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January 22, 2024 File: 0414 021 01

Manitoba Environment and Climate Change
Environmental Compliance and Enforcement
Box 36, 14 Fultz Boulevardt
Winnipeg, Manitoba
R3Y 0L6

Attention: Mr. Warren Rospad
Contaminated Sites Program Specialist

RE: **Remediation Plan - Polycyclic Aromatic Hydrocarbon and Metal Impacted Soil PR 311 Bridge at Manning Canal - RM of Hanover, Manitoba**

On behalf of Manitoba Transportation and Infrastructure (MTI) and the General Contractor (Graham Construction and Engineering Inc.), EGE Engineering Ltd. (EGE) is pleased to submit the following Remediation Plan (RP) for the excavation and off-site disposal of polycyclic aromatic hydrocarbon (PAH) and metal impacted soil (and possibly sediment) located at the Provincial Road (PR) 311 crossing of Manning Canal, in the Rural Municipality (RM) of Hanover, Manitoba (the Site).

1.0 SITE DESCRIPTION AND DEVELOPMENT PLAN

The Site formerly contained a timber and steel pile bridge that crossed Manning Canal on the PR 311 alignment approximately 11.5 km west of Blumenort, Manitoba. The bridge caught fire and burned in May 2023, which caused extensive damage and structural collapse. The absence of a crossing at this location is causing a negative impact in the local community; therefore, MTI is prioritizing the project to replace the damaged bridge with a new structure as quickly as possible.

The project has been tendered and awarded to Graham Construction. The construction of the new bridge will include excavation to remove and replace the previous west and east abutments and to remove and cut each of the steel piles and pile caps at 1.0 m below ground. In most cases, the excavation required for construction of the new bridge will not be deeper than 1.5 m below ground; however, some areas along the embankments near the two abutments may require slightly deeper excavation.

The project will require excavation of soil (and potentially sediment) contaminated with PAHs and metals. The contamination is associated with the treated timbers from the former bridge. Any contaminated soil or sediment excavated at the Site cannot be reused as fill and will be transported off-site for disposal. Photographs of the former bridge and the current site condition (steel piles and pile caps remaining) are provided below.

Photo 01: PR 311 bridge over Manning Canal (August 2016).

Photo 02: PR 311 bridge over Manning Canal (September 2023).

2.0 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

A Phase II Environmental Site Assessment (ESA) was completed by Dillon Consulting Limited in 2023 with the report dated December 14, 2023. Six boreholes were advanced by hand to a depth of 1.0 m below ground, with three at the west abutment and three at the east abutment.

Twelve soil samples (two per borehole) and one duplicate sample were submitted for laboratory analysis of benzene, toluene, ethylbenzene and xylenes (the BTEX components), the petroleum hydrocarbon (PHC) F1 to F4 Fractions, PAHs, metals and phenols. The soil samples were screened for combustible organic vapours and reported concentrations ranging from 30 to 1,320 ppm.

The analytical results for the soil samples were compared with the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG) using the agricultural land use classification and fine textured soil guidelines. The exceeded parameters are summarized in Table 2.1 below:

Table 2.1 - Soil Quality Exceedances

Parameter	Sample ID	Sample Depth (m)	Concentration (mg/kg)	Soil Quality Guideline - Agricultural (mg/kg)
Benz(a)anthracene	CL-WEST	0.5	1.1	0.1
	CL-WEST	1.0	0.12	
Benzo(a)pyrene	CL-WEST	0.5	0.84	0.7
Benzo(k)fluoranthene	CL-WEST	0.5	0.46	0.1
Dibenz(a,h)anthracene	CL-WEST	0.5	0.14	0.1
Indeno(1,2,3-c,d)pyrene	CL-WEST	0.5	0.58	0.1
Naphthalene	BH-01	0.5	0.014	0.013
		1.0	0.014	
	CL-WEST	1.0	0.039	
Phenanthrene	BH-01	0.5	0.082	0.046
	CL-WEST	0.5	0.72	
		1.0	0.12	
Pyrene	BH-01	0.5	0.15	0.1
		1.0	0.10	
	CL-WEST	0.5	1.3	
		1.0	0.2	
Arsenic	CL-WEST	1.0	15.0	12
HWS Boron	BH-01	0.5	14.0	2
		1.0	13.0	
	BH-02	0.5	16.3	
		1.0	14.9	
	BH-03	0.5	16.1	
		1.0	14.7	
	BH-04	0.5	15.9	
		1.0	15.3	
	CL-EAST	0.5	13.6	
		1.0	14.0	

Parameter	Sample ID	Sample Depth (m)	Concentration (mg/kg)	Soil Quality Guideline - Agricultural (mg/kg)
	CL-WEST	0.5	15.4	
		1.0	15.9	
Copper	CL-WEST	1.0	68.7	63
Nickel	CL-WEST	1.0	77.5	45
Tin	CL-WEST	1.0	9.65	5

As noted in Table 2.1, all six test hole locations exceeded the soil quality guideline for hot water soluble (HWS) boron. The BH-01 and/or CL-WEST samples, from the west abutment area on the north side and centreline of PR311 also exceeded the soil quality guidelines for several PAH compounds and arsenic, copper, nickel and tin. At the east abutment, the only exceedances were for HWS boron.

The locations of the soil quality exceedances are shown on Plate 01 below. The soil impacts were observed at both 0.5 and 1.0 m below ground. Lateral and vertical delineation of the impacted soil was not completed as part of the Phase II ESA.

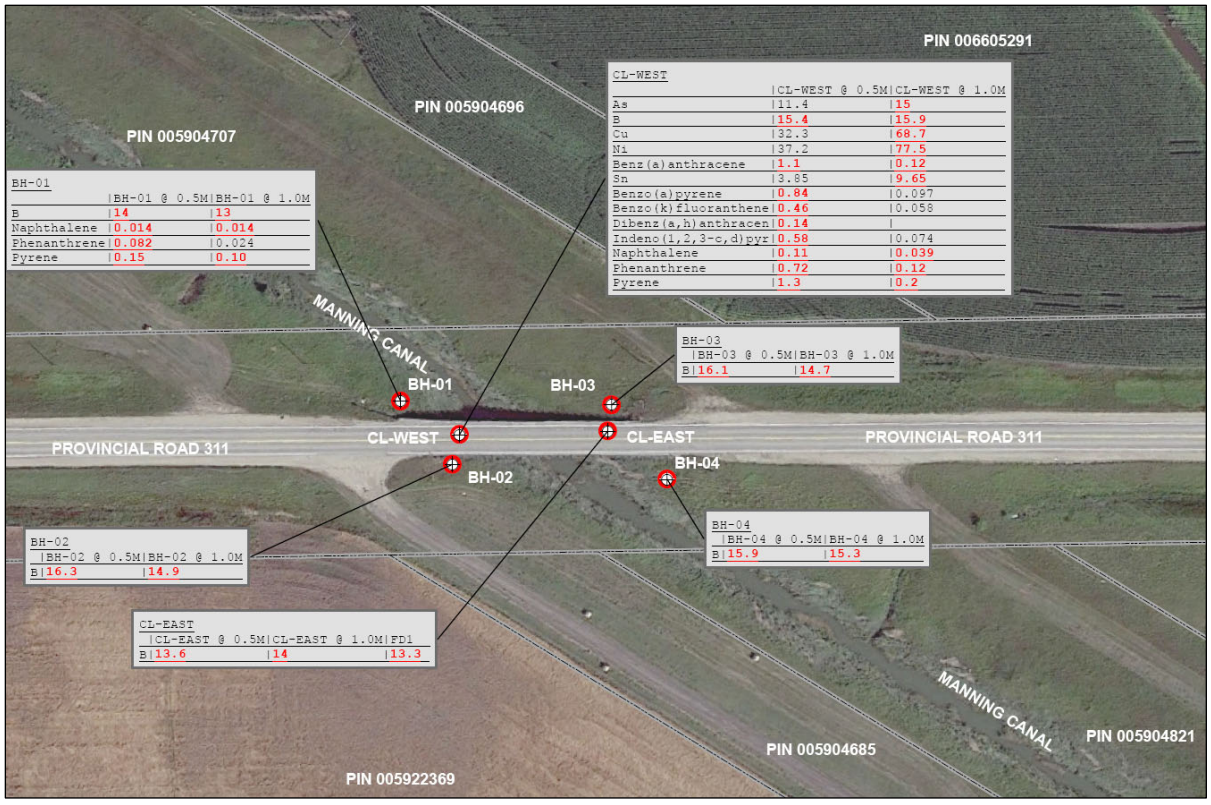

Plate 01: Location of soil quality exceedances (Source: Dillon, 2023).

Two sediment and surface water samples were also collected and analyzed for the same parameters as the soil samples. One sample was located upstream from the former bridge and one sample downstream. The two sediment and surface water quality samples also reported guideline exceedances for the following parameters:

- SS1 at the west abutment, north side - acenaphthene, anthracene, benz(a)anthracene, fluorene, naphthalene, phenanthrene and pyrene for sediment and arsenic, boron, chromium and iron for surface water; and
- SS2 at the west abutment, south side - acenaphthene, phenanthrene and arsenic for sediment and arsenic, boron, chromium and iron for surface water.

The location of the sediment and surface water exceedances are shown on Plates 02 and 03 below.

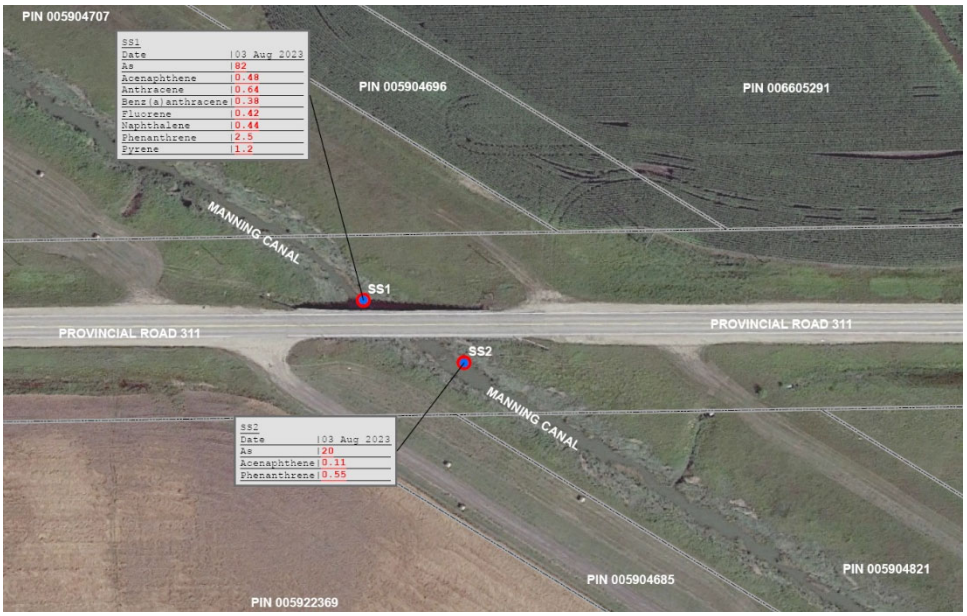

Plate 02: Location of sediment quality exceedances (Source: Dillon, 2023).

Plate 03: Location of surface water quality exceedances (Source: Dillon, 2023).

3.0 ENVIRONMENTAL QUALITY GUIDELINES

The following environmental quality guidelines are applicable at the Site:

- Primary Standard - CCME CEQG applicable to the BTEX components, metals and PAH compounds; and
- Primary Standard - CCME Canada Wide Standards for Petroleum Hydrocarbons in Soil (CWS for PHCs in Soil), January 2008 applicable to the PHC F1 to F4 Fractions.

The Site is within the PR 311 right-of-way that crosses Manning Canal and is surrounded by agricultural land. The project includes construction of a new bridge at the same location; therefore, the agricultural land use criteria have been selected for remediation of the Site.

The Phase II ESA included an assessment of the exposure pathways applicable to the Site and excluded the following pathways:

- Vapour inhalation (indoor) - there are no buildings on-site;
- Potable groundwater - there are no groundwater wells within 500 of the Site; and
- Groundwater check (livestock and irrigation) - there are no groundwater wells within 500 m of the Site.

The fine grained soil pathway applies to the Site based on the fine grained soil (topsoil/organic material or silt overlying silty clay to 1.0 m below ground). Grain size analysis was completed on four soil samples that included the silty clay and topsoil with all four samples classified as fine grained. Further description of the applicable exposure pathways and soil conditions is provided in the Phase II ESA.

4.0 DELINEATION OF IMPACTED AREAS

As noted above, lateral and vertical delineation of contaminated soil, sediment and surface water was not completed. Based on the available information, and to ensure minimal delays during construction, all excavated soil within the upper 1.5 m that is excavated to facilitate construction of the project will be considered contaminated soil. The General Contractor estimates the quantity of soil to be between 600 and 900 m^2. This soil will require disposal at a licensed soil treatment facility.

To determine if the excavations that are deeper than 1.5 m will encounter contaminated soil, EGE will complete test pit excavations at these areas to collect soil samples at 1.5 and 2.0 m below ground, which is the maximum depth of the excavation required. These samples will be submitted for laboratory analysis of the BTEX components, PHC F1 to F4 Fractions, PAHs and metals to determine if the soil can be reused on-site, or if it is excess soil, whether it must be treated as contaminated soil.

5.0 PROPOSED REMEDIATION AND RISK MANAGEMENT ACTIVITIES

The following remediation and risk management actions are proposed:

- All excavated soil between 0.0 and 1.5 m below ground is classified as contaminated soil based on the previous Phase II ESA and will be placed directly into trucks for transportation and disposal at the GFL MidCanada Soil Treatment Facility. No analytical testing of this soil is

required as all soil within this depth range has been classified as contaminated based on the previous Phase II ESA;
- Excavated soil deeper than 1.5 m will be classified by the test pit sampling program outlined above. All contaminated soil will be transported for disposal at the GFL MidCanada Soil Treatment Facility and non-contaminated soil will either be reused on-site or transported for off-site disposal as clean soil.

Any excess soil obtained from deeper than 1.5 m below ground that meets the agricultural land use soil quality guidelines is considered suitable for re-use on site, for use as clean fill at a licensed waste disposal ground or for disposal at any facility accepting fill material (after review of applicable exposure pathways).

EGE will provide periodic inspection of the construction activities to observe the excavation of the soil for transportation to the licensed soil treatment facility and to collect representative samples from the base of the excavations.

The General Contractor will ensure that the work is carried out in accordance with these requirements. This will include:

- Excavate the contaminated soil, place the material directly into trucks and transport the soil to the GFL MidCanada Soil Treatment Facility;
- Contaminated soil (and any debris within the soil) will not be stockpiled on-site unless temporarily required to manage the workflow. No contaminated soil stockpiles will remain at the end of the workday;
- Obtain scale tickets for all contaminated soil disposed at the soil treatment facility and pre-submit analytical data to obtain prior authorization for disposal of the impacted soil; and
- Transport the impacted soil in compliance with current hazardous waste regulations, if applicable, and cover all loads with tarpaulins to reduce wind-blown particles. Trucks will also be required to effectively contain all residual liquids generated from the soil, if present.

Some groundwater seepage may be encountered during excavation to cut the steel H-piles within the channel. The work is scheduled for February 2024; therefore, freezing conditions are anticipated. It is not expected that dewatering will be required to complete the construction; therefore, there will be no collection and disposal of groundwater.

6.0 ENVIRONMENTAL MONITORING AND SAMPLING

As noted above, no additional soil testing is required for the surface soil between 0.0 and 1.5 m at the Site as this material has been classified as contaminated and will be transported to the GFL MidCanada Soil Treatment Facility for disposal.

EGE will collect soil samples from the west and east abutment excavations and from a select number of the excavations to cut the steel H-piles in order to document the soil quality of the undisturbed soil to remain in place. A minimum of ten soil samples are expected from this activity.

The soil samples will be submitted to Bureau Veritas Laboratories (BVL). BVL are accredited by the Canadian Association for Environmental Laboratories (CALA). Prior to and throughout the field program, communication with the laboratory will be maintained to ensure that all quality

assurance/quality control (QA/QC) objectives, such as detection limits, proper sample containers and sample holding times are met.

All samples will be collected, transported and stored under conditions that maintain sample integrity using the general protocols presented in the *Guidance Manual for Environmental Site Characterization in support of Environmental and Human Health Risk Assessment*. BVL also applies internal QA/QC protocols including: using standard operating procedures; adhering to principles of good laboratory practice; and using standardized approved scientific methodologies. BVLs' QA/QC program includes laboratory duplicates, method blanks and matrix spikes.

Pre-cleaned sample containers will be provided by the laboratory. Sampling equipment will be decontaminated between sampling stations and disposable gloves will be worn during handling of all samples, sampling equipment and containers. The samples will be stored on ice packs in coolers pending transport to the laboratory and proper chain of custody will be followed throughout the sample handling. Based on the limited number of samples collected, no field QA/QC samples will be submitted for analysis.

7.0 SCHEDULE

The project construction activities are expected to start January 29, 2024 and the excavation work is among the first tasks to be completed. This work is expected to be completed by the end of February. The test pit sampling program will be completed the week of January 22, 2024 to determine if the soil below 1.5 m requires disposal as a contaminated material.

8.0 INSPECTION AND REPORTING

EGE will oversee the on-site remediation and risk management activities and prepare the Remediation Plan Closure Report. The report will include: a description of the site; an overview of the completed field activities, the quantity and location of all soil disposed off-site, a description of any soil sampling; and a summary of the analytical results. The report will also identify any areas of residual contamination and the basis for all findings.

We look forward to working with you on this project and trust that this meets your needs at this time. If any changes are made to this Remediation Plan prior to implementation, EGE will provide written documentation to the Department.

Should you have any questions or require any additional information please contact the undersigned at (204) 975-9433 (office) or (204) 612-0944 (cell).

Sincerely,
EGE Engineering Ltd.

David Klassen, P.Geo.
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