April 2011

Environmental Assessment for the Proposed CN Rail Spur at the Agrium Vanscoy Potash Mine in Central Saskatchewan

Submitted to:
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REPORT

Report Number: 10-1361-0052

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Executive Summary

Introduction

Canadian National Railway Company is proposing to construct and operate a rail spur line and associated wye near the community of Vanscoy in central Saskatchewan. Canadian National Railway Company has identified the need to construct a railway spur to connect the Agrium Inc. Vanscoy Potash Mine to Canadian National Railway Company's Watrous Subdivision. Canadian National Railway Company ships potash to the North American and world markets and has been serving the mine since 1992 through a running rights agreement with Canadian Pacific Railway. Constructing the spur line and wye will enable Canadian National Railway Company to provide direct transportation, improve service requirements, support the mine expansion, respond to competitive markets, and increase service efficiencies to the mine. The following document is a *Canadian Environmental Assessment Act* Screening which is required as an application under the *Canada Transportation Act.*

Physical Works

Physical works associated with this Project include the construction of a rail spur line 13.5 km long and a wye connecting to Canadian National Railway Company's Watrous Subdivision mainline. The spur line right-of-way will be 61 m wide and will cross, at grade, four public rural municipality roads, one rural municipality road allowance, and one high pressure gas pipeline. The entire length of the rail spur will parallel an existing Canadian Pacific Railway line. Construction of the rail spur and wye is expected to begin in the fall of 2011.

Description of the Environment

Baseline environmental information for the existing biophysical setting for the rail spur and wye was obtained from existing literature and supplemented with data and observations collected during the field inspections. Information was gathered and summarized for air quality, noise and vibration, land use, terrain and soils, vegetation, wildlife and wildlife habitat, aquatic resources, geology and groundwater, and heritage resources.

The rail spur and wye is located in an area dominated by agriculture activities and will be located adjacent to an existing Canadian Pacific Railway rail line on a landscape that has been extensively modified and supports residential, industrial and resource extraction activities. There are no areas designated as International Biological Program sites, provincial or regional parks, Saskatchewan Ministry of Agriculture lands designated under the *Wildlife Habitat Protection Act*, Fish and Wildlife Development Fund land, or lands owned by the Saskatchewan Wildlife Federation or Ducks Unlimited Canada within or along the Project corridor.

For vegetation, no Committee on the Status of Endangered Wildlife in Canada, *Species at Risk Act,* or provincially listed species were observed during the field surveys. For the habitat within the rail spur corridor, cultivated cropland, modified grassland, and hay are considered to have low potential to support listed plant species due to the growing of competitive agronomic crops/cover and chronic disturbance from agricultural activities. Wetland, native grassland and trembling aspen stands are considered to have moderate potential. One vegetation species listed with Committee on the Status of Endangered Wildlife in Canada and *Species at Risk Act* was found to have the potential to occur within the rail spur corridor.

For wildlife, 11 species listed by Committee on the Status of Endangered Wildlife in Canada, eight species listed under the *Species at Risk Act,* and 15 provincially tracked species may occur within the rail spur corridor. Sandhill crane and American white pelican were the only provincially tracked species that were recorded within the study area during field assessments.

There are sporadic wetlands along the rail spur corridor, which are isolated by agriculture activities and many are already segmented by the existing Canadian Pacific Railway rail line. A total of 38 wetlands were surveyed within and along the rail spur corridor. Of these, 15 of the wetlands will be impacted during Project construction and operation. The proposed rail spur and wye is located approximately 3 km east of Rice Lake, which is a large ephemeral and alkaline wetland that provides important seasonal, wildlife habitat. Based on literature and anecdotal information provided from local land users, it is unlikely that Rice Lake supports year round fish populations. The proposed rail spur will cross one watercourse, which has been modified by agricultural activities and therefore, does not likely contain fish or fish habitat.

Environmental Effects

The document identifies potential adverse environmental impacts that may occur as a result of the Project. The significance of these potential impacts is predicted after consideration of the corresponding environmental protection or mitigation measures that are or will be implemented. Air quality and noise effects for operations were based on the mine expansion, which, will result in an increase of approximately 8,000 rail cars per year for the next 65 years based on the current tailings management area capacity.

Results from the air quality assessment indicate that the contribution to the overall Saskatchewan and Canadian greenhouse gas inventory and comparisons of emissions to baseline conditions have negligible impacts on the environment for both the construction and operation phases.

Potential effects from noise were assessed in terms of a potential change in noise levels during construction of the rail spur and due to the increased rail traffic resulting from the mine expansion. Based on Health Canada guidelines, the impact of construction and operation noise is not expected to be significant as Canadian National Railway Company currently operates on the existing Canadian Pacific Railway line; therefore, the increase in rail traffic is not expected to generate a noticeable increase in average sound levels.

Construction of the rail spur line and wye will alter the landscape. The area that will be permanently altered is low in magnitude as the area to be affected is narrow and small, and is adjacent to an existing Canadian Pacific Railway rail line. This change will be long-term, and the assessed importance of this residual effect will be low.

The rail spur and wye are located in an area that has been extensively modified by agriculture and infrastructure development, therefore it is anticipated that there will be limited impacts to isolated areas of native vegetation. The potential changes to vegetation are anticipated to be of short-term and local. The magnitude of the change will be low and the assessed environmental importance of residual effects is predicted to be minimal. No residual impacts are anticipated with respect to rare plant species.

The wildlife and wildlife habitat assessment conducted for the rail spur and wye area indicated that the wetland, riparian, and upland areas may provide habitat for several species. Some species of wildlife may be temporarily displaced during construction of the rail spur line. During operation, it is expected that most species currently using the area will become accustomed to traffic, as human activity and rail traffic in this area already exists and occur frequently. The residual effects on wildlife during construction of the rail spur line are expected to be short-term and low in magnitude and the assessed importance is anticipated to be low.

Public Consultation

As part of its application, Canadian National Railway Company will publish a notice in public newspapers outlining the Project details. Canadian National Railway Company sent a letter and the Project Description of the Project to the Chief and Council of the Whitecap Dakota First Nation on March 7, 2011. Further, as part of the approval process, information on the Project will be posted on the Canadian Environmental Assessment Agency's website, and a copy of the applications and environmental assessment will be made available for public viewing.

Proposed Mitigation

The assessment of potential environmental impacts involves consideration of the rail spur and wye activities with respect to their interaction with the existing environmental components.

Rail spur line construction will likely result in a loss of native grassland, modified grassland, wetland, riparian, and woodland habitat within the right-of-way. Clearing within the proposed footprint will be limited to the extent necessary for construction and operation activities. During construction, best practices will be used to mitigate erosion, introduction of weeds, implementing site-specific spill containment and remediation plans, and compaction. Once construction has been completed, the sides of the rail spur and adjoining right-of-way area will be reclaimed/contoured to help re-establish a vegetation cover in disturbed areas.

Determination of Significance

Residual effects, or those effects that exist after applying mitigation, may still occur to terrain and soils, vegetation, and wildlife and wildlife habitat. To objectively assess the residual effect of predicted positive and negative impacts of the rail spur and wye on the biophysical environment, the associated criteria and scales were defined. The residual effects were considered in terms of their magnitude, spatial extent, occurrence, and duration. A level of importance was assessed for the predicted residual effects, which was evaluated as a function of the impact description criteria. Professional judgment was used to assess the importance of the predicted residual effect, using established impact criteria and definitions as guidelines.

Conclusion

Based on the assessment of the effects and their importance, incremental environmental and social effects may result from the interaction of the rail spur and wye with other local activities. These effects are considered to be primarily of low importance, and are predicted to be not significant. The rail spur and wye are not likely to cause adverse environmental effects, taking into account the implementation of mitigation measures.

Follow Up

A summary report outlining the construction monitoring activities and results will be completed following Project construction. Areas disturbed during the construction of the Project will be inspected within one year of completion to assess the success of any reclamation efforts undertaken and to assess the necessity for any remedial for follow-up work. Canadian National Railway Company has initiated contact with and will continue to work with regulatory agencies and other non-government organizations such as Ducks Unlimited Canada to finalize and implement a compensation plan for the Project. A wetland compensation plan will be submitted once finalized.

Contact

The contact information for this Project is listed in the table below.

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FIGURES

APPENDICES

1.0 INTRODUCTION

Canadian National Railway Company (CN) is proposing to construct and operate a rail spur line and associated wye (the Project) near the community of Vanscoy in central Saskatchewan within the Rural Municipality (R.M.) of Vanscoy (Figure 1). CN has identified the need to construct a railway spur of 13.5 km (8.4 miles) in length to connect Agrium Inc. (Agrium) Vanscoy Potash Mine (mine) to CN's Watrous Subdivision. The mine ships potash to the North American and world markets and CN has been serving the mine since 1992 through a running rights agreement with Canadian Pacific Railway (CP). Constructing the spur line and wye will enable CN to provide direct transportation, improve service requirements, support the mine expansion, respond to competitive markets, and increase service efficiencies to the mine.

Golder Associated Ltd. (Golder) was retained by CN to prepare and submit an Environmental Assessment (EA) on their behalf. The EA for this Project is a *Canadian Environmental Assessment Act* Screening to meet the requirements of application under the *Canada Transportation Act*. The scope of this report includes a Project overview coupled with the proposed construction and operation of the infrastructure. The intent of this report is to support CN's application to the Canadian Transportation Agency and a summary of the content is provided below:

- **Section 1:** an overview of the Project, including regulatory requirements.
- **Section 2:** a summary of the Project description.
- **Section 3:** a description of the biophysical setting in the Project area.
- **Section 4:** a description of the proposed environmental protection and/or mitigation, as well as prediction of the potential effects from the Project.

1.1 Contact Information

The Project contact information:

Proponent:	Canadian National Railway Company	Consultant:	Golder Associates Ltd.
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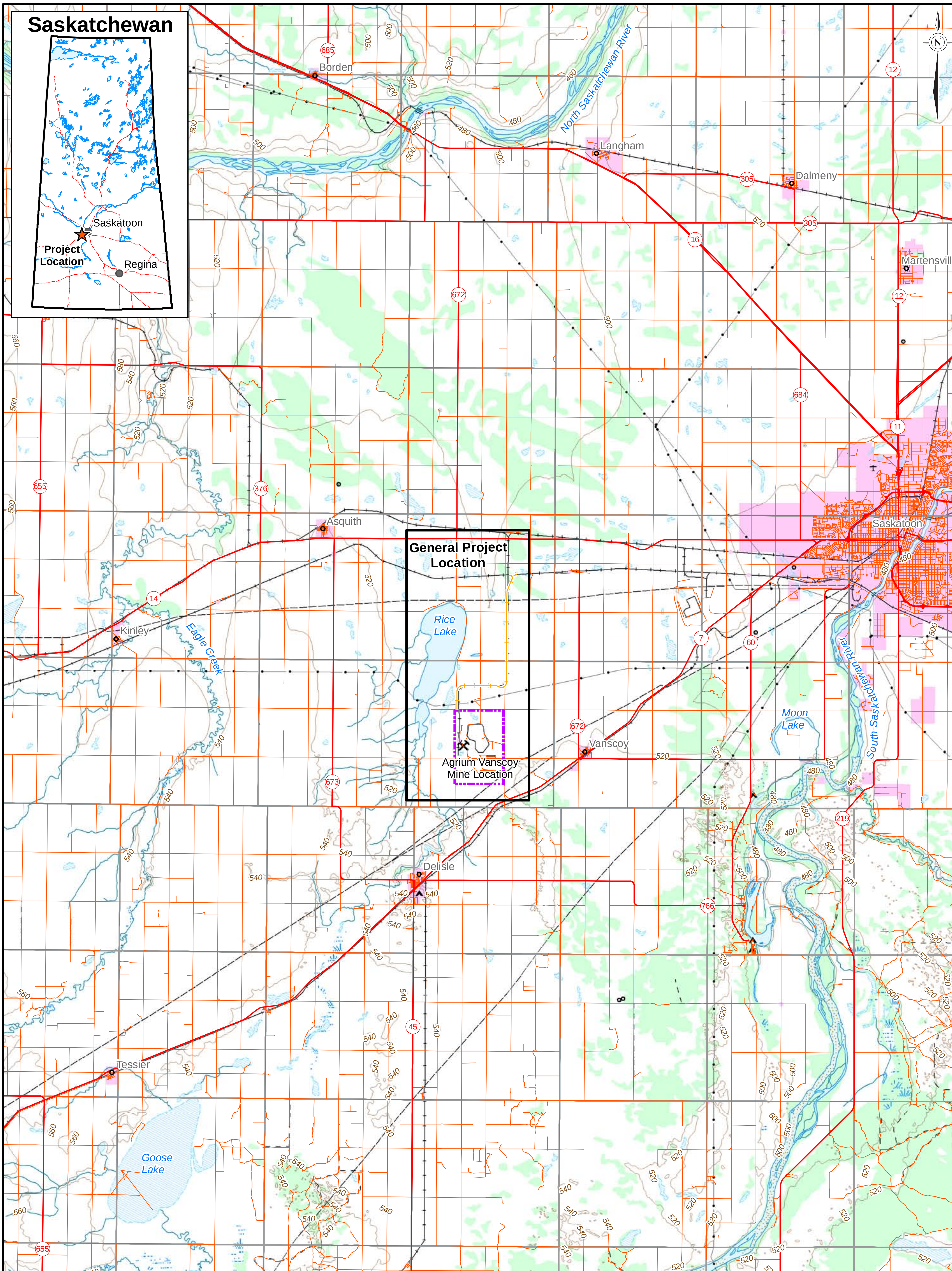
Email:	Luanne.Patterson@cn.ca	Email:	amy_langhorne@golder.com

1.2 Regulatory Engagement

The EA processes to which the Project is set, are from the *Canadian Environmental Assessment Act*. CN has been or will be discussing the Project with various regulatory agencies including the Canadian Transportation Agency and Transport Canada as deemed necessary by the Project permitting requirements.

G:\2010\1361\10-1361-0052 CN Agrium Spur Vanscoy\GIS\Maps\Terrestrial\10-1361-0052-TERR-General Site Location for the Proposed Rail Spur Project.mxd



5 0 5

SCALE 1:250,000 KILOMETRES

Legend

- Proposed Rail Spur
- Highway
- Road
- Agrium Vanscoy Mine Location
- Township / Range Boundary
- Urban Municipality

Reference:
DMTI Highways and Roads
Original Drawing File Courtesy of
Bob Paetsch (Senior Rail Technologist) at AECOM
NTS Mapsheets 73B 72O
NAD 83 UTM Zone 13

PROJECT

PROPOSED BUILD-IN TO
AGRIUM POTASH FACILITY

TITLE

LOCATION OF THE PROPOSED RAIL SPUR LINE PROJECT

Golder Associates
Saskatoon, Saskatchewan

PROJECT		10-1361-0052	FILE No.	
DESIGN			SCALE AS SHOWN	REV. 0
GIS	MGD	04/10/10	**FIGURE: 1**	
CHECK	KH	08/04/11		
REVIEW	KH	08/04/11		

CN will require authorization under Section 98 of the *Canada Transportation Act* to proceed with the construction of the Project. This provision is included in the *Law List* and triggers the application of *Canadian Environmental Assessment Act*. CN is also entering into road crossing and utility crossing agreements with the relevant and applicable authorities. Notices of Railway Works will be provided in accordance with the *Railway Safety Act*.

2.0 PROJECT DESCRIPTION

2.1 Project Overview

CN owns the land that will contain the proposed spur right-of-way (ROW) and this land will serve as the location of the Project. A small segment of land east of the existing CP line and existing turnout to the CN mainline is being purchased to facilitate the construction of a wye located at the northern limit of the Project near the juncture with CN's Watrous Subdivision.

From the CN Watrous Subdivision at mile 204.49 located south of Highway 14, the new line will travel south along the western edge of the SW¼ 23-36-8 W3M, 14-36-8 W3M, 11-36-8 W3M, 2-36-8 W3M, and 35-35-8 W3M, then extend west along the southern border of 34-35-8 W3M and 33-35-8 W3M. At this point, it will turn south along the western border of 28-35-8 W3M and 21-35-8 W3M to connect Agrium's mine (Figure 2). The entire length will parallel an existing CP line.

2.2 Construction Methods

CN will construct the Project in accordance with applicable standards and current practice. Excavation, embankment construction, and compaction of materials will occur within the entire length of the ROW to develop the appropriate track elevation and gradient. CN standards will be used to side slope or back slope embankments and any grading cuts along the sides of the ROW using appropriate best management practices. Construction for the Project will take place during one construction season, potentially in 2011 or as market demands.

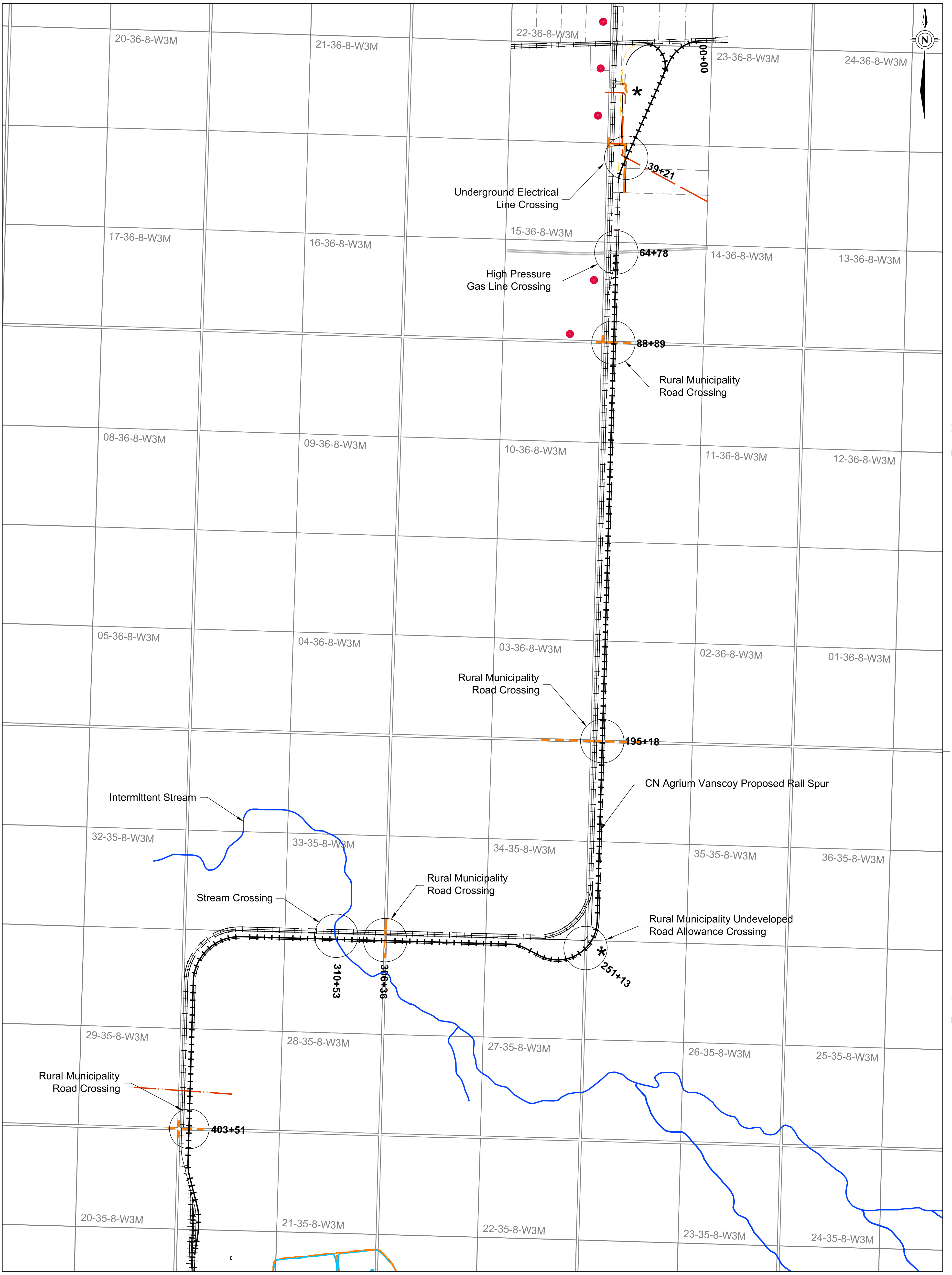
2.2.1 Roads and Utilities Crossings

The Project ROW will be 61 m wide and will cross, at grade, four public R.M. roads, an undeveloped R.M. road allowance, a high pressure gas pipeline, and an underground electrical line (Figure 2 and Table 1).

Table 1: Road and Utility Crossings Along the Proposed Rail Spur Line Project Right-of-Way

Crossing Type	CN Mileage
Underground electrical utility	39+21
High pressure gas pipeline	64+78
R.M. Road Crossing	88+89
R.M. Road Crossing	195+18
Undeveloped R.M. Road Allowance	251+13
R.M. Road Crossing	306+36
R.M. Road Crossing	403+51

G:\2010\1361\10-1361-0052 CN Agrium Spur Vanscoy\CAD\ Drawing file: 10-1361-0052 Proposed Rail Spur Line Alignment.dwg Apr 08, 2011 - 4:18pm



Rge 8 W3M

500 0 500

SCALE 1:30,000 METRES

Legend

- Residence Location
- Noise Monitoring Station
- 403+51 Mileage Marker (Shown in feet)
- CN Agrium Vanscoy Proposed Rail Spur
- Existing Rail/Spur Line
- Rural Municipality Road
- Underground Electrical
- Overhead Electrical
- Property Lot Boundary
- High Pressure Gas Line ROW
- Proposed Rail Spur Line to be Removed

Reference:
Original Drawing File Courtesy of Bob Paetsch (Senior Rail Technologist) at AECOM
NAD83 UTM Zone 13

PROJECT
PROPOSED BUILD-IN TO AGRIUM POTASH FACILITY

TITLE
SITE PLAN FOR THE PROPOSED RAIL SPUR LINE PROJECT

Golder Associates
Saskatoon, Saskatchewan

PROJECT	10-1361-0052		FILE No.		
DESIGN			SCALE	AS SHOWN	REV. 0
CADD	JDS/TAH	08/04/11			
CHECK	KH	08/04/11	FIGURE: 2		
REVIEW	KH	08/04/11			

All road and utility crossings will be constructed in accordance with Transport Canada safety requirements. CN expects to enter into agreements for all crossings with the appropriate road and utility authorities as required under the *Canada Transportation Act*. Should agreements not be reached, CN will file an application with the Canadian Transportation Agency for approval of the crossings. All crossings will meet Transport Canada E-10 requirement and will follow the Canadian Transportation Agency's requirements respecting agreement or order.

2.2.2 Clearing and Grading

Clearing will consist of removal of all trees, brush, or other obstacles from areas within the ROW that could hamper or obstruct soil lifting, grading operations and construction vehicle movement, or threaten the safety of construction personnel. Clearing, which includes grubbing, will be restricted to the ROW. It is anticipated that minimal clearing will be required as much of the Project occurs on terrain that has been previously modified by agricultural practices.

Grading activities may include removing and salvaging topsoil, collecting/placing fill with earth moving equipment to build the subgrade, followed by compacting the subgrade. Grading and excavation in the construction area may include sub-cuts, embankments, side sloping, and creation of side drainage ditches. All earthwork activities will be completed in accordance with the information and direction obtained from geotechnical investigations.

2.2.3 Waste Management and Spill Response

Contractors will be required to comply with all applicable legislation in the handling, storage, transport, and disposal of wastes. During construction, fuel barrels, liquid containers, and other compounds/materials will be stored in a dry and secure place and will be clearly marked as per Workplace Hazardous Materials Information System requirements. Typically, refuse and other non-hazardous waste (e.g., packaging) is collected and disposed of in local landfills. Good housekeeping practices will be maintained during all phases of construction.

CN and their contractors will provide adequate protection from potential spills/leaks during construction. An emergency response plan will be developed prior to the start of construction and will include the requirement of having spill response equipment and material (e.g., catch trays and absorbent pads) available on-site. The emergency response plan will also include the procedures for containment, clean-up, and spill remediation.

2.2.4 Clean–up and Slope Reclamation

Clean-up will be an ongoing activity throughout the construction phase. Immediately following construction, topsoil replacement will be completed on all recontoured or established slopes and embankments, and all construction debris will be collected and transported to the nearest acceptable disposal site. Where required, site stabilization measures and revegetation programs will be implemented based on and to match specific conditions.

2.2.5 Human Safety

The Project is located in a rural agricultural area. The CN spur will be located immediately adjacent to the existing CP spur. The public are familiar and use to train traffic movements in the immediate Project area. The CN trackage will not cause an increase in rail traffic through the area as rail traffic will depend on the volume of potash the mine will ship. Further, a portion of input/output from Agrium will be transferred to CN from other rail carriers, therefore, not changing the total traffic volumes transported. The CN crossings will be offset from the existing crossings so that vehicle and pedestrian traffic can see train movements on the adjacent line prior to crossing the line.

2.2.6 Alternatives to and Alternative Means

Three alternatives to the proposed wye alignment were considered. First, a wye location was considered east of the proposed location as a result of real estate concerns. This option would have required additional track and would have required construction within a permanent wetland. Second, a wye connection was considered west of the public road and existing CP line. An additional diamond would have had to be constructed, or running rights would have had to be established with CP. Both would be more expensive from a construction and maintenance perspective, and would involve running rights with CP. Third, the construction of two 6,000 foot capacity tracks within the CN station ground property east of the existing diamond was considered. This option would have required two additional mainline turnouts and a public crossing closure. Costs and road authority permitting would have been too complex when compared to the proposed wye alignment.

After taking into consideration the four options, the proposed wye alignment outlined in this report was chosen for financial and environmental reasons.

3.0 EXISTING ENVIRONMENT

3.1 Introduction

The following sections present an overview of the existing biophysical setting for the Project corridor alignment, including a 1 km surrounding buffer. Information was obtained and summarized from existing literature for the area coupled with data and observations collected during field inspections of the Project area in August and September 2010.

3.2 Air Quality

The Project is located in a primarily agricultural setting, and north of an active potash mine. The ambient air quality standards and objectives for Saskatchewan and Canada respectively, are outlined in Table 2.

Table 2: National Air Quality Objectives

Pollutant	Average Concentration (μg/m^3) for Applicable Time Period		
	1 Hour	24 Hours	Annual
Particulate Matter (Suspended Particulates)	NA	120	70
Sulfur Dioxide	450	150	30
Carbon Monoxide	15 000	NA	NA
Nitrogen Dioxide	400	NA	100

Note: NA = not available; μg/m^3 = micrograms per cubic metre.

Source: Modified from Government of Saskatchewan (1996) and Environment Canada (2011).

3.3 Noise

The Project area is located in a rural area of Saskatchewan, which does not have applicable noise regulations. Baseline noise monitoring was undertaken at two locations along the Project ROW (Figure 2). The results show that for the north monitoring location, the ambient soundscape during daytime and nighttime is fairly constant.

Dominant noise sources at the north location are affiliated with rail activity. At the south monitoring location, rail traffic was less frequent and the associated sounds less dominant; however, was a consistent contribution from more distant rail activity and from the overflight of aircraft. Though not as loud as the soundscape observed at the north monitoring location, the south monitoring location is still considered quite loud relative to what would be expected in a typical rural environment beyond the immediate influence of a rail line. Considering that the construction of this rail spur is not expected to increase rail traffic, no variations in current sound levels are expected.

3.4 Land Use

The Project occurs primarily in cultivated cropland; however, there are areas of modified grassland, native grassland, and isolated trembling aspen patches (*Populus tremuloides*) at the northern extent of the Project ROW. Small wetlands are present within and adjacent to the ROW and many of these wetlands have already been segmented by the existing CP rail line. The proposed line will also encounter four existing grid roads and one road allowance that are used by local traffic to access homes, agricultural fields and recreation pursuits (e.g., hunting).

3.4.1 Designated Areas

Public databases from Saskatchewan Ministry of Environment (MOE), Saskatchewan Ministry of Agriculture (MOA), Ducks Unlimited Canada (DUC), and R.M. maps were used to identify the occurrence of any protected or sensitive areas near the Project. These included provincial and regional parks, MOA lands designated under the *Wildlife Habitat Protection Act* (*WHPA*), Fish and Wildlife Development Fund (FWDF) land and lands owned by the Saskatchewan Wildlife Federation (SWF).

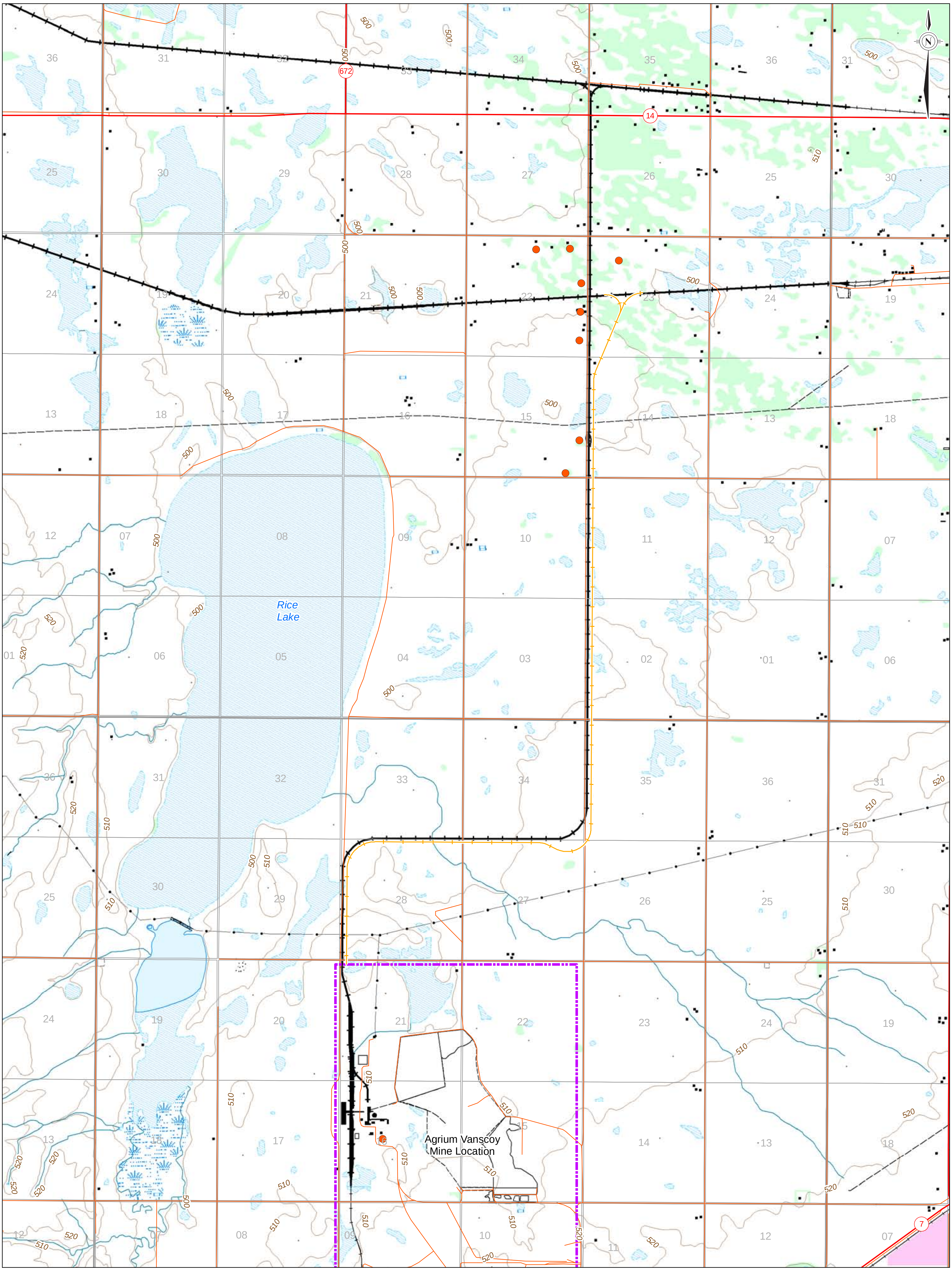
There are no areas designated as International Biological Program sites, provincial or regional parks, *WHPA*, DUC, FWDF, or SWF lands within or along the Project corridor (Figure 3). There is DUC and *WHPA* land associated with Rice Lake and this lake is also designated as an Important Migratory Bird Area and is approximately 800 m from the Project (at its closest).

3.5 Terrain

The Project is located within the Goose Lake Plain and Moose Wood Sand Hills Landscape Areas of the Moist Mixed Grassland Ecoregion (Acton et al. 1998). The Moist Mixed Grassland Ecoregion is characterized by a broad plain that is interrupted by deep, scenic valleys and subdued, hilly uplands. The plain areas tend to slope downward to the north and east as a result of underlying bedrock surface. The majority of the Ecoregion contains level to gently undulating glaciolacustrine and glacial till plains. The Goose Lake Plain Landscape Area is a nearly level glacial lake plain and elevations typically range from 520 m to 580 m. The Moose Wood Sand Hills Landscape Area is an area of sand dunes that straddle the South Saskatchewan River, including the alluvial plains along the river. The often stabilized dunes in this Landscape Area are described as moderately to steeply sloping and the alluvial plains are described as level.

The majority of the terrain in the immediate Project area is mapped as undulating with very gentle slopes (0.5% to 2% slopes) (Saskatchewan Land Resource Unit [SLRU] 2004). The terrain at the very north segment of the ROW is hummocky with gentle slopes (2% to 5%) and the profile transitions to undulating and dissected with very gentle slopes at the south end.

G:\2010\1361\10-1361-0052 CN Agrium Spur Vanscoy\GIS\Maps\Terrestrial\10-1361-0052-TERR-Designated Areas for the Proposed Rail Spur Project.mxd



Legend

- Residence Location
- Building
- Proposed Rail Spur
- Existing Railway
- Existing Pipeline
- Highway
- Road
- Transmission Line
- Agrium Vanscoy Mine Location
- Township / Range Boundary
- Section Boundary
- Urban Municipality
- Wildlife Habitat Protection Land
- Agricultural Crown land
- Ducks Unlimited Canada* Portions of Quarter Sections May Not Be Managed by Ducks Unlimited Canada
- Migratory Bird Concentration Site

Reference:
DMTI Highways and Roads
Ducks Unlimited Canada
Saskatchewan Ministry of Environment, 2010
Saskatchewan Ministry of Agriculture, 2010
Saskatchewan Conservation Data Centre 2010
Original Drawing File Courtesy of
Bob Paetsch (Senior Rail Technologist) at AECOM
NTS Mapsheets 73B/02/03 72O/14/15
NAD 83 UTM Zone 13

1 0 1

SCALE 1:50,000 KILOMETRES

PROJECT

PROPOSED BUILD-IN TO AGRIUM POTASH FACILITY

TITLE

DESIGNATED AREAS IN THE VICINITY OF THE PROPOSED RAIL SPUR LINE PROJECT

Golder Associates
Saskatoon, Saskatchewan

PROJECT	10-1361-0052		FILE No.
DESIGN			SCALE AS SHOWN REV. 0
GIS	MGD	07/04/11	
CHECK	KH	08/04/11	**FIGURE: 3**
REVIEW	KH	08/04/11	

3.6 Soils

3.6.1 Soil Associations

Soil map units are defined as simple or compound units (Agriculture Canada 1982 and 1991). Simple map units are delineated when one soil association represents over 85% of the polygon area while compound map units are delineated when two soil associations occur in the same polygon as dominant (60% to 70% of the polygon area) and a subdominant (25% to 30% of the polygon area). All soil polygons may have up to 15% soil inclusions of other soil types not described in the map unit; these are soils, which occur within a map unit but are not extensive enough to be distinguished separately or defined as subdominant.

A general description of the characteristics of each soil association and map unit encountered by the ROW is summarized in Table 3. The soil association map was obtained from published soil surveys in the form of digital information from the SLRU (2004) (Figure 4). The numbers behind association labels on the soil map are termed map units and indicate different and specified combinations of soil subgroups within an association that are the result of variations in topography, drainage, or aspect. Bradwell soils are the dominant soils that occur within and along the rail spur line ROW and makes up approximately 41% (5,532 m) of the ROW (Figure 4). The ROW will also cross soils of the Alluvium Complex (4%, 527 m), Asquith (26%, 3,572 m), Elstow (13%, 1,767 m), and Vera (17%, 2,274 m) soil associations.

3.6.2 Agriculture Capability

Agriculture capability of soils along the ROW was also obtained from SLRU (2004). Agriculture capabilities along the ROW range from Class 3 to Class 6 (Table 4). The major limitations include insufficient soil water holding capacity, excess salinity, and excess water, which may affect agricultural activities. Class 3 soils cover approximately 7,249 m (53%) of the ROW and Class 4 soils cover 2,426 m (17.7%). The remaining 3,998 m are rated as Class 5 and Class 6 (12.6% and 16.6%, respectively).

3.6.3 Soil Summary

Table 5 summarizes the key attributes of each of the soil associations crossed by the Project, and identifies construction considerations based on the characteristics of the soil.

3.7 Vegetation

3.7.1 Regional Vegetation

The Project is located within the Goose Lake Plain and Moose Wood Sand Hills Landscape Areas of the Moist Mixed Grassland Ecoregion (Acton et. al. 1998). In its natural state, the Moist Mixed Grassland Ecoregion is described as having a mix of woodland, shrubland, and open grassland; however, wooded areas are generally restricted to small patches in and around depressions or on steep north facing slopes or coulees. Currently, most of the Ecoregion is cultivated, with natural vegetation located in remnant patches or in areas (e.g., valley complexes) otherwise unsuitable for cultivation. Within the Goose Lake Plain and Moose Wood Sand Hills Landscape Areas, native vegetation is still the dominant cover in patches that are characterized by sandy soil.

Table 3: Soil Map Units and Soil Associations Encountered by the Proposed Rail Spur Line Project Right-of-Way

Soil Association	Map Unit	Map Unit Description[a]	Approximate Length (m)	Proportion (%)	Parent Material[a]	Dominant Surface Texture[b]
Alluvium Complex	Av 6	Dominantly carbonated and/or salinized Rego Humic Gleysols (i.e., wetland soils)	527	3.9	Undifferentiated alluvial deposits	Clay Loam
Asquith	Aq 1	Dominantly Orthic Dark Brown Chernozems (i.e., grassland soils)	3,572	26.1	Coarse to moderately coarse textured, weakly calcareous, glaciofluvial and lacustrine deposits	Sandy Loam to Loamy Sand
Bradwell	Br 3	Dominantly Orthic Dark Brown Chernozems with substantial areas of Eluviated Dark Brown Chernozems	5,431	39.7	Medium to moderately fine textured, moderately calcareous, sandy glaciofluvial and lacustrine deposits	Loam
	Br 5	Dominantly a combination of Dark Brown Chernozems and carbonated and/or saline Dark Brown Chernozems	101	0.7		Loam to Fine Sandy Loam
Elstow	Ew 3	Dominantly Orthic Dark Brown Chernozems with substantial areas of Eluviated Dark Brown Chernozems	1,767	12.9	Medium to moderately fine textured, moderately calcareous, silty glaciolacustrine deposits	Loam
Vera	Vr 4	Dominantly Orthic Regosols (i.e., weakly developed soils)	2,274	16.6	Sandy, eolian, or wind worked fluvial materials	Sand to Loamy Sand

Note: [a] SLRU (1997).
[b] SLRU (2004).

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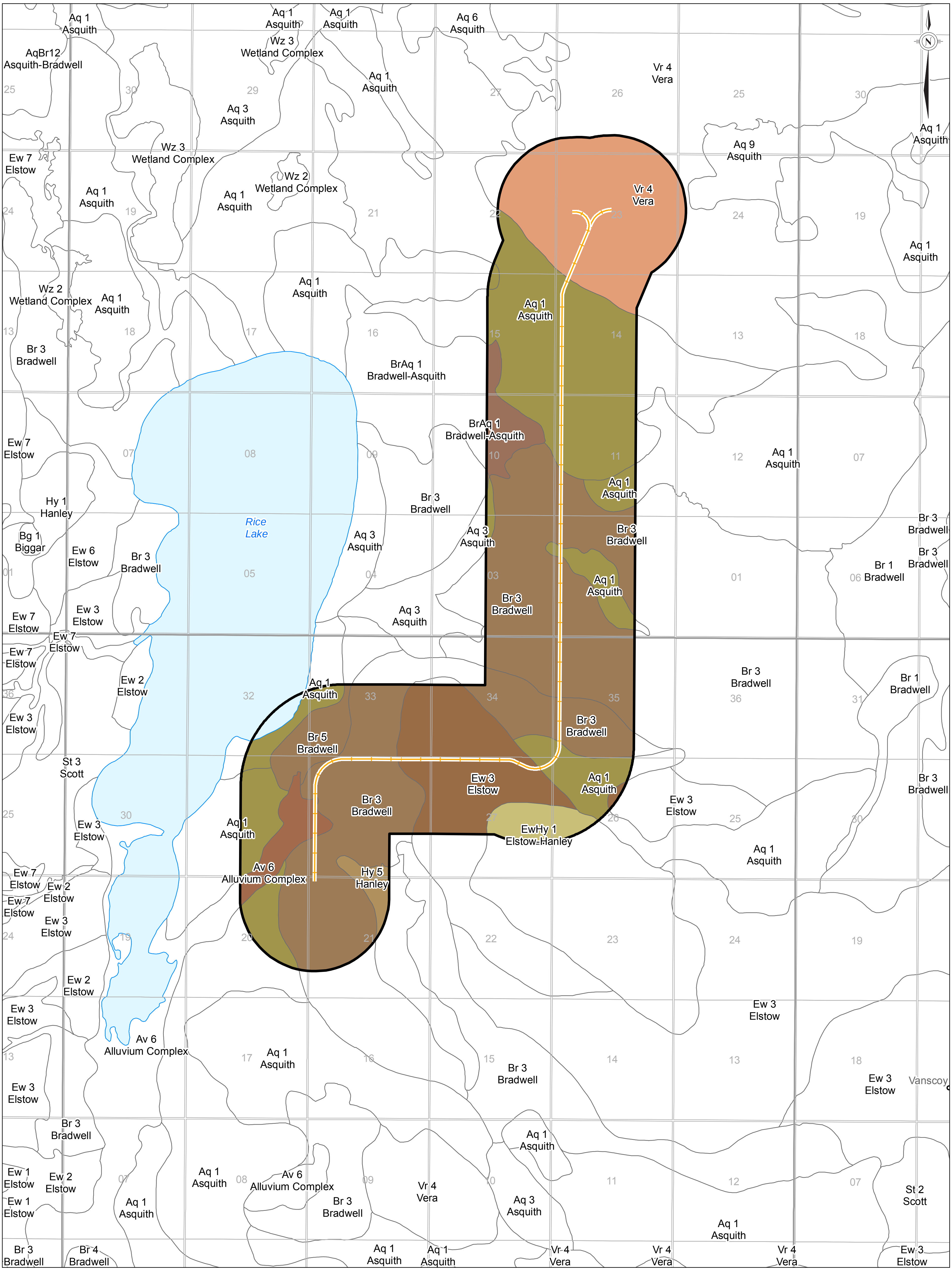

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SCALE 1:50,000 KILOMETRES

Legend

Proposed Rail Spur

1 Km Buffer

Township / Range Boundary

Section Boundary

Symbol Sequence

Association Symbol ← An 2 Allan → Map Unit

Association Name

PROJECT

PROPOSED BUILD-IN TO AGRIUM POTASH FACILITY

TITLE

SOIL ASSOCIATIONS WITHIN THE PROPOSED RAIL SPUR LINE PROJECT

Golder Associates
Saskatoon, Saskatchewan

PROJECT		10-1361-0052	FILE No.
DESIGN			SCALE AS SHOWN REV. 0
GIS	MGD	04/10/10	
CHECK	KH	08/04/11	FIGURE: 4
REVIEW	KH	08/04/11	

Reference:
Saskatchewan Land Resource Unit, 2004. SKSISv2, Digital Soil Resource Information for Agricultural Saskatchewan, 1:100,000 scale. Agriculture and Agri-Food Canada, Saskatoon, Sask.

Note: The numbers behind association labels are termed 'map units' and indicate different and specified combinations of soil subgroup profiles within an association, that are the result of variations in topography, drainage, or aspect.

Table 4: Agriculture Capability Classes of Soils Encountered by the Proposed Rail Spur Line Project

Map Unit	Agriculture Capability Symbol [(a)]	Agriculture Symbol Definition	Approximate Length (m)	Proportion (%)
Av 6	5(10)NW	100% of the soils were placed in Class 5 due to limitations related to excessive soil salinity and excess water	527	3.9
Aq 1	4(10)M	100% of these soils were placed in Class 4 due to limitations related to an insufficient soil water holding capacity	580	4.2
	4(6)M 5(4)M	60% of these soils were placed in Class 4 and 40% in Class 5 due to limitations related to an insufficient water holding capacity	2,992	21.9
Br 3	3(10)M	100% of these soils were placed in Class 3 due to limitations related to an insufficient water holding capacity	5,431	39.7
Br 5	3(5)M 4(5)N	50% of these soils were placed in Class 3 due to limitations related to an insufficient water holding capacity. 50% were placed in Class 4 due to limitations related to excessive soil salinity	101	0.7
Ew 3	3(10)M	100% of these soils were placed in Class 3 due to limitations related to an insufficient water holding capacity	1,767	12.9
Vr 4	6(10)SE	100% of these soils were placed in Class 6 due to limitations related to adverse soil characteristics and erosion damage	2,274	16.6

Note: [(a)] The first number indicates the capability class, the bracketed number indicates the percent of the area (out of ten), and the letters indicate the subclass. Example: 5(10) TE means that 100% of the area was placed in Class 5 because of limitations due to topography and erosion damage.

Table 5: Soil Sensitivities and Construction Considerations for Soil Map Units Encountered by the Proposed Rail Spur Line Project

Soil Map Unit	Stoniness Class[a]	Water and Wind Erosion Potential[a,b]	Salinity[a]	Construction Considerations
Av 6	S0[c]	Water - Low/Dissected (higher rates of erosion may occur on the steeper slopes along the edges of the dissection) Wind - Low	>70% of the map unit area is affected by salinity.	■ Special soil handling may be required for soils affected by salinity.
Aq 1	U	Water - Low in hummocky areas, Very Low in undulating areas Wind - High	3% to 10% of the map unit areas are affected by salinity.	■ Soil management practices during construction and soil stabilization following clean-up will be required due to high wind erosion potentials. Mitigation measures will decrease the consequence of erosion. ■ Special soil handling may be required for soils affected by salinity.
Br 3	U	Water - Very Low Wind - Low	3% to 10% of the map unit areas are affected by salinity.	■ Special soil handling may be required for soils affected by salinity.
Br 5	U	Water - Very Low/Dissected (higher rates of erosion may occur on the steeper slopes along the edges of dissections) Wind - Moderate	40% to 70% of the map unit area is affected by salinity.	■ Soil management practices during construction and soil stabilization following clean-up will be required due to moderate wind erosion potentials. Mitigation measures will decrease the consequence of erosion. ■ Special soil handling may be required for soils affected by salinity.
Ew 3	U	Water - Very Low Wind - Low	3% to 20% of the map unit areas are affected by salinity.	■ Special soil handling may be required for soils affected by salinity.
Vr 4	U	Water - Very Low Wind - Very High	3% to 10% of the map unit area is affected by salinity.	■ Soil management practices during construction and soil stabilization following clean-up will be required due to very high wind erosion potentials. Mitigation measures will decrease the consequence of erosion. ■ Special soil handling may be required for soils affected by salinity.

Note: [a] SLRU (2004).
[b] Water and wind erosion potentials are based on areas that have not had mitigation measures applied.
[c] Stoniness Class: S0 = Non-Stony; U = Unclassified.

3.7.2 Vegetation Survey

A vegetation survey was completed within and along the Project ROW in September 2010. The plant species documented during the vegetation survey are presented in Appendix A, Table A-1. At a classification level, six habitat types were observed and mapped. These habitat types include modified grassland, native grassland, cultivated cropland, trembling aspen stand, hay, and wetland (Figure 5).

3.7.3 Listed Plant Species and Potential Habitats

A list of species at risk that are known or have potential to occur within the Project area was compiled using federal and provincial status documents, provincial tracking lists, references/literature, and known distributions. Federal status documents include the *Species at Risk Act* (*SARA*) (2010) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (2010).

Provincial tracking lists maintained by Saskatchewan Conservation Data Centre (SKCDC) (2010a) provide information on the ecological status of provincial species and communities. The list of rare plants with potential to occur within the Project area was cross checked with Harms et al. (1992). This was completed to verify if the ranges overlap the Project and if habitat is present to support these plant species. Twenty-one provincially tracked plant species have been documented to occur within approximately 20 km of the Project and have ranges that overlap the Project area (Table 6). Smooth arid goosefoot (*Chenopodium subglabrum*) is listed as threatened under COSEWIC and threatened under Schedule 1 of *SARA* and has potential to occur within the eolian landform at the northern portion of the Project corridor; however, this species was not recorded during field surveys. The species presented in Table 6 were included because there is habitat that can support these species within Project corridor. Specifically, the eolian landforms at the northern portion of the ROW and the habitat associated with Rice Lake have higher potential to support these species. The habitat adjacent to Rice Lake is not anticipated to be affected by the Project; however, it does occur within the Project buffer. None of the species listed in Table 6 have been historically documented to occur immediately within the Project area.

No COSEWIC, *SARA,* or provincially listed species were observed during the September 2010 field survey. However, the absence of rare plant observations does not preclude the potential for rare plants to occur within the Project area. Rare plant occurrences at a site can be missed due to timing of plant surveys and because the presence of species can vary annually and locally. For example, climatic fluctuations may not allow adequate time for plants to mature and produce flowers, making them more difficult to spot and identify during certain years. Further, available microhabitats within larger habitat types can vary over time and space thereby influencing the presence of suitable growing sites for specific species. Therefore, a plant survey can not confirm the absence of rare plants or rare plant communities; it can only confirm their presence.

Nonetheless, the potential for occurrence within the Project area is based on habitat suitability to support these species. For the habitat within the Project corridor, cultivated cropland, modified grassland, and hay are considered to have low potential to support listed plant species due to the growing of competitive agronomic crops/cover and chronic disturbance from agricultural activities. Wetland and native grassland are considered to have moderate potential, although these areas can contain microsites that have high potential to support listed species. For example, within the native grassland and associated eolian landform encountered by the northern portion of the ROW, any sandy and eroded microsites would be considered to have high potential to support some of the species listed in Table 6. Areas of moderate potential for listed plants include the trembling aspen stand.

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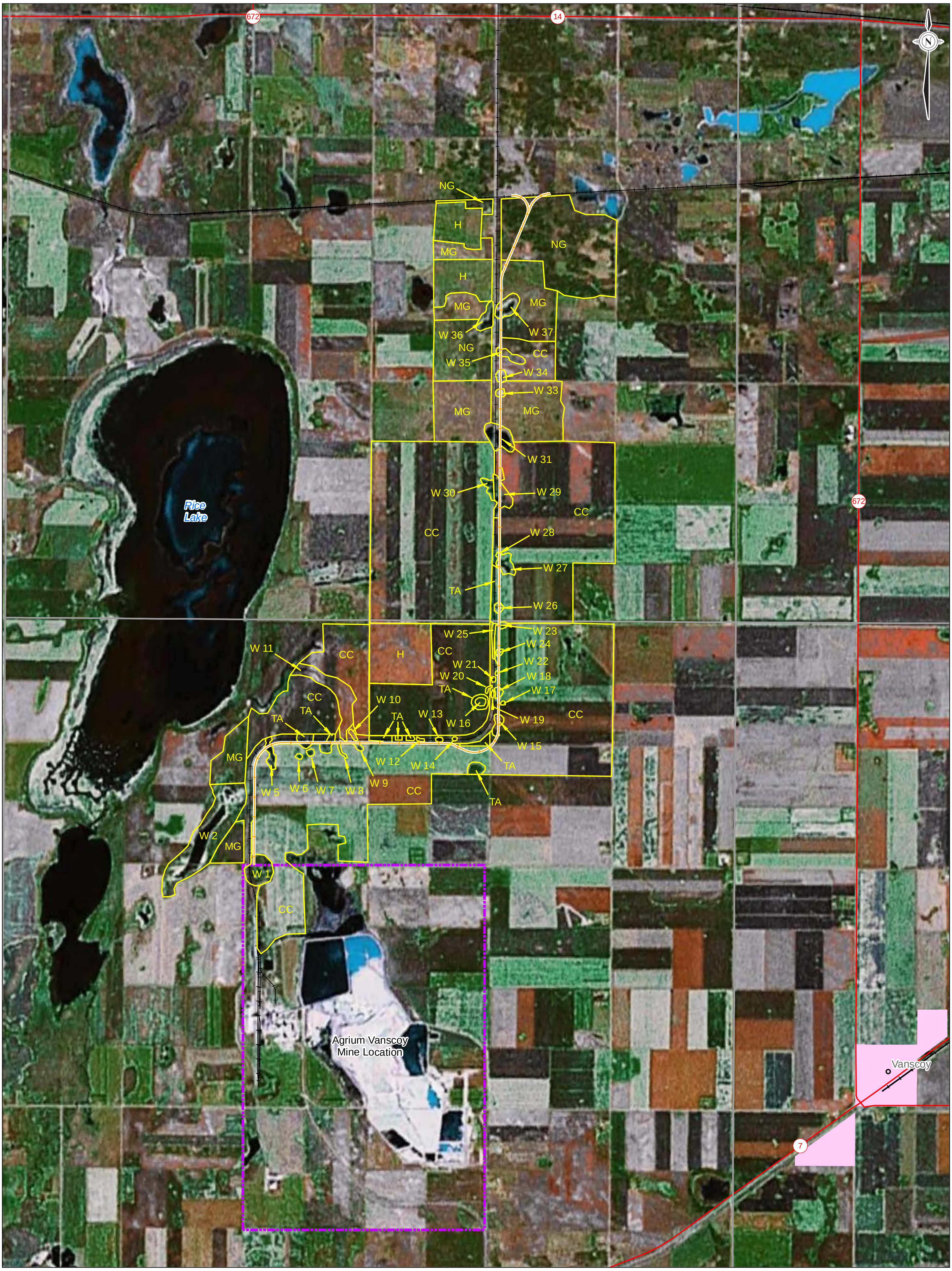

Legend

	Proposed Rail Spur	MG	Modified Grassland
	Existing Railway	NG	Native Grassland
	Highway	CC	Cultivated Cropland
	Agrium Vanscoy Mine Location	TA	Trembling Aspen Stand
	Township / Range Boundary	H	Hay
	Urban Municipality	W	Wetland

Reference:
Image © 2010 TerraMetrics
DMTI Highways and Roads
Original Drawing File Courtesy of
Bob Paetsch (Senior Rail Technologist) at AECOM
NTS Mapsheets 73B/02/03
NAD 83 UTM Zone 13

1 0 1

SCALE 1:50,000 KILOMETRES

PROJECT

PROPOSED BUILD-IN TO AGRIUM POTASH FACILITY

TITLE

HABITAT MAP FOR THE PROPOSED RAIL SPUR LINE PROJECT

Golder Associates
Saskatoon, Saskatchewan

PROJECT		10-1361-0052	FILE No.	
DESIGN			SCALE AS SHOWN	REV. 0
GIS	MGD	04/10/10		
CHECK	KH	08/04/11		
REVIEW	KH	08/04/11		

FIGURE: 5

Table 6: Listed Plant Species that have Potential to Occur within and have Ranges that Overlap the Proposed Rail Spur Line Project Area

Common Name	Scientific Name	Provincial Status[a]	COSEWIC Status[b]	*SARA* Status[c]	Preferred Habitat in Saskatchewan (Harms et al. 1992)
Forbs, Ferns, and Fern Allies					
Bushy cinquefoil	*Potentilla paradoxa*	S2S3	Not Listed	Not Listed	Moist sandy shores and slough margins
Chaffweed	*Centunculus minimus*	S2	Not Listed	Not Listed	Drying slough margins and prairie depressions
Crowfoot	*Viola pedatifida*	S3	Not Listed	Not Listed	Mesic, usually sandy grasslands
Dry goosefoot	*Chenopodium desiccatum*	S2	Not Listed	Not Listed	Dry, eroded grassland and barrens; sometimes human-disturbed sites
Five-foliate cinquefoil	*Potentilla nivea* var. *pentaphylla*	S2	Not Listed	Not Listed	Dry, sandy prairie associated with eolian landforms
Hairy germander	*Teucrium canadense* var. *occidentale*	S2	Not Listed	Not Listed	Moist lake and stream shore flats, prairie depressions
Indian milk-vetch	*Astragalus aboriginum*	S2	Not Listed	Not Listed	Dry, eroded sandy prairie slopes and shores
Low milk-vetch	*Astragalus lotiflorus*	S3	Not Listed	Not Listed	Sandy, often eroded grasslands
Marsh felwort	*Lomatogonium rotatum*	S2	Not Listed	Not Listed	Moist meadow depressions and marshy shores, usually calcareous or saline
Mingan moonwort	*Botrychium minganense*	S1	Not Listed	Not Listed	Mesic open aspen woods and ditches
Moss gentian	*Gentiana fremontii*	S2	Not Listed	Not Listed	Moist, springy, calcareous, or saline meadow depressions
Mud purslane	*Elatine rubella*	S2	Not Listed	Not Listed	Wet to drying mud-flats on shores, in slough bottoms and tilled field potholes
Narrow-leaved water plantain	*Alisma gramineum*	S3	Not Listed	Not Listed	Wet to drying mud-flats, and sloughs
Neat bug-seed	*Corispermum nitidum*	S2	Not Listed	Not Listed	Sandy open prairies associated with eolian landforms, disturbed roadsides, and old fields
Small lupine	*Lupinus pusillus* ssp. *pusillus*	S3	Not Listed	Not Listed	Stabilized sand-hill grasslands associated with eolian landforms
Smooth arid goosefoot	*Chenopodium subglabrum*	S2	Threatened	Schedule 1 Threatened	Active to stabilized sand dune blowouts associated with eolian landforms

Table 6: Listed Plant Species that have Potential to Occur within and have Ranges that Overlap the Proposed Rail Spur Line Project Area (continued)

Common Name	Scientific Name	Provincial Status[(a)]	COSEWIC Status[(b)]	*SARA* Status[(c)]	Preferred Habitat in Saskatchewan (Harms et al. 1992)
Forbs, Ferns, and Fern Allies (continued)					
Tall beggar's-ticks	*Bidens frondosa*	S2S3	Not Listed	Not Listed	Wet shores and ditches
Upright narrow-leaved pondweed	*Potamogeton strictifolius*	S2	Not Listed	Not Listed	Emersed aquatics in shallow water of protected lake bays, ponds, and slow streams
Graminoids					
Engelmann's spike-rush	*Eleocharis engelmannii*	S2	Not Listed	Not Listed	Drying open slough bottoms and tilled-field depressions
Garber's sedge	*Carex garberi*	S2	Not Listed	Not Listed	Wet, boggy or marshy, open or shrubby, sometimes calcareous shores and depressions
Smooth wild-rye	*Elymus glaucus*	S2	Not Listed	Not Listed	Mesic, open woods and thickets

Note: No SKCDC, COSEWIC, or *SARA*-listed species were observed during field surveys.

(a) SKCDC Tracked Species List for Vascular Plants (SKCDC 2011), where:

S1 = extremely rare (5 or fewer occurrences in Saskatchewan, or very few remaining individuals).

S2 = rare (6 to 20 occurrences in Saskatchewan or few remaining individuals).

S3 = rare to uncommon (21 to 100 occurrences in Saskatchewan; may be rare and local throughout the province or may occur in a restricted provincial range; may be abundant in places).

(b) COSEWIC (2010).

(c) *SARA* (2010); Schedule 1 is the official list of wildlife species at risk.

3.7.4 Weed Species

Four noxious weeds, listed under the *Noxious Weeds Act* (SKCDC 2010b), were documented during field surveys. Canada thistle (*Cirsium arvense*), common dandelion (*Taraxacum officinale* ssp. *officinale*), night flowering catchfly (*Silene noctiflora*), and perennial sow-thistle (*Sonchus arvensis*) were observed sporadically in various places within and adjacent to the Project ROW on cultivated land and in modified grasslands.

3.8 Wetlands

The federal government has prepared the Federal Policy on Wetland Conservation that outlines their policy to conserve wetlands. The objective of the policy is to promote conservation of Canada's wetlands to sustain their ecological and socioeconomic functions, now and in the future (Government of Canada 1991). The principle goals of this policy include: maintenance of the functions and values derived from wetlands, no net loss of wetland functions on federal lands and waters, and enhancement and rehabilitation of wetlands in areas where the continuing loss or degradation of wetlands or their functions have reached critical levels (Government of Canada 1991).

Field surveys in September and October 2010 were completed to classify wetlands within and adjacent to the Project ROW. Wetlands were classified based on the classification system described by Stewart and Kantrud (1971). In the prairie region, seven major classes of wetlands in natural basins are recognized on the basis of ecological differentiation. Each class is distinguished by the vegetational zone occurring in the central or deeper part and occupying 5% or more of the total wetland area being classified. Definitions of each class of wetland can be found in Table 7.

Table 7: Classes of Wetlands and Lakes in the Prairie Region

Permanency Class	Definition of Class
Class I	Ephemeral wetland
Class II	Temporary wetland
Class III	Seasonal wetland
Class IV	Semi-permanent wetland
Class V	Permanent wetland
Class VI	Alkali wetland
Class VII	Fen (alkaline bog) wetland

Source: Stewart and Kantrud (1971).

A total of 38 wetlands were surveyed within and along the ROW (Figure 5). Of these, 15 of the wetlands will be impacted during Project construction and operation. Semi-permanent wetlands were the dominant wetland class identified, followed by temporary, seasonal, and ephemeral. The most common vegetation species observed were cattails (*Typha* spp.), sedges (*Carex* spp.), awned sedge (*Carex atherodes*), and marsh reed grass (*Calamagrostis canadensis*).

3.9 Wildlife and Wildlife Habitat

A field assessment was conducted for the Project area on August 4 and September 2, 2010. The assessment was completed along and within the entire ROW.

3.9.1 Wildlife Habitat

The Moist Mixed Grassland Ecoregion supports numerous avian and terrestrial species because the ecoregion contains a wide variety of habitats including grasslands, wooded groves, and wetlands. However, the natural landscape within the ecoregion has been greatly modified by agriculture and approximately 80% of the ecoregion is now cultivated (Acton et al. 1998). Extensive landscape modification has in turn influenced the distribution and occurrence of wildlife, as well as the carrying capacity of the remnant and modified habitat types. Species commonly found in the area are generally those that have adapted to, or readily utilize habitats influenced by human activity.

The Project corridor is located in an area that has been altered or influenced by human activity and the proposed spur line will be located adjacent to an existing CP rail line. The majority of the ROW passes through cultivated land although there are small portions of modified grassland, native grassland, and isolated trembling aspen stands (Figure 5). There are sporadic wetlands along the ROW, which are isolated by agriculture activities. Many of the wetlands within and along the ROW are already segmented by the existing CP rail line.

Land use influences the suitability and utilization of the habitat by wildlife and, within the immediate Project area, the habitat value is assessed as low to moderate as a result of the concentrated anthropogenic influence. However, Rice Lake, which occurs near the Project area, is an important migratory bird concentration area (Figure 3; SKCDC 2010b).

3.9.2 Mammals

During the August and September field assessments, mule deer (*Odocoileus hemionus*) and white-tailed deer (*O. virginianus*) individuals, as well as moose (*Alces alces*) and striped skunk (*Mephitis mephitis*) sign were observed within the Project area (Table 8). Additional mammal species that likely occur in the Project area include porcupine (*Erethizon dorsatum*), white-tailed jackrabbit (*Lepus townsendii*), prairie vole (*Microtus ochrogaster*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), and pronghorn (*Antilocapra americana*) (Acton et al. 1998).

3.9.3 Avifauna

A total of 113 bird species may breed in the 3/73B mapsheet (Smith 1996). Five waterbird, two raptor, and 17 upland breeding bird species were observed or heard within the Project area during the August and September field assessments (Table 8).

3.9.4 Amphibians and Reptiles

Saskatchewan supports a total of 19 amphibian and reptile species, eight of which may be found in the Project area (Fisher et al. 2007). Only boreal chorus frog (*Pseudacris maculata*) and Canadian toad (*Bufo hemiophrys*) were observed during the field assessments (Table 8).

3.9.5 Sensitive Wildlife Species

Eleven species listed by COSEWIC (2010) and eight species listed under the *SARA* may occur in the Project area (Table 9). In addition, fifteen provincially tracked species may occur within the Project area (Table 9). Sandhill crane (*Grus canadensis*) and American white pelican (*Pelecanus erythrorhynchos*) were the only provincially tracked species that were recorded within the Project area during field assessments. Sandhill cranes and American white pelicans are likely migrants through or summer visitors to the Project area; however, it is unlikely they would be nesting or feeding in the Project corridor due to current land use practices.

Table 8: Wildlife Species Observed or Heard within the Proposed Rail Spur Line Project Area during Field Assessments

Common Name	Scientific Name
Mammals	
Moose	*Alces alces*
Mule deer	*Odocoileus hemionus*
White-tailed deer	*Odocoileus virginanus*
Striped skunk	*Mephitis mephitis*
Birds	
American white pelican	*Pelecanus erythrorhynchos*
Canada goose	*Branta canadensis*
Mallard	*Anas platyrhychos*
Red-tailed hawk	*Buteo jamaicensis*
Swainson’s hawk	*Buteo swainsoni*
American coot	*Fulica americana*
Sandhill crane	*Grus canadensis*
Killdeer	*Charadrius vociferus*
Mourning dove	*Zenaida macroura*
Northern flicker	*Colaptes auratus*
American crow	*Corvus brachyrhynchos*
Black-billed magpie	*Pica hudsonia*
Eastern kingbird	*Tyrannus tyrannus*
Tree swallow	*Tachycineta bicolor*
Mountain bluebird	*Sialia currucoides*
Brown thrasher	*Toxostoma fufum*
Cedar waxwing	*Bombycilla cedrorum*
Yellow warbler	*Dendroica petechia*
Vesper sparrow	*Pooecetes gramineus*
Savannah sparrow	*Passerculus sandwichensis*
Clay-colored sparrow	*Spizella pallida*
Baird’s sparrow	*Ammodramus bardii*
Common grackle	*Quiscalus quiscula*
American goldfinch	*Carduelis tristis*
Amphibians	
Boreal chorus frog	*Pseudacris maculata*
Canadian toad	*Bufo hemiophyrs*

Table 9: Sensitive Wildlife Species that may occur in the Proposed Rail Spur Line Project Area

Common Name	Scientific Name	COSEWIC Status[(a)]	*SARA* Status[(b)]	Provincial Status[(c)]	Potential for Occurrence in the Project Site
Mammals					
Olive-backed pocket mouse	*Perognathus fasciatus*	Not Listed	Not Listed	S3	**Moderate to High** - Species has been recorded within the Project area (SKCDC 2010b). Species prefers sparsely vegetated areas with loose sandy to clayey soils (Manning and Jones 1988).
Birds					
Horned grebe	*Podiceps auritus*	Special Concern	Not Listed	Not Listed	**Moderate** - Species is a confirmed breeder in 3/73B mapsheet (Smith 1996). Breeds in small to medium sized (0.05 ha to 10 ha) freshwater ponds with emergent vegetation (Stedman 2000).
American white pelican*	*Pelecanus erythrohynchos*	Not Listed	Not Listed	S3B	**Moderate to High** - Species was recorded within the Project area during field assessments. Species likely stages or rests on Rice Lake.
Cooper's hawk	*Accipiter cooperii*	Not Listed	Not Listed	S4B S2M S2N	**Moderate** - Species is a confirmed breeder in the 3/73B mapsheet (Smith 1996). Nests in deciduous forests and deciduous riparian habitat (Curtis et al. 2006).
Ferruginous hawk	*Buteo regalis*	Threatened	Threatened Schedule 1	S4B S4M	**Low to Moderate** - Species is a confirmed breeder in mapsheet 3/73B (Smith 1996). Species requires large areas of uncultivated native grassland (Schmutz 1984 and 1987) and may therefore be present at the northern extent of the ROW.
Sandhill crane*	*Grus canadensis*	Not Listed	Not Listed	S2B S4M	**Moderate to High** - Species is a possible breeder in the 3/73B mapsheet (Smith 1996). Species prefers isolated, open marshes or bogs that are far from human habitation (Tacha et al. 1992). Species was recorded within the Project area during the field assessment.
Long-billed curlew	*Numenius americanus*	Special Concern	Special Concern Schedule 1	S3B S4M	**Low to Moderate** - Species is a probable breeder in the 3/73B mapsheet (Smith 1996). Species prefers open, sparse grassland habitat (Dugger and Dugger 2002) and may therefore be present at the northern extent of the ROW. Species commonly forages in cultivated fields and may rest in haylands.
Burrowing owl	*Speotyto cunicularia*	Endangered	Endangered Schedule 1	S2B	**Low to Moderate** - Species is a confirmed breeder in the 3/73B mapsheet (Smith 1996). Species has been recorded within the Project area (SKCDC 2010b). Species prefers to nest in native grassland habitat (Haug et al. 1993) and may therefore be present at the northern extent of the ROW.

Table 9: Sensitive Wildlife Species that may occur in the Proposed Rail Spur Line Project Area (continued)

Common Name	Scientific Name	COSEWIC Status[(a)]	*SARA* Status[(b)]	Provincial Status[(c)]	Potential for Occurrence in the Project Site
Birds (continued)					
Short-eared owl	*Asio flammeus*	Special Concern	Special Concern Schedule 3	S3B S2N	**Moderate** - Species is a confirmed breeder in the 3/73B mapsheet (Smith 1996). Species prefers to breed in large expanses of native grassland habitat (Wiggins et al. 2006) and may therefore be present at the northern extent of the ROW.
Red-headed woodpecker	*Melanerpes erthrocephalus*	Threatened	Threatened Schedule 1	S1B S1M	**Low** - Species is a possible breeder in the 3/73B mapsheet (Smith 1996). Species has only been sighted in Saskatchewan 40 times since 1966, with most of these sightings occurring in the eastern part of the province (Smith 1996). Species prefers grassland areas with isolated woodlots (Smith et al. 2000).
Loggerhead shrike	*Lanius ludovicianus excubitorides*	Threatened	Threatened Schedule 1	S3B	**Moderate to High** - Species is a confirmed breeder in the 3/73B mapsheet (Smith 1996) and has been observed within the Project area (SKCDC 2010b). Species prefers open country with abundant shrubby vegetation (Yosef 1996).
Sprague's pipit	*Anthus spragueii*	Threatened	Threatened Schedule 1	S4B	**Moderate to Hig**h - Species is a confirmed breeder in the 3/73B mapsheet (Smith 1996) and has been sighted within the Project area (SKCDC 2010b). Species prefers large areas of native grassland with little to no shrub cover present (Robbins and Dale 1999).
Yellow-breasted chat	*Icteria virens*	Not Listed	Not Listed	S4B	**Moderate** - Species is a probable breeder in the 3/73B mapsheet (Smith 1996). Species prefers dense shrubby areas, especially in riparian areas (Eckerle and Thompson 2001).
Chestnut-collared longspur	*Calcarius ornatus*	Threatened	Not Listed	Not Listed	**Low to Moderate** - Species is a possible breeder in the 3/73B mapsheet (Smith 1996). Species prefers moderately to heavily grazed native grassland (Hill and Gould 1997) and may be present at the northern extent of the ROW.
Bobolink	*Dolichonyx oryzivorus*	Threatened	Not Listed	Not Listed	**Moderate to High** - Species is a possible breeder in the 3/73B mapsheet (Smith 1996). Species prefers large (greater than 30 ha) modified grassland and hay fields (Martin and Gavin 1995).

Table 9: Sensitive Wildlife Species that may occur in the Proposed Rail Spur Line Project Area (continued)

Common Name	Scientific Name	COSEWIC Status[a]	*SARA* Status[b]	Provincial Status[c]	Potential for Occurrence in the Project Site
Amphibians and Reptiles					
Northern leopard frog	*Lithobates pipiens*	Special Concern	Special Concern Schedule 1	S3	**Low to Moderate** - Species ranges throughout Canada up to the Northwest Territories (Species at Risk Public Registry 2010). Species prefers vegetation that is 15 cm to 30 cm and is located close to water (Species at Risk Public Registry 2010).
Plains spadefoot	*Spea bombifrons*	Not Listed	Not Listed	S3	**Low to Moderate** - Species occurs in the south-central and southwest portions of the province (Fisher et al. 2007). Species prefers native grasslands with loose soils (Fisher et al. 2007) and so may be present at the northern extent of the ROW.
Wandering garter snake	*Thamnophis elegans vagrans*	Not Listed	Not Listed	S4	**Moderate** - Species occurs in the south-central and southwest portions of the province (Fisher et al. 2007). Species prefers shrubland and woodland areas that are located close to water (Fisher et al. 2007).

Note: * Denotes species that were observed during field assessments.

[a] COSEWIC (2009 and 2010).

[b] *SARA* (2010); Schedule 1 is the official list of wildlife species at risk. Schedule 3 lists species that were designated as species at risk by COSEWIC prior to October 1999 and must be reassessed using revised criteria before they can be added to Schedule 1 of *SARA.*

[c] SKCDC (2010b).

Provincial Rank Definitions

S1 Extremely Rare – 5 or fewer occurrences in Saskatchewan, or very few remaining individuals.

S2 Rare – 6 to 20 occurrences in Saskatchewan, or few remaining individuals.

S3 Rare/Uncommon – 21 to 100 occurrences in Saskatchewan; may be rare and local throughout province or may occur in a restricted provincial range (may be abundant in places).

S4 Common – more than 100 occurrences; generally widespread and abundant, but may be rare in parts of its range.

B – for a migratory species, rank applies to the breeding population in the province.

M – for a migratory species, rank applies to the transient population in the province.

N – for a migratory species, rank applies to the non-breeding population in the province.

3.10 Aquatic Resources

The proposed Project is located approximately 3 km east of Rice Lake, which is a large ephemeral and alkaline wetland that provides important seasonal, wildlife habitat. There was no existing fish information for Rice Lake or its tributary streams (Saskatchewan Parks and Renewable Resources 1991). According to MOE's online database, no bathometric data or fish stocking program information is available for Rice Lake (SKCDC 2010a).

Anecdotal information provided from local land users indicates that Rice Lake is considered a slough and has been dry during hot summers in the past. Based on this information, it is unlikely that Rice Lake supports a fish population and it is not connected with any other known fish bearing waters.

Based on a review of satellite imagery and National Topographic Service maps, six unnamed seasonal watercourses flow into Rice Lake. The largest has a mainstem length of approximately 28 km and flows north into the south end of Rice Lake. Four other watercourses flow east into the west side of Rice Lake. The sixth watercourse has a mainstem length of approximately 10 km and flows northwest into the southeast corner of Rice Lake. This watercourse is crossed by the proposed Project 10 km from the northern end of the ROW, approximately 2.7 km upstream of Rice Lake (Figure 2). This watercourse has a defined, but intermittent channel, which has been modified by agricultural activities. The likelihood of this watercourse containing fish habitat or supporting seasonal or year-round fish populations at the proposed crossing location is low.

3.11 Geology and Groundwater Information

Geology and groundwater information for the Project site was taken from *Physical Environment of Saskatoon – Canada* (Christiansen 1970).

The uppermost bedrock sediments in the Project area are the Lea Park Formation and the Upper Colorado Group, which occur approximately 100 m below ground surface (bgs). The Oldman Formation sediments (bedrock), which commonly overly the Lea Park Formation in the Saskatoon area, are absent in the Project area as they were removed by preglacial erosion during the formation of the Tyner Valley and its tributaries. The bedrock sediments are overlain by drift, including Quaternary fluvial sediments of the Empress Group, and glacial sediments of the Sutherland and Saskatoon Groups.

The Empress Group, which overlies the bedrock sediments, is comprised of approximately 25 m of stratified sands, silts, gravels, and clays. The Sutherland Group, which overlies the Empress Group, is comprised of approximately 35 m of glacial tills and stratified drift. The Saskatoon Group, which includes the Battleford and Floral formations, lies between the Sutherland Group and the present day surface and is comprised of approximately 40 m of glacial tills and stratified drift. Surficial stratified drift occurs as eolean, glaciolacustrine and glaciofluvial sediments, and as alluvial sediments deposited by post glacial streams and rivers.

Locally aquifers occur in surficial drift deposits, which are comprised of stratified silts and clays with interbedded very fine sand deposits, and the deeper Tyner Valley Aquifer, which is comprised of medium sand interbedded with silty clay and till in the upper part, and interbedded with gravel in the lower part. These aquifers typically are often hydraulically connected, forming the Tyner Valley Aquifer system, which is the most extensive aquifer in the Saskatoon area. The Tyner Valley Aquifer System includes the Tyner Valley Aquifer, the adjacent Oldman Formation, which forms the walls of the Tyner Valley, and overlying glacial deposits which together act as a contiguous hydrologic system.

Locally, groundwater wells completed in the Tyner Valley aquifer are often flowing artesian wells where surface elevations are below 488 masl.

3.11.1 Water Well Records

A search of the SaskWater water well database was conducted for all surrounding land within 1.6 km of the rail corridor. This included all water wells constructed in Sections 2, 3, 10, 11, 14, 15, 22 and 23 of Township 36, Range 8, West of the 3rd Meridian and Sections 26 to 29 and 32 to 35, Township 35, Range 8, West of the 3rd Meridian.

A total of 41 wells were listed in the SaskWater database for the surrounding area. Of these, 11 wells were recorded as test bores or observation wells, while the remaining 29 were recorded as domestic withdrawal wells.

Of the domestic withdrawal wells, 21 were completed in surficial drift or intertill aquifers of the Saskatoon Group, five appear to be completed in deep stratified drift deposits within the Sutherland Group, and three were completed in Empress Group deposits associated with the Tyner Valley Aquifer. The majority of these domestic wells were situated in Sections 22 and 23, Township 36, Range 8, West of the 3rd Meridian at the north end of the rail alignment.

Three wells were completed in surficial drift (sand), which was recorded to occur from surface to between 4.6 m bgs to 15.0 m bgs. Groundwater levels in these wells ranged from 3.0 m bgs to 3.6 m bgs. These wells were located in the NE¼, Section 10, SW¼ Section 15, and Section 23, Township 36, Range 8, West of the Third Meridian.

The intertill wells were generally completed in intertill sands and gravels of the Saskatoon Group. The completion depths ranged from 9.0 m bgs to 27 m bgs, although most were between 12 m bgs and to 15 m bgs. Corresponding groundwater levels ranged from 2 m bgs to 9 m bgs.

Deep intertill aquifers appear to have been completed in sands and gravels in the lower Sutherland Group. These wells were located in SW¼ Section 22, SE¼, Section 23, and NE¼, Section 14, Township 36, Range 8, West of the 3rd Meridian. There were completed to depths ranging from 50 m bgs to 65 m bgs. Corresponding groundwater levels recorded for two wells ranged from 0.3 m bgs to 19.5 m bgs.

All three wells completed in the Tyner Valley Aquifer were located in the SE¼, Section 23, Township 36, Range 8, West of the Third Meridian. These were completed between 78.3 m bgs and 82.3 m bgs. Corresponding groundwater wells recorded for one of the wells was 1.2 m bgs.

Approximately nine domestic wells, completed in either surficial drift or shallow intertill aquifers lie within quarter sections immediately adjacent to the proposed rail line. These are all located at the northern end of the proposed rail alignment. Of these, only those completed in the shallow surifical drift aquifers (one or two wells in total) may be sensitive to potential impacts from rail operations, in the event of a significant spill. Wells completed in the deeper intertill and Tyner Valley aquifers should be at low risk to impacts from operations due to the protective layering of low permeability glacial till sediments that lie between the aquifers and ground surface.

3.12 Heritage Resources

The proposed Project was submitted to the Heritage Conservation Branch for screening on September 28, 2010. The following factors were used in determining the need for, and scope of, a Heritage Resources Impact Assessment (HRIA) as per Section 63 of *The Heritage Property Act*: the presence of previously recorded heritage resources, the area's overall heritage potential, the extent of previous land disturbance, and the scope of the proposed Project.

The Heritage Conservation Branch determined that there are no recorded archaeology sites in conflict, and the majority of the Project area occurs in previously disturbed cultivated land. In a letter dated September 8, 2010, the Heritage Conservation Branch indicated that the potential for heritage sites to be adversely affected was considered low, and an HRIA is not required for this Project (Heritage Conservation Branch File No. 10-1835; Appendix B).

3.13 Public and Aboriginal Involvement

As part of its application, CN will publish a notice in public newspapers outlining the Project details in spring of 2011. The EA for the Project will be available on the CN website and at a public venue (e.g., library in Saskatoon).

The closest Aboriginal community to the Project is the Whitecap Dakota First Nation located approximately 25 km east, on the east banks of the South Saskatchewan River. There are no lands currently selected under the Treaty Land Entitlement Framework Agreement as indicated on the Saskatchewan Ministry of Energy and Mine's disposition website (http://www.er.gov.sk.ca/files/geomines/1to250k_maps/72o.dwf). CN sent a letter and the Project Description of the Project to the Chief and Council of the Whitecap Dakota First Nation on March 7, 2011 (Appendix C).

Further, as part of the approval process, information on the Project will be posted on the Canadian Transportation Agency's website, and a copy of the applications and EA will be made available for public viewing.

4.0 ENVIRONMENTAL EFFECTS

The environmental screening identifies potential adverse environmental impacts that may occur as a result of the Project. The significance of these potential impacts is predicted after consideration of the corresponding environmental protection or mitigation measures that are or will be implemented.

The spatial and temporal scope of the screening assessment is defined according to the interaction of the proposed activity and the environment. The potential effects to the environment from this interaction are considered and, as applicable, the appropriate mitigation measures applied. The residual effects that may occur after the mitigation measures are implemented are then assessed using best professional judgment of experienced EA specialists, supplemented by available data.

The scope of the Project environmental screening is defined both spatially and temporally by the construction and operation of the Project. The spatial scope of the Project is determined based on the environmental effects potentially caused by various Project activities. Based on this, for the purpose of this assessment, the spatial scope of the Project is defined as the lands directly affected by Project construction.

4.1 Potential Environmental Impacts and Proposed Mitigation

The assessment of potential environmental impacts involves consideration of the Project activities (Section 2.0) with respect to their interaction with the existing environmental components (Section 3.0). Based on the interaction between the Project and the environment, Project activities (i.e., construction of the rail spur line) have the potential to affect terrain and soils, vegetation, wetlands, wildlife, and wildlife habitat in the Project area. These latter components are considered of value and therefore are the valued ecological components (VECs). All of the VECs can be sufficiently mitigated, are localized in spatial extent, or have been altered or diminished by landscape disturbances, namely agriculture and existing infrastructure development. Potential effects and the mitigation measures implemented to avoid or minimize impacts are described in the subsequent sections.

Nonetheless, residual effects, or those effects that exist after applying mitigation, are still predicted to occur to terrain and soils, vegetation, and wildlife and wildlife habitat. To objectively assess the residual effect of predicted positive and negative impacts of the Project on the biophysical environment, the associated criteria and scales must be defined. Each criterion has a scale associated with it. The scales used are relative. These residual effects are considered in terms of their magnitude, spatial extent, occurrence, and duration, as described in Table 10.

Table 10: Impact Description Criteria for Considering the Importance of Residual Effects

Criteria	Description
Magnitude	A measure of the change that can occur as the Project proceeds, which can be low (above background conditions, but within established criteria or scientific threshold and the range of natural variability), medium (substantially above background conditions, but with established criteria or scientific threshold and the range of natural variability), or high (predicted to exceed established criteria or scientific threshold and will likely cause detectable change beyond the range of natural variability).
Spatial extent	The area potentially affected, whether it is the site, locally (i.e., the Project area), the region, or beyond regional.
Occurrence	The frequency of the impact over the specified duration, whether it occurs infrequently, frequently, or continuously. Occurrence may also refer to the probability of an occurrence (i.e., the risk of an occurrence), which is described as none, very unlikely, unlikely, or likely. The probability of an occurrence typically applies to an accident.
Duration	The length of time over which an effect occurs, which can be immediate (occurring only during construction), short-term (lasting longer than construction, but less than three years after), medium-term (lasting the life of the Project), and long-term (remaining after Project closure). Some effects can be reversed after the Project activity is halted, such as the remediation and reclamation of a site.

A level of importance is assessed for the predicted residual effects, which is evaluated as a function of the impact description criteria. Professional judgment is used to assess the importance of the predicted residual effect, using the following impact criteria and definitions (Table 11) as guidelines.

Table 11: Definition of the Assessed Levels of Importance of Residual Effects

Level	Definition
High	Potential impact could threaten sustainability of the resource and should be considered a management concern. Research, monitoring, and/or recover initiatives should be considered.
Medium	Potential impact could result in a decline in resource to lower-than-pre-construction but stable levels in the study area after Project closure and into the foreseeable future. Regional management actions such as research, monitoring, and/or recovery initiatives may be required.
Low	Potential impact may result in a slight decline in resource in study area during the life of the Project. Research, monitoring, and/or recovery initiatives would not normally be required.
Minimal	Potential impact may result in a slight decline in resource in study area during construction phase, but the resource should return to pre-construction levels.

4.1.1 Air Quality

The purpose of this section of the EA is to quantify air emissions generated from the construction and operation of the spur rail line connecting Agrium's mine to CN Watrous Subdivision. The emissions from the construction and operations phase are summarized below and details of the air quality assessment are provided in Appendix D.

4.1.1.1 Construction Phase

There are two primary sources of air emissions associated with the construction phase of the Project that may affect air quality: fleet exhaust and fugitive dust. The fleet includes haul trucks, dozers, excavators, and other support vehicles. Fugitive dust includes the railway bed and road dust, and earthwork activities such as loading and unloading soil/gravel, grading and bulldozing. Construction vehicle movements along the railway bed could result in dust generation, especially during the drier summer months (e.g., July and August). During wetter months, precipitation will assist in reducing dust emissions from the railway bed.

A summary of emission estimates and a listing of construction equipment are provided in Appendix D-1. The emission estimates were based on information provided by CN and published emission factors (e.g., United States Environmental Protection Agency [U.S. EPA] 1995).

The following mitigation measures will be incorporated into the construction phase of the Project to reduce air emissions:

- equipment will adhere to federal emission standards and will be regularly maintained; and
- water will be applied to mitigate dust generation.

With these mitigation measures, the residual impact associated with road dust is expected to be low.

The impacts on air quality due to Project construction are expected to be adverse, of low magnitude, of local geographic extent and of immediate duration. The importance of the residual impacts to air quality is expected to be minimal. The impacts are considered possible but are not predicted to be significant.

4.1.1.2 Operations Phase

The reduction of emissions from locomotive engines in Canada is driven by the following two regulations:

- *Canadian Environmental Protection Act* (*CEPA*) – Sulphur in Diesel Fuel Regulations (*CEPA* 1999): The *CEPA* Sulphur in Diesel Fuel Regulations sets a sulphur limit of 500 ppmw in rail diesel by May 2012. After May 2012, the sulphur content in diesel fuel for use in locomotive engines is limited to 15 ppmw. The average sulphur content in 2008 was 147 ppmw indicating that ultra-low sulphur diesel is already used extensively (Railway Association of Canada [RAC] 2008).
- U.S. EPA – Control of Emissions of Air Pollution from Locomotives and Marine Compression-Ignition Engines Less Than 30 Litres per Cylinder (U.S. EPA 2008): There is no regulation in Canada which sets emission standards for locomotive engines; however, emissions from the Canadian engine fleet is indirectly influenced by the U.S. EPA emission standards due to the large percentage of American manufactured locomotive engines that are in the Canadian fleet.

The emission rates were calculated using emission factors and locomotive and operating conditions specific to the Project. Due to expansion of the Agrium mine, the number of trains per year will increase by 80, for a total of 280 trains per year. The increased emission rates associated with the additional trains were used for the air assessment, and are not associated directly with either the CN or CP rail lines. At this point, it is not known the number of trains that will travel on which track to service the Agrium mine. Results from the assessment indicate that the greenhouse gas (GHG) emission contribution from the Project will amount to 0.12% of Saskatchewan emissions and less than 0.01% of emissions for Canada for 2008 (Appendix D). Emissions will increase with the Project when compared to baseline; however, these increases are expected to be less than calculated since the assessment did not consider future improvements in the fuel economy and engine performance of locomotives coming into service. If only a new dedicated CN spur line is constructed and the number of trains on the rail line does not change, no change in emissions will occur during the operations phase.

The contribution to the overall Saskatchewan and Canadian GHG inventory and comparisons of emissions to baseline conditions indicate that air quality impacts on the environment are negligible for both the construction and operation phases.

4.1.2 Noise

The objective of the noise assessment is to identify and analyze changes in the acoustical environment that result from Project activities. The assessment of noise is focussed on the predicted changes in the acoustic environment that have the potential to affect people. Details of the noise assessment are included in Appendix E.

The assessment predicts the change in noise levels due to increased train traffic on the spur resulting from increased rail traffic volume estimated for the period between 2010 and 2015. Increased rail traffic is expected as a result of increased production (40%) at the mine. The assessment of operational noise for the Project was completed by:

- establishing the existing cumulative noise levels at selected receptors; and
- assessing the change (increase) in sound levels as a result of the increase in rail traffic on the new spur and the main branch next to the spur.

The assessment also investigates the effect of construction noise at the location of the most impacted receptor (i.e., the dwelling located nearest to the construction activity), for the eight month period required to complete construction of the new rail spur. As per Health Canada guidance, the effect of construction noise is quantified using both the percentage highly annoyed (HA) metric and an integrated sound level that includes both daytime and nighttime contributions. The assessment of construction noise for the Project was completed by:

- establishing the existing cumulative noise level at the most impacted receptor;
- establishing the existing HA at the most impacted receptor;
- assessing the change (increase) in HA as a result of noise generated by the construction of the new spur; and
- assessing the integrated sound level at the most impacted receptor in comparison to the maximum level allowed by Health Canada.

Potential effects of the Project were assessed in terms of a potential change in noise levels due to the increased rail traffic on the new spur due to the mine expansion. The increase in rail traffic is not expected to generate a noticeable increase in average sound levels. The maximum sound levels associated with rail traffic are expected to remain unchanged. Potential effects of construction activities associated with the Project were assessed at the location of the most and least impacted receptors. The impact of construction noise was quantified via both the integrated sound level and the change in HA. Based on Health Canada guidance, the impact of construction noise is not expected to be significant at the most impacted receptor (or any other dwellings in the area). The impact of noise from future decommissioning is expected to be less than the impact from construction.

4.1.3 Land Use

Construction of the Project will change some areas from agriculture to transportation land use. This can be mitigated by notifying the public about construction activities and schedules. CN will be responsible for addressing any potential concerns with the Project. If traffic flow during construction is going to be affected, appropriate notification and signage will be used where required. The residual effect on land use is expected to be low in magnitude and short-term in duration. The assessed importance of the residual effect is anticipated to be minimal.

4.1.4 Terrain and Soils

Construction of the Project has the potential to change local topography, the quality of soil resources, and decrease topsoil quantity. The majority of the Project site has been previously modified by agricultural and residential use; consequently, the current topography and soil conditions have been influenced by anthropogenic activities. Table 12 provides a summary of Project activities, potential impacts, and proposed mitigation for terrain and soils.

Table 12: Potential Environmental Impacts and Mitigation for Terrain and Soils

Issue	Project Activity	Potential Impact	Proposed Mitigation
Terrain and Soil	Rail spur line construction - site clearing and contouring.	Admixing and compaction of soil during construction; loss of landforms.	■ Minimizing the size of the footprint and salvaging topsoil and organic materials for replacement during reclamation. ■ Compacted areas outside of the spur line may require deep ripping. ■ Contouring areas (where possible) adjacent to the spur line to pre-disturbance conditions.
		Wind and water erosion of soil during and shortly after construction, in particular wind erosion at the northern portion of the ROW; change in surface hydrology.	■ Use soil erosion and sediment control best practices during construction. ■ Revegetating exposed soil as soon as possible.
	Rail spur line construction - soil contamination from fuel spills and waste.	Change in soil quality and chemistry; poor growth of vegetation and a potential decrease in vegetation diversity; impacts to wildlife health.	■ Implementing a site-specific spill containment and remediation plan. ■ Spill response equipment and material will be readily available on-site. ■ Any spills will be immediately isolated, contained and cleaned up. ■ Equipment will be inspected for leaks prior to entry onto site and throughout the duration of the Project. ■ Fuel and any chemicals/liquids associated with construction will be stored at a designated area away from sensitive areas (wetlands).
	Operation and rail spur - soil contamination from fuel spills and waste.	Change in soil quality and chemistry; poor growth of vegetation and a potential decrease in vegetation diversity; impacts to wildlife health.	■ CN has an established response plan for leaks, spills, and accidents on which they operate.

Rail spur line construction may result in the loss of landforms and affect soil quality, quantity, and distribution. During construction, soil will be removed from the site or contoured to suit construction requirements. This will result in the disturbance of the soil profile and soil structure, in turn increasing the potential for admixing, compaction, and loss. The effects of soil disturbance can be mitigated by minimizing the size of the footprint and salvaging topsoil and organic materials for use as reclamation material following rail spur line construction. The salvaged topsoil and organic soil can potentially serve as a seed source for revegetation, and salvaged organic materials (i.e., leaf litter) can also act as an amendment to increase organic matter that would improve soil quality during reclamation and assist with erosion control (i.e., organics in soil enhance particle cohesion). Salvaged soil will be stored in such a manner so that erosion runoff into adjacent waterbodies is minimized (i.e., on the uplands away from Rice Lake). Areas along the rail bed that have been compacted during construction but will be subsequently reclaimed may require deep ripping to mitigate compaction.

During construction, soil erosion from wind can occur on exposed mineral soil (i.e., where vegetation has been removed), in particular at the northern portion of the ROW where sandy soils exist. In addition, disturbance of soil can change the hydrology of the area because a change in soil structure can potentially decrease infiltration and increase overland flow. Erosion may result from increased surface water runoff (i.e., sheet wash, rain splash, and rill and gulley formation). The outcome of soil erosion is important because of potential offsite effects. These effects include the sedimentation of adjacent waterbodies and, more importantly, the release of compounds that may be present in the sediment that can dissolve and be released into water and potentially cause water quality changes. Soil erosion and sediment control measures, as well as the use of best practices for construction, can reduce potential issues during rail spur line construction. After construction, soil erosion may be controlled by installing erosion control measures (e.g., erosion control blankets) and revegetating exposed soil as soon as possible.

Soil contamination from fuel spills and waste discharge may occur as a result of rail spur line construction. Where soil quality is changed by contamination, the result could be poor growth of vegetation, decrease in vegetation quality (i.e., reduced forage quality), and a potential decrease in vegetation diversity, which may impact wildlife health. Soil contamination and spills can be mitigated through a spill containment and remediation plan. During the construction program, equipment will be inspected for leaks prior to entry onto site and throughout the duration of the Project. Further, appropriate spill containment and clean-up equipment/material will be readily available on-site.

The potential effect of soil disturbance during rail spur line construction is related to the change in landform, removal of soil, and possible compaction from equipment (Table 13). However, the majority of the Project is located on previously disturbed land and soil modifications/alteration has already occurred because of agricultural activities and possibly by construction of the adjacent CP rail spur. The changes to soil quantity and quality (growth medium) can be minimized through salvaging and replacement of soil following rail spur line construction, coupled with keeping the construction ROW and staging areas to the minimal width as feasible to safely facilitate construction. Excluding the long-term change in terrain and the area supporting the rail spur subgrade, the duration of the changes to terrain and soil will be short-term and will cease once the rail spur line construction and reclamation is completed. Residual effects are expected to be of low magnitude and isolated to the alignment of the rail spur. The assessed importance of the potential residual effect from this activity is expected to be low.

Table 13: Predicted Residual Effects and Assessed Environmental Importance of Residual Effects on Terrain and Soils

Predicted Residual Effects	Magnitude	Spatial Extent	Occurrence	Duration	Assessed Importance
Changes to landforms	Low	Local	Infrequent	Short to Long-term	Low
Changes to soil quantity and quality	Low	Local	Infrequent	Short-term	Minimal
Soil contamination from spills	Low	Local	Infrequent	Short-term	Low

Construction of the rail spur line has the potential to increase erosion potential. The potential changes are anticipated to be of short-term and local. Sediment and erosion control measures based on best practices for construction will be used. The effects from the construction of the rail spur line are expected to be mitigated. Based on this, the assessed importance of the potential residual effects is predicted to be minimal (Table 13).

Construction of the rail spur line will alter the landscape. The area that will be permanently altered is low in magnitude as the area to be affected is narrow and small, and is adjacent to an existing CP rail line. This change will be long-term, and the assessed importance of this residual effect will be low (Table 13).

In the event that a spill occurs, this may have potential to cause longer term effects on soil resources, although this will be dependant on the chemical properties of the spilled or released material, the soil type on which the spill occurs, and vegetation present on the soil that becomes affected. Potential soil contamination may have a direct effect on vegetation growth and vigour, as well as health effects on terrestrial species eating vegetation on contaminated soil, including the potential for direct exposure to soil bound contaminants. A spill containment and remediation plan can be used mitigate the issues related to a spill during construction and operation. The effect of a spill is predicted to be low in magnitude and short-term in duration (Table 13). The assessed important of this potential residual effect on soil resources is anticipated to be low.

4.1.5 Vegetation

Construction of the Project has the potential to change the quality of vegetation resources and decrease vegetation cover. However, the majority of the Project is located on previously disturbed land and vegetation cover modifications/alteration has already occurred largely because of agricultural activities. Table 14 provides a summary of Project activities, potential impacts, and proposed mitigation for vegetation resources.

The effects of vegetation removal can be mitigated by minimizing the size of the footprint and salvaging topsoil and organic materials (i.e., vegetation) for use as reclamation material following rail spur line construction. Clearing within the proposed footprint will be limited to the extent necessary for storing salvaged soils and slash, and to safely facilitate construction and operation activities. Shrubby material will be cleared and windrowed/piled on the edges of areas cleared for construction, but not stored near sensitive areas (i.e., wetlands). The material will either be removed from site to an acceptable disposal location or it may be mulched/chipped and stored for subsequent erosion control and reclamation. Once construction has been completed, salvaged soil materials (i.e., growth media containing plant seeds) may be spread over the reclaimed/contoured area to help re-establish a vegetation cover. Following soil replacement, slash or mulch may be rolled back or spread onto the area and walked down to promote decomposition, reduce fire hazard and increase surface roughness; all of which help mitigate erosion. This is expected to also help revegetation, as the slash/mulch will create suitable growing sites for plants that are seeded or naturally colonize and regenerate from the seed bank.

Table 14: Potential Environmental Impacts and Mitigation for Vegetation

Issue	Project Activity	Potential Impact	Proposed Mitigation
Vegetation	Rail spur line construction - site clearing and contouring.	Disturbance or loss to existing vegetation communities; increase in erosion potential.	■ Minimizing the size of the footprint and salvaging topsoil and vegetation materials for subsequent replacement or spreading on reclaimed areas. ■ Revegetating applicable areas as soon as possible following construction. ■ Clearing will be limited to the extent necessary for storing salvaged soils and slash, and to safely facilitate construction and operation activities. ■ Erosion control measures (e.g., straw crimping, hydro-mulch, tackifiers, erosion control blankets) should be used, until a vegetation cover can re-establish.
		Disturbance or loss of listed plants and traditional use plants.	■ The construction site adjacent to the rail spur will be landscaped and an appropriate vegetation cover re-established. ■ The majority of the Project is in an area where habitat potential for listed plants is low due to extensive agricultural activities, and previous infrastructure development.
		Introduction and/or expansion of noxious weeds.	■ Vegetation management plan will be implemented to control or eradicate noxious weeds. ■ Construction equipment will be cleaned prior to entry of construction areas to prevent the introduction of weeds. ■ Appropriate seed mixes will be used for revegetation on both native and non-native grassland areas.
	Rail spur line construction - vegetation contamination from fuel spills and waste.	Change in vegetation quality and chemistry; poor growth of vegetation and a potential decrease in vegetation diversity; impacts to wildlife health.	■ Implementing a site-specific spill containment and remediation plan. ■ Spill response equipment and material will be readily available. ■ Any spills will be immediately isolated, contained, and cleaned up using appropriate measures and techniques. ■ Equipment will be inspected for leaks throughout the duration of the Project.
	Operation and rail spur use - vegetation contamination from fuel spills and waste.	Change in vegetation quality and chemistry; poor growth of vegetation and a potential decrease in vegetation diversity; impacts to wildlife health.	■ CN has an established response plan for leaks, spills, and accidents on which they operate.

Removal of vegetation may result in an increase in the potential for soil erosion. Disturbance of vegetation can change the hydrology of the area because the absence of vegetation can potentially decrease infiltration and increase overland flow. In areas where soil erosion is a concern, erosion control measures will be used to reduce the potential effects of soil erosion until a vegetation cover can re-establish.

Rail spur line construction may result in the introduction of noxious weeds. The introduction of noxious weeds can result in a shift in the structure and composition of vegetation communities present at the Project area, especially in areas of native grassland. A vegetation management plan will be implemented to control or eradicate noxious weeds to reduce the potential for weed establishment. Revegetation will be completed as soon as possible following construction to help reduce suitable growing sites for noxious weeds. Construction equipment used for construction will be cleaned prior to the entry into the Project area to mitigate the introduction of new noxious weeds and/or reduce expansion of existing weed communities.

Contamination of vegetation from fuel spills and waste may occur as a result of the rail spur line construction, which can result in a change in vegetation quality. If a spill occurs, the result could be poor growth of vegetation and a decrease in vegetation quality due to potential uptake of compounds from soil or physical damage to plants from contaminant contact with the plant biomass. Vegetation contamination and spills can be mitigated through a spill containment and remediation plan.

The Project is located in an area that has been extensively modified by agriculture and infrastructure development, therefore it is anticipated that there will be limited impacts to isolated areas of native vegetation. Furthermore, non-native agronomic species have historically been used to plant hayfields and were typically used to revegetate road and railway ditches. These species are often highly competitive, aggressive, and are found throughout the area. This growth advantage often diminishes the quality of native habitat by out competing native vegetation including listed plants. Consequently, the localized change is not anticipated to have a major effect on vegetation communities or wildlife habitat in the area. The duration of the changes will be short-term, low in magnitude, and will be restricted to the area occupied by the rail line. Based on this, the potential assessed environmental importance of the residual effect is predicted to be minimal (Table 15). No residual impacts are anticipated with respect to rare plant species.

Table 15: Predicted Residual Effects and Assessed Environmental Importance of Residual Effects on Vegetation

Predicted Residual Effects	Magnitude	Spatial Extent	Occurrence	Duration	Assessed Importance
Localized loss or change to vegetation cover	Low	Local	Infrequent	Short-term	Minimal
Disturbance or loss of native grassland communities	Low	Local	Infrequent	Medium-term	Low
Disturbance to listed plant species habitat.	Low	Local	Infrequent	Short-term	Low
Vegetation contamination from spills	Low	Local	Infrequent	Short-term	Low

Revegetating reclaimed areas as soon as possible following construction with an appropriate vegetation cover can reduce potential issues with loss or changes in the vegetation cover. The potential changes are anticipated to be of short-term and local. The magnitude of the change will be low and the assessed environmental importance of residual effects is predicted to be minimal (Table 15).

Disturbance to listed plant species habitat is predicted to be low in magnitude, as the majority of the ROW crosses habitat with low potential to support listed plant species. The assessed environmental importance to disturbance of listed plant species is anticipated to be low.

In the event that a spill occurs, this may have potential to cause longer term effects on vegetation resources, although this will be dependant on the chemical properties of the spilled material, the soil type on which the spill occurs, and vegetation present on the area that becomes affected. Potential contamination from spills may have a direct effect on vegetation growth and vigour, or health effects on terrestrial species eating vegetation on contaminated soil. A spill containment and remediation plan can be used mitigate the issues related to a spill during construction and operation. As well, equipment used for construction will be inspected for leaks prior to entry onto site and throughout the duration of the Project. The potential for negative effects from accidental spills on vegetation are expected to be local, medium-term in duration and the environmental consequences are expected to be low (Table 15). The assessed importance of the residual effects is expected to be low.

4.1.6 Wildlife and Wildlife Habitat

The wildlife and wildlife habitat assessment conducted for the Project area indicated that the wetland, riparian, and upland areas may provide habitat for several species. The use of this area changes with the seasons, as many of the species of wildlife or their sign that were observed or heard during the August and September 2010 field assessments are migratory species or resident species with large home ranges or dispersal characteristics.

Table 16 provides a summary of issues, potential impacts, and proposed mitigation for the Project. Table 17 lists the predicted residual effects and shows the result of the assessed important of the residual effect on wildlife and wildlife habitat.

Some species of wildlife may be temporarily displaced during construction of the rail spur line. During operation, it is expected that most species currently using the area will become accustomed to traffic, as human activity and rail traffic in this area already exists and occur frequently. The residual effects on wildlife during construction of the rail spur line are expected to be short-term and low in magnitude (Table 17). The assessed importance is anticipated to be low.

Construction of the rail spur line will likely result in a loss of native grassland, modified grassland, wetland, riparian, and woodland habitat within the ROW. Clearing within the proposed footprint will be limited to the extent necessary for construction and operation activities. Once construction has been completed, the sides of the rail spur and adjoining ROW area will be reclaimed/contoured area to help re-establish a vegetation cover in disturbed areas. The residual effects are expected to be local and low in magnitude and the assessed environmental importance is anticipated to be low.

4.1.7 Wetlands

A total of 38 wetlands were surveyed within and along the ROW. Of these, 15 will be encountered or encroached by the Project during construction and it is estimated that 4.4 ha of wetland habitat has the potential to be impacted or altered by the Project (Table 18). The areas of wetland affected was calculated based on the construction corridor width and length, and therefore represents the area of wetland directly affected by the Project.

Table 16: Potential Environmental Impacts and Mitigation for Wildlife and Wildlife Habitat

Issue	Project Activity	Potential Impact	Proposed Mitigation
Wildlife and Wildlife Habitat	Rail spur line construction	Sensory disturbance (noise, visual, harassment) to wildlife	■ The Project is located in an area dominated by agriculture activities, as well as existing transportation infrastructure including a CP rail line, where daily human activities occur. Construction will likely occur before or after the sensitive breeding and rearing period for most wildlife species where they may be more susceptible to stressors.
		Loss and/or disturbance to wildlife habitat	■ The Project is located adjacent to an existing CP rail line and on a landscape that has been extensively modified and supports residential, industrial and resource extraction activities. Trees and shrubs cleared for construction should regenerate adjacent to the rail subgrade and associated area disturbed by construction.
		Habitat change	■ Wetland and wooded areas will be disturbed and wildlife travel corridors may be temporarily altered or blocked. For large mammals, the rail spur will not impede movement, but for small mammals, reptiles and amphibians, it may become a barrier. However, the existing CP rail spur will have already created this influence. Plant establishment in the ROW along the sides of the rail spur may also create new habitat for species as this area may not be subject to agricultural activities and the establishment of a persistent growth cover will provide nesting habitat, forage opportunities, perch sites and escape and rest cover.
	Operation of rail spur line	Sensory disturbance (noise, visual, harassment) to wildlife	■ The Project is located in an area dominated by agriculture activities, as well as existing transportation infrastructure including a CP rail line, where daily human activities occur. Species presently using the area have likely become accustomed to human activity, including rail traffic. For most species, tolerance of rail traffic is expected to continue. Foraging opportunities for wildlife within the ROW will not likely change.

Table 17: Predicted Residual Effects and Assessed Environmental Importance of Residual Effects on Wildlife and Wildlife Habitat

Predicted Residual Effects	Magnitude	Spatial Extent	Occurrence	Duration	Assessed Importance
Temporary displacement and sensory disturbance	Low	Local	Infrequent	Medium-term	Low
Loss of native grassland, modified grassland, wetland, riparian, and woodland habitat along the ROW	Low	Local	Infrequent	Medium-term	Low

Table 18: Wetlands Affected by the Proposed Rail Spur Line Project Construction

Wetland Class (non-permanent) [(a)]	Estimated Area of Disturbance (ha)	Wetland Class (permanent) [(b)]	Estimated Area of Disturbance (ha)
Class 1	0.14	Class 3	0.47
Class 2	0.90	Class 4	2.86
Total	**1.04**	**Total**	**3.33**

Note: [(a)] Non-permanent wetland is defined as a Class 1 or 2 wetland (Stewart and Kantrud 1971).
[(b)] Permanent wetland is defined as a Class 3, 4, or 5 wetland (Stewart and Kantrud 1971).

Strategies to reduce the loss of wetland habitat includes avoidance and implementing appropriate mitigation measures to minimize the impacts. After implementing avoidance and mitigation measures, compensation will be used in an attempt to address unavoidable losses or impacts to permanent wetlands (i.e., Classes 3, 4, and 5) and their functions. CN will work with regulatory agencies and other non-government organizations such as DUC to finalize and implement a compensation plan for the Project to reach the "no net loss" (3.3 ha) approach as outlined by Environment Canada.

4.1.8 Heritage Resources

Impacts to heritage resources relate primarily to construction activities that involve topsoil removal, subsoil excavation, and the compaction of soils by heavy machinery traffic. These activities have the potential to negatively impact heritage resources located on or below the ground surface. Such alterations to the soil can result in the displacement of artifacts and thus the loss of valuable contextual information. Construction can also lead to destruction of artifacts and features themselves, resulting in the complete loss of heritage information. Impacts to heritage resources are permanent and irreversible.

Further mitigation measures are not anticipated as no heritage resources were found in conflict with the proposed Project. However, even the most thorough investigation may not identify all archaeological materials present in a given area. In the event that heritage resources are discovered during Project construction, all work in the immediate area will cease and notice provided to the appropriate regulatory authority. No residual impacts are anticipated.

5.0 CUMULATIVE ENVIRONMENTAL EFFECTS

Cumulative effects refer to the effect on the environment as it results from a Project or activity when combined with those of other past, existing, and reasonably foreseeable Projects and activities. When individual activities or disturbances interact spatially or temporally, their combined effects can result in environmental effects that may differ in nature or extent from the effects of individual activities.

Not every valued component (VC) requires an analysis of cumulative effects. The key is to determine if the incremental effects from the Project and one or more additional developments/activities overlap (or interact) with the temporal or spatial distribution of the VC. For some VCs (e.g., hydrology, soils, and plants), there is little or no potential for cumulative effects, because there is little or no overlap with other developments, particularly when effects occur at the local scale. For other VCs (e.g., white-tailed deer) that are distributed, or travel over large areas and can be influenced by a number of developments, the analysis of cumulative effects can be necessary and important.

5.1 Analysis

The Project cumulative effects assessment was done using best professional judgment of experienced EA specialists and supplemented by available data.

There are no predicted measurable cumulative effects from the Project on the following VCs:

- air quality;
- soils; and
- vegetation resources.

Wildlife could be considered a VC that could be influenced by cumulative effects. However, the incremental impacts from the Project are predicted to not significantly influence the persistence of the abundance and distribution of existing wildlife populations (Table 19). The scale of impacts, independently or combined, should not be large enough to cause irreversible changes at the population level and decrease the resilience of the VCs. The Project is expected to impact individuals that currently occupy and use habitats within the Project footprint. However, the incremental changes to the quantity, quality, and spatial distribution of habitats should not have a significant impact on the structure and function of populations and communities in the ecosystem relative to natural factors and human land use practices occurring in the Project area.

Table 19: Assessed Cumulative Effects and Level of Importance

Predicted Residual Effects	Assessed Importance	Interaction with Another Activity	Cumulative Effects	Assessed Environmental Significance
Sensory disturbance.	Low	Spatial and temporal interaction with local activities. No potential interaction with future activities is known.	Increased traffic along both rail lines due to mine expansion.	Not-significant
Loss of native grassland, modified grassland, wetland, riparian, and woodland habitat within or along the ROW.	Low	Spatial and temporal interaction with local activities. No potential interaction with future activities is known.	Permanent change to vegetation cover	Not-significant

5.2 Summary

Based on the assessment of the cumulative effects and their importance, incremental environmental and social effects may result from the interaction of the Project with other local activities. These cumulative effects are considered to be primarily of low importance, and are predicted to be not significant.

The Project is not likely to cause adverse environmental effects, taking into account the implementation of mitigation measures.

6.0 MONITORING AND FOLLOW-UP

If requested or required by regulatory agencies, an environmental monitor will be on-site during critical stages of the Project. The environmental monitor would act as a liaison between the proponent, their contractors, and regulatory agencies with jurisdiction over construction activities and/or associated environmental issues and concerns. The monitor would also advise on the adherence and compliance with the issued permits, guidelines, and authorizations. This may include matters such as confirming proper erosion control measures are put in place and are functioning properly prior to and during construction.

A summary report outlining the construction monitoring activities and results will be completed following Project construction. Areas disturbed during the construction of the Project will be inspected within one year of completion to assess the success of any reclamation efforts undertaken and to assess the necessity for any remedial for follow-up work. Guidelines for determining reclamation success will follow those outlined by current industry best standards that include but are not limited to, provincial guidelines.

6.1 Wetland Compensation Plan

Potential habitat compensation plan options have been identified that could possibly be used to compensate for the losses of wetlands affected by the rail spur line Project based on a “no net loss” approach. CN has initiated contact with and will continue to work with regulatory agencies and other non-government organizations such as DUC to finalize and implement a compensation plan for the Project. A wetland compensation plan will be submitted once finalized.

7.0 CLOSURE

The reported information is believed to provide a reasonable representation of the general environmental conditions at the Project location. Any use of this report or any reliance on, or decisions based on this report by a third party is the responsibility of such third parties. Golder will not be held responsible or liable for any damages to the physical environment, any property, or to life, which may have occurred from actions of decisions based upon any of the information within this report.

We trust this report meets your approval. If you have questions or comments, please contact Golder at your convenience.

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APPENDIX A

Plant Species List

Table A-1: Plant Species Observed along the Proposed Rail Spur Line Project

Common Name	Latin Name	Common Name	Latin Name
Trees			
Balsam poplar	*Populus balsamifera*	Trembling aspen	*Populus tremuloides*
Shrubs			
Creeping juniper	*Juniperus horizontalis*	Western snowberry	*Symphoricarpos occidentalis*
Narrow leaved willow	*Salix exigua*	Willow species	*Salix* spp.
Saskatoon	*Amelanchier alnifolia*	Wolf willow	*Elaeagnus commutata*
Thorny buffalo berry	*Shepherdia argentea*	Wood's rose	*Rosa woodsii*
Forbs, Ferns, and Fern Allies			
Alfalfa	*Medicago sativa*	Narrow-leaved american vetch	*Vicia americana*
Biennial wormwood	*Artemisia biennis*	Narrow-leaved goosefoot	*Chenopodium pratericola*
Canada fleabane	*Conyza canadensis*	Narrow-leaved hawkweed	*Hieracium umbellatum*
Canada goldenrod	*Solidago canadensis*	Neat pussytoes	*Antennaria microphylla*
Canada thistle[a]	*Cirsium arvense*	Night flowering catchfly[a]	*Silene noctiflora*
Cattail	*Typha latifolia*	Northern bedstraw	*Galium boreal*
Common dandelion[a]	*Taraxacum officinale* ssp. *officinale*	Owl's clover	*Orthocarpus luteus*
Common peppergrass	*Lepidium densiflorum*	Pasture sage	*Artemisia fridgida*
Common sunflower	*Helianthus annuus*	Wavyleaf thistle	*Cirsium undulatum*
Common yarrow	*Achillea millefolium*	Perennial sow thistle[a]	*Sonchus arvensis*
Crocus	*Pulsatilla pratensis*	Plains wormwood	*Artemisia campestris*
Dotted blazing star	*Liatris punctata*	Prairie rose	*Rosa arkansana*
Drummond's catchfly	*Silene drummondii*	Prairie sage	*Artemisia ludoviciana*
Drummond's rock cress	*Arabis drummondii*	Seaside arrow-grass	*Triglochin maritima*
Duck weed	*Lemna minor*	Smooth aster	*Symphyotrichum laeve*
Flixweed	*Descurainia sophia*	Smooth false dandelion	*Agoseris glauca* var. *glauca*
Goat's beard	*Tragopogon dubius*	Smooth wild strawberry	*Fragaria virginiana*
Gumweed	*Grindelia squarrosa*	Stinging nettle	*Urtica dioica*
Hairy golden aster	*Heterotheca villosa*	Velvety goldenrod	*Solidago mollis*
Harebells	*Campanula rotundifolia*	Water parsnip	*Sium suave*
Heart-leaved alexanders	*Zizia aptera*	Water smartweed	*Polygonum amphibium*
Horsetail	*Equisetum arvense*	Western dock	*Rumex occidentalis*
Kochia	*Kochia scoparia*	White sweet clover	*Melilotus alba*
Lamb's-quarters	*Chenopodium album*	Wild blue flax	*Linum lewisii*
Long-headed anemone	*Anemone cylindrica*	Wild licorice	*Glycyrrhiza lepidota*
Many flowered aster	*Symphyotrichum ericoides*	Yellow sweet clover	*Melilotus officinalis*
Missouri goldenrod	*Solidago missouriensis*		

Table A-1: Plant Species Observed along the Proposed Rail Spur Line Project (continued)

Common Name	Latin Name	Common Name	Latin Name
Graminoids			
Awned sedge	*Carex atherodes*	June grass	*Koeleria macrantha*
Awned wheatgrass	*Elymus trachycaulus* ssp. *subsecundus*	Kentucky bluegrass	*Poa pratensis*
Baltic rush	*Juncus balticus*	Needle-and-thread grass	*Hesperostipa comata*
Blue grama	*Bouteloua gracilis*	Prairie bulrush	*Scirpus maritimus*
Canada wildrye	*Elymus canadensis*	Rough hairgrass	*Agrostis scabra*
Canary reed grass	*Phalaris arundinacea*	Sand reed grass	*Calamagrostis longifolia*
Creeping spike-rush	*Eleocharis erythropoda*	Sedges	*Carex* spp.
Crested wheatgrass	*Agropyron cristatum*	Slender wheatgrass	*Elymus trachycaulus*
Foxtail barley	*Hordeum jubatum*	Smooth brome	*Bromus inermis*
Hardstem bulrush	*Scirpus acutus*	Western porcupine grass	*Hesperostipa curtiseta*

Note: [(a)] Listed on the Saskatchewan Noxious Species List (SKCDC 2010a).

APPENDIX B

Heritage Clearance Letter

Saskatchewan

Ministry of
Tourism, Parks,
Culture and Sport

Heritage Resources Branch
9th Floor 1919 Saskatchewan Dr.
Regina, Saskatchewan
S4P 4H2

(306) 787-2848
jennifer.thompson@gov.sk.ca

Our File: 10-1835

September 8, 2010

Mr. Patrick Young
Golder Assoicates
Agent for: **CN Rail**
1721 8th Street
SASKATOON SK S7H 0T4

Dear Mr. Young:

**RE: CN Rail Spur Line to Agrium Potash Mine Near Vanscoy:
SW 23-36-8-W3M to SW 21-35-8-W3M;
HERITAGE RESOURCE REVIEW**

Thank you for referring this project to our office for review.

In determining the need for, and scope of, heritage resource impact assessment (HRIA) pursuant to S. 63 of *The Heritage Property Act*, the following factors were considered: the presence of previously recorded heritage sites, the area's overall heritage resource potential, the extent of previous land disturbance, and the scope of new proposed land development.

There are no recorded heritage sites located in conflict with the proposed project. As well, most of the project is located on land that has been previously disturbed by cultivation. There is an area of native parkland in the SW 23-36-8-W3M but this area is generally flat and is not located near a major water source. The potential for heritage sites to be adversely affected is low. Our office has no concerns with the project proceeding as planned.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Jennifer Thompson.

Dr. Jennifer A. Thompson
Archaeologist
Archaeological Resource Management

APPENDIX C

Whitecap Dakota Letter

ENVIRONMENT
WESTERN CANADA REGION

Floor 2, 13477 116 Avenue, Surrey, BC. V3R 6W4
Tel: (604) 582-3608 Fax: (604) 589-6508

March 7, 2011

Chief and Council
Whitecap Dakota First Nation
182 Chief Whitecap Trail
Whitecap, SK
S7K 2L2

Dear Chief and Council:

Re: Proposed CN Spur into the Agrium Vanscoy Potash Mine

I am attaching a document entitled "Project Description for a Proposed CN Spur to Serve Agrium Potash Mine Near Vanscoy, Saskatchewan", dated August 2010, for your review and comment.

The attached document was prepared by our consultants, Golder Associates, and provides a detailed description of CN's proposal to build a new rail spur and wye adjacent to the existing CP spur from the CN mainline into the Agrium Vanscoy Potash Mine near Vanscoy, Saskatchewan. The project will begin south of Highway 14 and continue south along the western edge of the SW¼ 23-36-8 W3M, 14-36-8 W3M, 11-36-8 W3M, 2-36-8 W3M, and 35-35-8 W3M, then extend west along the southern border of 34-35-8 W3M and 33-35-8 W3M, before turning south again along the western boarder of 28-35-8 W3M and 21-35-8 W3M to connect to Agrium's facility.

The attached document contains a number of plans indicating the location of the Project and the general configuration of the project to be built. It also contains a brief description of the existing environmental condition of the Project site.

The Project requires an environmental assessment pursuant to the *Canadian Environmental Assessment Act* (CEAA) before the Canadian Transportation Agency can exercise its discretion to approve construction of the Project. The Canadian Transportation Agency is the responsible authority under CEAA for the Project.

CEAA contains provisions for consideration of comments from potentially affected parties, including Métis and First Nations. Environmental effects likely to result from a project must be taken into consideration as part of the environmental assessment. The term “environmental effects” is defined under CEAA as including:

> “...any change that the project may cause in the environment, including any effect of such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons or on any structure, site or thing that is of historic, archaeological, paleontological or architectural significance...”

If you have any comments on this Project, please let us know by April 15, 2011.

Please do not hesitate to contact the undersigned at 604-582-3608 if you have any questions, or require clarification on any point.

Yours truly,

Luanne Patterson
System Manager – Environmental Assessment

Enclosure

APPENDIX D

Air Quality Assessment

INTRODUCTION

The purpose of this section of the EA is to quantify air emissions generated from the construction and operation of the spur rail line connecting Agrium's mine to CN Watrous Subdivision located near Vanscoy, Saskatchewan. CN intends to operate unit trains on this spur line based on Agrium's demand for rail service.

The air emissions inventory includes consideration of the construction of the 13 km railway spur and 60 m ROW width ("Construction Phase"), and the subsequent increase in rail service to Agrium ("Operation" Phase). For the Operation Phase, the air emission inventories are calculated prior to the Project (i.e., baseline) and for the Project to show the change in the air emissions due to the Project. The Project is scheduled to be constructed in 2011 and hence, emission standards for locomotives manufactured from 2005 to 2011 have been used to represent both baseline and Project scenarios.

The air emission inventory in this study includes the following compounds:

- SO_2
- NO_X
- CO
- Volatile organic compounds (VOCs) or total hydrocarbons (THCs)[1]
- Particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$)
- Particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10})
- Total suspended particulate (TSP) matter
- GHGs which include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)

EMISSION CALCULATIONS

This section of the report outlines the approach used to calculate air emission rates during the construction and operation phase of the spur line. An emissions summary is presented first, followed by details on the calculation methods and assumptions for each emission type.

Construction Phase

Air emissions generated during construction activities at the Project site were quantified for the following sources:

- fleet exhaust; and
- fugitive dust, which includes: 1) on-site railway bed ("road") dust; and 2) earthwork activities such as loading and unloading soil/gravel, grading and bulldozing.

[1] Emissions of THC were assessed for the operations phase since the U.S. EPA emission standards for locomotives quantifies THC and not VOCs. In contrast, emissions associated with the construction phase typically include VOCs and not THCs. The main difference between THCs and VOCs is that THC includes methane and ethane while VOCs do not (U.S. EPA 2010).

Equipment data were provided according to a range of utilization scenarios; however, the tabulated emission rates presented in this report are based on a maximum worst-case scenario. The emission rates estimated during the construction phase are shown in Table D-1 in tonnes per day (t/d). Fugitive emissions rates are shown in Table D-2 for on-site railway bed dust and earthwork activities. For comparison purposes, the reported daily emissions estimates from the Agrium Vanscoy Potash facility are also presented. A listing of construction equipment used in the emission calculations is provided in Appendix D-1.

Table D-1: Fugitive Emission Rates during the Construction Phase

Activity	Emission Rate (t/d)		
	$PM_{2.5}$	PM_{10}	TSP
Railway Bed Dust	0.045	0.455	1.592
Grading	0.010	0.092	0.313
Bulldozing	0.001	0.002	0.010
Loading/Unloading	0.000	0.000	0.000
Total	**0.056**	**0.549**	**1.915**

Table D-2: Emission Rates during the Construction Phase

Parameter	Emission Rate (t/d)			Agrium Vanscoy[(b)]
	Fleet Exhaust	Fugitive	Total	
SO_2	<0.001	--	< 0.001	--
NO_X	0.212	--	0.212	0.060
CO	0.072	--	0.072	0.107
VOC	0.023	--	0.023	0.047
$PM_{2.5}$	0.010	0.056	0.066	0.153
PM_{10}	0.010	0.549	0.559	0.227
TSP	0.010	1.915	1.925	0.890
GHG (eCO_2)[(a)]	25.284	--	25.284	159.126

(a) Total GHG expressed as equivalent carbon dioxide (eCO_2) includes CO_2 as well as the higher greenhouse potential of CH_4 and N_2O.

(b) Agrium Vanscoy Potash Operations emissions estimates from 2009 National Pollutant Release Inventory submission. Available at: http://www.ec.gc.ca/pdb/websol/querysite/facility_substance_summary_e.cfm?opt_npri_id=0000001177&opt_report_year=2009 (accessed January 2011).

Emissions Inventory Approach

Fleet Exhaust

Emissions of SO_2 were calculated using a mass balance based on diesel consumption and a diesel sulphur content of 15 ppmw, which is regulated by *CEPA* (1999). It is assumed that 100% of the sulphur in the diesel will be converted to SO_2.

Emissions of NO_X, CO, VOCs, and particulate matter from the construction fleet exhaust were calculated using the U.S. EPA NONROAD method (NONROAD) (U.S. EPA 2005). NONROAD uses the following equation to obtain representative vehicle emission rates for a single vehicle:

$$\begin{aligned} Vehicle\ Emissions = \ & Vehicle\ Horsepower \times Steady\ State\ \ Emission\ Factor \times Gross\ Operating\ Hours \times \\ & Load\ Factor \times Transient\ Adjustment\ Factor \times Deterioration\ Factor \end{aligned}$$

The above equation includes the following key elements:

- emission factors for different vehicle types and ratings representing steady-state vehicle operation;
- load factors accounting for the fact that off-road vehicles cannot constantly operate at their maximum rated horsepower (hp); and
- transient adjustment factors and deterioration factors that consider the engine's deterioration over time for a mobile engine during transient operating conditions.

The steady-state emission factors, load factors, transient adjustment factors, and deterioration factors from NONROAD are summarized in Tables D-3 to D-5 respectively.

Table D-3: Steady-State Emission Factors for Off-road Diesel Engines

Category of Vehicle	Model Year	Steady-State Emission Factors (g/bhp-h)		
		NO_X	CO	PM
Vehicles 300 to 600 bhp				
tier 1	1996	6.015	1.306	0.201
tier 2	2001	4.335	0.843	0.132
tier 3	2006	2.500	0.843	0.150
tier 4 final	2011	0.276	0.084	0.009
Vehicles 600 to 750 bhp				
tier 1	1996	5.822	1.327	0.220
tier 2	2002	4.100	1.327	0.132
tier 3	2006	2.500	1.327	0.150
tier 4 final	2011	0.276	0.133	0.009
Vehicles >750 bhp				
tier 1	2000	6.153	0.764	0.193
tier 2	2006	4.100	0.764	0.132
tier 3	-	-	-	-
tier 4 final	2011	2.392	0.076	0.069[a]

Note: g/bhp-h = grams per brake-horsepower hour; - = no criteria available.
[a] Tier 4 transitional emission factors that are more conservative than Tier 4 final emission factors were used for PM emission estimates.

Source: U.S. EPA (2004).

Table D-4: Load Factors for Off-road Diesel Engines

Category of Vehicle	Load Factor
Truck	0.58
Shovel	0.58
Dozer	0.58
Grader	0.58
Pipe layer	0.58
Scraper	0.58
Cable reeler	0.58
Cable tractor	0.58
Sideboom	0.58
Loader	0.48
Backhoe	0.21

Source: U.S. EPA (2004).

Table D-5: Transient Adjustment and Deterioration Factors for Off-road Diesel Engines

Category of Vehicle	NO_X	CO	PM
Transient adjustment factors			
tier 1	0.95	1.53	1.23
tier 2	0.95	1.53	1.23
tier 3	1.04	1.53	1.47
tier 4[(a)]	–	–	–
Deterioration factors[(b)]			
tier 1	1.024	1.101	1.473
tier 2	1.009	1.101	1.473
tier 3	1.008	1.151	1.473
tier 4	1.008	1.151	1.473

Note: [(a)] There is no transient adjustment factor for Tier 4 engines since transient emission control is expected to be an integral part of all Tier 4 engines.

[(b)] Engines are assumed to be at the end of their median life to allow for conservative deterioration factors in the calculations.

Source: U.S. EPA (2004).

Fugitive Dust

Estimated fugitive dust emissions during construction activities consist of the following:

- on-site “road” dust (unpaved railway bed); and
- earthwork activities that include loading and unloading, bulldozing and grading operations.

Since excavated material will not be stored on-site, the assessment did not consider windblown dust (i.e., erosion).

Unpaved Railway Bed Dust

Construction vehicle movements along the railway bed could result in dust generation, especially during the drier summer months (e.g., July and August). During wetter months, precipitation will assist in reducing dust emissions from the railway bed. In addition, a watering program will be implemented to further inhibit the generation of airborne particulates. Based on typical construction site protocol, a dust control efficiency of 55% was assumed in the calculations. The equation used to develop size specific particulate emission factors is as follows:

$$E = k\left(\frac{s}{12}\right)^{a}\left(\frac{W}{3}\right)^{b}\left[\frac{365-P}{365}\right](281.9)$$

Where:

E = size specific emission factor (g/VKT)

s = surface silt content (%)

W = mean vehicle weight (tonnes)

P = number of days in a year with at least 0.254 mm of precipitation

k,a, b = see Table D-6

281.9 = conversion from lb/VMT (pound per vehicle mile travelled) to g/VKT (gram per vehicle kilometre travelled)

Table D-6: Constants for Equation

Constants	$PM_{2.5}$	PM_{10}	TSP
K (lb/VMT)	0.15	1.5	4.9
A	0.9	0.9	0.7
B	0.45	0.45	0.45

Source: U.S. EPA (2004).

The average number of days of precipitation per year was taken from the climate normal data (1971 to 2000) from the Meteorological Service of Canada Regina International Airport station.

Earthwork Activities

The clearing and grading of the Project site as well as the transportation of materials during construction will generate particulate matter. Emissions of particulate matter due to earthwork activities are calculated based on loading and unloading, bulldozing and grading operations as shown in Table D-7.

Table D-7: Emission Factors for Earthwork Activities

Activity	Calculation Methodology
Loading and Unloading	Emission factor (EF) in kilograms of emissions per megagram of material moved: $$EF = k(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$ Where k is the size-specific multiplier; M is moisture content in percent; and U is the mean wind speed in meters per second.
Bulldozing	Emission factor (EF) in kg of emission per hour: $$TSP\ EF = \frac{2.6(s)^{1.2}}{(M)^{1.3}}$$ $$PM_{15}\ EF = \frac{0.45(s)^{1.5}}{(M)^{1.4}}$$ $$PM_{10}\ EF = 0.75 \times PM_{15}EF$$ $$PM_{2.5}\ EF = 0.0017 \times TSP\ EF$$ Where S is the material silt content in percentage; and M is the material moisture content in percentage.
Grading Operation	Emission factor (EF) in kilogram per vehicle kilometre travelled (km/VKT): $$TSP\ EF = 0.0034(S)^{2.5}$$ $$PM_{15}\ EF = 0.0056(S)^{2.0}$$ $$PM_{10}\ EF = 0.60 \times PM_{15}\ EF$$ $$PM_{2.5}\ EF = 0.031\ \times TSP\ EF$$ Where S is the mean vehicle speed in km/h.

A summary of the information and assumptions used in the calculation of the construction phase emission rates are provided in Appendix D-2.

Operation Phase

The reduction of emissions from locomotive engines in Canada is driven by the following two regulations:

- *CEPA* – Sulphur in Diesel Fuel Regulations (*CEPA* 1999): The *CEPA* Sulphur in Diesel Fuel Regulations sets a sulphur limit of 500 ppmw in rail diesel by May 2012. After May 2012, the sulphur content in diesel fuel for use in locomotive engines is limited to 15 ppmw. The average sulphur content in 2008 was 147 ppmw indicating that ultra-low sulphur diesel is already used extensively (RAC 2008).
- U.S. EPA – Control of Emissions of Air Pollution from Locomotives and Marine Compression-Ignition Engines Less Than 30 Litres per Cylinder (U.S. EPA 2008): There is no regulation in Canada which sets emission standards for locomotive engines; however, emissions from the Canadian engine fleet is indirectly influenced by the U.S. EPA emission standards due to the large percentage of American manufactured locomotive engines that are in the Canadian fleet.

The emission rates were calculated using the following:

- emission factors (Table D-8); and
- locomotive and operating conditions specific to the Project (Table D-9).

Table D-8: Line-haul Locomotive Emission Factors

Parameter	Emission Factor
SO_2 [a] (g/L)	0.85
SO_2 [b] (g/L)	0.25
NO_X (g/bhp-h)	5.5
CO (g/bhp-h)	1.5
THC (g/bhp-h)	0.3
$PM_{2.5}$ (g/bhp-h)	0.2
PM_{10} (g/bhp-h)	0.2
CO_2 (g/L)	2,663
CH_4 (g/L)	0.15
N_2O (g/L)	1.1

Note: [a] Based on a sulphur content of 500 ppmw for baseline case.
[b] Based on a sulphur content of 147 ppmw for Project case.

Table D-9: Locomotive Operating Conditions

Parameter		Value
Fuel		**Diesel**
Rail line (km)		13
Number of engines per train		2
Train speed (km/h)		16
Engine power (bhp)		4000 to 4400
Engine power at idle[a] (hp)		220
Fuel consumption rate (L/h)	Operation	200
	Idle	32
Idle time (min/train)		30

Note: [a] Assumed to be 5% of maximum power of 4400 hp.

The emission factors shown in Table D-8 are based on the 2008 Canadian engine fleet, which are summarized in the 2008 Locomotive Emissions Monitoring Program (RAC 2008). The NO_X, CO, THCs, PM, and PM_{10} emission factors for line-haul locomotives are based on engines manufactured from 2005 to 2011 (Tier 2) (U.S. EPA 2008) and on SO_2, CO_2, CH_4, and N_2O emission factors taken from the 2008 Locomotive Monitoring Program (RAC 2008). The diesel sulphur content was assumed to be 500 ppmw for the baseline case and 147 ppmw for the Project case. The SO_2 emission factors for 2011 is expected to be lower than the emission factors presented in Table D-8 as more ultra-low sulphur diesel is used; however, it is difficult to quantify the average diesel sulphur content that will be in use in 2011. Therefore, the average sulphur content for 2008 was used. The assessment also did not consider the use of ultra-low sulphur diesel fuel after May 2012.

The Project will result in the addition of approximately 80 trains per year for a total of 280 trains per year. The 80 train per year increase is as a result of the additional trains required to service Agrium's planned increased production. If the number of trains required to transport Agrium's product does not change, no change in emissions will occur. In this latter case, the existing number of trains will run on the new dedicated CN spur line instead of running on the existing adjacent CP tracks.

It was assumed that each engine per train would operate at the maximum rating of 4400 hp except when idling at an assumed 220 hp. The train speed on the spur line is limited to 16 kilometres per hour (10 miles per hour) and, by maximizing queuing efficiencies, idle times of approximately 30 minutes are anticipated.

The annual air emission estimates during the operation phase are shown in Table D-10 for the baseline and Project cases. The baseline case represents the existing 200 trains operating per year on the tracks and the Project case represents rail traffic at 280 trains per year. Without an increase in rail traffic, the air emissions would not change from the baseline case because the same trains are operating on different, but collocated tracks. The results shown in the table indicate the following:

- Emissions of SO_2 will decrease with the Project. The decrease in annual SO_2 emissions from the baseline case to the Project case is the result of a reduction in the sulphur content in the diesel fuel as more ultra-low sulphur diesel is used. It can be expected that after May 2012 the use of 100% ultra-low sulphur diesel will decrease SO_2 emissions further.
- NO_X, CO, THCs, $PM_{2.5}$, and PM_{10} emissions will increase with the Project due to an increase in the number of trains scheduled to service Agrium. These increases are expected to be less than calculated since the assessment did not consider future improvements in the fuel economy and engine performance of locomotives coming into service.

Table D-10: Air Emission Summary - Operations Phase

Parameter	Baseline (t/y)	Project (t/y)	Agrium Vanscoy (t/y) [b]
SO_2	0.12	0.05	--
NO_X	16	23	22
CO	4.4	6.2	39
THC	0.88	1.2	17
$PM_{2.5}$	0.59	0.82	56
PM_{10}	0.59	0.82	83
GHG (eCO_2) [a]	430	600	58,081

Note: [a] Total GHG expressed as equivalent carbon dioxide (eCO_2) include CO_2 as well as the higher greenhouse potential of CH_4 and N_2O.

[b] Agrium Vanscoy Potash Operations emissions estimates from 2009 National Pollutant Release Inventory submission.

Source: http://www.ec.gc.ca/pdb/websol/querysite/facility_substance_summary_e.cfm?opt_npri_id=0000001177&opt_report_year=2009 (accessed in January 2011).

GHG emissions will increase with the Project due to an increase in the number of trains scheduled to service Agrium. For comparison, Table D-11 provides a summary of national GHG emissions reported in Canada. The GHG emission contribution from the Project will amount to 0.12% of Saskatchewan emissions and less than 0.01% of emissions for Canada for 2008.

Table D-11: National and Provincial Greenhouse Gas Emissions

Reporting Year [a]	Canadian Emissions (kt eCO_2/y)		Saskatchewan Emissions (kt eCO_2/y)	
	Overall[b]	Rail Industry	Overall[b]	Rail Industry
1990	592,000	7,000	43,400	600
2004	741,000	n/a	71,700	200
2005	731,000	6,000	72,300	400
2006	718,000	6,000	71,300	400
2007	747,000	7,000	74,000	200
2008	734,000	7,000	75,000	500
2010 (projected)	828,000	n/a	72,000	n/a
2015 (projected)	865,000	n/a	71,000	n/a
Proposed CN Project	0.6 (kt eCO_2/y)			

Note: [a] Data for years 1990 to 2008 are from Environment Canada (2010a). Data for year 2010 and 2015 are from Natural Resources Canada (2006).
[b] All industries included.

SUMMARY AND CONCLUSIONS

Annual emissions during the construction phase and operation phase of the Project have been quantified.

The study indicates the following:

- Operation Phase: Emissions of SO_2 emissions will decrease in the Project case due to a decrease in the sulphur content of the diesel fuel as more ultra-low sulphur diesel is used. Emissions of NO_X, CO, THCs, $PM_{2.5}$, and PM_{10} increased with the Project; however, these increases are expected to be less than calculated since the assessment did not consider future improvements in the fuel economy and engine performance of locomotives coming into service.
- GHGs: The annual maximum GHG emissions resulting from the Project operation phase are estimated to increase by 170 t/y eCO_2 to 600 t/y eCO_2. This increase equates to 0.12% of Saskatchewan railway emissions and less than 0.01% of railway emissions for Canada for 2008. The contribution to the overall Saskatchewan and Canadian GHG inventory is negligible for both the construction and operation phase.

Appendix D-1

Table D-1.1: Construction Equipment used in the Emission Calculations

Equipment Name	Number of Units	Horsepower	Annual Gross Operating Hours
Open Bowl Scraper	7	500	1,200
Off Highway Articulated Trucks	10	450	1,200
Grader	4	250	1,200
Hydraulic Excavator	2	250	1,200
Tractor w/ Pad Foot Roller	4	175	1,200
Vibratory Packer - Pad Foot	4	175	1,200
Track Dozer	4	300	1,200
1/2 Ton Pick-Up Truck	6	250	1,200
20 kVa Standby Generator	2	50	1,200
Motor Grader	4	250	480
Wheeled Front End Loader	3	200	480
Vibratory Packer - Smooth Drum	2	175	480
Track Dozer	4	300	480
Water Truck	2	300	480
Tractor Trailer w/ End Dump Trailer	4	400	480
1/2 Ton Pick-Up Truck	6	250	480
20 kVa Standby Generator	2	50	480
Plasser American GRM2000 Tamper	3	330	720
Knox Kershaw 925 w/ Cummins QSB6.7 diesel	3	240	720
Nordco Hammer Spiker	3	100	720
Pettibone Speed Swing 360	3	190	720
Kenworth T370 w/ 21' Flat Deck	1	350	720
Cat 950H	4	200	720
Train	3	4,400	720
Pick-up Truck	6	250	720
Cat D20-6 as surrogate	3	50	720

Table D-1.2: Summary of Information Used in Emission Rate Calculations – Construction Phase

Activity	Information
Fleet Exhaust	
emission factors	■ includes fleet exhaust emissions during construction ■ PM emissions based on the U.S. EPA NONROAD (U.S. EPA 2004 and 2005) methodology ■ Tier 2 steady state emission factors, transient adjustment factors, deterioration factors, load factors and sulphur adjustment are incorporated based on the U.S. EPA NONROAD methodology ■ all PM assumed to be less than or equal to PM_{10}, therefore PM_{10} and TSP emissions are the same ■ $PM_{2.5}$ emissions assumed to be 97% of PM_{10} based on the U.S. EPA NONROAD methodology
base quantities	■ fleet information including vehicle type, number of vehicles, gross operating hours and brake-horsepower (bhp) for each vehicle type are based on the Project information for construction ■ SO_2 emission rates calculated from maximum fuel consumption during construction
emission controls	■ no emission controls assumed

Table D-1.2: Summary of Information Used in Emission Rate Calculations – Construction Phase (continued)

Activity	Information
On-site "Road" (Railway Bed) Dust	
emission factors	■ emissions from fleet vehicles traveling on on-site "road" during construction ■ haul trucks assumed to be primary source of road dust emissions ■ TSP and PM_{10} emission factors based on Equation (1a) presented in Chapter 13.2.2 of AP-42 (U.S. EPA 1995)
base quantities	■ vehicle specifications taken from vendor data ■ mean vehicle weight for CAT 657 haul truck based on 48 t capacity ■ mean vehicle weight for CAT 740 haul truck based on 40 t capacity ■ loaded and empty weights for CAT 657 truck are 119 t and 72 t, respectively ■ loaded and empty weights for CAT 740 truck are 73 t and 33 t, respectively ■ kilometres traveled per trip based on haul truck capacity and operating hours and length of travel (assumed to be length of rail spur) ■ 115 days per year with measurable precipitation greater than 0.254 mm based on meteorological data from Regina International Airport Station (Environment Canada 2010b)
emission controls	■ 55% dust suppression efficiency included to account for on-site watering program during the dry season
Earthwork Activities	
emission factors	■ includes emissions from loading/unloading, bulldozing and grading ■ TSP and PM_{10} emission factors for loading/unloading activities are based on Equation (1) presented in Chapter 13.2.4 of AP-42 (U.S. EPA 1995) ■ bulldozing TSP and PM_{10} emission factors from Table 11.9-2 of Chapter 11.9 of AP-42 (U.S. EPA 1995) ■ grading TSP and PM_{10} emission factors from Table 11.9-2 of Chapter 11.9 of AP-42 (U.S. EPA 1995)
base quantities	■ annual mass of material moved was calculated to be 1.3 Mt/y based on haul truck operating hours ■ an average wind speed of 5.17 m/s based on meteorological data from Regina International Airport Station ■ 2 bulldozers assumed to operate continuously ■ a moisture content assumed to be 24% based on data from similar construction projects ■ a silt content of 8.5% assumed based on Table 13.2.2-1 from AP-42 (average silt content for construction site) ■ 2 graders assumed to operate continuously ■ vehicle speed assumed to be 11.4 km/h based on data in Table 11.9-3 from Chapter 11.9 of AP-42 (U.S. EPA 1995)
emission controls	■ no emission controls assumed

Appendix D-2

Table D-2.1: Summary of Information Used in Emission Rate Calculations – Construction Phase

Activity	Information
fleet exhaust	
emission factors	■ includes fleet exhaust emissions during construction ■ PM emissions based on the U.S. EPA NONROAD (U.S. EPA 2004 and 2005) methodology ■ Tier 2 steady state emission factors, transient adjustment factors, deterioration factors, load factors and sulphur adjustment are incorporated based on the U.S. EPA NONROAD methodology ■ all PM assumed to be less than or equal to PM_{10}, therefore PM_{10} and TSP emissions are the same ■ $PM_{2.5}$ emissions assumed to be 97% of PM_{10} based on the U.S. EPA NONROAD methodology
base quantities	■ fleet information including vehicle type, number of vehicles, gross operating hours and bhp for each vehicle type are based on the Project information for construction ■ SO_2 emission rates calculated from maximum fuel consumption during construction
emission controls	■ no emission controls assumed
on-site "road" (railway bed) dust	
emission factors	■ emissions from fleet vehicles traveling on on-site "road" during construction ■ haul trucks assumed to be primary source of road dust emissions ■ TSP and PM_{10} emission factors based on Equation (1a) presented in Chapter 13.2.2 of AP-42 (U.S. EPA 1995)
base quantities	■ vehicle specifications taken from vendor data ■ mean vehicle weight for CAT 657 haul truck based on 48 t capacity ■ mean vehicle weight for CAT 740 haul truck based on 40 t capacity ■ loaded and empty weights for CAT 657 truck are 119 t and 72 t, respectively ■ loaded and empty weights for CAT 740 truck are 73 t and 33 t, respectively ■ kilometres traveled per trip based on haul truck capacity and operating hours and length of travel (assumed to be length of rail spur) ■ 115 days per year with measurable precipitation greater than 0.254 mm based on meteorological data from Regina International Airport Station (Environment Canada 2010)
emission controls	■ 55% dust suppression efficiency included to account for on-site watering program during the dry season
earthwork activities	
emission factors	■ includes emissions from loading/unloading, bulldozing and grading ■ TSP and PM_{10} emission factors for loading/unloading activities are based on Equation (1) presented in Chapter 13.2.4 of AP-42 (U.S. EPA 1995) ■ bulldozing TSP and PM_{10} emission factors from Table 11.9-2 of Chapter 11.9 of AP-42 (U.S. EPA 1995) ■ grading TSP and PM_{10} emission factors from Table 11.9-2 of Chapter 11.9 of AP-42 (U.S. EPA 1995)

Table D-2.1: Summary of Information Used in Emission Rate Calculations – Construction Phase (continued)

Activity	Information
earthwork activities (continued)	
base quantities	■ annual mass of material moved was calculated to be 1.3 Mt/y based on haul truck operating hours ■ an average wind speed of 5.17 m/s based on meteorological data from Regina International Airport Station ■ 2 bulldozers assumed to operate continuously ■ a moisture content assumed to be 24% based on data from similar construction projects ■ a silt content of 8.5% assumed based on Table 13.2.2-1 from AP-42 (average silt content for construction site) ■ 2 graders assumed to operate continuously ■ vehicle speed assumed to be 11.4 km/h based on data in Table 11.9-3 from Chapter 11.9 of AP-42 (U.S. EPA 1995)
emission controls	■ no emission controls assumed

APPENDIX E

Noise Assessment

INTRODUCTION

The objective of the noise assessment is to identify and analyze changes in the acoustical environment that result from Project activities. For this purpose, the Project is defined as adding a spur in close proximity (parallel within 30 m) to an existing spur from the main branch line to the Agrium-Vade mine facility. The spur will be used to facilitate the increase in rail traffic, associated with increased mine production.

The assessment of noise is focussed on the predicted changes in the acoustic environment that have the potential to affect people.

ASSESSMENT METHOD

The assessment predicts the change in noise levels due to increased train traffic on the spur resulting from increased rail traffic volume estimated for the period between 2010 and 2015. Increased rail traffic is expected as a result of increased production (40%) at the mine. The assessment of operational noise for the Project was completed by:

- establishing the existing cumulative noise levels at selected receptors; and
- assessing the change (increase) in sound levels as a result of the increase in rail traffic on the new spur and the main branch next to the spur.

The Project case considers the rail traffic on the new spur associated with the increase in rail traffic by 2015 to an expected 28,000 railcars per year, a 40% increase in the number of cars over the current case (20,000 cars).

The assessment also investigates the effect of construction noise at the location of the most impacted receptor (i.e., the dwelling located nearest to the construction activity), for the eight month period required to complete construction of the new rail spur. As per Health Canada guidance, the effect of construction noise is quantified using both the percentage HA metric and an integrated sound level that includes both daytime and nighttime contributions. The assessment of construction noise for the Project was completed by:

- establishing the existing cumulative noise level at the most impacted receptor;
- establishing the existing HA at the most impacted receptor;
- assessing the change (increase) in HA as a result of noise generated by the construction of the new spur; and
- assessing a specific integrated sound level for the eight month construction period at the most impacted receptor in comparison to the maximum level allowed by Health Canada.

Decommissioning is discussed qualitatively.

NOISE CRITERIA

The noise criterion used to assess the impact of the increased rail traffic within the study area is noticeability of the change in noise levels.

Noise levels can be expressed as the average noise level L_{eq} over a given period (e.g., nighttime period). Average sound levels L_{eq} are widely used to predict annoyance levels. The maximum sound level L_{max} (the highest noise level experienced) can be evaluated.

Based on Health Canada guidance, two criteria are used to assess the impact of noise resulting from the eight months of construction required for the Project: the change in the HA metric, and an integrated sound level that includes both daytime and nighttime contributions. Both criteria are assessed at the location of the most impacted receptor.

Health Canada assesses significant impact from construction noise by comparing the calculated percentage of the population that is HA by noise in the baseline situation, to the expected annoyance due to the cumulative noise levels in the construction phase. The formula used to calculate percentage HA is given below:

$$\% HA = \frac{100}{1 + EXP(10.4 - 1.32 * \log(10^{0.1*Leq24} + 3.375 * 10^{0.1*Ln})}$$

With:

% HA = percentage of the population predicted to be HA.

EXP = exponent of the value to the number *e*, a mathematical value.

$L_{eq},24$ being the average L_{eq} over the entire 24 hr period.

L_n = the sound level during nighttime hours.

Health Canada also assesses significant impact from construction noise by comparing a specific integrated noise level to a maximum allowable value. The Health Canada-specified integrated noise level for construction is given below:

$$10 * \log(10^{0.1*Leq24} + 3.375 * 10^{0.1*Ln})$$

With:

$L_{eq},24$ being the average cumulative L_{eq} (i.e., baseline + construction) over the entire 24 hr period.

L_n = the cumulative sound level (i.e., baseline + construction) during nighttime hours.

Saskatchewan does not have applicable noise regulations.

Impact Criteria and Classification

For the impact of increased rail traffic during Project operation, the approach used to establish the magnitude classification considers the threshold at which people will begin to notice a change in noise levels (3 dBA)[2].

For the impact of increased noise due to Project construction, the approach used to establish the magnitude classification considers guidance provided by Health Canada. In order for the construction noise to be classified as insignificant at the location of the most impacted receiver, the Health Canada guidelines specify that the change in HA must be less than 6.5%, and the integrated cumulative noise level (i.e., baseline + construction) must be less than 75 dBA.

[2] Cowan, P.J. 1994. Handbook of Environmental Acoustics. Van Nostrand Reinhold. New York, U.S.A. p. 79.

CONSTRUCTION AND DECOMMISSIONING

Construction

The following is a list of activities that comprise potential noise sources associated with typical construction and decommissioning (a more detailed description of the construction activities is included in the assessment section):

- excavation of site and earthworks (construction only);
- welding assembly of tracks;
- mobile equipment traffic (e.g., haul truck, backhoe, bulldozer, crane, front end loader, forklift); and
- diesel generators for welders.

Best management practices and reasonable measures to reduce the potential effects of construction and decommissioning noise from the Project will be applied. The following best practices will be considered and applied when appropriate:

- the schedule will restrict construction activities to the daytime period;
- scheduling large vehicle trips as convoys to reduce the number of times per day a disturbance may occur;
- staging areas for construction will be located further away from sensitive noise receptors/residences;
- “drive-through” methods of moving equipment on-site will be maximized to reduce the use of back-up alarms;
- wooden blocks and spacer material between rails will be used to minimize rail impact noise;
- use of rubber-tire construction equipment instead of track type will be considered where applicable;
- all diesel engines will be fitted with a muffler or silencing systems, and kept in good repair; and
- whenever possible, construction activities will take advantage of acoustical screening from existing on-site buildings/obstacles to shield noise receptors from construction equipment noise.

If a noise complaint is made during the construction or decommissioning periods, CN will respond and take appropriate action to ensure that the issue has been managed responsibly.

BASELINE

Table E-1 summarizes the results for the daytime (7:00 AM to 10:00 PM) and nighttime (10:00 PM to 7:00 AM) periods at the north location and the south location. Monitoring was undertaken at the north location on September 10 and 11, 2010 and at the south location between September 13 and 16, 2010. The period averages were based on the hourly data, filtered to exclude extraneous noise events and weather conditions.

Table E-1: Summary of Ambient Sound Levels

Monitoring Location	L_{eq} (dBA)	
	Daytime	Nighttime
North Location	68	65
South Location	54	57

The results show that for the north monitoring location, the ambient soundscape during daytime and nighttime is fairly constant, and quite loud. During the daytime, the average ambient sound level was 68 dBA and at nighttime, it was 65 dBA. In general, the sound data recorded were considered consistent with what could be expected only a few tens of metres from an active rail line. Dominant noise sources at the north location are affiliated with rail activity. At the south monitoring location, rail traffic was less frequent and the associated sounds, less dominant, however, there was a consistent contribution from more distant rail activity and from the overflight of aircraft. Though not as loud as the soundscape observed at the north monitoring location, the south monitoring location is still considered quite loud relative to what would be expected in a typical rural environment beyond the immediate influence of a rail line. The ambient sound levels monitored at the south location were 54 dBA and 57 dBA respectively for the day and night. Much of the data at the south monitoring location was disqualified due to apparently unusually high levels of bird activity (snow-goose migration), but the long period of monitoring resulted in a representative sample being collected.

ASSESSMENT OF THE IMPACT OF INCREASED RAIL TRAFFIC

Where the new spur and the existing spur run parallel and are within close proximity (30 m) of each other, they can be considered as one line located in the centre, between the two lines from a technical-acoustical perspective. Close (within about 1.3 km) of the main branch, the new spur (northbound) diverts to the east to attach to the main line. Close to this side spur, a single dwelling has been identified in 14-36-8 W3M.

The planned increase in mine production is 8,000 carloads per year, up from 20,000 carloads in 2010 to 28,000 carloads in 2015. Based on information provided by CN (email dated September 13, 2010), trains will consist of up to 105 railcars, with two locomotives. The maximum increase in rail traffic therefore translates to an additional 80 loaded trains per year; 200 loaded trains per year in 2010 and 280 loaded trains in 2015. The same number of trains would also be expected to deliver empty railcars. In 2015, at a rate of 280 trains per year (or 560 train passages per year) an assumed maximum of two train passages per day would be expected, (one passage to the mine site delivering empty railcars, the return passage from the mine with loaded railcars). It is also reasonable to assume that in 2010 at a rate of 200 trains per year (400 passages per year) that on some days, two passages per day could be expected.

As a conservative approach to assessing the associated noise, one could assume that, instead of two train passages per day, as in 2010, there would be four passages per day in 2015 (two trains), an effective doubling of the number of train passages.

The expected change (increase) in sound levels has been assessed at the following four locations:

- On the main branch, where the added volume in rail traffic is added to the rail traffic on the main line.

- Where the side spur diverts from the new spur towards the east in 14-36-8-W3M. Along the continuation of the existing spur to the north, two dwellings were identified just west of the existing spur. The new spur diverts eastwards, away from those dwellings. The dwellings are close to the existing tracks (approximately 185 m.)
- Near the existing spur.
- Near the mine.

It should be noted that the shipment of the current amount of potash from the mine on the proposed spur would not result in an increase in rail traffic and associated noise.

Main Branch

The anticipated change in sound levels on the main branch resulting from the of addition of up to two train passages daily, is dependent on the amount of rail traffic currently using the main branch. During the baseline monitoring program a total of 11 (September 10, 2010) and 20 (September 11, 2010) train passages, were observed in an 11.5 and 24 hour period respectively on the main branch. Adding two passages to the existing rail traffic at this location would increase the average sound levels L_{eq} by less than 1 dB; 0.7 dB if there was an average of 11 existing passages per day, or 0.4 dB if 20 trains per day were already passing on this portion of the main branch. A change in sound levels of less than 3 dB is not considered noticeable for human hearing[3]. Maximum sound levels L_{max} as a result of a train passing or blowing the horn would not change, but would occur more often.

Wye

The change in sound levels where the new spur connects to the main line (the new wye) are dependent on both the increase in rail traffic, and the distance from the main line rail tracks to both the existing spur and the planned new tracks. The most conservative case would be where all the rail traffic would continue on the existing spur; the doubling of the number of train passages would result in an increase in sound levels of 3 dB, just discernable for human hearing. Assuming that the added volume (as much as two train passages per day) will be routed on the new spur and that two train passages per day will continue on the existing tracks, the added passages on new track would result in an increase of less than 2 dB (the shortest distance from the closest dwelling to the new wye is roughly double the distance to the existing tracks). Maximum sound levels L_{max} as a result of a train passing or blowing the horn would not change. Two dwellings have been identified along this piece of track in Township 22, Range 8, West of the 3rd Meridian. An existing dwelling in 14-36-8 W3M is CN property and will be decommissioned.

Parallel Spur

Where the new spur runs parallel with the existing one, average sound levels would increase as much as 3 dB, just discernible for human hearing. Maximum sound levels L_{max} as a result of a train passing or blowing the horn would not change. Two dwellings have been identified along this piece of track in Section 15, Township 36, Range 8, West of the 3rd Meridian.

[3] Cowan, P.J. 1994. Handbook of Environmental Acoustics. Van Nostrand Reinhold. New York, U.S.A. p. 79.

Mine Property

Near the mine, the sound levels would increase by less than 3 dB; the sound from the added train movements would blend with sound levels from the mine operation itself. Assuming that the mine production increase will be 40%, an increase in train handling and railcar movements on-site of 40% can also be assumed. The increased sound emitted by the handling activities alone would increase the average sound levels at this location by up to 1.5 dB. Since the sound associated with local train handling operations has to be added to the noise emitted by the mine operations, the increase from the increased rail activity would be less influential in the overall soundscape and the overall increase in sound levels would be less than 1.5 dB. Maximum sound levels L_{max} resulting from the passage of a train or blowing the horn would not change. One dwelling has been identified within the mine site location, in Section 16, Township 35, Range 8 West of the 3rd Meridian.

ASSESSMENT OF THE IMPACT OF CONSTRUCTION ACTIVITIES

Noise Modelling Software

Construction noise was assessed using the computer modelling the specific model used was the Type 7810 Predictor® (Predictor) software (developed by Softnoise GMBH and distributed by Bruel & Kjaer). It was identified as appropriate software to develop a predictive noise model for the construction activities. The algorithms used by the model are consistent with International Standards, including ISO 9613-2:1996 *Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation* (ISO 1996). The model has the capability to simulate emission sources represented as a series of point, line and area sources. Each source type can be characterized by entering noise emissions in terms of frequency components of the emission. The Predictor model also accounts for noise attenuation related to meteorological conditions (such as temperature and humidity), ground cover and physical barriers, either natural (terrain based) or man-made. According to ISO 9613-2:1996 *Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation*-2 (ISO 1996), the overall accuracy of the standard is ± 3 dB for distances between source and receiver of up to 1 km. The accuracy for the distances up to or over 1.5 km is not stated. Accuracy will also depend on the accuracy of the supplied noise data (sound power levels), which is often ± 2 dB for measured sources.

Construction Activities

Construction activities can be divided into three phases:

- Site Grading
- Base Course
- Track Installation

During all three phases, construction will be carried out 6 days a week (Monday – Saturday), 12 hours per day (0700 – 1900), for a total of 72 working hours per week (email dated February 17, 2011). All working hours fall within the Health Canada-defined daytime period for construction noise (0700 – 2300). Construction activities will begin at the main rail line and work their way south, roughly paralleling the existing CP rail spur. The site grading equipment will lead the way for the base course equipment, which in turn will lead the way for the track installation equipment. The amount of time the back-up alarm sounds was a conservative estimate based on professional judgement.

Site Grading

Site grading is expected to last for a total of five months. Site grading equipment leading to meaningful contributions to the overall construction noise level includes:

- 7 open bowl scrapers, including back-up alarm operating 50% of the time;
- 10 off-highway articulated trucks, including back-up alarm operating 10% of the time;
- 4 graders, including back-up alarm operating 50% of the time;
- 2 hydraulic excavators, including back-up alarm operating 20% of the time;
- 4 tractors with pad foot rollers, including back-up alarm operating 50% of the time;
- 4 vibratory packers with foot pads, including back-up alarm operating 50% of the time;
- 4 track dozers, including back-up alarm operating 50% of the time; and
- 4 diesel generators (20 kVA).

Each piece of site grading equipment is assumed to be operating for a total of 1,200 hours over the course of the five month site grading period.

Base Course

Base course operations are expected to last for a total of two months, including a one month overlap with the site grading phase. Base course equipment leading to meaningful contributions to the overall construction noise level includes:

- 4 motor graders, including back-up alarm operating 50% of the time;
- 3 wheeled front end loaders, including back-up alarm operating 50% of the time;
- 2 smooth drum vibratory packers, including back-up alarm operating 50% of the time;
- 4 track dozers, including back-up alarm operating 50% of the time;
- 2 water trucks, including back-up alarm operating 10% of the time;
- 4 tractor trailers with end dump trailers, including back-up alarm operating 10% of the time; and
- 2 diesel generators (20 kVA).

Each piece of base course equipment is assumed to be operating for a total of 480 hours over the course of the two month base course period.

Track Installation

Track installation operations are expected to last for a total of three months, including a one month overlap with the base course phase. Track installation is not expected to overlap with the site grading activity. Track installation equipment leading to meaningful contributions to the overall construction noise level includes:

- 3 tampers, including back-up alarm operating 50% of the time;

- 3 ballast regulators, including back-up alarm operating 50% of the time;
- 3 spikers, including back-up alarm operating 10% of the time;
- 3 speed swings, including back-up alarm operating 10% of the time;
- 1 boom truck, including back-up alarm operating 10% of the time;
- 4 wheeled front end loaders, including back-up alarm operating 50% of the time;
- 3 work train locomotives; and
- 3 diesel generators (20 kVA).

Each piece of track installation equipment is assumed to be operating for a total of 720 hours over the course of the three month track installation period.

Source power levels for each piece of construction equipment (site grading, base course, and track installation) were obtained from previous measurements of similar equipment during fieldwork at other construction sites. In keeping with the ISO (1996) standard, a 5 dB penalty is applied to each back-up alarm to account for the increased annoyance caused by its tonal nature. Likewise, a 5 dB penalty is applied to each vibratory packer, tamper, spiker, and speed swing to account for the increased annoyance caused by its impulsive nature. The ISO (1996) standard also indicates that a 3 dB reduction should be applied to the work train locomotives to account for the decreased annoyance associated with the noise from this type of source.

The total time required for construction of the new rail spur is 8 months. Based on Health Canada guidelines for construction projects lasting less than one year, an overall adjustment of *10*log(T)*,where *T* is the construction time in years, is applied to the results of the noise model. In this case *T* = 8/12 and the applied adjustment is a reduction of 1.8 dB.

Construction Noise Impact at the Most Impacted Receptor

Because construction activities will effectively follow the path of the existing CP rail spur, the dwelling located nearest the existing rail spur was selected as the most impacted receptor. The impact of construction noise on all other dwellings in the area is expected to be less than the impact at this closest dwelling. As mentioned previously, the dwelling in 14-36-8 W3M has been purchased by CN and so it need not be considered. For the purposes of the construction noise assessment, the most impacted receiver is identified as the northernmost dwelling with 15-36-8 W3M. This dwelling is located approximately 70 m to the west of the existing CP rail spur.

The daytime and nighttime baseline levels for the most impacted receptor are taken from the top row of Table E-1 (i.e., the L_{eq} values for the northern monitoring location). Using these values, the baseline HA value for the most impacted receptor is found to be 29.0%. Using Predictor model outputs for the daytime construction noise level at the most impacted receptor, and the baseline for the nighttime noise level, the cumulative (i.e., construction + baseline) HA value is found to be 32.1%. This represents an increase in HA of 3.1%, which is well below the 6.5% significance threshold specified by Health Canada. Using the same Predictor model outputs for daytime level and the baseline nighttime level, the Health Canada-specified integrated noise level for the cumulative situation is found to be 73.1 dBA. This is 1.9 dB below the 75 dBA significance threshold specified by Health Canada.

In order to assess the range of construction noise impacts that could be expected at dwellings other than the most impacted receiver, the Health Canada criteria were also applied to the dwelling identified as the least impacted receptor. The least impacted receptor was identified as the southernmost dwelling in 15-36-8 W3M. This dwelling is located approximately 250 m to the west of the existing CP rail spur. Following the same procedure as described for the most impacted receptor, the HA increase at this least impacted receptor was found to be 0.5% and the Health Canada-specified integrated noise level for the cumulative situation was found to be 72.2 dBA. Both of these values are below the significance threshold specified by Health Canada.

Therefore, using both the HA and integrated noise level criteria, the construction noise levels are not significant at the most impacted receptor. As demonstrated by analysis of construction noise at the least impacted receptor, if the impact is insignificant at the most impacted receptor, it is safe to conclude that the construction noise will not have a significant impact at any of the dwellings in the area.

Decommissioning

Decommissioning the Project would involve similar equipment as is being proposed for construction, but at a lower intensity level and for a shorter duration., The resultant noise impact is therefore expected to be less than during construction and is also predicted to be compliant with the Health Canada requirements.

SUMMARY

Potential effects of the Project were assessed in terms of a potential change in noise levels due to the increased rail traffic on the new spur, and in terms of annoyance resulting from construction noise during the anticipated eight months of construction activities. The increase in rail traffic is not expected to generate a noticeable increase in average sound levels. The maximum sound levels associated with rail traffic are expected to remain unchanged. At the location of the most impacted receptor, the eight months of construction are expected to lead to a small increase in the percentage of the population that is HA, but this increase is far less than that which Health Canada deems to be a significant impact. Likewise, the integrated, cumulative noise level at the location of the most impacted receptor is also expected to fall below the level that Health Canada deems to be significant. Future decommissioning is expected to result in a lower impact from noise than during construction.

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