

## TECHNICAL MEMORANDUM 01

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Date: May 3, 2021

File: 7603-002-00/TM01

To: Jeffrey Balon

E-mail: jeff.balon@desnedhe.com

From: Christopher Nameth, P.Eng.

Pages: 6

Subject: English River Property Management – Alternate Disposal Pipeline

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### 1.0 Background

#### 1.1 Overview

English River Property Management (ERPM) intends to upgrade its existing wastewater treatment system, currently consisting of a small mound treatment system. The intent of the upgrades is to enable the facility to service an expanded commercial and industrial development within the Grasswood Reserve, with the potential to serve as a regional wastewater treatment system in the future. Based on the *Wastewater Treatment Facility – Design Basis Memorandum; MPE Engineering; 2020*, the proposed treatment facility would consist of a Membrane Bioreactor (MBR) mechanical treatment system.

Discharge to the South Saskatchewan River via a forcemain was previously reviewed. After consultation with the City of Saskatoon, a preferred alternative was identified. This alternative involves connection to City of Saskatoon Stormwater or Sanitary trunks at the south end of Preston Avenue intersection. This memorandum has been prepared to provide a conceptual pipeline alignment as well as a budgetary cost estimate.

#### 1.2 Location

The ERPM commercial development is located directly adjacent to the southern Saskatoon city limit on the west side of Highway 11. The proposed wastewater treatment facility (WWTF) is located near the center of the ERPM parcel. Figure 1.1 is a location plan of the proposed WWTF system.

## 2.0 Design Criteria

A detailed breakdown and overview of the characteristics and generation of the design criteria is outlined in the *Grasswoods Wastewater Treatment Facility – Effluent Disposal Strategy & DUIS; MPE Engineering Ltd; 2021*.

### Initial/Current Effluent Flows:

- Average Dry Weather Flow (ADWF): 1.78 L/sec.
- Average Day Flow (ADF): 2.18 L/sec.
- Max Day Flow (MDF): 4.35 L/sec.
- Peak Hour Flow (PHF): 9.69 L/sec.

### Projected/Future Flows:

- Average Dry Weather Flow (ADWF): 2.78 L/sec.
- Average Day Flow (ADF): 3.33 L/sec.
- Max Day Flow (MDF): 6.67 L/sec.
- Peak Hour Flow (PHF): 14.99 L/sec.

To ensure sufficient capacity for future growth, potential stormwater discharge flows, and an additional factor of safety, it is recommended that the forcemain be sufficiently sized to convey a flow of 15 L/sec.

### 2.1 Discharge Location

Based on preliminary discussions between the City of Saskatoon and ERPM, it is understood that the proposed forcemain will discharge into either the Preston Stormwater Trunk or Preston Sanitary Trunk at the southernmost location. The exact location of the connection has yet to be finalized and should be confirmed prior to finalizing the preliminary design.

### 2.2 Preliminary Design Review

For the purpose of this report, an effluent pump station structure is expected to be constructed as part of the WWTF, but the pumping components would be included in this project. The following upgrades will be required for the effluent disposal project.

#### 2.2.1 Effluent Pumping System

The proposed effluent pumping system will consist of the following

- Installation of a 25 HP duplex submersible pump system
- Installation of mechanical piping and valving
- Installation the following all lift station controls, instrumentation, and alarm notification
  - Ultrasonic Level Transmitter, Pressure Transducre Indicator and Controller
  - High Switch
  - Phase Line Monitor
- Electrical & Control Panels
- Ventilation system for wet well
- Tie lift station into SCADA System at the WWTF

#### 2.2.2 Proposed Underground Work

In addition to construction of the effluent pumping system, the following additional underground work is recommended:

- Construction of a 2,300 m HDPE forcemain, 250 mm in diameter, between the pumping station and the connection location at the south end of Preston Avenue.
- Construction of a bored railway crossing on the south end of the Stonebridge development.

### 2.2.2.1 Effluent Forcemain

A 3,000 m long 250 mm HDPE DR 17 forcemain is required to connect the effluent pumping system to Preston Avenue Trunk system. The proposed alignment extends north approximately 1,000 m, then proceeds west and north approximately 2,000 m, towards the proposed connection location. The intent would be to have the 250 mm forcemain installed via narrow trench plough, with the railway crossing constructed with a bored steel casing pipe.

### 2.2.2.2 CN Rail Crossing Requirements

The proposed underground works will cross a CN ROW, and therefore will require CN's approval and oversight. The approvals process with CN is extensive and complicated. However, as MPE has navigated railway crossing process recently on a variety of different sized projects we are confident that the project can be successfully completed without significant issue. At this time, MPE has identified the potential crossing as the second level geotechnical requirement as defined by CN's Application process.

The process for completing this level crossing as required by CN is as follows:

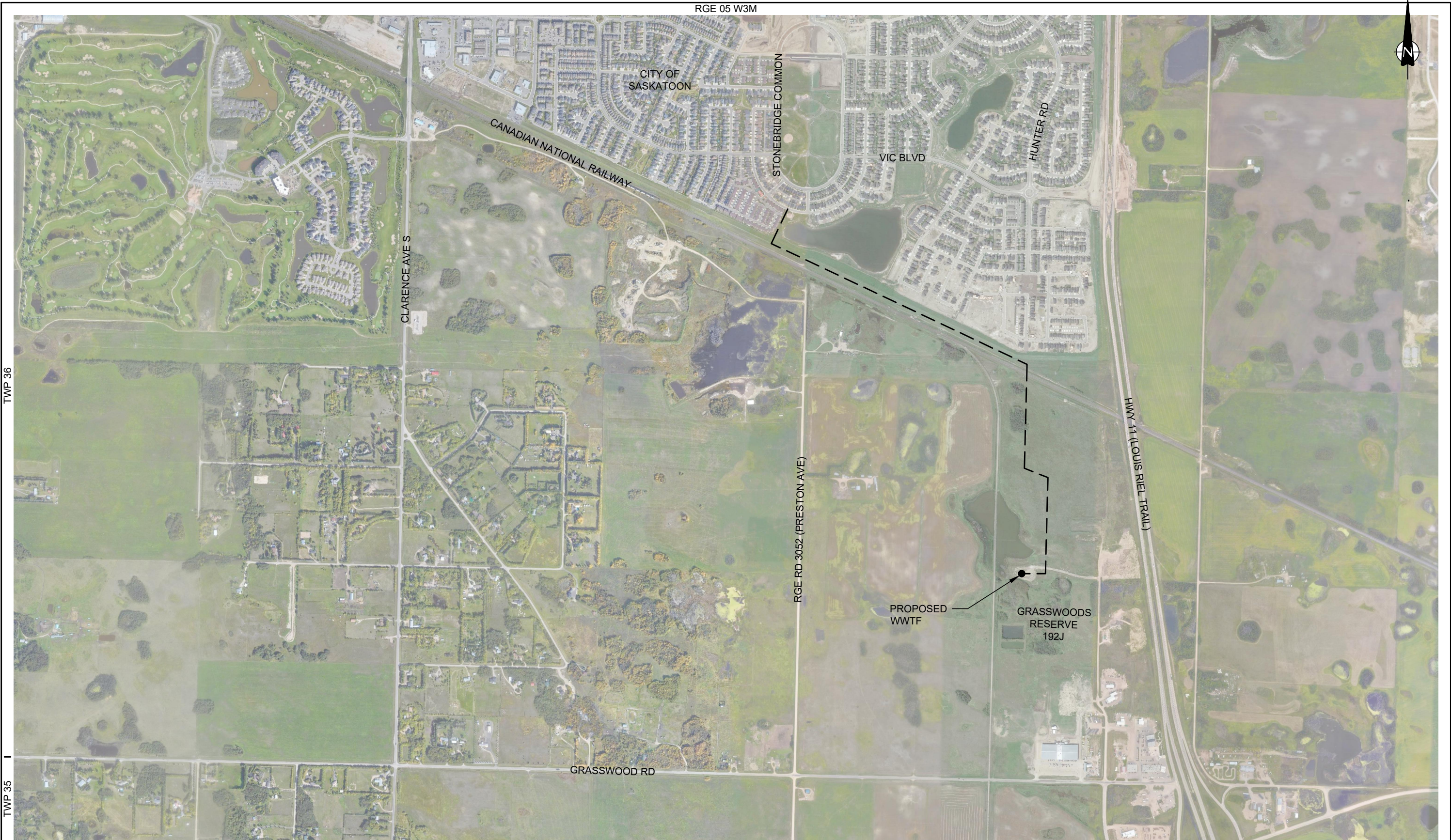
- Prepare a geotechnical investigation for the project that includes subsurface conditions and applicability of crossing methods.
- Prepare a crossing design and specifications compliant with CN's design and construction requirements.
- Submit the geotechnical investigation and design documents to CN for review.
- Obtain an Agreement File Number.
- Obtain a Flagging Agreement.
- Hydroexcavate any identified buried utilities.
- Install subsurface monitoring points.
- Schedule a kickoff meeting with the following stakeholders:
  - CN,
  - MPE geotechnical engineer of record,
  - Prime contractor,
  - Any applicable sub-contractors.
- Contractor to submit a detailed crossing schedule and remediation plan.
- Implement the subsurface monitoring program 4 days prior to the crossing.
- Complete the crossing under the direct oversight of the engineer.
- Follow up subsurface monitoring.
- Project closeout with CN.

For the proposed Crossing, MPE has the capability to complete the geotechnical investigation internally. The investigation would include 4 boreholes to a depth of 9 m below grade. The report submitted to CN would be sufficient for a crossing in cohesive material. If the crossing location is in an area of saturated sand, MPE's geotechnical personnel may recommend moving the crossing location depending on the identified risk. If more detailed studies are necessary, MPE can complete that work as required. These might include dewatering designs; however, this is not anticipated based on the preliminary site location.

CN does have control on the timeline for potential crossings and does not allow crossings when the ground is frozen, however this should not be a concern based on the anticipated project timeline. In addition, CN flagging will be required at any time that any contractor or engineering personnel are within CN's ROW. It should be noted that the costs for CN Flagging, CN Engineering Review are to be paid for by the client. MPE has included estimated costs for these items in the capital cost estimate which have been included in Appendix A.

Figure 2.2.1.2 depicts the conceptual plan and illustrates all major work to be completed.





TWP 36

TWP 35

RGE 05 W3M

CITY OF SASKATOON

CANADIAN NATIONAL RAILWAY

CLARENCE AVE S

STONEBRIDGE COMMON

VIC BLVD

HUNTER RD

RGE RD 3052 (PRESTON AVE)

HWY 11 (LOUIS RIEL TRAIL)

GRASSWOOD RD

PROPOSED WWTF

GRASSWOODS RESERVE 192J



ENGLISH RIVER PROPERTY MANAGEMENT  
 WWTF - EFFLUENT DISPOSAL STUDY  
 ALTERNATE DISPOSAL PIPELINE

SCALE: 1:15000	DATE: NOVEMBER 2020	JOB: 7603-003-00	FIGURE: 1.0
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### 2.3 Construction Logistics

Construction of the pipeline should not have an impact on the construction of the proposed WWTF and construction can proceed in conjunction with the facility. Connections will need to be coordinated during construction and will need to be coordinated with City of Saskatoon personnel.

#### 2.3.1 Schedule

Pipeline work can likely begin at any time during the construction season. It is expected that the forcemain between the WWTF and the Preston Avenue Trunks would be installed via narrow trench installation. It is also anticipated that the railway crossing will be complete via boring of a steel casing pipe with an HDPE carrier pipe. It is anticipated that a significant approval application process will be required to gain approval to cross the CN rail line.

### 2.4 Capital Cost Estimate

Cost estimates have been prepared for construction of the proposed alternate Grasswood development disposal pipeline. The capital costs for the above options are summarized in Table 2.4 below and they are inclusive of a contingency and engineering fees. Taxes have not been included.

<b>Item</b>	<b>Description</b>	<b>Cost</b>
1	General Conditions	\$ 200,000
2	Effluent Pumping System	\$ 231,000
3	Effluent Pipeline	\$ 1,046,000
4	Canadian National Railway Crossing	\$ 170,000
5	Contingency (20%)	\$ 329,400
6	Engineering Allowance (12%)	\$ 237,168
<b>TOTAL</b>		<b>\$ 2,214,000</b>

The above estimate is an opinion of probable costs and a function of many factors that can change with time and hence are not actual costs. Construction equipment and methods that are commonly utilized in the industry are assumed for estimating purposes. Refer to Appendix A for the complete details of the capital cost estimate.

## **3.0 Conclusions & Recommendations**

### **3.1 Conclusions**

The major findings are summarized as follows:

- Disposal to the City of Saskatoon Preston Avenue Trunks is recommended.
- Installation of pumping system at WWTF is required
- 250 mm HDPE pipeline is recommended to convey a design flow of 15 L/sec.
- Recommended work is as follows:
  - Construction of effluent pumping system as part of the WWTF project.
  - Construction of a 2,300 m, 250 mm HDPE forcemain.
  - Construction of Canadian National Railway crossing and all associated work.

### **3.2 Recommendations**

Recommendations are provided below:

- Adopt this study and its recommendations.
- Forward this report to the Water Security Agency for review and comment.
- Proceed with detailed design, tendering, and construction.

## **APPENDIX A**

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Detailed Cost Estimate



ERPM WWTF Disposal Pipeline

Cost Estimate

DESCRIPTION		QUANTITY	UNIT	SUPPLY	INSTALL	COST
<b>General Conditions</b>						
1	Mob/demob/bonding/insurance/profit	1	LS	\$ 200,000.00		\$ 200,000.00
<b>SUBTOTAL</b>						<b>\$ 200,000.00</b>
<b>Effluent Pumping System</b>						
<b>Process Mechanical</b>		2	ea.	\$ 25,000.00	\$ 10,000.00	\$ 70,000.00
1	Self-Priming Sewage Pump Package	2	ea.	\$ 15,000.00	\$ 5,000.00	\$ 40,000.00
2	Mechanical Piping	1	LS	\$ 10,000.00	\$ -	\$ 10,000.00
3	Plug Valve (100 mm)	2	ea.	\$ 2,000.00	\$ 500.00	\$ 5,000.00
4	Submersible Butterfly Valve (150 mm)	1	ea.	\$ 2,500.00	\$ 500.00	\$ 3,000.00
5	Ball Valve (50 mm)	1	ea.	\$ 750.00	\$ -	\$ 800.00
6	Ball Check Valve (100mm)	2	ea.	\$ 2,000.00	\$ 500.00	\$ 5,000.00
7	Couplings	1	LS	\$ 1,000.00	\$ -	\$ 1,000.00
8	Air Release Vavle	2	LS	\$ 1,500.00	\$ -	\$ 3,000.00
9	Ultrasonic Level Transmitter	1	LS	\$ 2,500.00	\$ 3,500.00	\$ 6,000.00
10	Level Pressure Transducers	1	LS	\$ 2,500.00	\$ -	\$ 2,500.00
11	Pressure Gauges with Isolators	2	ea.	\$ 500.00	\$ -	\$ 1,000.00
12	Level Switches	2	ea.	\$ 500.00	\$ -	\$ 1,000.00
<b>Electrical</b>						
1	VFD's	1	LS	\$ 30,000.00		\$ 30,000.00
2	Lighting Fixtures Switches and Installation	1	LS	\$ 5,000.00		\$ 5,000.00
3	Panels	1	LS	\$ 10,000.00		\$ 10,000.00
4	Power Distribution Equipment	1	LS	\$ 3,500.00		\$ 3,500.00
5	Emergency Lighting	1	LS	\$ 2,500.00		\$ 2,500.00
6	Pin and Sleeve Connectors	1	ea.	\$ 2,000.00		\$ 2,000.00
7	General Electrical Costs (Receptacles, boxes etc.)	1	LS	\$ 5,000.00		\$ 5,000.00
8	General Cable Costs	1	LS	\$ 5,000.00		\$ 5,000.00
9	Programming & Commissioning	1	LS	\$ 20,000.00		\$ 20,000.00
<b>SUBTOTAL</b>						<b>\$ 231,000.00</b>
<b>Effluent Pipeline</b>						
1	250 mm HDPE Forcemain Piping (Narrow Trench)	3,000	m	\$ 310.00		\$ 930,000.00
2	250 mm Plug Valve	2	ea	\$ 6,500.00		\$ 13,000.00
3	Air Release Structure	3	ea	\$ 7,500.00		\$ 22,500.00
4	Connection to WWTF	1	LS	\$ 5,000.00		\$ 5,000.00
5	Connection to Preston Avenue Trunk	1	LS	\$ 75,000.00		\$ 75,000.00
<b>SUBTOTAL</b>						<b>\$ 1,046,000.00</b>
<b>Canadian National Railway Crossing</b>						
1	<b>CP Railway Geotechnical Requirements (Can be completed by MPE)</b>					
a)	Geotechnical Investigation of Crossing Location	1	LS	\$ 23,000.00		\$ 23,000.00
b)	Engineer of Record Services	1	LS	\$ 5,000.00		\$ 5,000.00
c)	Track Monitoring and Resident Service	10	day	\$ 2,200.00		\$ 22,000.00
2	<b>Canadian National Railway Services (Allowance)</b>					
a)	CN Engineering Fees	1	LS	\$ 6,000.00		\$ 6,000.00
b)	CN Flagging	10	day	\$ 2,700.00		\$ 27,000.00
3	<b>HDD Crossing Construction</b>					
a)	Subsurface Monitoring points	4	ea	\$ 500.00	\$ 1,000.00	\$ 6,000.00
b)	400 mm Casing Diameter Horizontal Directional Drill	50	m.	\$ 1,500.00		\$ 75,000.00
c)	250 mm Carrier Pipe	50	m	\$ 125.00		\$ 6,250.00
<b>SUBTOTAL</b>						<b>\$ 170,000.00</b>
<b>GRAND SUBTOTAL</b>						<b>1,647,000.00</b>
						\$ 329,400.00
Contingency (20%)						\$ 237,168.00
Engineering Allowance (12%)						
<b>GRAND TOTAL</b>						<b>\$ 2,214,000.00</b>