April 25, 2019 Project No. 10161797

Mr. Mirek Czyzowicz, Environmental Officer
CN Environment
821 Lagimodiere Boulevard
P.O. Box 1620 Station Main
Winnipeg, MB
R3C 2Z6

Sent Via Email

RE: CN MP 197.4 RIVERS SUBDIVISION, TASK ORDER FOR INTRUSIVE INVESTIGATION

Dear Mr. Czyzowicz:

The following task order has been developed for Canadian National Railway Company (CN) to provide the scope of work and cost estimate for an investigation on CN-owned property related to a former derailment that occurred at Mile 197.4 of the Rivers Subdivision, near St. Lazare, Manitoba (the Site). The investigation will assess the potential impacts within the CN Right-of-Way (ROW), including the east culvert, by delineating the vertical depth and horizontal length of soil impacts through visual observations of product and/or soil staining.

1.0 SITE SETTING

The Site is located approximately 11 km to the south/southeast of St. Lazare, Manitoba at legal location SW-13-016-28W1M in the Rural Municipality (RM) of Ellice-Archie. The CN rail line in this area runs north/northwest to south/southeast through agricultural lands including improved pasture. The Assiniboine River mirrors this alignment, approximately 850 m to the west.

From this point forward, directions referenced in this work plan are in relation to standard railroad practice, which is consistent with nomenclature that has been in place at the Site during the derailment response to date. Site directions herein are based on the convention that the rail line runs east-west and Site north corresponds approximately to true east.

2.0 BACKGROUND

At approximately 02:45 on February 16, 2019, a CN freight train derailed at Mile 197.4 of the Rivers Subdivision, located adjacent to an oxbow of the Assiniboine River. A total of 34 cars derailed, all of which were carrying Cold Lake Dilbit Blend (CLB). The immediate emergency response to this event focused on containing the spilled product visible on the ice and snow of the oxbow. Of the 34 cars, 13 cars were ruptured and released approximately 820,000 liters of CLB.

- CLB had been released onto the north side of the rail line embankment and pooled into the adjacent road ditch. CLB had accumulated in the ditch near a culvert, which was temporarily blocked with a soil berm.
- On the south side of the rail line, derailed cars were lying on their sides on the embankment or downgradient on the frozen oxbow. There were four to five flow paths of CLB extending from cars down the embankment. A large area of pooled CLB was located

south of the cars on embankment. The initial CLB release was approximately 10 to 15 m wide and 70 m long extending down to the oxbow.
- Areas where the CLB had melted the snow were observed.
- Released CLB appeared to become more viscous as it cooled.

The subject area of this investigation will be limited to CN owned lands within the CN ROW in order to delineate the potential CLB impacts under the rail line.

3.0 SCOPE OF WORK

The following approach will be taken for Site delineation:

- HDR will advance approximately three of the eight directional boreholes at locations identified as hot spots through previous test pitting conducted by KGS;
- If product and/or visual soil staining is not observed in the initial three directional boreholes, five vertical boreholes will be conducted from the top of the rail line and the remaining directional boreholes will not be completed;
- The five remaining directional boreholes will be completed at varied angles to investigate the potential depth of product beneath the rail line;
- The directional boreholes will be completed at an approximate 45 degree angle to investigate the visual presence of product to approximately 6 m below ground surface (m bgs) vertically beneath the rail line;
- Vertical boreholes completed from the top of the rail bed, they would be advanced to an estimated depth of 3 m bgs beneath the rail bed;
- Drilling from the top of the rail line will require a two hour work block per borehole location to account for the time to access a borehole location, setup, drill and backfill;
- The proposed method to backfill boreholes drilled from the top of the rail bed will be to remove the casing, allow the sub-ballast material to slough into the borehole and fill the remainder of the borehole with hydrate bentonite chips;
- The proposed method of backfilling the directional boreholes is backfilling with a bentonite slurry from the bottom of the borehole using tremmie pipe;
- Following the investigation of the CN rail bed, an additional eight vertical boreholes will be completed as monitoring wells to a depth of approximately 4 m bgs adjacent to the north side of the cattle path; and
- The east culvert will be investigated with the advancement of 10 boreholes to a depth of approximately 2 to 4 m bgs:
    - Five vertical boreholes and one directional borehole will be advanced to assess the visual presence of product and/or soil staining above and adjacent to the east culvert; and
    - Four boreholes will be completed as monitoring wells.

A Site location plan showing the proposed borehole/monitoring well locations is shown in the attached Figure 1 – Borehole Location Plan and the cross section of the rail line is shown in the attached Figure 2 – Cross Section.

METHODS

Manitoba One Call, private locates and CN signals will be contacted and cleared prior to initiation of the field work component. It was been assumed the CN will provide track protection for the investigation, if required. HDR will retain an approved subcontractor to perform drilling operations. HDR proposes to conduct the borehole/monitoring well drilling using a track-mounted auger drill rig equipped with hollow-stem capabilities. For budgetary purposes, it is assumed drilling subcontractors will mobilize from Brandon Manitoba to complete the drilling program. Drill staff will have eRailSafe certification.

Soil samples will be collected directly from the core barrel liners below observed CLB and/or staining soil based on field screened by the HDR personnel for confirmation of soil quality with respect to applicable guidelines for the CN ROW. It is assumed that two soil samples will be submitted from each borehole/monitoring well location with an additional six potential samples for delineation purposes. Soil samples will be submitted for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), and petroleum hydrocarbon (PHC) Fractions F1 to F4 along with three representative samples for grain-size.

Directional boreholes will backfilled with a bentonite slurry from the bottom of the borehole using a tremmie pipe and vertical boreholes will be backfilled with hydrated bentonite chips. Monitoring wells will be constructed of 50 mm diameter, schedule 40, threaded PVC pipe with a 10 slot PVC screen. Monitoring well installations are planned to have 4 m of solid riser and 1 m of screen will be used; although, the length of the well screen will be determined in the field. Silica sand (10/20 filter pack) will be used to fill the annular space around the screen from the bottom to approximately 0.6 m above the screened interval. The annulus of the borehole above the sand pack will be backfilled with hydrated bentonite chips. All monitoring wells will be completed with stick-up protective casings. HDR will retain an approved sub-consultant or contractor to survey all borehole/monitoring wells. Table 1 summarizes the proposed sampling schedule, detailed analytical plan is provided in the attached Table 3.

Table 1: Summary of Proposed Sampling

Sampling Area	Number of Locations	Chemical Analysis
CN ROW	21 boreholes, 8 completed as monitoring wells	BTEX, PHC F1 to F4, grain size
East culvert	10 boreholes, 4 completed as monitoring wells	BTEX, PHC F1 to F4, grain size

PROJECT MANAGEMENT AND REPORTING

Project management activities associated with this program include on-Site presence to meet with any third party consultants that may be present during drilling, along with scheduling and field staff coordination (e.g., acquiring necessary equipment/supplies, preparing field instruction and health and safety plans). Other project management activities include tasks such as subcontractor invoice management, project filing and cost-control review during the field program.

At HDR, health and safety is an integral part of our work and as such a proactive approach is taken toward providing a work environment where hazards are identified and mitigated through the implementation of our health and safety procedures.

HDR will prepare a letter report summarizing the results of intrusive investigation along with borehole logs. An electronic copy of the final report will be submitted to CN shortly after comments are provided. A hard copy of the report can be provided upon request.

4.0 SCHEDULE

HDR proposes to initiate drilling activities on May 1, 2019.

CLOSURE

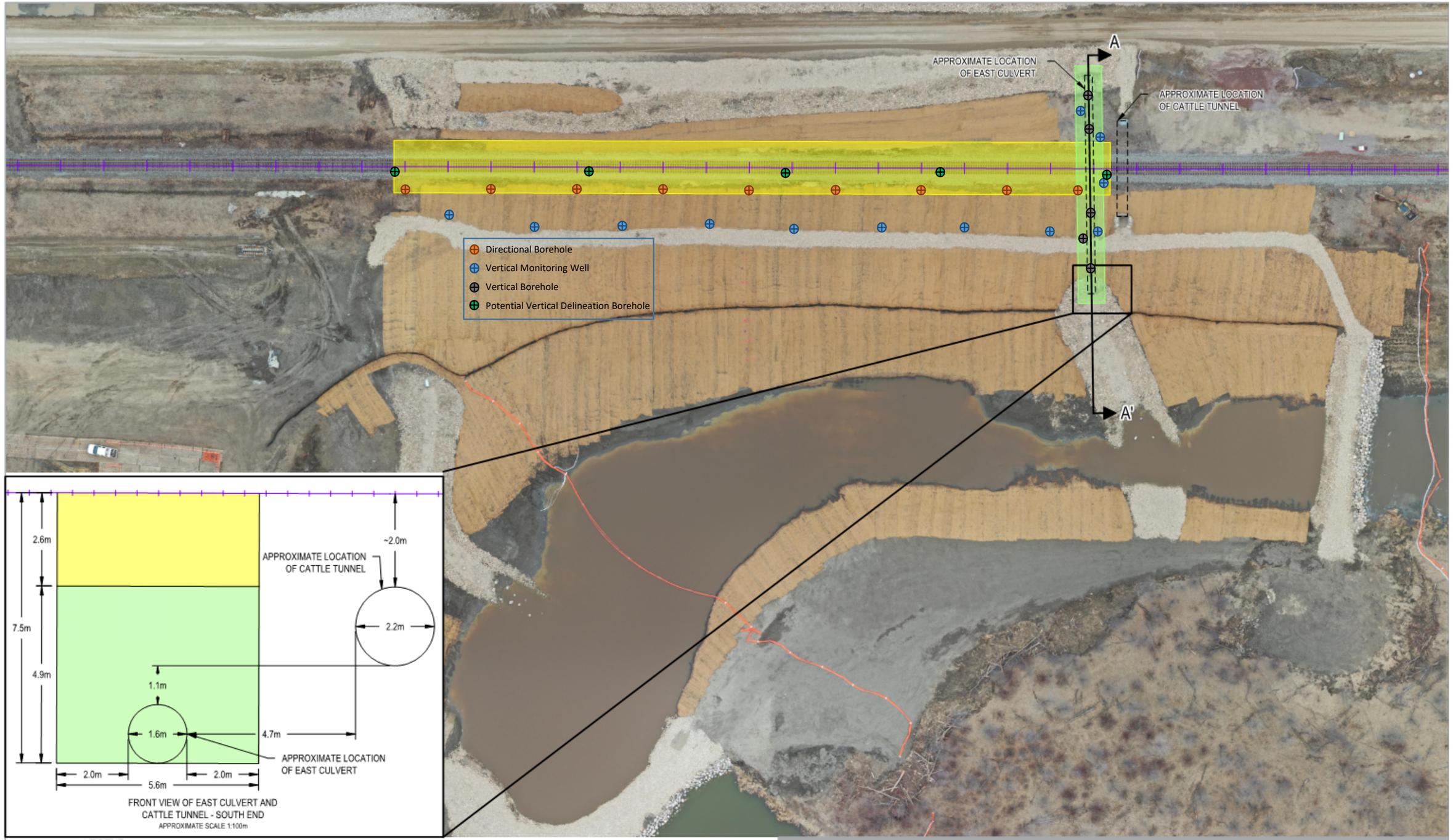
We trust that the information presented in this document meets your needs. If you have any questions concerning the content of this scope of work, please do not hesitate to contact Loni Waldner at (403) 804-6775. We appreciate the opportunity to provide CN with this work plan and we look forward to working with you on this project.

HDR Corporation

Jeremy Zemek, EP
Environmental Technician

Loni Waldner, P. Eng.
Senior Environmental Engineer

Attachments: Figure 1 – Borehole Location Plan
Figure 2 – Cross Section
Table 3 – Analytical Plan



LEGEND

- APPROXIMATE RAIL CENTRE LINE
- APPROXIMATE CULVERT EXCAVATION AREA
- APPROXIMATE SUB-BALLAST (GRANULAR PIT RUN) IMPACTED
- A — APPROXIMATE CROSS-SECTION LOCATION

DRAFT

0 7.5 15 22.5m

APPROXIMATE SCALE
Coordinate System:
NAD 83 UTM ZONE 14 METRES

TRACK NORTH
TRUE NORTH

GHD

CANADIAN NATIONAL RAILWAY DERAILMENT
RIVERS SUBDIVISION - MILE POINT 197.4
ELLICE, MANITOBA

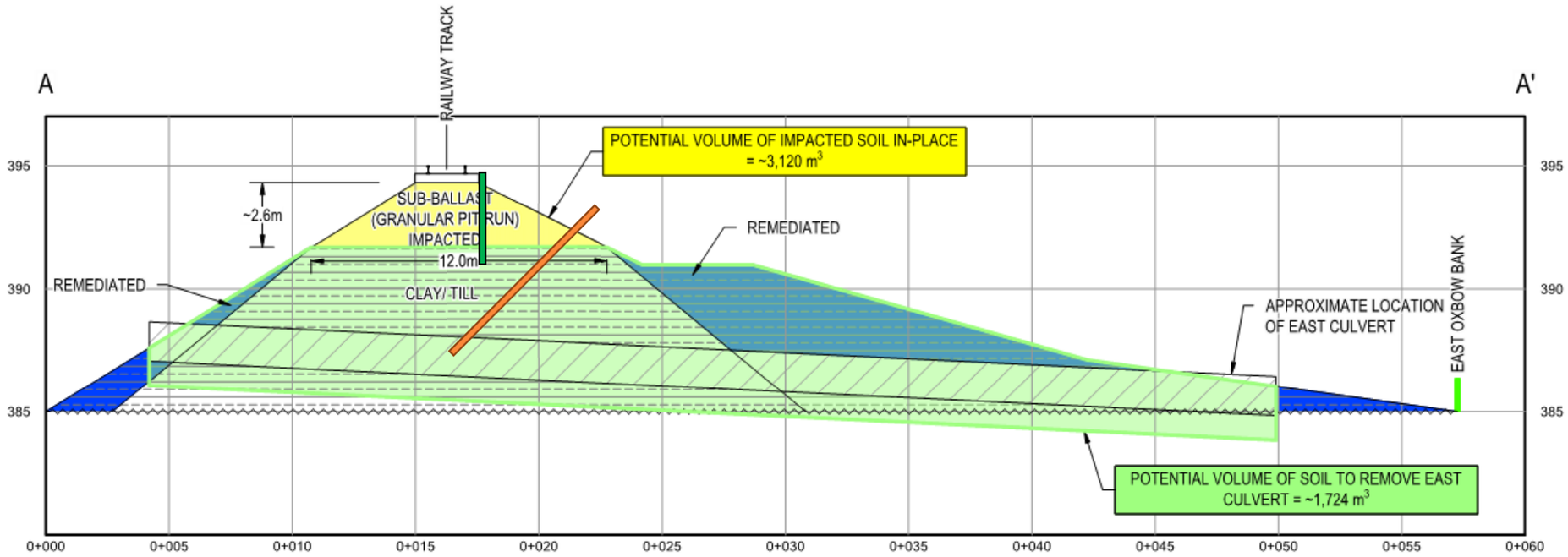
BOREHOLE LOCATION PLAN

Project No. **11186702-02**
Report No. **PRES003**
Date **April 2019**

FIGURE 1

Filename: P:\drawings\11186000s\11186702\11186702-pres\11186702-02\PRES003\11186702-02\PRES003\GN\11186702-02\PRES003\GN-WA001.dwg
Plot Date: 16 April 2019 5:42 PM

DATA SOURCES:
- IMAGE PROVIDED BY GHD LTD., UAV IMAGERY 04/10/2019.
- CONTOURS DERIVED FROM KGS GROUP CONSULTING ENGINEERS, MARCH 2019.



Directional Borehole

Potential Vertical Borehole

SECTION A-A'

HORZ. 1:200

FIGURE 1

DRAFT

GHD

CANADIAN NATIONAL RAILWAY DERAILMENT
RIVERS SUBDIVISION - MILE POINT 197.4
ELLICE, MANITOBA

CROSS SECTION

Project No. 11186702-02
Report No. PRES003
Date April 2019

FIGURE 2

Data Source

Filename: P:\drawings\11186000s\11186702\11186702-prev\11186702-02\PRES003\11186702-02\PRES003\GN\11186702-02\PRES003\GN-WA004.dwg
Plot Date: 17 April 2019 11:15 AM

Table 3
Analytical Plan
MP 197.4, Rivers Subdivision
near St. Lazare, MB

Issue	No. Boreholes	Soil Samples by Type	
		BTEX, PHC F1-F4	Grain-size
New Boreholes and Monitoring Well Installations	31	66	3
QA/QC [1]	-	7	-
Total	31	73	3

Notes:

1. QA/QC samples include 10% blind duplicates submitted for analysis of BTEX and PHC Fractions F1-F4.