosion and pipe integrity problems.
4. Stockpile fill in areas where it can be easily recovered (usually uphill) and where natural drainage is not blocked.
5. Do not stockpile fill in a manner which overloads slopes causing slope failure. Obtain advice from a geotechnical engineer.
6. Replace cuts and recontour slopes to a maximum 1:3 grade unless otherwise directed by a geotechnical engineer.
7. Employ erosion control measures such as breakers, cross ditches and berms, and revegetation.

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SaskEnergy

GRADING THE RIGHT-OF-WAY

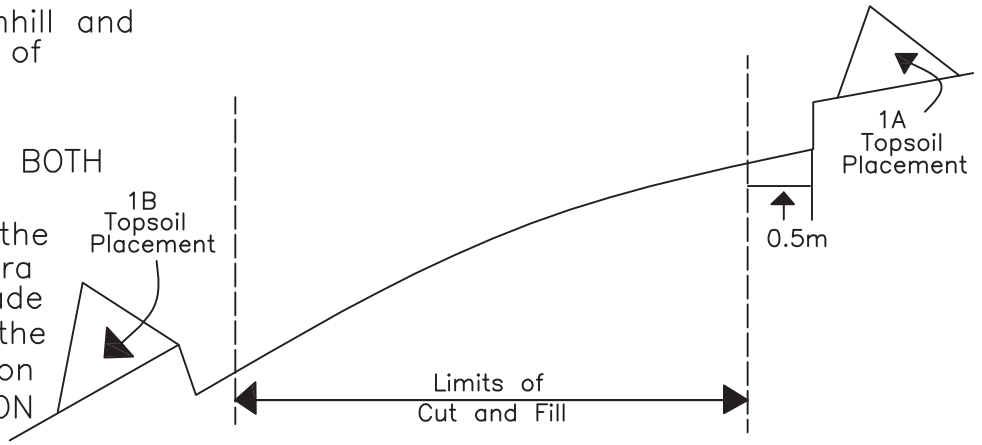
TransGas
A SaskEnergy Company

ACAD FILE: F0715
DRAWING No. DWG. NO. 15
SHEET 1 OF 1
REV. DATE: April 2010
REV. B

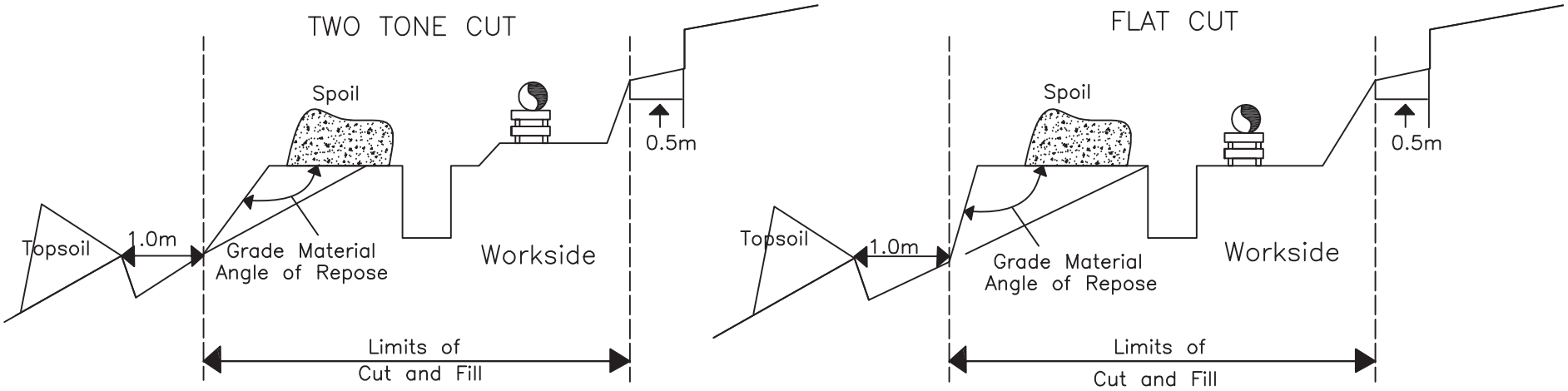
A.10 TOPSOIL CONSERVATION; SIDE HILL GRADING IN AGRICULTURAL LAND DWG. NO 16

1) A. Whenever possible, strip topsoil over the full width of the right–of–Way plus extra space on the downhill and uphill edges to allow for the grade material angle of repose and topsoil grade cut separation. Place topsoil on the high side of the grade cut in temporary workspace. DO NOT PLACE TOPSOIL ON BOTH SIDES OF THE Right–OF–WAY.

1) B. In situations where topsoil must be placed on the lowside of the cut, strip topsoil full width plus extra space to allow for the angle of repose of the grade material on the lowside, and cut replacement on the high side. Place topsoil in temporary workspace on the lowside of the cut. DO NOT PLACE TOPSOIL ON BOTH SIDES OF THE RIGHT–OF–WAY.



2) Make grade cut (flat or two tone) staying 0.5 m away from topsoil edge cut of pile on highside and maintaining 1.0 m of separation between grade material and topsoil edge cut or pile on low side. Place excess grade spoil in approved pushouts on acquired temporary work space. Pushouts must be stripped of topsoil. Excavate ditch and maintain separation.



3) Replace grade cut and topsoil to original contour using approved hotline retrieval methods as required.

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TOPSOIL CONSERVATION: SIDE HILL GRADING IN AGRICULTURAL LAND

TransGas
A SaskEnergy Company

ACAD FILE: F0716

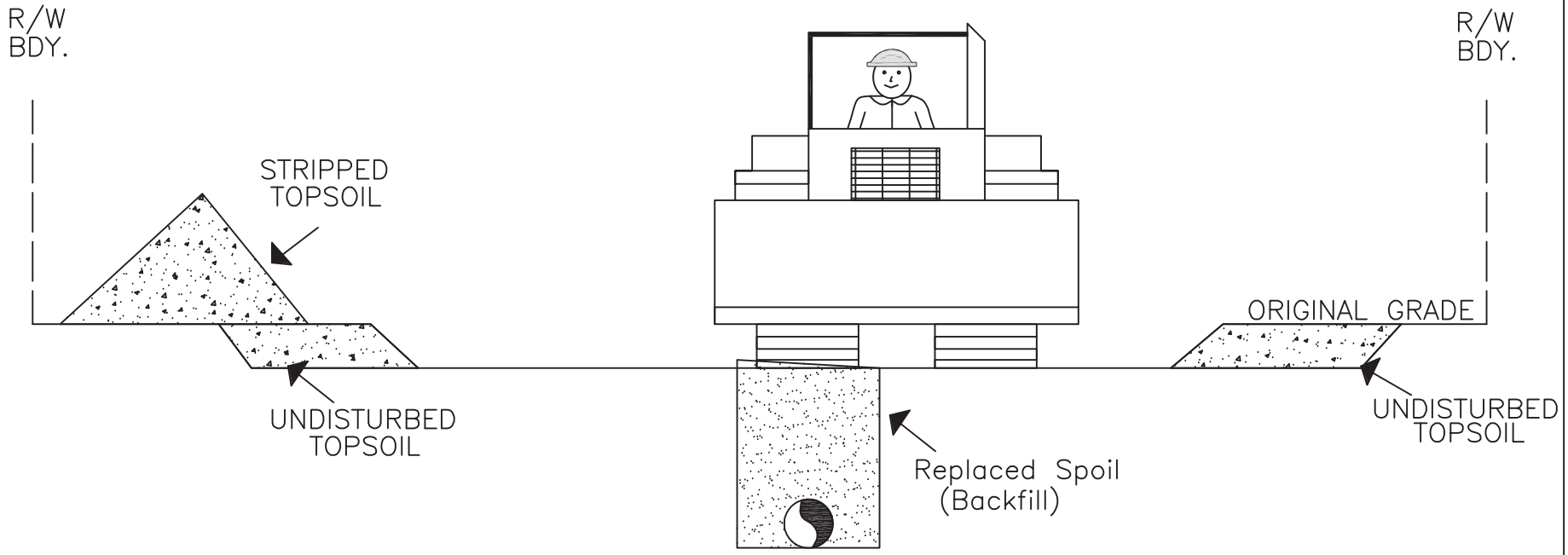
DRAWING No.
DWG. NO. 16
SHEET 1 OF 1

REV. DATE: November 2013 | REV. C

A.11 COMPACTION OF BACKFLLL DWG. NO 17

NOTES

1. Except in rocky or muskeg areas, compact the backfill subsoil to minimize settlement. The degree of compaction which can be achieved is limited by soil type, frost and moisture content, depth of cover, pipe strength and insulation, and other factors. Typically compaction is achieved by a few passes with a crawler tractor. In special cases, such as irrigated fields and open cut road crossings, 100% compaction is desirable and requires special equipment and compaction in multiple lifts.
2. Dispose of excess subsoil in locations satisfactory to the landowner and in a manner which will prevent mixing with topsoil.



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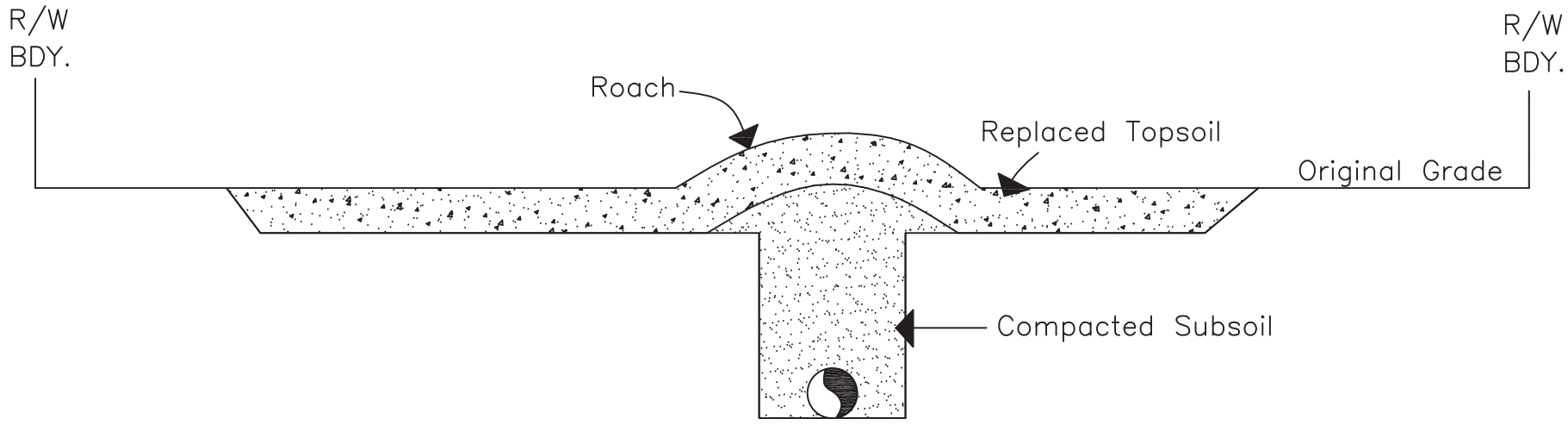
SaskEnergy

COMPACTION OF BACKFILL

TransGas
A SaskEnergy Company

ACAD FILE: F0717
DRAWING No. DWG. NO. 17
SHEET 1 OF 1
REV. DATE: November 2013 | REV. C

A.12 ROACHING THE TRENCH DWG. NO. 18



PROFILE
Not To Scale

NOTES

1. Roach the trench to compensate for settlement and changes in natural drainage patterns. The height of the roach depends upon land use, the degree of compaction achieved, and soil frost. Frozen soils require a higher roach than non–frozen soils. In agricultural lands, including some forested lands, the roach should be low and wide (unfrozen) to facilitate topsoil replacement. A higher roach is acceptable on forested land provided drainage and wildlife are unaffected. Typical values for roaching of representative soil types are presented below. The higher numbers in the range represent the worst case (frozen or clods).

Type of Backfill	Swell Coefficient (r)
blasted rock	.00 - .05
sand & gravel	.05 - .10
sand	.08 - .15
silty sand	.10 - .15
silt	.10 - .20
clay	.10 - .25
organic (muskeg)	.50 - 1.00

$R = r \times D$ where R = height of roach
r = swell coefficient
D = depth of trench

2. Leave periodic gaps in roach (eg. 250 m), at all obvious drainage courses and at trench breakers. These gaps may require maintenance the following year to fill in settled areas.
3. Replace topsoil evenly after trench has settled or has been compacted.

Source: Formula adapted from TransCanada Pipelines, 1979

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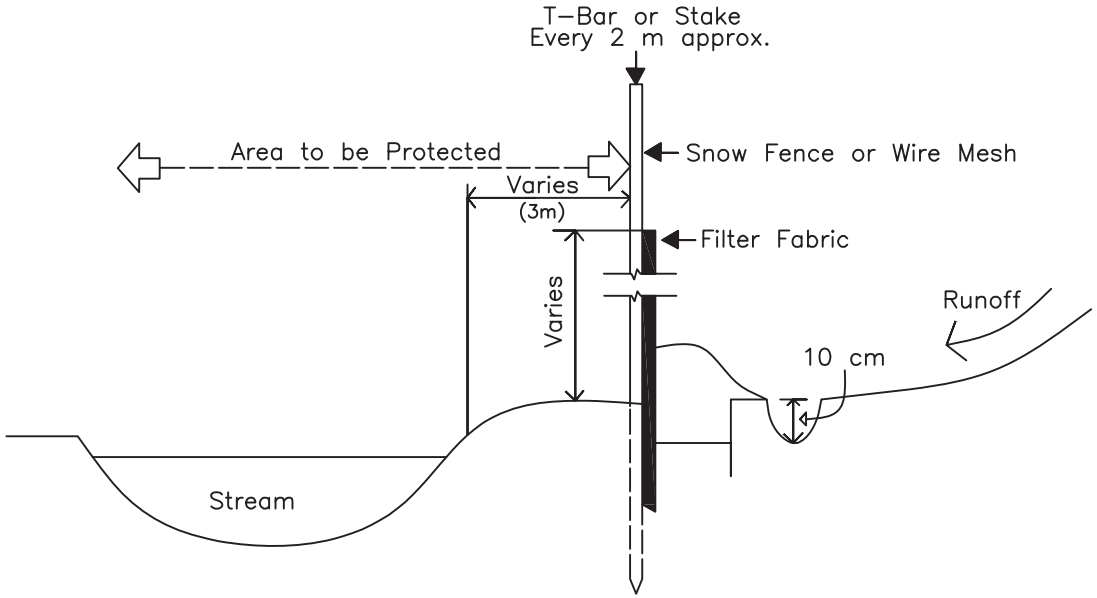
SaskEnergy

ROACHING THE TRENCH

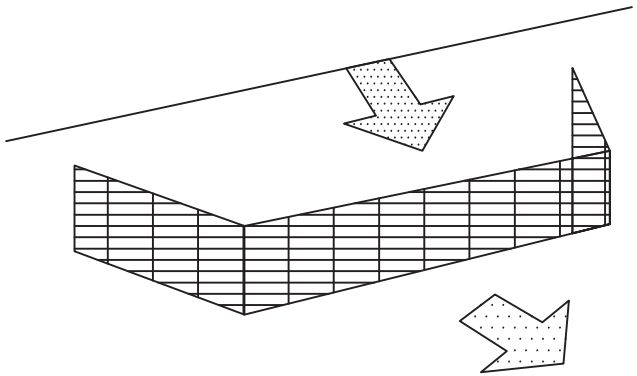
TransGas
A SaskEnergy Company

ACAD FILE: F0718
DRAWING No. DWG. NO. 18
SHEET 1 OF 1
REV. DATE: April 2010
REV. A

A.13 SEDIMENT CONTROL: TYPICAL SEDIMENT FENCES DWG. NO 19



Side View of Sediment Fence



Oblique View

NOTES

1. Watercourses that are fish–bearing or potentially fish–bearing and/or have steep approach slopes at the proposed crossings may need sediment fences during construction, as determined by the Environmental Monitor and regulatory agencies.
2. Install sediment fences at the base of approach slopes following clearing and grading using the method and materials above or other approved designs.
3. Ensure sediment fence is keyed into the substrate. Excavate a narrow trench, place the base of the sediment fence in the trench, and place the fill back into the trench, securing the fence in place.
4. Place silt fences a minimum 2 m, if feasible, from the toe of the slope in order to increase ponding volume.
5. Maintain sediment fences throughout construction.
6. Ensure that sediment fences, if removed or damaged, are reinstalled or repaired prior to the end of the work day.
7. Maintain sediment fences in place at the base of the approach slopes until revegetation of the right of way is complete.
8. In areas with frequent traffic, install two or more sediment fences in a staggered and overlapped configuration to allow vehicle passage without removal or opening of the sediment fence.

Source: Adapted from TERA 1998, Alliance 1997

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DATE APPROVED

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SEDIMENT CONTROL: TYPICAL SEDIMENT FENCES

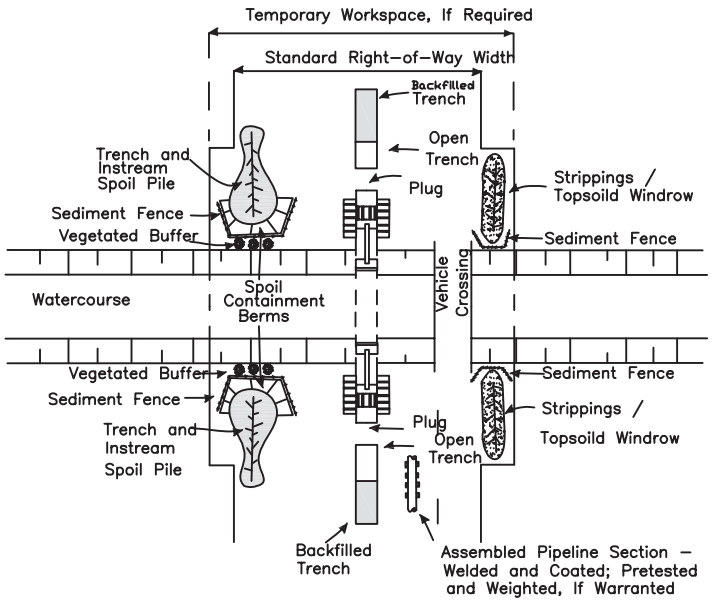
TransGas
A SaskEnergy Company

ACAD FILE: F0719

DRAWING No.
DWG. NO. 19
SHEET 1 OF 1

REV. DATE: November 2013
REV. C

A.14 CONSTRUCTION TECHNIQUE: TYPICAL OPEN CUT OF SMALL WATERCOURSES DWG. NO. 40



Plan View

(Note to Scale)

Notes:

1. Obtain additional temporary workspace to allow instream spoil to be stored above banks.
2. Install vehicle crossing if warranted.
3. Install sediment and erosion control structures, as required, for all spoil piles.
4. Leave plugs at end of standard trench.
5. Complete construction of the instream pipe section. Weight and pretest pipe, if warranted, prior to commencement of instream activity.
6. Trench through watercourse retaining hard plugs back from each bank until just prior to pipe installation. Stockpile all instream spoil above banks. Construct berms (e.g., subsoil, saddle weights, shotrock) to prevent saturated spoil from flowing back into watercourse (see DWG. NO. 16). Maintain streamflow, if present, throughout crossing construction.
7. Lower–in and backfill immediately. Restore stream channel to approximate preconstruction profile and substrate. Attempt to complete all instream activity within 24 hours.
8. If necessary to control water flow and trench sloughing, install temporary soft plugs and dewater trench on to stable vegetated land, not directly to watercourse.
9. Restore, stabilize, and reclaim watercourse banks and approaches to as close to orginal grade as practical.

Source: Adapted from TERA 1998

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CONSTRUCTION TECHNIQUE: TYPICAL OPEN CUT OF SMALL WATERCOURSES

TransGas A SaskEnergy Company

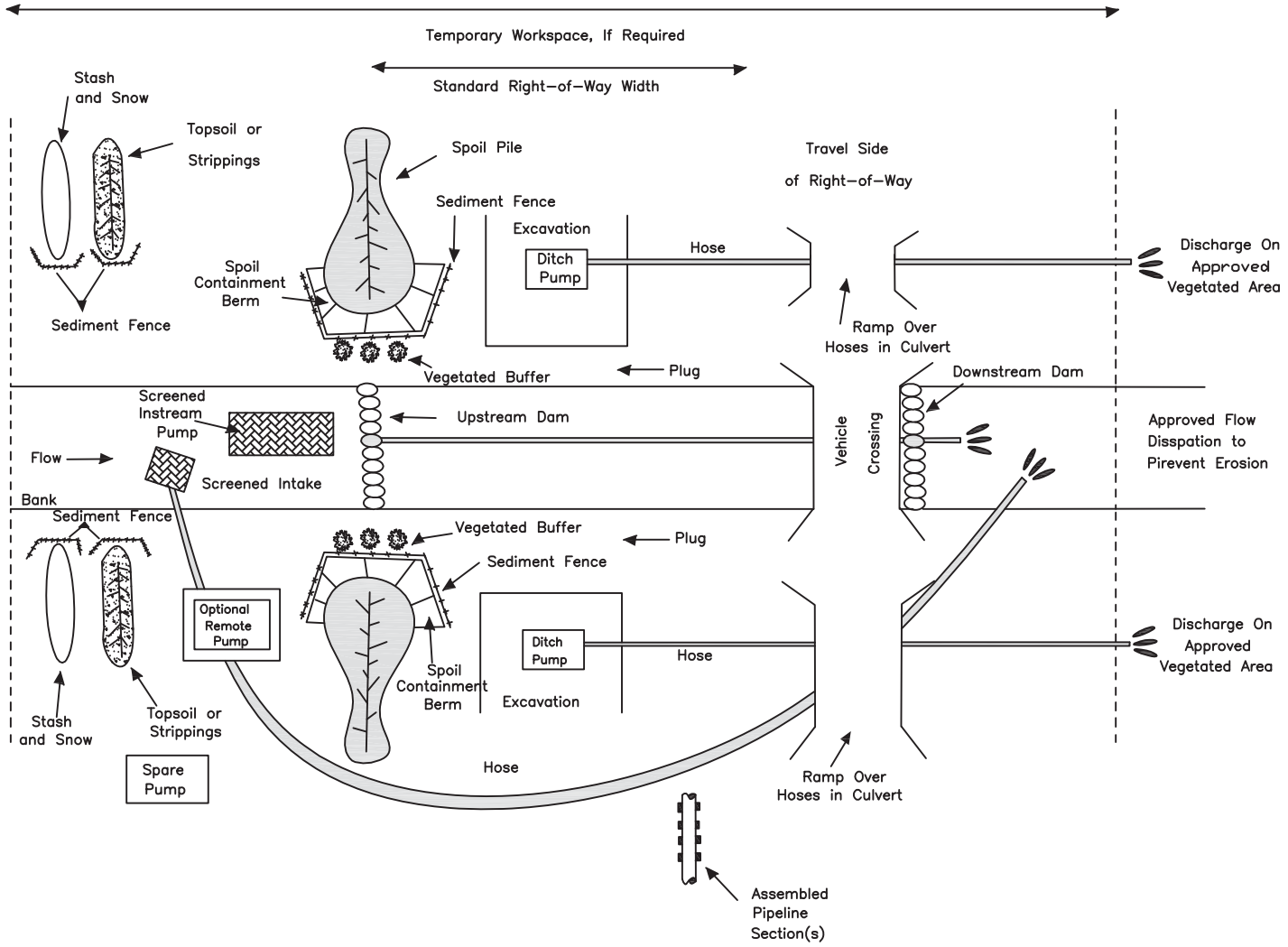
ACAD FILE: F0740

DRAWING No. DWG. NO. 40

SHEET 1 OF 1

REV. DATE: November 2013 | REV. C

A.15 CONSTRUCTION TECHNICQUE: TYPICAL DAM AND PUMP DWG. NO 42-1, 42-2



Plan View
(Not to Scale)

See Notes On Page 2

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DATE APPROVED

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CONSTRUCTION TECHNIQUE: TYPICAL DAM AND PUMP

TransGas
A SaskEnergy Company

ACAD FILE: F0742-1
DRAWING No. DWG. NO. 42-1
SHEET 1 OF 2
REV. DATE: November 2013
REV. C

Notes:

1. Install the vehicle crossing, If required, on the work side edge of the right–of–way to allow for a wide excavation.
2. Stockpile all required materials and equipment on–site prior to beginning instream work.
3. Complete construction of the instream pipe section. If warranted, weight, coat, and pretest pipe prior to the commencing of instream activity.
4. Begin the operation in the early morning to allow for same day installation, if practical.
5. Install pumps in natural pool upstream of the excavation. Excavate temporary sump within right–of–way if no natural pool exists. Check pump operation to equalize flow.
6. Ensure pumps can handle anticipated flow. Have standby pumps and generators capable of handling 100% of anticipated flow onsite and ready to be used if operating pumps fail.
7. Construct the upstream dam on the edge of the temporary workspace to allow for a wide excavation. Ensure dam is impermeable. Construct dam using sand bags, aquadam, sheet piling or other approved material that ensures a tight seal of the bed and banks.
8. Plug the vehicle crossing culvert or construct the downstream dam. Where a bridge is used, the bridge and dam should be installed as close to the edge of the temporary workspace as practical to allow for a wide excavation.
9. Assess the need to dewater isolated section of the watercourse and ensure tight seal about dams prior to trenching.
10. Excavate trench as rapidly as possilbe. Create spoil containment sumps, if warranted, to keep spoil from flowing back into the stream channel.
11. Install pipe.
12. Backfill the stream channel first pushing the silted water back into the bank excavations. Pump or drain the bank excavations while progressively backfilling from the stream channel outward. Construct water containment sumps if warranted.
13. Complete back fill, leaving small, shallow (<0.5 m) sump just upstream from the downstream dam. Install a pump intake in this sump.
14. Temporarily suspend pump bypass and/or slowly elevate corner of upstream dam and allow isolated channel to be flushed with water. Turbid water will flow into the shallow sump and then be pumped onto well–vegetated area.
15. Remove the downstream dam or vehicle crossing plug.
16. Remove the upstream dam or vehicle crossing plug.
17. Restore, stablize, and reclaim bed and banks of stream channel to preconstruction profiles.

Source: Adapted from TERA 1998

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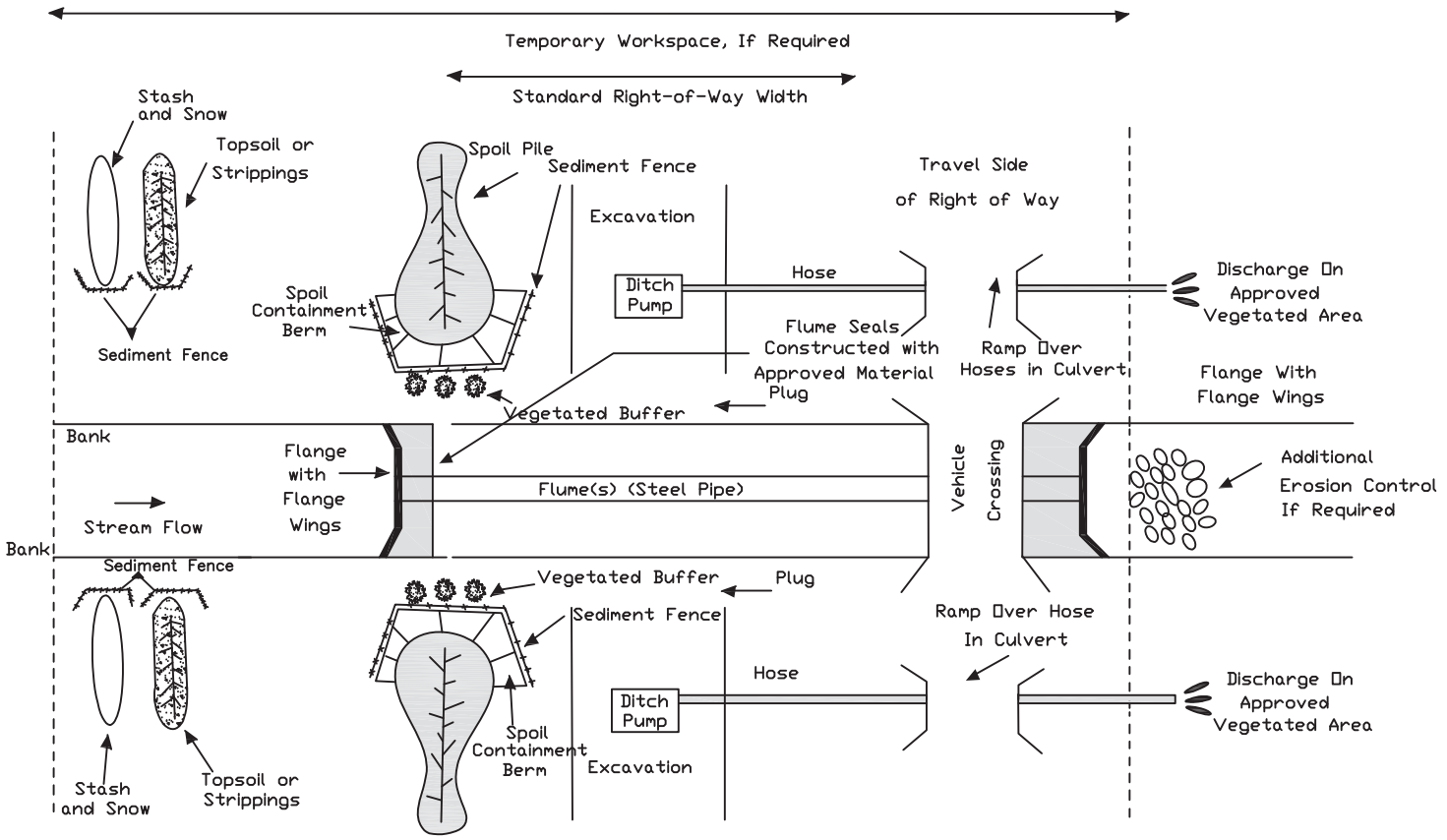
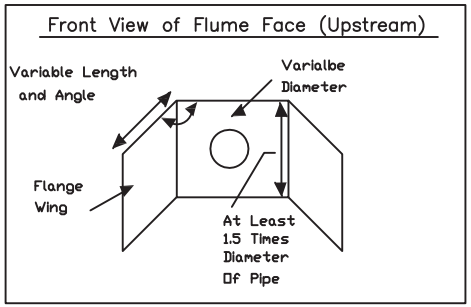
CONSTRUCTION TECHNIQUE:
TYPICAL DAM AND PUMP

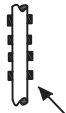
TransGas
A SaskEnergy Company

ACAD FILE: F0742–2
DRAWING No. DWG. NO. 42–2
SHEET 2 OF 2
REV. DATE: November 2013
REV. C

A.16 CONSTRUCTION TECHNIQUE: TYPICAL FLUME DWG. NO 43-1, 43-2







Assembled Pipejine Section
Welded. Coated and pretested

Plan View

(Not to Scale)

See Notes On Page 2

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CONSTRUCTION TECHNIQUE: TYPICAL FLUME

TransGas
A SaskEnergy Company

ACAD FILE: F0743-1
DRAWING No. DWG. NO. 43-1
SHEET 1 OF 2
REV. DATE: November 2013
REV. B

Notes:

1. Install the vehicle crossing, if required, on the work side edge of the right of way to allow for a wide excavation.
2. Size flume to handle anticpated flows.
3. Stockpile all required materials prior to beginning instream work. Complete construction of the instream pipe section. Weight and pretest pipe, if warranted, prior to commencing instream activity.
4. Install a pre–assembled flume, or construct a flume and install both an upstream and downstream of the flume outlet.
5. Install additional erosion control, if required, downstream of the flume outlet.
6. Ensure a tight seal about the dam and flume prior to undertaking trench excavation. Beginning in the early morning, excavate the trench as quickly as practical placing spoil out of the stream channel. Create spoil containment sumps or berms, if warranted to keep spoil from flowing back into the stream channel.
7. Pump excavation as required to prevent downstream flow of silted water. Direct the pumped water onto vegetated areas well back from the watercourse. Construct water containment sumps, if warranted.
8. Install pipe.
9. Backfill the stream channel first, squeezing the turbid water into the bank excavations. Pump or drain the bank excavations while progressively backfilling from the stream channel outward.
10. Complete backfill, leaving a small shallow (<0.5 m) sump upstream of the downstream dam. Install a pump intake in this sump.
11. Slowly elevate corner of flume (or edge of dam) and/or shut down auxiliary bypass pumps, and allow isolated channel to be flushed with water. Turbid water will flow into the shallow sump and then be pumped onto well–vegetated area.
12. Once isolated channel is flushed, remove downstream seal material.
13. Remove upstream seal materials.
14. Remove the flume.
15. Restore, stablize, and reclaim bed and banks of stream channel to preconstruction profiles.

Source: Adapted from TERA 1998

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CONSTRUCTION TECHNIQUE:
TYPICAL FLUME

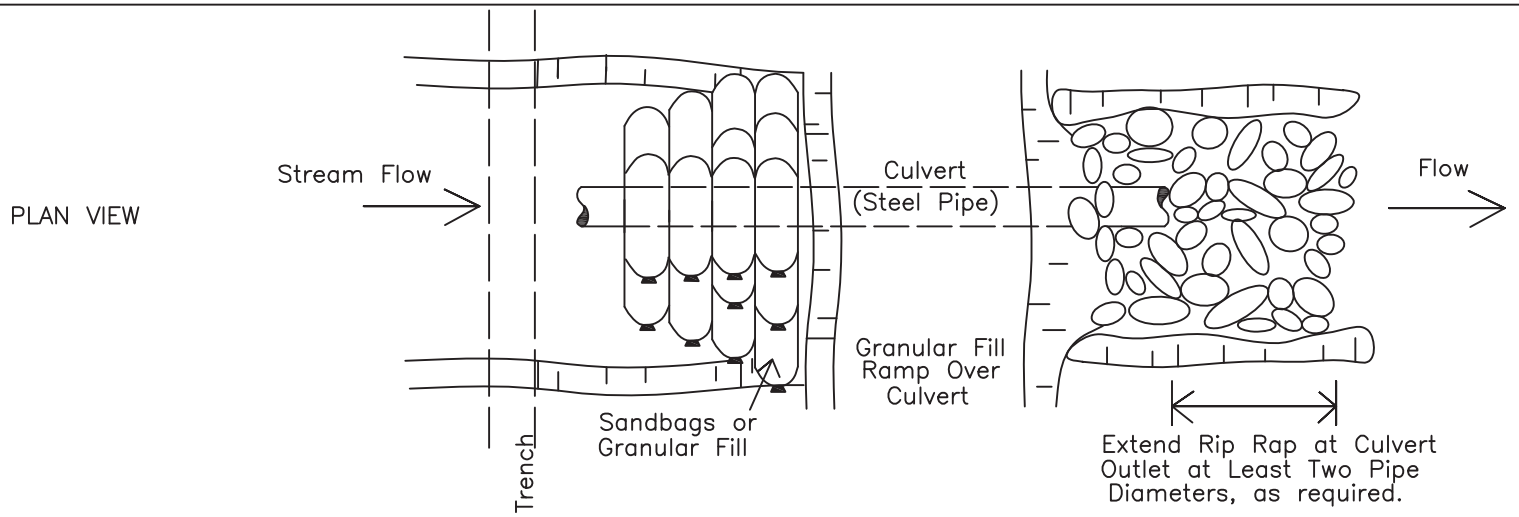
TransGas
A SaskEnergy Company

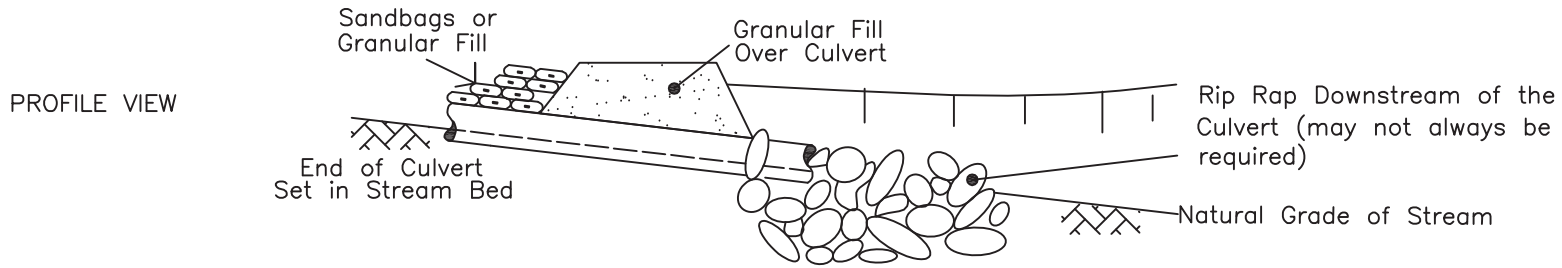
ACAD FILE: F0743–2

DRAWING No.
DWG. NO. 43–2
SHEET 2 OF 2

REV. DATE: November 2013 | REV. C

A.17 VEHICLE CROSSING: TYPICAL RAMP AND CULVERT DWG. NO. 45





NOTES

1. Install ramp and culverts to allow vehicles to cross relatively narrow watercourses where sedimentation must be minimized or fish passage allowed.
2. Design culverts to handle 150% of maximum anticipated flows or to a five year flood level and according to specific guidelines where fish passage (i.e. migration) is required. Contact goverment authorities for minimum water depth specifications, and maximum water velocities. Ensure damn is impermeable.
3. Place ends of culverts below the natural grade of watercourse at an angle that does not exceed normal watercourse gradient. Depth of placement is dependent upon bed type, culvert size, and expected flow conditions.
4. Remove temporary culverts and ramp materials when no longer required. Remove culvert and ramp prior to freeze–up (summer construction) and prior to spring break–up (winter construction).
5. Restore and stabilize bed and banks.

Source: Alliance 1998

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VEHICLE CROSSING: TYPICAL RAMP AND CULVERT

TransGas
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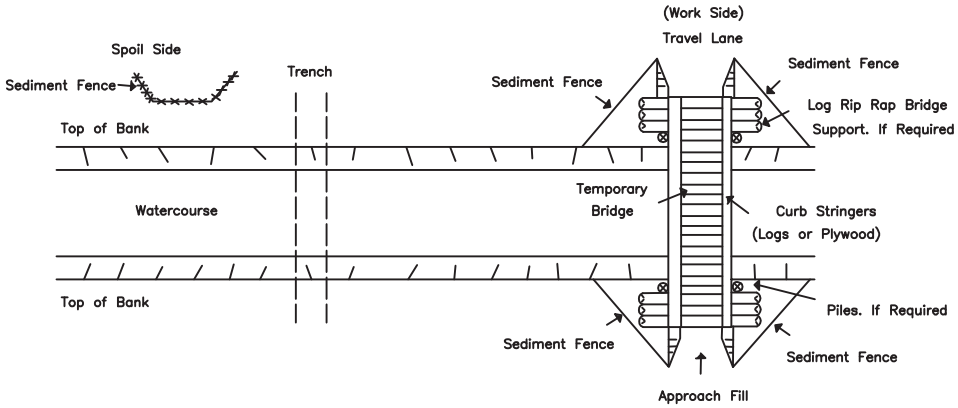
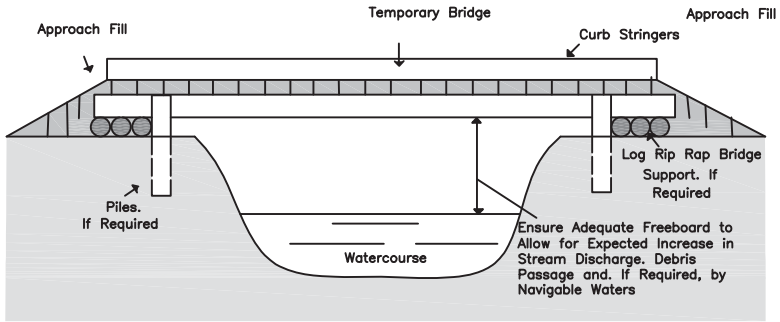
ACAD FILE: F0745
DRAWING No. DWG. NO. 45
SHEET 1 OF 1
REV. DATE: November 2013
REV. C

A.18 VEHICLE CROSSING: TYPICAL TEMPORARY BRIDGE DWG. NO. 47





Plan View

(Not to scale)

Notes:

1. Install a temporary bridge (e.g., log, pre–fabricated span) to allow vehicles to cross watercourses that are sensitive or that have unstable bed and banks. Bridges are also used where watercourses are too deep, wide, and/or fast to permit an alternative crossing structure. This method minimizes sedimentation of the watercourse, and bank and bed restoration work. It is generally limited to watercourses less than 30 m in width.
2. Utilize approach fills rather than cuts in banks to minimize erosion potential. Do not constrict flow with approach fill or support structures. Ensure adequate free–board to handle anticipated streamflows. Use a geotextile liner to prevent fine material from entering watercourse.
3. Remove bridge immediately after use. If bridge is to remain in place through spring break–up to access final clean–up, it must be designed for spring floods and ice jams. Remove support structures and approach fills. Restore and stabilize banks.
4. Install curb strings of logs or plywood to ensure that fill material does not spill into the watercourse, where required.

Source: TERA 1998

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VEHICLE CROSSING: TYPICAL TEMPORARY BRIDGE

TransGas A SaskEnergy Company

ACAD FILE: F0747

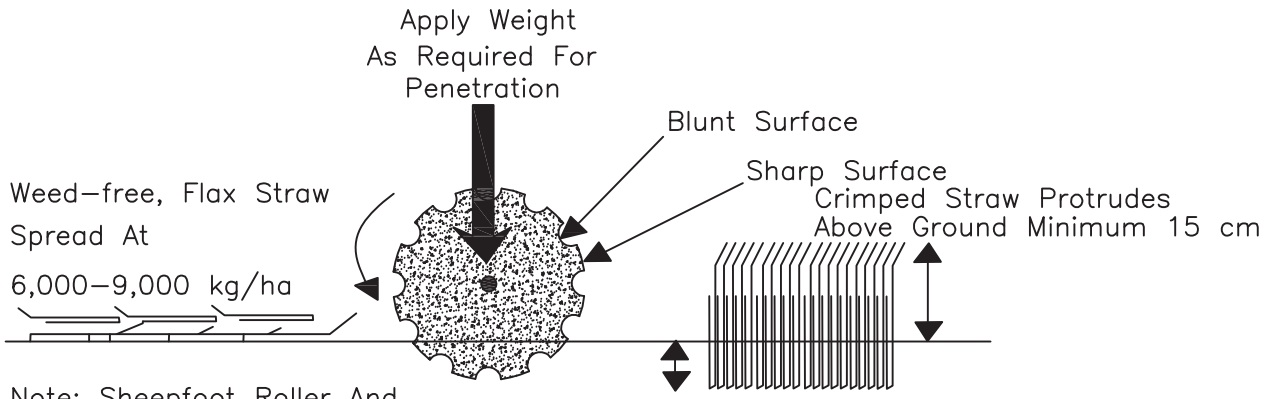
DRAWING No. DWG. NO. 47

SHEET 1 OF 1

REV. DATE: November 2013 | REV. C

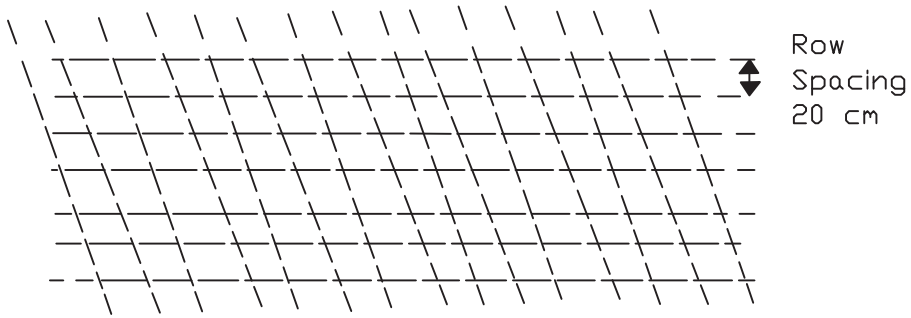
A.19 CRIMPED STRAW MULCH PROCEDURE. NO.57

Crimper Wheel Requirements



Note: Sheepfoot Roller And
Agricultural Discer Are
Unacceptable Alternatives

Crimper Pattern



Crimped In Two Directions,
Second At 60 – 90° To First.

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CRIMPED STRAW MULCH PROCEDURE

TransGas
A SaskEnergy Company

ACAD FILE: F0757
DRAWING No.
DWG. NO. 57
SHEET 1 OF 1
REV. DATE: April 2010
REV. B

Appendix B PERMITS AND APPROVALS

Construction of the Project will require permits from various levels of government (Federal, Provincial, and Municipal) before proceeding. A list of environmental permits required for construction is provided below. Additional non-environmental permits may be required for construction of the Project.

Issuing Agency	Permit
Saskatchewan Ministry of the Environment	Aquatic Habitat Protection Permit
Water Security Agency	Temporary Water Rights License
Canada Energy Board	Order

Appendix C EMERGENCY CONTACT INFORMATION

Contact	Phone Number
Shaunavon RCMP	911
Non-Emergency Police Assistance	306-297-5550
Hospital Assistance	911
Shaunavon Hospital and Care Centre	306-297-2644
Emergency Response	911

APPENDIX B VASCULAR PLANT SPECIES OBSERVED DURING THE 2020 EARLY RARE PLANT SURVEY

Appendix B Table B- 1 Vascular Plant Species Observed during the 202 Early Rare Plant Survey

Scientific Name	Common Name	Provincial Rank
Achillea millefolium	common yarrow	S5
Agropyron cristatum ssp. *pectinatum*	crested wheat grass	SNA
Androsace septentrionalis	northern fairy candelabra	S5
Anemone patens var. *multifida*	prairie crocus	S5
Antennaria parvifolia	small-leaved everlasting	S4
Antennaria rosea ssp. *rosea*	rosy everlasting	S4
Artemisia campestris ssp. *caudata*	plains sagewort	S4
Artemisia cana ssp. *cana*	silver sagebrush	S5
Artemisia frigida	pasture sagewort	S5
Artemisia ludoviciana ssp. *ludoviciana*	prairie sagewort	S5
Astragalus spp.	milk vetch	-
Astragalus cicer	cicer milk vetch	SNA
Astragalus crassicarpus var. *crassicarpus*	ground-plum	S4
Astragalus gilviflorus var. *gilviflorus*	cushion milkvetch	S5
Astragalus lotiflorus	low milk vetch	S4
Astragalus pectinatus	narrow-leaved milk vetch	S4
Avenula hookeri	Hooker's oat grass	S5
Bromus inermis	smooth brome	SNA
Carex duriuscula	low sedge	S5
Cerastium arvense ssp. *strictum*	field mouse-ear chickweed	S5
Cirsium arvense	Canada thistle	SNA
Cirsium flodmanii	Flodman's thistle	S4
Comandra umbellata ssp. *umbellata*	common comandra	S5
Crepis runcinata ssp. *glauca*	smooth hawk's-beard	S4
Dasiphora fruticosa	shrubby cinquefoil	S4
Elaeagnus angustifolia	Russian olive	SNA
Erysimum inconspicuum var. *inconspicuum*	shy wallflower	S4
Festuca hallii	**plains rough fescue**	**S3**
Festuca rubra ssp. *arctica*	arctic red fescue	S4
Galium boreale	northern bedstraw	S5
Geum triflorum var. *triflorum*	three-flowered avens	S5
Glyceria grandis var. *grandis*	common tall manna grass	S4
Gutierrezia sarothrae	broomweed	S4
Hesperostipa comata ssp. *comata*	needle-and-thread	S5
Heterotheca villosa var. *villosa*	hairy false golden-aster	S5
Hymenoxys richardsonii var. *richardsonii*	Colorado rubber-plant	S4

Appendix B Vascular Plant Species Observed during the 2020 Early Rare Plant Survey

Scientific Name	Common Name	Provincial Rank
Juncus balticus	wire rush	S4
Koeleria macrantha	June grass	S5
Linum lewisii var. *lewisii*	flax	S4
Medicago sativa ssp. *sativa*	alfalfa	SNA
Mentha canadensis	wild mint	NA
Muhlenbergia cuspidata	plains muhly	S4
Oxytropis campestris var. *spicata*	northern locoweed	S4
Packera cana	prairie groundsel	S4
Pascopyrum smithii	western wheat grass	S5
Penstemon albidus	white beardtongue	S4
Penstemon procerus var. *procerus*	slender beardtongue	S4
Persicaria amphibia var. *emersa*	water smartweed	S4
Phalaris arundinacea	reed canary grass	S4
Phlox hoodii ssp. *hoodii*	moss phlox	S5
Poa pratensis	Kentucky bluegrass	SNA
Poa secunda ssp. *secunda*	Canby blue grass	S5
Potentilla bipinnatifida	plains cinquefoil	S4
Psathyrostachys juncea	Russian wild rye	SNA
Ratibida columnifera	prairie coneflower	S4
Rosa acicularis ssp. *sayi*	prickly rose	S5
Rosa arkansana	prairie rose	S5
Selaginella densa var. *densa*	dense spike-moss	S4
Solidago spp.	goldenrod	-
Solidago altissima var. *altissima*	tall goldenrod	S5
Sonchus arvensis ssp. *arvensis*	field sow-thistle	SNA
Sphaeralcea coccinea ssp. *coccinea*	scarlet mallow	S5
Symphoricarpos occidentalis	buckbrush	S5
Taraxacum officinale ssp. *officinale*	common dandelion	SNA
Thermopsis rhombifolia	golden bean	S5
Tragopogon dubius	common goat's-beard	SNA
Typha angustifolia	narrow-leaved cattail	SNA
Vicia americana ssp. *minor*	wild vetch	S5

APPENDIX C SPECIES OF MANAGEMENT CONCERN IN THE RAA

C.1 Wildlife SOMC with the Potential to Occur in the Project RAA

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	SKMOE[2]	SKCDC[3]	SKMOE Activity Restriction Feature (Recommended Setback) [4]
INVERTEBRATES[5]						
Dusky dune moth	*Copablepharon longipenne*	Endangered	Endangered		S1	-
Monarch	*Danaus plexippus*	Special Concern	Endangered	-	S2B	-
Pale yellow dune moth	*Copablepharon grandis*	Special Concern	Special Concern		S2	-
Verna's flower moth	*Schinia verna*	Threatened	Threatened	-	S1	-
Gypsy cuckoo bumble bee	*Bombus bohemicus*	Endangered	Endangered	-	S1	-
Yellow-banded bumble bee	*Bombus terricola*	Special Concern	Special Concern	-	S5	-
Western bumble bee	*Bombus occidentalis*	-	Threatened	-	S4	-
Nine-spotted lady beetle	*Coccinella novemnotata*	-	Endangered	-	S4	-
Transverse ladybird beetle	*Coccinella transversoguttata*	-	Special Concern	-	S4	-
Greenish-white grasshopper	*Hypochlora alba*	Special Concern	Special Concern	-	S4	-
HERPTILES						
Plains spadefoot toad	*Spea bombifrons*	-	-	-	S3	Breeding and overwintering habitat (90 m)
Great plains toad	*Anaxyrus cognatus*	Special Concern	Special Concern	-	S3	Breeding and overwintering habitat (500 m)
Canadian toad	*Anaxyrus hemiophrys*	-	-	-	S4	Breeding and overwintering habitat (90 m)
Northern leopard frog	*Lithobates pipiens*	Special Concern	Special Concern	-	S3	Breeding and overwintering habitat (500 m)
Western tiger salamander	*Ambystoma mavortium*	Special Concern	Special Concern	-	S4	-
Bullsnake	*Pituophis catenifer sayi*	-	Special Concern	-	S4	-
Eastern yellow-bellied racer	*Coluber constrictor flaviventris*	Threatened	Threatened	-	S2	Hibernacula (1,000 m)
Prairie rattlesnake	*Crotalus viridis viridis*	Special Concern	Special Concern	-	S3	Hibernacula (200 m)
Plains hog-nosed snake	*Heterodon nasicus*	-	-	-	S3	Hibernacula (200 m)
Western painted turtle	*Chrysemys picta*	-	-	-	S3	-
BIRDS						
Sharp-tailed grouse	*Tympanuchus phasianellus*	-	-	-	S5	Lek (400 m)
Western Grebe	*Aechmophorus occidentalis*	Special Concern	Special Concern	-	S3B, S3M	Nesting colony (200 m)
Eared grebe	*Podiceps nigricollis*	-	-	-	S5B, S5M	Nesting colony (200 m)

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	SKMOE[2]	SKCDC[3]	SKMOE Activity Restriction Feature (Recommended Setback) [4]
Horned grebe	*Podiceps auritus*	Special Concern	Special Concern	-	S5B, S5M	-
Double-crested cormorant	*Phalacrocorax auritus*	-	-		S5B, S5M	Nesting colony (1000 m)
American white pelican	*Pelecanus erythrorhynchos*	-	-		S5B, S5M	Nesting colony (1000 m)
American bittern	*Botaurus lentiginosus*	-	-	-	S5B	Breeding bird* (350 m)
Great blue heron	*Ardea herodias*	-	-	-	S5B	Nesting colony (1,000 m)
Black-crowned night-heron	*Nycticorax nycticorax*	-	-	-	S4B	Nesting colony (1,000 m)
Snowy egret	*Egretta thula*	-	-	-	SNA	Nesting colony (1,000 m)
Cattle egret	*Bubulcus ibis*	-	-	-	SNA	Nesting colony (1,000 m)
Great egret	*Ardea alba*	-	-	-	SNA	Nesting colony (1,000 m)
Yellow rail	*Coturnicops noveboracensis*	Special Concern	Special Concern	-	S3B, S3M	Breeding bird* (350 m)
Whooping crane	*Grus americana*	Endangered	Endangered	Endangered	SXB, S1M	Staging area (1,000 m)
Piping plover	*Charadrius melodus circumcinctus*	Endangered	Endangered	Endangered	S3B	High-water mark (600 m)
Long-billed curlew	*Numenius americanus*	Special Concern	Special Concern	-	S3B, S4M	Breeding bird* (200 m)
Herring gull	*Larus argentatus*	-	-	-	S5B, S5M	Nesting colony (400 m)
Franklin's gull	*Leucophaeus pipixcan*	-	-	-	S4B, S4M	Nesting colony (400 m)
Bonaparte's gull	*Chroicocephalus philadelphia*	-	-	-	S4B, S4M	Nesting colony (400 m)
Black tern	*Chlidonias niger*	-	-	-	S5B, S5M	Nesting colony (400 m)
Common tern	*Sterna hirundo*	-	-	-	S5B, S5M	Nesting colony (400 m)
Forster's tern	*Sterna forsteri*	-	-	-	S4B	Nesting colony (400 m)
Turkey vulture	*Cathartes aura*	-	-	-	S3B, S3M	-
Osprey	*Pandion haliaetus*	-	-		S2B, S2M	Nest site (1,000 m)
Golden eagle	*Aquila chrysaetos*	-	Not At Risk	-	S3B, S3N, S4M	Nest site (1,000 m)
Ferruginous hawk	*Buteo regalis*	Threatened	Threatened	-	S3B	Nest site (1,000 m)
Peregrine falcon	*Falco peregrinus*	Special Concern	-	-	S1B, SNRM	Nest site (1,000 m)
Burrowing owl	*Athene cunicularia*	Endangered	Endangered	Endangered	S2B, S2M	Breeding bird* (500 m)
Short-eared owl	*Asio flammeus*	Special Concern	Special Concern	-	S3B, S2N, S3M	Breeding bird* (500 m)
Red-headed woodpecker	*Melanerpes erythrocephalus*	Threatened	Endangered		S1B,S1M	
Common nighthawk	*Chordeiles minor*	Threatened	Special Concern	-	S4B, S4M	Breeding bird* (200 m)
Chimney swift	*Chaetura pelagica*	Threatened	Threatened	-	S2B, S2M	Breeding bird* (300 m)
Loggerhead shrike	*Lanius ludovicianus excubitorides*	Threatened	Threatened	-	S2B, S2M	Breeding bird* (400 m)

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	SKMOE[2]	SKCDC[3]	SKMOE Activity Restriction Feature (Recommended Setback) [4]
Bank swallow	*Riparia riparia*	Threatened	Threatened	-	S5B, S5M	-
Barn swallow	*Hirundo rustica*	Threatened	Threatened	-	S5B, S5M	-
Sprague's pipit	*Anthus spragueii*	Threatened	Threatened	-	S3B	Breeding bird* (250 m)
McCown's longspur	*Rhynchophanes mccownii*	Special Concern	Threatened	-	S3B	Breeding bird* (200 m)
Chestnut-collared longspur	*Calcarius ornatus*	Threatened	Threatened	-	S3B	Breeding bird* (200 m)
Bobolink	*Dolichonyx oryzivorus*	Threatened	Threatened	-	S4B, S4M	-
Baird's sparrow	*Ammodramus bairdii*	Special Concern	Special Concern	-	S4B	-
Lark bunting	*Calamospiza melanocorys*	Threatened	Threatened	-	S2B, S2M	-
MAMMALS						
Little brown myotis	*Myotis lucifugus*	Endangered	Endangered	-	S4	Roost/foraging site (500 m)
Big brown bat	*Eptesicus fuscus*	-	-	-	S5	Roost/foraging site (500 m)
Silver-haired bat	*Lasionycteris noctivagans*	-	-	-	S5B	Roost/foraging site (500 m)
Hoary bat	*Lasiurus cinereus*	-	-	-	S5B	Roost/foraging site (500 m)
Long-eared myotis	*Myotis evotis*	-	-	-	S2B, S2N	Roost/foraging site (500 m)
Olive-backed pocket mouse	*Perognathus fasciatus*	-	-	-	S3	-
American badger	*Taxidea taxus taxus*	Special Concern	Special Concern	-	S3	-
Swift fox	*Vulpes velox*	Threatened	Threatened	-	S3	Den (2,000 m)
Pronghorn	*Antilocapra americana*	-	-	-	S3	-

Common Name	Scientific Name	SARA[1]	COSEWIC[1]	SKMOE[2]	SKCDC[3]	SKMOE Activity Restriction Feature (Recommended Setback) [4]
NOTES: [1] Species listed under Schedule 1 of the Species at Risk Act (Government of Canada 2019) [2] Species listed under The Wildlife Act; Saskatchewan Ministry of Environment Species at Risk (Government of Saskatchewan 2019a) [3] Saskatchewan Conservation Data Centre species lists (SKCDC 2019b, 2019c); designations are as follows: S = province-wide status 1 = critically imperiled / extremely rare: at very high risk of extinction or extirpation due to extreme rarity, very steep declines, high threat level, or other factors 2 = imperiled / very rare: at high risk of extinction or extirpation due to a very restricted range, very few populations, steep declines, threats or other factors 3 = vulnerable / rare to uncommon: at moderate risk of extinction or extirpation due to a restricted range, relatively few populations, recent and widespread declines, threats, or other factors 4 = apparently secure: uncommon but not rare; some cause for long-term concern due to declines or other factors 5 = secure / common: demonstrably secure under present conditions; widespread and abundant; low threat level S#S# = Range of uncertainty about the exact rarity of the species B = for a migratory species, applies to the breeding population in the province M = for a migratory species, rank applies to the transient (migrant) population N = for a migratory species, applies to the non-breeding population in the province NA = conservation status is not applicable to the species (e.g. it may have been introduced in Saskatchewan) [4] Saskatchewan Activity Restriction Guidelines for Sensitive Species (SKMOE 2017) [5] Includes only SARA- and COSEWIC-listed species * characterized by breeding bird behavior (e.g., (territorial calling to competing male, mate or young; singing; courtship displays; carrying food or nest materials) or presence of nest or young found incidentally.						