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PROJECT : 14-0434-004 2014 O & M CN Hornepayne Yard

TO : Mr. Kirk Crosson
Ministry of the Environment
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FROM : Nick Tropea
KGS Group

DATE : February 10, 2015

SUBJECT : 2014 MOE Final Report CNHornepayne Yard

SUBMITTED FOR : Approval Your Use
 As Requested Review and Comment

SENT VIA :

ITEM	DESCRIPTION	STATUS
RPT	Title: Hornepayne Yard 2014 Environmental Activities (RPT), Revision: (0, Feb 10, 2015)	Issued for Use

REMARKS : As per the request of Nick Tropea, please see enclosed one (1) hard copy of the MOE Final Report regarding the 2014 Environmental for Hornepayne Yard will be sent to you via Purolator courier.

Regards,


Stacy Allison
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February 9, 2015

File No. 14-0434-004

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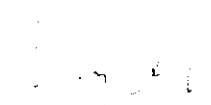
RE: CN Hornepayne Yard – 2014 Final Report for the Ministry of Environment
2014 Environmental Program – Hornepayne, Ontario

Dear Mr. Stadnyk:

Please find enclosed one (1) hard copy of the 2014 Final Report prepared for the Ministry of Environment for the above noted site. For your convenience, an electronic copy of the Final Report has been forwarded to Ms. Carolyn David.

KGS Group sincerely appreciates the opportunity to have been of service on this project. If you have any further questions regarding this report, please contact Mr. Nick Tropea or the undersigned.

Yours truly,


Tony Gallo, M.Sc., EP
Senior Environmental Scientist

TG/sla
Enclosure

cc: Ms. Carolyn David, P. Eng., M. Eng., Environmental Coordinator
Mr. Kirk Crosson, Environmental Officer, Ministry of Environment



**Canadian National
Hornepayne Yard
Hornepayne, Ontario
2014 Environmental Program
Ministry of the Environment
February 2015**

Privileged and Confidential

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EXECUTIVE SUMMARY

KGS Group was retained by Canadian National (CN) to provide environmental and engineering services for the 2014 Environmental Program at the CN Hornepayne Yard, located in Hornepayne, Ontario. This report details the operation and maintenance activities associated with remedial activities at the Yard. The Hornepayne Yard operates under the Amended Certificate of Approval No. 3528–83LQWT (C of A).

West End Diesel Recovery System

The West End Diesel Recovery System (DRS) continues to function as per design, passively collecting Light Non-Aqueous Phase Liquids (LNAPL) from the fuelling stand area and preventing the off-site migration of LNAPL. Approximately 5,879 L of LNAPL was collected during the 2014 operating year. Since commissioning in the fall of 1998, the system has recovered approximately 183,732 L.

The DRS was inspected weekly from May to November 2014. Monthly DRS effluent samples met all criteria outlined in the C of A.

East End Environmental Protection System

Lagoon No.2 Containment System

The Lagoon No.2 Containment System (CS) continued to prevent the off-site migration of LNAPL from the Lagoon No.2 and Former Pump House areas to the Little Jackfish River.

The horizontal extent of the LNAPL plume has not changed from previous years, although the measured LNAPL thickness in monitoring wells fluctuates between years. The Lagoon No.2 CS recovered approximately 2,077 L of LNAPL in 2014. Since 1998, approximately 27,754 L of LNAPL has been collected from this area.

In 2014, the Lagoon No.2 CS was inspected weekly from May to November. Effluent sampled from the Lagoon No.2 outlet met all criteria outlined in the C of A. Lagoon No.2 continues to adequately attenuate impacted effluent from various Yard operations.

Former Shop Track Fuelling Area Diesel Recovery System

The skimmer unit was operated for the majority of the 2014 operating year (May to October). In total, 4,760 L of LNAPL was collected from this area between the operation of the skimmer unit and the collection of LNAPL from Yard operations by both KGS Group and local CN personnel. Since 2004, approximately 18,330 L of LNAPL / waste oil has been collected from this area.

Waste Oil Transfer Facility

The Waste Oil Transfer Facility did not operate in 2014. A total of 25,000 L of total fluids, collected by KGS Group led operations, were taken directly off-site for processing.

Surface Water

The surface water program continues to show that Yard effluent/surface water discharge has no visual evidence of PHC sheen. All analytical data collected from the surface water sampling locations were below the C of A criteria.

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1.0 INTRODUCTION

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) was retained by Canadian National (CN) to provide environmental and engineering services for the 2014 Environmental Program at the CN Hornepayne Yard, located in Hornepayne, Ontario (Figure 1). This report details the operation and maintenance activities associated with both the West End Diesel Recovery System (DRS) and East End Environmental Protection Systems (EPS) (PIN # 1000/ONPR/100586, PIN # 1000/ONPR/100587, and PIN # 1000/ONPR/100591), and also details the results of the groundwater and surface water monitoring and sampling program conducted during the 2014 operating year. The East and West End systems operate under the Amended Certificate of Approval No. 3528–83LQWT (C of A), which was issued on April 29, 2010 (Appendix A).

1.1 SYSTEM DESCRIPTIONS

1.1.1 West End Diesel Recovery System

The location of the West End DRS (PIN # 1000/ONPR/100587) within the Hornepayne Yard is shown on Figure 2, while the DRS components are shown on Figure 3. The DRS was constructed in 1998 and was composed of eleven (11) underdrains placed below the former fuelling area, each at various elevations within the subsurface. Ten (10) of the underdrains remain, with nine (9) underdrains being functional. Underdrain No.7 was destroyed in 1998 during construction of the diesel recovery lagoon (DRL). During maintenance of the underdrains in 2013, a blockage was found within underdrain No.4 at approximately seven (7) feet, and could not be removed. The underdrains discharge total fluids into the DRL. A skimmer unit, located within the skimmer building at the west end of the DRL, collects LNAPL floating on the surface of the water within the DRL. Collected LNAPL is transferred by gravity to a 25,000 L waste oil recovery tank. Effluent from the DRL is discharged to a discharge trench. At the downstream end of the discharge trench is a concrete control structure, through which effluent is discharged to the Little Jackfish River. Flow through the structure is controlled using a manual butterfly valve.

1.1.2 East End Environmental Protection System

Lagoon No.2 Containment System

Figure 4 shows the location of the Lagoon No. 2 Containment System (CS) relative to the Yard, while the general components of the Lagoon No.2 CS are shown on Figure 5. The Lagoon No.2 CS contains system components located both inside and outside of the oil / water separator (OWS) building and the compressor building. Located inside the OWS building is a 45.4 gallon per minute OWS, transfer tank, and refrigerated air dryer, while the air compressor is located in the air compressor building. A horizontal waste oil tank, nine (9) pumping wells, an interception trench and collection sump, a bentonite cut-off wall, and Lagoon No.2 are located outside of both buildings. Five (5) submersible pneumatic pumps transfer total fluids from selected pumping wells to the OWS. The submersible pumps can be placed in any of the pumping wells within the network, depending on LNAPL thickness measured in the selected wells. Total fluids, collected from the interception trench and sump located approximately 100 m west of the air compressor building, are also pumped to the OWS. A submersible pump, transfers the total fluids from the interception trench into the OWS at the OWS building. An automatic float controls the fluid level within the trench. Total fluids are processed by the OWS. LNAPL drains by gravity into a transfer tank. When LNAPL inside the transfer tank attains a pre-determined level (level switch), LNAPL is pumped into a 4,560 L, double walled waste oil tank. Effluent water from the OWS is discharged directly into Lagoon No.2.

Former Shop Track Fuelling Area Diesel Recovery System

The location of the Former Shop Track Fuelling area (FSTF) (PIN # 1000/ONPR/100591) is shown on Figure 6, while the general FSTF components are shown on Figure 7. The FSTF DRS is composed of a collection sump, a submersible pump, a skimmer unit, and 4,540 L waste oil recovery tank. Total fluids from the surrounding area drain by gravity through open slats cut into the existing collection sump. The skimmer unit, which is located within the skimmer building, collects LNAPL floating on the surface of the water within the existing collection sump. Collected LNAPL is transferred by gravity to the 4,540 L waste oil recovery tank. When fluid levels within the collection sump drop to a level where the skimmer belt can no longer collect floating LNAPL on the surface of the water, then the submersible pump, complete with stop and

start floats, is activated to transfer total fluids from the collection sump to the OWS, located at the Waste Oil Transfer Facility.

Waste Oil Transfer Facility

The location of the Waste Oil Transfer Facility (WOTF) (PIN # 1000/ONPR/100591) is shown on Figure 8. The WOTF system components are shown on Figure 9. The WOTF contains system components both inside and outside the building. The WOTF consists of a control panel, holding tank, coalescing OWS, LNAPL transfer pump, CN tanker car, former fuelling stand sump pit, and submersible pump. Total fluids, collected from the Yard via operations conducted by KGS Group, local CN forces and other contractors, are placed in a 10,000 gallon holding tank. The purpose of the WOTF system is to separate the total fluids stored in the holding tank. Total fluids drain by gravity from the holding tank to the coalescing OWS, located inside the WOTF building. The total fluids are processed through the OWS. Collected LNAPL is pumped to an external tanker car, provided by CN. Effluent water from the OWS drains by gravity and discharges to Lagoon No.2.

2.0 OPERATION AND MAINTENANCE

2.1 WEST END FUELLING STAND SYSTEM

2.1.1 Operations and Inspections

KGS Group personnel installed the skimmer belt on May 28, 2014 and started operation of the skimmer unit. Both KGS Group and local personnel adjusted the skimmer belt and increased / decreased the blade tension on the skimmer belt on an as required basis during 2014. The skimmer unit was shut down and winterized on November 4, 2014 by KGS Group personnel.

In 2014, KGS Group personnel conducted monthly inspections from May to November, while local personnel conducted weekly inspections during the same time period. Inspections were conducted to assess the operation of the DRS, to measure the collection of LNAPL, and to visually inspect the final discharge location. KGS Group personnel also collected an effluent sample from the final discharge location on a monthly basis. Weekly inspection forms for the 2014 operating year can be provided upon request.

2.1.2 Operation and Maintenance Issues

In 2014, the skimmer unit operated from May to November, experiencing a few minor operational interruptions, which included interruptions to the electrical supply for the building. The interruptions to the electrical supply were caused by inclement weather, subsequently causing the system to shut down on several occasions. On each occasion, KGS Group, CN or local personnel were able to restart system operations within one (1) week of the interruption.

2.1.3 Collected LNAPL

The West End DRS recovered approximately 5,879 L of LNAPL during the 2014 operating year (Figure 10). Since the commissioning of the system in the spring of 1998, the West End DRS has collected approximately 183,732 L of LNAPL (Figure 11).

2.2 EAST END ENVIRONMENTAL PROTECTION SYSTEM

2.2.1 Lagoon No.2 Containment System Operations and Inspections

KGS Group personnel installed the pneumatic pumps and the associated system components on May 27, 2014 and began system operation. In 2014, KGS Group personnel conducted monthly inspections from May to November, while local personnel conducted weekly inspections during the same time period. Inspections were conducted to assess the operation of the Lagoon No.2 CS, to measure the collection of LNAPL, and to visually inspect the final discharge location. KGS Group personnel also collected an effluent sample from the final discharge location on a monthly basis. Weekly inspection forms for the 2014 operating year can be provided upon request.

The recovery trench submersible pump did not operate when tested during system setup. A replacement submersible pump was purchased and installed on July 15, 2014. The submersible pump operated within normal parameters throughout the remainder of the 2014 operating year.

The pneumatic pumps were rotated between five (5) of the recovery wells in 2014 (PW-2, PW-6, PW-7, PW-8, and PW-9). Pumping Wells PW-3, PW-4, PW-5, and PW-10 were not utilized due to insignificant thickness of LNAPL present and fluctuating water table levels. LNAPL from within these four (4) pumping wells was manually bailed during each inspection, when present.

2.2.2 Lagoon No.2 Containment System Operation and Maintenance Issues

Operation of the Lagoon No.2 CS began on May 27, 2014, with four (4) pumps in operation within pumping wells PW-2, PW-6, PW-8 and PW-9. On June 9, 2014, the system experienced an automatic shut down due to a full LNAPL transfer tank, which was caused by a damaged discharge line, connecting the LNAPL transfer tank to the LNAPL transfer pump. The contents of the LNAPL transfer tank were removed and placed in the waste oil tank. The discharge line was replaced on June 10, 2014 and the system was activated.

On July 31, 2014, local personnel observed that the Lagoon No.2 CS was not operating. Further inspection revealed that a full waste oil tank engaged the high level alarm, triggering the automatic shut down of the system. Green for Life of Thunder Bay, Ontario removed the

collected fluids from the waste oil tank on August 6, 2014. The collected fluids were taken off-site for processing. The Lagoon No.2 CS was activated.

On September 16, 2014, KGS Group personnel observed that the LNAPL transfer pump and both floats, located in the LNAPL transfer tank, were not in operation. KGS Group personnel manually shut down operation of the Lagoon No. 2 CS until the pump and floats could be inspected. KGS Group personnel, along with Commercial Electric Ltd. of Thunder Bay, Ontario, inspected the system components on October 14, 2014. It was determined that the LNAPL transfer pump and the floats required replacement. The Lagoon No.2 CS remained shut down for the remainder of the year. The Lagoon No.2 CS components were winterized on November 4, 2014. Green for Life of Thunder Bay, Ontario removed the total fluids from the OWS on November 4, 2014. The volume of total fluids was added to the total of LNAPL recovered from this area of the Yard in 2014, and is presented on Figure 12.

2.2.3 Lagoon No.2 Collected LNAPL

The Lagoon No.2 CS recovered approximately 2,077 L of LNAPL during the 2014 operating year (Figure 12). Since LNAPL recovery began in the spring of 1998, the Lagoon No.2 CS, in its various forms, has collected approximately 27,754 L of LNAPL (Figure 13).

2.2.4 Former Shop Track Fuelling Area Diesel Recovery System Operations and Inspections

KGS Group personnel installed the skimmer belt and began operation of the skimmer unit on May 27, 2014. KGS Group and local personnel adjusted the skimmer belt and increased / decreased the blade tension on the skimmer belt on an as required basis during 2014. The skimmer unit was winterized on November 5, 2014 by KGS Group personnel.

Although the remedial system did not operate in 2014, the waste oil tank and skimmer unit were inspected on a monthly basis.

In 2014, KGS Group personnel conducted monthly inspections from May to November, while local personnel conducted weekly inspections during the same time period. Inspections were conducted to measure the collection of LNAPL placed in the waste oil tank, and inspect the

skimmer unit. Weekly inspection forms for the 2014 operating year can be provided upon request.

2.2.5 Former Shop Track Fuelling Area Diesel Recovery System Operation and Maintenance Issues

During an inspection on July 2, 2014, local personnel observed a full waste oil tank, which engaged the automatic high level shut down of the skimmer unit. Green for Life of Thunder Bay, Ontario removed the collected fluids from the waste oil tank on July 14, 2014. The collected fluids were taken off-site for processing. The skimmer unit was activated. The skimmer unit was manually shut down on October 14, 2014 due to the absence of measurable LNAPL within the collection sump.

2.2.6 Former Shop Track Fuelling Area Diesel Recovery System Collected LNAPL

In total, 4,760 L of LNAPL was recovered / collected from this area in 2014. The FSTF area skimmer unit operated from May until October 2014, while both KGS Group and local CN personnel placed waste oil, from various Yard operations, in the waste oil tank. A summary of LNAPL collection for 2014 can be found on Figure 14. Since its commissioning in the spring of 2004, system and manual collection has recovered approximately 18,330 L of LNAPL / waste oil. A summary of historical collection can be found on Figure 15.

2.2.7 Waste Oil Transfer Facility Operations and Inspections

As there was no tanker car placed at the WOTF in 2014, the transfer system was not operated.

Level measurements were recorded as KGS Group and local CN personnel used the holding tank to store waste oil generated from Yard activities. There were no operation or maintenance issues to report for this area in 2014.

2.2.8 Waste Oil Transfer Facility Collected LNAPL

The WOTF did not operate in 2014. Green for Life of Thunder Bay, Ontario removed approximately 25,000 L of total fluids (collected from various LNAPL collection systems in the Yard) for off-site processing / disposal. Waste Manifest Forms are provided in Appendix B.

3.0 C OF A EFFLUENT PROGRAM

As per the requirements of the C of A, effluent samples were collected from four (4) locations in 2014. The four (4) locations area as follows:

- HOR 002 05 (Lagoon No.2 Outlet, sampled monthly during operating year),
- HOR 004 05 (Jackfish River Down Stream, sampled monthly during operating year),
- HOR 005 05 (Jackfish River Mid Stream, sampled monthly during operating year), and
- HOR 013 05 (Drainage Trench to Jackfish River, sampled monthly during operating year).

The effluent sampling locations are shown on Figure 16. KGS Group personnel collected effluent samples at these locations during each monthly inspection visit or as part of the surface water-sampling program. Effluent samples were submitted to Maxxam Analytics Inc. in Mississauga, Ontario for the laboratory analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), total purgeable hydrocarbons (TPH), total extractable hydrocarbons (TEH), petroleum hydrocarbon (PHC) fractions F1 to F4, methyl-t-butyl-Ether (MTBE), pH, alkalinity, hardness, and lead. The effluent samples were submitted to the laboratory accompanied with completed chain of custody (COC) forms supplied by CN via the SAP program.

Surface water quality analysis results are presented in Table 1. Laboratory certificates of analysis can be provided upon request.

3.1 RESULTS

3.1.1 West End DRS

Concentrations of BTEX, PHC fractions F1 to F4, MTBE, lead and pH in the effluent samples were below the applicable C of A criterion. Surface water quality analysis results are presented in Table 1. Laboratory certificates of analysis can be provided upon request.

3.1.2 Lagoon No.2 CS

Concentrations of BTEX, PHC fractions F1 to F4, MTBE, lead and pH in the effluent samples were below the applicable C of A criterion. Surface water quality analysis results are presented in Table 1. Laboratory certificates of analysis can be provided upon request.

3.1.3 Jackfish River Mid-Stream and Jackfish River Down Stream

Laboratory results show that BTEX, PHC fractions (where analysed), MTBE, lead and pH were below the applicable C of A criterion.

3.2 EFFLUENT FLOW

3.2.1 Effluent Flow Estimation

In May 2014, transducers were installed in the West End (discharge trench) and East End (Lagoon No.2) to measure and record the height of the water column in order to calculate the effluent flow rate from both locations. In the West End, the transducer was installed in the discharge trench, upgradient of the final effluent discharge point to the Little Jackfish River, while in the East End, the transducer was installed in the northeast corner of Lagoon No.2, upgradient of the final effluent discharge point to the Little Jackfish River (Figures 3 and 5).

Each logger was placed within a protective “pipe and block” assembly to ensure that the logger was protected, and that the logger maintained its vertical position for accurate measurement of water depth. A continuous monitoring barometric pressure logger was installed in the West End in conjunction with the depth loggers to calibrate the water depth measurements, which are impacted by changes in atmospheric pressure. The loggers were pre-set to obtain water depth readings on an hourly basis. Data from each logger was manually downloaded on a monthly basis to ensure that the loggers were functioning as required, and to minimize data loss due to equipment malfunction or other issues. Pressure transducer calculations are provided in Appendix C.

Measurements from both effluent streams were collected from May to November 2014. Recorded water depths and barometric pressure were transferred to an excel spreadsheet, which was used to calculate flows at each location based on the specific flow formulae developed for each location. The median was used to describe the central tendency of flow data due to the skewed nature (non normal distribution) of flow. The median was chosen over the mean because the median is not impacted by extreme values in the data sets. The daily, weekly, and monthly statistical values summarizing the median, 25th percentiles, and 75th percentiles are presented in Tables 2 to 5. Percentiles were used for comparisons of the

spread between data sets, as it is less affected by extreme values in the data sets compared to the range.

3.2.2 Calibration

The calibration of flow data was conducted in 2014. Calibration consisted of the collection of physical measurements of flow by using a calibrated twenty (20) L pail. Five (5) separate measurements were collected and the median value was taken as the flow rate. This value was then compared to the calculated flow and used to ensure that the calculated flow was within 20% of the actual flow rate.

3.2.3 West End

Daily, weekly and monthly flow rates calculated at the west end are presented in Tables 2 and 3, respectively. Median flow rates ranged from 0 L/sec in June to 0.35 L/sec in October. Flow measurements and calibration were not collected in June as the water level was over the discharge pipe. Also, the discharge pipe was observed to be plugged with organic debris, likely due to beaver activity in the area. The organic debris was removed.

The relative percent difference (RPD) between the actual flow rate (calibrated measurement) and the calculated flow rate (flow meter measurement) was generally within 20%, and ranged from 8% (August) to 31% (September).

3.2.4 East End

Daily, weekly and monthly flow rates calculated at the east end are presented in Tables 4 and 5, respectively. Median flow rates ranged from 0.28 L/sec in August to 0.48 L/sec in June.

The RPD between the actual flow rate (calibrated measurement) and the calculated flow rate (flow meter measurement) was generally within 20%, and ranged from 4% (June) to 23% (September).

4.0 GEOLOGY AND HYDROGEOLOGY

4.1 GEOLOGY

4.1.1 West End

Native soils within the West End are generally silty sands with traces of clay. The shallow soils are typically brown turning to grey-blue at the saturation zone, which is typical of a stable water table. Localized peat layers are also found within this area. Layers of surficial imported fill, where present, range in thickness from 0 to 4 m. Historical drill logs are provided in Appendix D, while stratigraphic cross sections for the West End are presented in Appendix E (Figure E1 and E2, respectively).

4.1.2 East End

The geology of the East End typically consists of fill overtop layers of peat and silty sands. Parallel to the Little Jackfish River, the geology shifts to more coarse granular materials, sands, gravel, cobbles and boulders. Historical drill logs are provided in Appendix D, while stratigraphic cross sections for the East End are presented in Appendix E (Figures E3 and E4, respectively).

4.2 HYDROGEOLOGY

4.2.1 West End

Groundwater monitoring data for this section of the Yard is presented in Table 6. Representative contours for the spring and fall monitoring events are shown on Figures 17 and 18, respectively.

Groundwater depths ranged from a depth of 0.051 m below ground surface (bgs) (OW9-3) to 3.239 mbgs (OW8-3) in the spring and from 0.752 mbgs (OW9-3) to 3.338 mbgs (MW-119) in the fall.

Interpreted groundwater flow direction was to the north / northeast, with local flow varying in the area of the DRS due to the influence of the underground drains and the DRL.

The average hydraulic gradient in the spring was 0.02 m/m, with local variations ranging from 0.01 to 0.04 m/m. The average hydraulic gradient in the fall was 0.025 m/m, with local variations ranging from 0.01 to 0.05 m/m. Based on an estimated hydraulic conductivity of 10^{-8} m/s for silty clay, and an effective porosity of 0.25, the estimated groundwater velocity, local to the DRS in 2014 ranged from 0.01 to 0.06 m/year.

4.2.2 East End

Groundwater monitoring data for this section of the Yard is presented in Table 6. Representative contours for the spring and fall monitoring events are shown on Figures 19 and 20, respectively.

Former Pump House Area

Groundwater depths in the Former Pump House area ranged from a depth of 0.337 mbgs (MW-108) to 1.895 mbgs (MW-46) in the spring and from 1.08 mbgs (MW-108) to 2.067 mbgs (MW-46) in the fall.

Interpreted groundwater flow direction was to the north / northeast, generally towards the Little Jackfish River. Hydraulic gradients were variable and the estimated groundwater velocities through the silty sands ranged between 1 to 3 m/year.

Lagoon No.2 Area

Groundwater depths in the Lagoon No.2 area ranged from a depth of 1.333 mbgs (MW-52) to 2.594 mbgs (OW5-1) in the spring and from 1.978 mbgs (MW-103) to 3.245 mbgs (OW5-1) in the fall.

Interpreted groundwater flow direction was to the north / northeast, with local flow varying in the area of Lagoon No.2 due to the influence of underground infrastructure. The average hydraulic gradient in the spring was 0.026 m/m, with local variations ranging from 0.016 to 0.042 m/m in the spring, while the average hydraulic gradient in the fall was 0.023 m/m, with local variations ranging from 0.018 to 0.034 m/m. Based on an estimated hydraulic conductivity of 10^{-6} m/s for silt and silty sands, and an effective porosity of 0.30 the estimated groundwater velocity local to

Lagoon No.2 in 2014 ranged from 1.68 to 4.41 m/year in the spring and from 1.89 to 3.57 m/year in the fall.

Former Shop Track Fuelling Area

Groundwater depths in the FSTF area ranged from a depth of 0.618 mbgs (OW3-2) to 2.429 mbgs (MW-114) in the spring and from 0.948 mbgs (MW-125R) to 3.04 mbgs (MW-114) in the fall.

Interpreted groundwater flow direction was to the north / northeast towards Lagoon No.2 and the Little Jackfish River. Groundwater flow is locally influenced by underground infrastructure. The average hydraulic gradients in the spring and fall were variable, with local variations ranging from 0.01 to 0.03 m/m. Based on an estimated hydraulic conductivity of 10^{-6} m/s for silty sands and an effective porosity of 0.30 the estimated groundwater velocity local to the FSTF area in 2014 ranged from 1 to 3 m/year in the spring and fall.

Roundhouse Area

Representative contours for the spring and fall monitoring events are shown on Figures 19 and 20, respectively. Groundwater flow was to the north / northwest. Groundwater gradients were variable, with an estimated groundwater velocity of 1 to 3 m/year through the sandy silts/silts.

5.0 GROUNDWATER SAMPLING

5.1 METHODOLOGY

5.1.1 Groundwater Sampling

Groundwater sampling events were conducted between June 11 and 12 (spring) and October 14 and 15 (fall), 2014. Groundwater samples were obtained using dedicated polyethylene tubing and foot valves. Each monitoring well was purged dry to ensure a representative sample was obtained from the aquifer. Groundwater samples were collected when 40% to 50% of the initial volume had recharged. Each sample was then placed into the appropriate sample bottle and shipped in cooler chests with ice to Maxxam Analytics Inc., an accredited analytical testing facility, in Mississauga, Ontario.

Groundwater samples from monitoring wells located within 30 m of the Little Jackfish River were submitted for the laboratory analysis of BTEX, and PHC fractions F1 to F4 as part of the spring sampling event. The groundwater samples collected from these wells were submitted for the laboratory analysis of PHC fractions F2 to F4 as part of the fall sampling event. All other groundwater samples were submitted for the laboratory analysis of PHC fractions F2 to F4 in October.

5.1.2 Assessment Criteria

Groundwater sampling results were compared to the Ontario Ministry of Environment (MOE) "Soil, Groundwater and Sediment Standards for us under XV.1 of the Environmental Protection Act, dated April 15, 2011. Groundwater results for monitoring wells located within 30 m of the Little Jackfish River were assessed using Table 9 Site Conditions Standards (SCS), while results from monitoring wells outside of the 30 m from the Little Jackfish River were assessed using the Table 3 SCS.

5.2 GROUNDWATER MONITORING

5.2.1 West End

Groundwater was monitored in twenty (20) monitoring wells in 2014. LNAPL was measured in four (4) monitoring wells (MW-11R, MW-122, OW8-3, and OW60) in 2014. Measurable LNAPL varied from 0.001 m at MW-122 to 1.22 m at MW-11R.

5.2.2 Former Pump House Area

Groundwater was monitored in six (6) monitoring wells in 2014. LNAPL was measured in one (1) monitoring well (MW-106) in 2014. Monitoring well MW-106 showed an LNAPL thickness of 0.034 m in the spring, and 0.026 m in the fall, respectively.

5.2.3 Lagoon No.2

Groundwater was monitored in thirteen (13) monitoring wells in 2014. LNAPL was measured in four (4) monitoring wells (MW-21, MW-101, OW5-2 and OW5-4) in 2014. Measurable LNAPL varied from 0.017 m at OW5-2 to 1.916 m at OW5-4.

5.2.4 Former Shop Track Area

Groundwater was monitored in eleven (11) monitoring wells in 2014. LNAPL was measured in seven (7) monitoring wells (MW-50, MW-109, MW-110R, MW-112R, MW-124R, MW-126 and OW3-2) in 2014. Measurable LNAPL varied from 0.007 m at MW-112R to 1.092 m at MW-124R.

5.2.5 Roundhouse Area

Groundwater was monitored in three (3) monitoring wells in 2014. LNAPL was measured in one (1) monitoring well (MW-34R) in 2014. Monitoring well MW-34R showed an LNAPL thickness of 0.215 m in the fall.

5.3 GROUNDWATER SAMPLING RESULTS

Laboratory results for samples collected during the groundwater monitoring and sampling program are presented on Table 7, while general groundwater field chemistry results are presented on Table 8. Laboratory certificates of analysis can be provided upon request.

5.3.1 Former Pump House Area

Within 30 m of Little Jackfish River – Groundwater was sampled from three (3) monitoring wells (MW-20, MW-43, and MW-46) within 30 m of the Little Jackfish River in 2014. Concentrations of BTEX and PHC fractions F1 to F4 were non-detectable, or at concentrations below MOE Table 9 SCS. BTEX results were generally similar to results from previous years (2010 to 2013), with concentrations being non-detectable or at levels below MOE Table 9 SCS. Concentrations of PHC fractions F1 to F4 which exceeded MOE Table 9 SCS are as follows:

- **MW-20** – PHC fractions F2 and F3 exceeded in both June and October, with concentrations being within the range of historical results.
- **MW-43** – PHC fraction F2 exceeded in both June and October, with concentrations being within the range of historical results.
- **MW-46** – PHC fraction F2 exceeded in both June and October, with concentrations being within the range of historical results.

Outside 30 m from Little Jackfish River – Two (2) monitoring wells (MW-107 and MW-108) were sampled from outside the 30 m limit from the Little Jackfish River in 2014. A third monitoring well (MW-106), located outside the 30 m limit from the Little Jackfish River, was not sampled in 2014 due to the presence of measurable LNAPL on groundwater from this location. PHC fraction F4 concentrations were non-detectable; therefore, below MOE Table 3 SCS. PHC fraction concentrations which exceeded MOE Table 3 SCS are as follows:

- **MW-107 and MW-108** – PHC fractions F2 and F3 exceeded in 2014, with concentrations generally being within the range of historical results. The concentration of PHC fraction F2 at MW-107 was lower than previous results.

Field Chemistry – Groundwater sampled from all wells within the FPH area was impacted to some degree, making comparisons for trends in field chemistry difficult. However, the data continues to generally show that DO concentrations are slightly lower, and more reduced

conditions exist in wells at this location, compared to other locations in the Yard where groundwater is not impacted. These results indicate increased biological activity is occurring within the FPH area.

5.3.2 Lagoon No.2 Area

Within 30 m of Little Jackfish River – Groundwater was sampled from four (4) monitoring wells (MW-40, MW-52, OW5-1, and OW5-3) that are located within 30 m of the Little Jackfish River in 2014. A fifth monitoring well (OW5-2), located within the 30 m limit of the Little Jackfish River, was not sampled in 2014 due to the presence of measurable LNAPL on groundwater at this location. Concentrations of BTEX and PHC fractions F1 to F4 were non-detectable, or at concentrations below MOE Table 9 SCS. BTEX results were generally similar to results from previous years (2010 to 2013), with concentrations being non-detectable or at levels below MOE Table 9 SCS. Concentrations of PHC fractions F1 to F4 which exceeded MOE Table 9 SCS are as follows:

- **MW-40** – PHC fraction F2 exceeded in October, with concentrations being within the range of historical results.
- **MW-52** – PHC fractions F2 and F3 exceeded in both June and October, with concentrations being within the range of historical results.
- **OW5-1** – PHC fractions F2 and F3 exceeded in June, with concentrations being within the range of historical results.
- **OW5-3** – PHC fractions F2 and F3 exceeded in both June and October, with concentrations being within the range of historical results.

Outside 30 m from Little Jackfish River – Groundwater samples were collected from four (4) monitoring wells (MW-51, MW-102, MW-103, and MW-104) from outside of the 30 m limit from the Little Jackfish River, in October 2014. Two (2) monitoring wells (MW-21 and MW-101), located outside of the 30 m limit of the Little Jackfish River were not sampled in 2014 due to the presence of measurable LNAPL on groundwater at these locations. PHC Fraction F2 to F4 concentrations in groundwater generally exceeded MOE Table 3 SCS at all sampling locations as follows:

- **MW-51** – PHC fractions F2 to F4 exceeded in October, with concentrations being within the range of historical results.

- **MW-102** – PHC fractions F2 and F3 exceeded in October, with concentrations being within the range of historical results.
- **MW-103** – PHC fractions F2 and F3 exceeded in October, with concentrations being within the range of historical results.
- **MW-104** – PHC fractions F2 to F3 exceeded in October, with concentrations being within the range of historical results.

Field Chemistry – Field chemistry results show a definite trend of low dissolved oxygen and increased reducing conditions in groundwater from impacted wells as compared to non-impacted wells. The data suggests that there is increased biological activity within impacted areas

5.3.3 Former Shop Track Fuelling Area

Groundwater samples were collected from four (4) monitoring wells in the FSTF area in October 2014 (MW-49, MW-109, MW-114, and MW-115). Concentrations of PHC fractions F2 to F4 were non-detectable in monitoring well MW-115. Concentrations of PHC fractions F2 to F4 in groundwater exceeded MOE Table 3 SCS as follows:

- **MW-49** – PHC fractions F2 to F3 exceeded in October, with concentrations being within the range of historical results.
- **MW-109** – PHC fractions F2 to F3 exceeded in October, with concentrations being within the range of historical results.
- **MW-114** – PHC fractions F2 to F4 exceeded in October, with concentrations being within the range of historical results.

Field Chemistry – Field chemistry results show lower dissolved oxygen concentrations and more reduced conditions in groundwater sampled from impacted areas versus non-impacted areas. The data suggest increased biological activity in impacted areas.

5.3.4 Roundhouse Area

Groundwater was sampled from one (1) monitoring well, MW-24, in October 2014. Concentrations of PHC fractions F2 to F4 were non-detectable.

6.0 CONCLUSIONS

The following conclusions are made based on the 2014-operating year:

6.1 WEST END

- The West End DRS continues to function as per design, passively collecting LNAPL from the fuelling stand area and preventing the off-site migration of LNAPL.
- The skimmer unit operated from May to November in the 2014-operating year. Minor maintenance and electrical related interruptions led to the manual shutdown of the system on three (3) occasions. LNAPL was removed as required from the DRL.
- Weekly inspections were conducted throughout the 2014-operating year, which lasted from May 28, 2014 to November 4, 2014.
- Approximately 5,879 L of LNAPL was collected during the 2014-operating year. Since commissioning in the fall of 1998, the system has recovered approximately 183,732 L.
- Target parameter concentrations in monthly effluent samples were below their applicable C of A criterion.

6.2 EAST END

6.2.1 Lagoon No.2 Containment System Operation and Maintenance

- The Lagoon No.2 CS continues to prevent the off-site migration of LNAPL from the Lagoon No.2 area to the Little Jackfish River.
- The Lagoon No.2 CS operated from May to September in the 2014-operating year. A few minor interruptions were experienced in the operation of the system in 2014. The system was manually shutdown in October 2014 and winterized in November 2014.
- Weekly inspections were conducted throughout the 2014-operating year, which lasted from May 27, 2014 to November 4, 2014.
- Approximately 2,077 L of LNAPL was collected in 2014. Since 1998, approximately 27,754 L of LNAPL has been collected.
- Target parameter concentrations in monthly effluent samples were below their applicable C of A criterion.

- Groundwater from this area was sampled in 2014 and analyzed based on the C of A Criterion. Laboratory analysis showed the continued presence of target parameters in exceedance of applicable MOE Criteria.
- Field chemistry results show a trend of low dissolved oxygen and increased reducing conditions in groundwater from impacted wells as compared to non-impacted wells. The data continues to suggest that there is increased biological activity within impacted areas.

6.2.2 Former Shop Track Fuelling Area

- The FSTF DRS, with the exception of the skimmer unit, did not operate in 2014.
- The skimmer unit operated from May 27, 2014 to November 5, 2014.
- Approximately 4,760 L of LNAPL was collected by the skimmer unit and from Yard operations and maintenance by both CN and KGS Group personnel in 2014. Since 2004, approximately 18,330 L of LNAPL has been collected.

6.2.3 Waste Oil Transfer Facility

- Enviro-West of Thunder Bay processed 25,000 L of total fluids, collected from various Yard LNAPL recovery systems, off-site due to the non-operation of the WOTF.

6.2.4 Surface Water

- No PHC sheen was observed on any of the surface water samples taken in 2014. The 2014 data showed that the Yard activities are not having any measurable or visible effects on the surface water quality of the Little Jackfish River.
- All analytical data collected from the surface water sampling locations were below the C of A criteria.

7.0 THIRD PARTY USE AND STATEMENT OF LIMITATIONS

7.1 THIRD PARTY USE OF REPORT

This report has been prepared for Canadian National Railway and any use by a third party of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

7.2 STATEMENT OF LIMITATIONS

KGS Group prepared the environmental conclusions and recommendations for this report in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. As the report is based on the available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information. KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated.

TABLES

TABLE 1
SURFACE WATER QUALITY ANALYSIS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Sample ⁽¹⁾	Date	Parameter (mg/L)																	Comments			
		Benzene	Toluene	Ethyl- benzene	Xylene (-o)	Xylenes (-m,-p)	MTBE	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₄)	F3 (C ₁₄ -C ₂₄)	F4 (C ₂₄ -C ₅₀)	T.P.H. (<C ₁₀)	T.E.H. (C ₁₀ -C ₂₄)	Oil & Grease	Mineral Oil & Grease	pH	Alkalinity	Hardness		Lead		
HOR 002 05 (Iagoon No.2)	Nov-14	0.00023	0.0019	0.0011	0.0055	0.0053	<0.0004	0.06	0.12	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	260	310	<0.05	2)		
	Oct-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	270	290	<0.05	2)		
	Sep-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	0.082	2.70	0.85	<0.2	<0.1	3.50	1.20	<0.5	7.8	320	350	<0.05	2)		
	Aug-14	<0.0002	0.00034	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	0.58	0.21	<0.2	<0.1	0.80	<0.5	<0.5	8.0	310	310	<0.05	2)		
	Jul-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0004	<0.025	0.37	<0.2	<0.2	<0.1	0.53	1.30	<0.5	7.9	330	350	<0.05	2)		
	Jun-14	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	<0.0004	<0.025	0.41	<0.2	<0.2	<0.1	0.53	0.60	0.5	7.7	280	340	<0.05	2)		
	May-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.26	<0.2	<0.2	<0.1	0.37	0.70	0.5	7.7	220	280	<0.05	2)		
	Nov-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	0.18	0.29	<0.2	<0.1	0.35	1.80	<0.5	7.9	370	380	<0.05	2)		
	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	0.51	0.24	<0.2	<0.1	0.73	<0.5	<0.5	7.9	400	420	<0.05	2)		
	Sep-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	1.00	0.51	<0.2	<0.1	1.50	0.60	<0.5	7.7	380	440	<0.05	2)		
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	0.65	0.29	<0.2	<0.1	0.82	2.00	<0.5	7.7	380	450	<0.05	2)		
	Jul-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	2.10	0.61	<0.2	<0.1	2.60	2.30	0.80	7.7	380	410	<0.05	2)		
	Jun-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.26	<0.2	<0.2	<0.1	0.38	<0.5	<0.5	7.7	320	360	<0.05	2)		
	Nov-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.5	7.5	280	340	<0.05	2)		
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.1	-	0.20	<0.1	<0.1	<0.1	0.29	<0.5	<0.5	8.2	260	290	<0.05	2)		
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Lab Dup	
	Sep-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Aug-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.33	0.18	<0.1	<0.1	0.46	3.2	0.7	7.9	430	460	<0.05	2)		
	Jul-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	1.20	0.38	<0.1	<0.1	1.50	<0.5	<0.5	7.7	420	410	<0.05	2)		
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	<0.1	<0.1	0.52	1.7	<0.5	7.8	320	380	<0.05	2)		
	May-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	1.00	0.50	<0.1	<0.1	2.50	<0.5	<0.5	7.7	300	350	<0.05	2)		
	Nov-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	1.60	0.78	<0.1	<0.1	2.50	<0.5	<0.5	7.8	433	410	<0.05	2)		
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	-	-	<0.1	<0.1	1.00	0.9	<0.5	7.9	327	330	<0.05	2)		
	Sep-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	1.50	0.42	<0.1	<0.1	1.90	<0.5	<0.5	7.9	432	430	<0.05	2)		
	Aug-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	1.60	0.82	<0.1	<0.1	2.40	<0.5	<0.5	8.0	441	430	<0.05	2)		
	Jul-11	0.0008	<0.0002	0.0004	0.0004	<0.0004	<0.0001	-	-	-	-	0.32	8.50	<0.5	<0.5	7.6	400	410	<0.05	2)		
	Jun-11	0.0006	<0.0002	0.0004	<0.0002	0.0015	<0.0002	-	-	-	<0.1	<0.1	3.70	<0.5	<0.5	7.8	288	300	<0.05	2)		
	May-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.12	0.12	<0.1	<0.1	0.24	<0.5	<0.5	8.0	-	250	<0.05	2)		
	Nov-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	<0.1	<0.1	0.54	<0.5	<0.5	7.9	-	380	<0.05	2)		
	Oct-10	0.0003	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	<0.1	<0.1	0.45	<0.5	<0.5	8.1	362	400	<0.05	2)		
	Sep-10	0.0003	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	<0.1	<0.1	0.37	<0.5	<0.5	8.0	366	390	<0.05	2)		
	Aug-10	<0.0002	0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	-	-	<0.1	<0.1	0.39	1.2	<0.5	7.9	272	250	<0.05	2)		
Jul-10	<0.0002	0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	-	-	<0.1	<0.1	1.50	1.9	<0.5	7.8	363	330	<0.05	2)			
Jun-10	0.0006	<0.0002	0.0002	<0.0002	<0.0004	<0.0004	-	-	-	0.15	4.80	4.3	<0.5	<0.5	7.6	382	360	<0.05	2)			
May-10	<0.0005	<0.01	<0.0005	<0.0005	<0.0005	<0.01	-	-	-	<0.1	1.80	<0.5	<0.5	7.8	393	410	<0.05	2)				
HOR 004 05 Wachish River Down Stream;	Nov-14	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.025	<0.1	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	87	95	<0.05				
	Oct-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.1	<0.2	<0.5	<0.5	7.8	68	100	<0.05				
	Oct-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.1	<0.2	<0.5	<0.5	7.8	97	100	<0.05	Field Dup			
	Sep-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.1	<0.2	<0.5	<0.5	7.9	90	120	<0.05				
	Aug-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.1	120	120	<0.05			
	Aug-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.9	120	120	<0.05	Field Dup		
	Jul-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	1.00	<0.5	8.0	120	120	<0.05			
	Jun-14	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.5	71	82	<0.0005			
	Jun-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	-	-	<0.5	<0.5	7.5	73	85	<0.0005	Field Dup		
	Jun-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	-	-	-	-	-	-	-	-	-	-	-	-	Lab Dup	
	May-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.5	67	78	<0.05			
	Nov-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	97	100	<0.05			
Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	100	110	<0.05	2)			
Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.80	<0.5	8.2	100	110	<0.05	Field Dup			
Oct-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.1	100	-	-	-	Lab Dup		
Sep-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.8	86	100	<0.05	2)			

TABLE 1
SURFACE WATER QUALITY ANALYSIS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Sample ⁽¹⁾	Date	Parameter (mg/L)																	Comments		
		Benzene	Toluene	Ethyl-benzene	Xylene (-o)	Xylenes (-m,-p)	MTBE	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	T.P.H. (<C ₁₀)	T.E.H. (C ₁₀ -C ₂₄)	Oil & Grease	Mineral Oil & Grease	pH	Alkalinity	Hardness		Lead	
HOR 004 05 (Jackfish River, Down Stream) (Cont'd)	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.60	<0.5	8.0	81	92	<0.05	*4	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	-	-	-	-	-	<100	-	-	-	-	-	-	-	-	Lab Dup.
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.10	<0.5	8.0	81	89	<0.05	Field Dup.	
	Jul-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.10	<0.5	7.8	85	95	<0.05		
	Jun-13	<0.00025	<0.0005	<0.00025	<0.00025	<0.00025	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.4	75	83	<0.05	*4	
	Jun-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.90	<0.5	7.7	76	89	<0.05	Field Dup.	
	May-13	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.60	<0.5	7.7	59	68	<0.05		
	Nov-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.5	6.8	100	110	<0.05		
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.4	180	190	<0.05		
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.4	179	190	<0.05	Field Dup.	
	Sep-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.8	170	180	<0.05		
	Sep-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.8	170	-	-	<0.05	Lab Dup.
	Aug-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	2.6	<0.5	7.9	140	150	<0.05		
	Aug-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.5	7.7	140	160	<0.05	Field Dup.	
	Jul-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	100	100	<0.05	*4	
	Jul-12	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	Lab Dup.
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	1.2	<0.5	8.0	88	96	<0.05		
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.1	<0.1	-	-	<0.5	<0.5	7.9	87	96	<0.05	Field Dup.	
	May-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.7	89	94	<0.05		
	Nov-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	129	130	<0.05		
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	127	130	<0.05		
	Oct-11	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	Lab Dup.
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	-	-	<0.5	<0.5	8.0	127	130	<0.05	Field Dup.	
	Sep-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.2	160	160	<0.05		
	Aug-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	127	130	<0.05		
	Aug-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	127	130	<0.05	Field Dup.	
	Aug-11	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	Lab Dup.
	Jul-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	101	100	<0.05		
	Jun-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	91	100	<0.05		
	Jun-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	Lab Dup.
Jun-11	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.1	291	300	<0.05	Field Dup.		
May-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.9	-	63	<0.05			
Nov-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	-	100	<0.05			
Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	0.90	<0.5	8.0	98	110	<0.05			
Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	102	110	<0.05	Field Dup.		
Sep-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.7	98	100	<0.05			
Aug-10	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	121	120	<0.05	Field Dup.		
Aug-10	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	122	120	<0.05			
Jul-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	0.80	<0.5	7.9	123	130	<0.05			
Jun-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.9	109	110	<0.05	Field Dup.		
Jun-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	0.80	<0.5	7.9	107	110	<0.05			
May-10	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	98	100	<0.05			
HOR 005 05 (Jackfish River, M.d-Stream)	Nov-14	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.9	85	95	<0.05		
	Oct-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.8	93	98	<0.05		
	Oct-14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.7	91	-	-	Lab Dup.	
	Sep-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	0.80	<0.5	7.9	100	120	<0.05		
	Aug-14	<0.0002	<0.00025	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	110	110	<0.05		
	Jul-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	1.90	<0.5	8.0	110	120	<0.05		
Jun-14	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	<0.025	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.6	71	82	<0.05			
May-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.5	67	73	<0.05			

TABLE 1
SURFACE WATER QUALITY ANALYSIS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Sample ⁽¹⁾	Date	Parameter (mg/L)																	Comments		
		Benzene	Toluene	Ethyl- benzene	Xylene (-o)	Xylenes (-m,-p)	MTBE	F1 (C ₈ -C ₁₀)	F2 (C ₁₀ -C ₁₄)	F3 (C ₁₄ -C ₂₄)	F4 (C ₂₄ -C ₅₀)	T.P.H. (<C ₁₀)	T.E.H. (C ₁₀ -C ₂₄)	Oil & Grease	Mineral Oil & Grease	pH	Alkalinity	Hardness		Lead	
HOR 005 05 (Jackfish River Mid-Stream) (Cont'd)	Nov-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	98	100	<0.05	⁽³⁾	
	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.9	99	110	<0.05	⁽⁴⁾	
	Sep-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0004	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.70	<0.5	7.9	85	98	<0.05	⁽⁴⁾	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.40	<0.5	8.0	80	84	<0.05	⁽⁴⁾	
	Jul-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.90	<0.5	7.7	86	95	<0.05		
	Jun-13	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.7	75	87	<0.05		
	May-13	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.7	58	87	<0.05		
	Nov-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.5	6.8	100	110	<0.05		
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.4	160	160	<0.05	⁽⁴⁾	
	Sep-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.8	150	170	<0.05		
	Aug-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.5	7.3	130	150	<0.05		
	Aug-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	Lab Dup.
	Jul-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.9	89	100	<0.05	⁽⁴⁾	
	Jul-12	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	Lab Dup.
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	0.24	<0.5	<0.5	7.9	86	95	<0.05		
	May-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.7	89	93	<0.05		
	Nov-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	126	120	<0.05		
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	125	130	<0.05		
	Sep-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.8	156	150	<0.05		
	Aug-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	128	130	<0.05		
	Aug-11	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	Lab Dup.
	Jul-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	99	100	<0.05		
	Jul-11	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	Lab Dup.
	Jun-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	91	96	<0.05		
	Jun-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.0	91	-	-	-	Lab Dup.
	May-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.9	-	66	<0.05		
	Nov-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.8	-	110	<0.005		
	Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	0.70	<0.5	7.9	102	110	<0.005		
Sep-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.8	98	100	<0.005			
Aug-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	122	120	<0.005			
Jul-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	1.10	<0.5	7.9	123	120	<0.005			
Jun-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	0.70	<0.5	7.8	107	110	<0.005			
May-10	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	102	110	<0.005			
HOR 013 05 (West End)	Nov-14	0.0013	<0.0005	0.0017	0.00027	<0.00025	<0.0005	0.05	0.48	0.27	<0.2	<0.1	0.75	<0.5	<0.5	7.9	330	350	<0.05	⁽³⁾	
	Oct-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	<0.025	0.20	0.33	<0.2	<0.1	0.50	<0.5	<0.5	8.1	300	310	<0.05	⁽³⁾	
	Sep-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	<0.025	<0.1	<0.2	<0.2	<0.1	0.28	0.50	<0.5	8.2	250	270	<0.05		
	Aug-14	<0.0001	0.00029	<0.0001	<0.0001	<0.0001	<0.0002	<0.025	0.18	0.38	<0.2	<0.1	0.54	1.90	<0.5	8.0	270	270	<0.05		
	Jul-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	<0.025	0.22	0.27	<0.2	<0.1	0.49	2.00	<0.5	8.1	290	300	<0.05		
	Jul-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	-	<0.025	-	-	-	<0.1	-	-	-	-	-	-	-	-	Lab Dup.
	Jun-14	0.0006	<0.0004	<0.0002	<0.0002	<0.0002	<0.0004	<0.025	0.46	0.37	<0.2	<0.1	0.80	0.90	<0.5	7.7	300	350	<0.05	⁽⁴⁾	
	Jun-14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.7	300	-	-	Lab Dup.
	May-14	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.30	<0.2	<0.2	<0.1	0.48	1.00	<0.5	7.8	220	240	<0.05	⁽³⁾	
	Nov-13	0.0008	<0.0002	0.0008	<0.0002	<0.0004	<0.0005	-	0.41	0.48	<0.2	<0.1	0.89	<0.5	<0.5	7.9	390	400	<0.05	⁽³⁾	
	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0004	-	0.25	0.40	<0.2	<0.1	0.63	1.70	<0.5	8.1	310	340	<0.05	⁽⁴⁾	
	Sep-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	0.25	0.38	<0.2	<0.1	0.60	1.60	<0.5	8.1	300	350	<0.05	⁽⁴⁾	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.00	<0.5	7.9	300	320	<0.05	⁽⁴⁾	
	Jul-13	<0.0001	<0.0002	<0.0001	<0.0001	0.0011	<0.0002	-	0.50	0.47	<0.2	<0.1	0.97	2.40	<0.5	7.6	350	370	<0.05	⁽⁴⁾	
	Jun-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	0.42	0.40	<0.2	<0.1	0.81	1.80	<0.5	7.7	290	310	<0.05	⁽⁴⁾	
	May-13	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.70	<0.5	7.7	58	63	<0.05	⁽⁴⁾	
Nov-12	0.0004	<0.0002	0.0005	<0.0002	0.0005	<0.0002	-	0.19	0.32	<0.1	<0.1	0.48	1.3	<0.5	7.2	250	270	<0.05	⁽⁴⁾		

TABLE 1
SURFACE WATER QUALITY ANALYSIS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Sample ⁽¹⁾	Date	Parameter (mg/L)																	Comments			
		Benzene	Toluene	Ethyl-benzene	Xylene (-o)	Xylenes (-m,-p)	MTBE	F1 (C ₈ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₈ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	T.P.H. (<C ₁₀)	T.E.H. (C ₁₀ -C ₂₄)	Oil & Grease	Mineral Oil & Grease	pH	Alkalinity	Hardness		Lead		
HOR 013 05 (West End) (Con'd)	Oct-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry	
	Sep-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Aug-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Jul-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.13	0.17	<0.1	<0.1	0.27	<0.5	<0.5	8.1	270	280	<0.05	-	14	
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	-	-	<0.1	<0.1	0.73	1.1	<0.5	8.0	330	360	<0.05	-	14	
	May-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	0.28	0.30	<0.1	<0.1	0.58	3.30	<0.5	7.9	330	380	<0.05	-		
	Nov-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	0.11	<0.1	<0.1	0.24	<0.5	<0.5	8.2	239	240	<0.05	-		
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0004	-	-	-	<0.1	<0.1	0.24	<0.5	<0.5	8.2	184	200	<0.05	-		
	Aug-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Jul-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	-	-	<0.1	<0.1	0.22	<0.5	<0.5	8.0	267	290	<0.05	-	14	
	Jun-11	0.0005	<0.0002	0.0004	<0.0002	0.0005	<0.001	-	-	-	<0.1	<0.1	0.58	<0.5	<0.5	8.0	312	330	<0.05	-	14	
	May-11	0.0003	<0.0002	0.0005	<0.0002	0.0006	<0.0005	-	0.18	0.20	<0.1	<0.1	0.36	<0.5	<0.5	7.8	-	130	<0.05	-		
	Nov-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.004	-	-	-	<0.1	<0.1	0.34	<0.5	<0.5	7.9	-	350	<0.005	-		
	Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	-	-	<0.1	<0.1	0.28	2.60	<0.5	8.0	278	310	<0.005	-		
	Sep-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.005	-	-	-	<0.1	<0.1	0.23	3.40	<0.5	8.1	229	250	<0.005	-		
	Aug-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Jul-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
Jun-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry	
May-10	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	<0.1	<0.1	0.50	<0.5	<0.5	8.1	238	260	<0.005	-	14		
Certificate of Approval ⁽¹⁾																						
C of A Criteria		5	0.8	2	40	32	200	1,000	1,000	-	-	-	-	-	6.5-8.5	-	-	-	-	10	-	

Notes:

"-" = No Data
T.P.H. = Total Purgeable Hydrocarbons
T.E.H. = Total Extractable Hydrocarbons
MTBE = Methyl-t-butyl-Ether

- Certificate of Approval No. 3528-83LQWT issued for the sets the effluent criteria as listed above.
- The limit for Lead shall be determined based on the hardness of water. If the hardness is less than 30 mg/L, then the limit is 1 ug/L. If the hardness is between 30 mg/L and 80 mg/L, then the limit is 3 ug/L. When hardness is greater than 80 mg/L then the limit is 5 ug/L.
- Due to the level of petroleum hydrocarbon compounds beyond the appropriate range, the sample required dilution. Detection limits were adjusted accordingly.
- Due to foaming, the sample required dilution. Detection limits were adjusted accordingly.
- Due to matrix interferences, the detection limits were adjusted accordingly.
- Due to the high concentration of non-target analytes, the sample required dilution. Detection limits were adjusted accordingly.

BOLD - Value exceeds C of A Criteria

TABLE 2
WEST END DAILY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Day	Median (L/Sec)	25th Percentile	75th Percentile
29-May-14	0.07	0.07	0.07
30-May-14	0.16	0.13	0.16
31-May-14	0.25	0.25	0.26
1-Jun-14	0.30	0.29	0.34
2-Jun-14	0.40	0.37	0.42
3-Jun-14	NF	NF	NF
4-Jun-14	NF	NF	NF
5-Jun-14	NF	NF	NF
6-Jun-14	NF	NF	NF
7-Jun-14	NF	NF	NF
8-Jun-14	NF	NF	NF
9-Jun-14	NF	NF	NF
10-Jun-14	NF	NF	NF
11-Jun-14	NF	NF	NF
12-Jun-14	NF	NF	NF
13-Jun-14	NF	NF	NF
14-Jun-14	NF	NF	NF
15-Jun-14	NF	NF	NF
16-Jun-14	NF	NF	NF
17-Jun-14	NF	NF	NF
18-Jun-14	NF	NF	NF
19-Jun-14	NF	NF	NF
20-Jun-14	NF	NF	NF
21-Jun-14	NF	NF	NF
22-Jun-14	NF	NF	NF
23-Jun-14	NF	NF	NF
24-Jun-14	NF	NF	NF
25-Jun-14	NF	NF	NF
26-Jun-14	NF	NF	NF
27-Jun-14	NF	NF	NF
28-Jun-14	NF	NF	NF
29-Jun-14	NF	NF	NF
30-Jun-14	NF	NF	NF
1-Jul-14	NF	NF	NF
2-Jul-14	NF	NF	NF
3-Jul-14	NF	NF	NF
4-Jul-14	NF	NF	NF
5-Jul-14	NF	NF	NF
6-Jul-14	NF	NF	NF
7-Jul-14	NF	NF	NF

Day	Median (L/Sec)	25th Percentile	75th Percentile
8-Jul-14	NF	NF	NF
9-Jul-14	NF	NF	NF
10-Jul-14	NF	NF	NF
11-Jul-14	NF	NF	NF
12-Jul-14	NF	NF	NF
13-Jul-14	NF	NF	NF
14-Jul-14	NF	NF	NF
15-Jul-14	0.40	0.38	0.43
16-Jul-14	0.33	0.32	0.37
17-Jul-14	0.28	0.26	0.32
18-Jul-14	0.25	0.24	0.27
19-Jul-14	0.23	0.23	0.25
20-Jul-14	0.23	0.22	0.24
21-Jul-14	0.21	0.20	0.22
22-Jul-14	0.22	0.20	0.35
23-Jul-14	0.32	0.31	0.34
24-Jul-14	0.28	0.27	0.30
25-Jul-14	0.26	0.24	0.27
26-Jul-14	0.25	0.25	0.26
27-Jul-14	0.26	0.26	0.26
28-Jul-14	0.25	0.25	0.26
29-Jul-14	0.26	0.25	0.26
30-Jul-14	0.26	0.26	0.27
31-Jul-14	0.28	0.28	0.29
1-Aug-14	0.27	0.27	0.28
2-Aug-14	0.27	0.25	0.28
3-Aug-14	0.29	0.28	0.32
4-Aug-14	0.27	0.27	0.28
5-Aug-14	0.25	0.24	0.27
6-Aug-14	0.19	0.18	0.22
7-Aug-14	0.17	0.16	0.19
8-Aug-14	0.15	0.14	0.17
9-Aug-14	0.13	0.11	0.15
10-Aug-14	0.11	0.10	0.13
11-Aug-14	0.11	0.11	0.13
12-Aug-14	0.13	0.13	0.13
13-Aug-14	0.13	0.12	0.13
14-Aug-14	0.12	0.10	0.13
15-Aug-14	0.09	0.09	0.11
16-Aug-14	0.09	0.09	0.09

Day	Median (L/Sec)	25th Percentile	75th Percentile
17-Aug-14	0.09	0.08	0.09
18-Aug-14	0.07	0.06	0.09
19-Aug-14	0.08	0.08	0.09
20-Aug-14	0.09	0.09	0.09
21-Aug-14	0.09	0.09	0.09
22-Aug-14	0.09	0.08	0.09
23-Aug-14	0.08	0.07	0.09
24-Aug-14	0.07	0.06	0.08
25-Aug-14	0.08	0.07	0.08
26-Aug-14	0.09	0.08	0.09
27-Aug-14	0.08	0.08	0.09
28-Aug-14	0.06	0.06	0.08
29-Aug-14	0.06	0.05	0.06
30-Aug-14	0.15	0.11	0.18
31-Aug-14	0.19	0.18	0.19
1-Sep-14	0.18	0.17	0.19
2-Sep-14	0.17	0.17	0.18
3-Sep-14	0.16	0.15	0.17
4-Sep-14	0.22	0.20	0.23
5-Sep-14	0.22	0.22	0.23
6-Sep-14	0.20	0.19	0.22
7-Sep-14	0.18	0.16	0.18
8-Sep-14	0.16	0.15	0.16
9-Sep-14	0.14	0.13	0.14
10-Sep-14	0.27	0.18	0.31
11-Sep-14	0.33	0.32	0.34
12-Sep-14	0.27	0.27	0.30
13-Sep-14	0.25	0.25	0.26
14-Sep-14	0.25	0.24	0.25
15-Sep-14	0.26	0.25	0.26
16-Sep-14	0.26	0.25	0.27
17-Sep-14	0.26	0.26	0.27
18-Sep-14	0.26	0.26	0.26
19-Sep-14	0.26	0.25	0.26
20-Sep-14	0.32	0.28	0.33
21-Sep-14	0.33	0.32	0.33
22-Sep-14	0.33	0.33	0.33
23-Sep-14	0.33	0.33	0.34
24-Sep-14	0.33	0.33	0.34
25-Sep-14	0.33	0.32	0.34

Day	Median (L/Sec)	25th Percentile	75th Percentile
26-Sep-14	0.32	0.32	0.34
27-Sep-14	0.32	0.31	0.34
28-Sep-14	0.33	0.32	0.34
29-Sep-14	0.37	0.37	0.38
30-Sep-14	0.38	0.36	0.38
1-Oct-14	0.37	0.37	0.38
2-Oct-14	0.36	0.36	0.37
3-Oct-14	0.40	0.38	0.44
4-Oct-14	0.44	0.43	0.44
5-Oct-14	0.43	0.43	0.44
6-Oct-14	0.41	0.40	0.41
7-Oct-14	0.38	0.38	0.39
8-Oct-14	0.36	0.35	0.36
9-Oct-14	0.33	0.33	0.35
10-Oct-14	0.30	0.29	0.32
11-Oct-14	0.27	0.26	0.28
12-Oct-14	0.24	0.23	0.25
13-Oct-14	0.22	0.20	0.22
14-Oct-14	0.24	0.20	0.28
15-Oct-14	0.27	0.26	0.27
16-Oct-14	0.24	0.23	0.25
17-Oct-14	0.36	0.30	0.39
18-Oct-14	0.39	0.39	0.40
19-Oct-14	0.38	0.37	0.38
20-Oct-14	0.37	0.37	0.37
21-Oct-14	0.35	0.35	0.36
22-Oct-14	0.33	0.33	0.35
23-Oct-14	0.31	0.30	0.33
24-Oct-14	0.30	0.29	0.30
25-Oct-14	0.31	0.30	0.32
26-Oct-14	0.33	0.32	0.34
27-Oct-14	0.30	0.30	0.32
28-Oct-14	0.37	0.30	0.40
29-Oct-14	0.40	0.40	0.41
30-Oct-14	0.39	0.39	0.40
31-Oct-14	0.39	0.38	0.39
1-Nov-14	0.37	0.37	0.38
2-Nov-14	0.36	0.35	0.36
3-Nov-14	0.34	0.34	0.35
4-Nov-14	0.34	0.34	0.34

Notes:
L/Sec = Litres per second
NF = No Flow due to organic debris plugging discharge pipe

The Flow Rate (Q) has been calculated using the equation:

$$Q = VA = \left(\frac{k_n}{n}\right) AR^{\frac{2}{3}} \sqrt{S}$$

where: n = the interior surface of the pipe, in this case PVC which uses the constant 0.012
S = slope = 7x10⁻⁷%
K_n = Mannings Equation Conversion Factor (for Metric calculations K_n = 1/sec)
A = the area (in meters²) of water within the pipe determined by:

$$A = \frac{(\theta - \sin(\theta)) D^3}{8}$$

R = The Hydraulic Radius (in meters) is determined by:

$$R = \frac{(\theta - \sin \theta) \left[\frac{D}{4} \right]}{\theta}$$

D = Diameter of the pipe, in this case 325 mm

$$\theta = \pi + 2 \left(\sin^{-1} \left[\left(\frac{2h_2}{D} \right) - 1 \right] \right)$$

h₂ = h₁ - height of pipe base

h₁ = Initial transducer height below water line + compensated height of water above transducer

Calibration:
- A calibration of the flow rate was completed monthly by manually measuring the amount of flow coming from the discharge pipe.
- The calibration was completed by recording the amount of time needed to fill a 20 L pail at the discharge pipe.
- The recorded calibration measurements are as follows:

Day	Calibrated Measurement (L/Sec)	Median Flow Meter Measurement (L/Sec)	Relative Percent Difference (%)
9-Jun-14	Not able to calibrate. Water level over discharge pipe. Pipe clogged with organic debris		-
15-Jul-14	Was not calibrated		-
5-Aug-14	0.102	0.11	8
16-Sep-14	0.19	0.26	31
14-Oct-14	0.2	0.24	18

TABLE 3
WEST END WEEKLY AND MONTHLY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Week	Median (L/Sec)	25th Percentile	75th Percentile
1-Jun-14 to 7-Jun-14	0.000	0.000	0.140
8-Jun-14 to 14-Jun-14	0.000	0.000	0.000
15-Jun-14 to 21-Jun-14	0.000	0.000	0.000
22-Jun-14 to 28-Jun-14	0.000	0.000	0.000
29-Jun-14 to 5-Jul-14	0.000	0.000	0.000
6-Jul-14 to 12-Jul-14	0.000	0.000	0.000
13-Jul-14 to 19-Jul-14	0.250	0.000	0.320
20-Jul-14 to 26-Jun-14	0.250	0.220	0.290
27-Jun-14 to 2-Aug-14	0.270	0.260	0.270
3-Aug-14 to 9-Aug-14	0.190	0.160	0.270
10-Aug-14 to 16-Aug-14	0.120	0.100	0.130
17-Aug-14 to 23-Aug-14	0.090	0.080	0.090
24-Aug-14 to 30-Aug-14	0.080	0.060	0.090
31-Aug-14 to 6-Sept-14	0.190	0.170	0.220
7-Sept-14 to 13-Sept-14	0.240	0.160	0.290
14-Sept-14 to 20-Sept-14	0.260	0.250	0.270
21-Sept-14 to 27-Sept-14	0.330	0.320	0.340
28-Sept-14 to 4-Oct-14	0.370	0.360	0.390
5-Oct-14 to 11-Oct-14	0.360	0.320	0.400
12-Oct-14 to 18-Oct-14	0.260	0.230	0.300
19-Oct-14 to 25-Oct-14	0.340	0.300	0.370
26-Oct-14 to 1-Nov-14	0.380	0.330	0.390

Month	Median (L/Sec)	25th Percentile	75th Percentile
June	0.00	0.00	0.00
July	0.22	0.00	0.26
August	0.10	0.09	0.17
September	0.26	0.21	0.33
October	0.35	0.30	0.39

TABLE 3
WEST END WEEKLY AND MONTHLY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO
PAGE 1 of 1

TABLE 4
LAGOON NO. 2 DAILY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Day	Median (L/Sec)	25th Percentile	75th Percentile
29-May-14	0.548	0.548	0.567
30-May-14	0.567	0.543	0.575
31-May-14	0.546	0.525	0.586
1-Jun-14	0.554	0.544	0.602
2-Jun-14	0.662	0.602	0.911
3-Jun-14	0.718	0.698	0.739
4-Jun-14	0.684	0.662	0.722
5-Jun-14	0.644	0.617	0.686
6-Jun-14	0.602	0.579	0.642
7-Jun-14	0.602	0.583	0.607
8-Jun-14	0.602	0.563	0.642
9-Jun-14	0.563	0.544	0.591
10-Jun-14	0.563	0.563	0.591
11-Jun-14	0.542	0.503	0.563
12-Jun-14	0.518	0.492	0.540
13-Jun-14	0.537	0.537	0.540
14-Jun-14	0.507	0.483	0.525
15-Jun-14	0.470	0.452	0.488
16-Jun-14	0.475	0.445	0.503
17-Jun-14	0.463	0.447	0.463
18-Jun-14	0.466	0.434	0.470
19-Jun-14	0.452	0.416	0.473
20-Jun-14	0.443	0.427	0.456
21-Jun-14	0.422	0.396	0.435
22-Jun-14	0.401	0.375	0.430
23-Jun-14	0.392	0.375	0.409
24-Jun-14	0.413	0.396	0.413
25-Jun-14	0.379	0.358	0.403
26-Jun-14	0.370	0.329	0.379
27-Jun-14	0.346	0.323	0.379
28-Jun-14	0.326	0.311	0.343
29-Jun-14	0.343	0.323	0.356
30-Jun-14	0.344	0.313	0.389
1-Jul-14	0.302	0.302	0.317
2-Jul-14	0.298	0.289	0.320
3-Jul-14	0.295	0.280	0.311
4-Jul-14	0.280	0.266	0.311
5-Jul-14	0.279	0.277	0.295

Day	Median (L/Sec)	25th Percentile	75th Percentile
6-Jul-14	0.289	0.274	0.305
7-Jul-14	0.302	0.302	0.302
8-Jul-14	0.320	0.305	0.320
9-Jul-14	0.316	0.292	0.343
10-Jul-14	0.280	0.266	0.311
11-Jul-14	0.280	0.277	0.284
12-Jul-14	0.277	0.263	0.277
13-Jul-14	0.289	0.274	0.289
14-Jul-14	0.277	0.277	0.292
15-Jul-14	0.277	0.277	0.277
16-Jul-14	0.308	0.304	0.308
17-Jul-14	0.311	0.280	0.311
18-Jul-14	0.295	0.280	0.295
19-Jul-14	0.295	0.289	0.295
20-Jul-14	0.294	0.277	0.295
21-Jul-14	0.277	0.277	0.277
22-Jul-14	0.308	0.292	0.308
23-Jul-14	0.298	0.280	0.298
24-Jul-14	0.280	0.263	0.280
25-Jul-14	0.277	0.260	0.277
26-Jul-14	0.274	0.274	0.274
27-Jul-14	0.292	0.277	0.292
28-Jul-14	0.295	0.289	0.295
29-Jul-14	0.277	0.274	0.277
30-Jul-14	0.277	0.277	0.277
31-Jul-14	0.308	0.292	0.308
1-Aug-14	0.279	0.266	0.280
2-Aug-14	0.266	0.246	0.266
3-Aug-14	0.251	0.251	0.251
4-Aug-14	0.251	0.237	0.251
5-Aug-14	0.237	0.237	0.244
6-Aug-14	0.602	0.579	0.642
7-Aug-14	0.602	0.583	0.607
8-Aug-14	0.602	0.563	0.642
9-Aug-14	0.563	0.544	0.591
10-Aug-14	0.563	0.563	0.591
11-Aug-14	0.323	0.280	0.406
12-Aug-14	0.518	0.492	0.540

Day	Median (L/Sec)	25th Percentile	75th Percentile
13-Aug-14	0.537	0.537	0.540
14-Aug-14	0.507	0.483	0.525
15-Aug-14	0.470	0.452	0.488
16-Aug-14	0.475	0.445	0.503
17-Aug-14	0.463	0.447	0.463
18-Aug-14	0.466	0.434	0.470
19-Aug-14	0.452	0.416	0.473
20-Aug-14	0.443	0.427	0.456
21-Aug-14	0.422	0.396	0.435
22-Aug-14	0.401	0.375	0.430
23-Aug-14	0.392	0.375	0.409
24-Aug-14	0.413	0.396	0.413
25-Aug-14	0.379	0.358	0.403
26-Aug-14	0.370	0.329	0.379
27-Aug-14	0.346	0.323	0.379
28-Aug-14	0.326	0.311	0.343
29-Aug-14	0.343	0.323	0.356
30-Aug-14	0.344	0.313	0.389
31-Aug-14	0.344	0.313	0.389
1-Sep-14	0.302	0.302	0.317
2-Sep-14	0.298	0.289	0.320
3-Sep-14	0.295	0.280	0.311
4-Sep-14	0.280	0.266	0.311
5-Sep-14	0.279	0.277	0.295
6-Sep-14	0.289	0.274	0.305
7-Sep-14	0.302	0.302	0.302
8-Sep-14	0.320	0.305	0.320
9-Sep-14	0.316	0.292	0.343
10-Sep-14	0.280	0.266	0.311
11-Sep-14	0.280	0.277	0.284
12-Sep-14	0.277	0.263	0.277
13-Sep-14	0.289	0.274	0.289
14-Sep-14	0.277	0.277	0.292
15-Sep-14	0.277	0.277	0.292
16-Sep-14	0.308	0.304	0.326
17-Sep-14	0.311	0.280	0.331
18-Sep-14	0.295	0.280	0.311
19-Sep-14	0.295	0.289	0.295

Day	Median (L/Sec)	25th Percentile	75th Percentile
20-Sep-14	0.369	0.352	0.372
21-Sep-14	0.344	0.343	0.372
22-Sep-14	0.343	0.326	0.343
23-Sep-14	0.336	0.330	0.347
24-Sep-14	0.330	0.314	0.330
25-Sep-14	0.314	0.298	0.330
26-Sep-14	0.314	0.283	0.330
27-Sep-14	0.283	0.280	0.314
28-Sep-14	0.297	0.280	0.314
29-Sep-14	0.365	0.346	0.403
30-Sep-14	0.338	0.314	0.346
1-Oct-14	0.326	0.311	0.343
2-Oct-14	0.323	0.308	0.323
3-Oct-14	0.457	0.419	0.473
4-Oct-14	0.403	0.385	0.403
5-Oct-14	0.392	0.385	0.399
6-Oct-14	0.392	0.386	0.400
7-Oct-14	0.403	0.386	0.403
8-Oct-14	0.389	0.389	0.406
9-Oct-14	0.389	0.375	0.392
10-Oct-14	0.392	0.379	0.396
11-Oct-14	0.379	0.379	0.396
12-Oct-14	0.375	0.359	0.375
13-Oct-14	0.375	0.375	0.375
14-Oct-14	0.445	0.405	0.466
15-Oct-14	0.430	0.413	0.435
16-Oct-14	0.423	0.409	0.427
17-Oct-14	0.594	0.555	0.619
18-Oct-14	0.525	0.521	0.525
19-Oct-14	0.521	0.503	0.525
20-Oct-14	0.507	0.503	0.518
21-Oct-14	0.507	0.492	0.510
22-Oct-14	0.488	0.473	0.510
23-Oct-14	0.484	0.466	0.507
24-Oct-14	0.466	0.463	0.466
25-Oct-14	0.477	0.473	0.500
26-Oct-14	0.499	0.495	0.503
27-Oct-14	0.481	0.481	0.484

Day	Median (L/Sec)	25th Percentile	75th Percentile
28-Oct-14	0.563	0.498	0.610
29-Oct-14	0.559	0.556	0.575
30-Oct-14	0.544	0.544	0.563
31-Oct-14	0.548	0.541	0.548
1-Nov-14	0.529	0.529	0.548
2-Nov-14	0.525	0.507	0.525
3-Nov-14	0.503	0.502	0.521
4-Nov-14	0.514	0.514	0.514

Notes:

L/Sec = Litres per second

The Flow Rate (Q) has been calculated using the equation:

$$Q = VA = \left(\frac{k_n}{n}\right) AR^{\frac{2}{3}} \sqrt{S}$$

where: n = the interior surface of the culvert, in this case corrugated steel which uses the constant 0.024

S = the slope of the water, in this case 0.000016

k_n = Manning's Equation Conversion Factor (for Metric calculations $k_n = 1/\text{sec}$)

A = the area (in meters²) of water within the culvert determined by:

$$A = \frac{(\theta - \sin(\theta)) D^3}{8}$$

R = The Hydraulic Radius (in meters) is determined by:

$$R = \frac{(\theta - \sin(\theta)) \left(\frac{D}{4}\right)}{\theta}$$

D = Diameter of the culvert (m)

$$\theta = \pi + 2 \left(\sin^{-1} \left[\left(\frac{2h_1}{D} \right) - 1 \right] \right)$$

h_1 = h_1 - height (in meters) of culvert base

h_2 = Initial transducer height (in meters) below water line + compensated height of water above transducer

Calibration:

- A calibration of the flow rate was completed monthly by manually measuring the amount of flow coming from the discharge pipe.
- The calibration was completed by recording the amount of time needed to fill a 20 L pail at the discharge pipe.
- The recorded calibration measurements are as follows:

Day	Calibrated Measurement (L/Sec)	Median Flow Meter Measurement (L/Sec)	Relative Percent Difference (%)
9-Jun-14	0.543	0.563	4
15-Jul-14	Was not calibrated		
5-Aug-14	0.382	0.323	17
15-Sep-14	0.22	0.277	23
14-Oct-14	0.5	0.423	17

TABLE 5
LAGOON NO.2 WEEKLY AND MONTHLY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Week	Median (L/Sec)	25th Percentile	75th Percentile
1-Jun-14 to 7-Jun-14	0.64	0.58	0.70
8-Jun-14 to 14-Jun-14	0.54	0.53	0.56
15-Jun-14 to 21-Jun-14	0.45	0.43	0.47
22-Jun-14 to 28-Jun-14	0.38	0.34	0.40
29-Jun-14 to 5-Jul-14	0.30	0.28	0.32
6-Jul-14 to 12-Jul-14	0.30	0.28	0.28
13-Jul-14 to 19-Jul-14	0.29	0.28	0.29
20-Jul-14 to 26-Jul-14	0.29	0.28	0.29
27-Jul-14 to 2-Aug-14	0.28	0.28	0.28
3-Aug-14 to 9-Aug-14	0.25	0.24	0.27
10-Aug-14 to 16-Aug-14	0.29	0.28	0.30
17-Aug-14 to 23-Aug-14	0.31	0.29	0.31
24-Aug-14 to 30-Aug-14	0.28	0.27	0.30
31-Aug-14 to 6-Sept-14	0.26	0.25	0.28
7-Sept-14 to 13-Sept-14	0.38	0.28	0.40
14-Sept-14 to 20-Sept-14	0.35	0.33	0.38
21-Sept-14 to 27-Sept-14	0.33	0.31	0.34
28-Sept-14 to 4-Oct-14	0.34	0.31	0.39
5-Oct-14 to 11-Oct-14	0.39	0.38	0.40
12-Oct-14 to 18-Oct-14	0.43	0.38	0.51
19-Oct-14 to 25-Oct-14	0.50	0.47	0.51
26-Oct-14 to 1-Nov-14	0.54	0.50	0.56

Month	Median (L/Sec)	25th Percentile	75th Percentile
June	0.48	0.40	0.58
July	0.29	0.28	0.29
August	0.28	0.26	0.30
September	0.33	0.28	0.37
October	0.46	0.39	0.51

TABLE 5
LAGOON NO.2 WEEKLY AND MONTHLY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO
PAGE 1 OF 1

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
WEST END								
IMW-3	15-Oct-14	326.504	1.488	-	-	325.016	-	
	11-Jun-14	326.504	1.395	-	-	325.109	-	
	7-Oct-13	326.504	1.758	-	-	324.746	-	
	11-Jun-13	326.504	1.497	-	-	325.007	-	
	2-Oct-12	326.504	1.934	-	-	324.570	-	
	5-Jun-12	326.504	1.486	-	-	325.018	-	
	4-Oct-11	326.504	1.793	-	-	324.711	-	
	27-Jun-11	326.504	1.799	-	-	324.705	-	
	4-Oct-10	326.504	1.674	-	-	324.830	-	
22-Jun-10	326.504	1.863	-	-	324.641	-		
IMW-4	15-Oct-14	324.406	0.829	-	-	323.577	-	
	10-Jun-14	324.406	0.696	-	-	323.710	-	
	7-Oct-13	324.406	1.035	-	-	323.371	-	
	11-Jun-13	324.406	0.769	-	-	323.637	-	
	2-Oct-12	324.406	1.350	-	-	323.056	-	
	5-Jun-12	324.406	0.824	-	-	323.582	-	
	4-Oct-11	324.406	1.196	-	-	323.210	-	
	27-Jun-11	324.406	1.129	-	-	323.277	-	
	4-Oct-10	324.406	1.014	-	-	323.392	-	
22-Jun-10	324.406	1.290	-	-	323.116	-		
IMW-8	15-Oct-14	325.553	1.790	-	-	323.763	-	
	10-Jun-14	325.553	1.325	-	-	324.228	-	
	7-Oct-13	325.553	1.811	-	-	323.742	-	
	11-Jun-13	325.553	1.472	-	-	324.081	-	
	2-Oct-12	325.553	-	-	-	-	-	Dry, DTB - 2.163 m
	5-Jun-12	325.553	1.641	-	-	323.912	-	
	4-Oct-11	325.553	2.170	-	-	323.383	-	
	27-Jun-11	325.553	1.842	-	-	323.711	-	
	4-Oct-10	325.553	1.992	-	-	323.561	-	
22-Jun-10	325.553	2.138	-	-	323.415	-		
MW-10	14-Oct-14	326.842	2.568	-	-	324.274	-	
	10-Jun-14	326.842	2.375	-	-	324.467	-	
	7-Oct-13	326.842	2.789	-	-	324.053	-	(2)
	11-Jun-13	326.842	2.627	-	-	324.215	-	(2)
	2-Oct-12	327.075	3.454	-	-	323.621	-	
	5-Jun-12	327.075	2.888	-	-	324.187	-	
	4-Oct-11	327.075	3.165	-	-	323.910	-	
	27-Jun-11	327.283	3.055	-	-	324.228	-	
	4-Oct-10	327.283	3.086	-	-	324.197	-	
22-Jun-10	327.283	3.335	-	-	323.948	-		
MW-11R	15-Oct-14	326.880	3.887	2.660	1.227	322.993	324.220	
MW-11	14-Oct-14	327.035	-	-	-	-	-	Destroyed
	10-Jun-14	327.035	-	-	-	-	-	CNL
	7-Oct-13	327.035	-	-	-	-	-	CNL
	11-Jun-13	327.035	4.001	2.963	1.038	323.034	324.072	
	2-Oct-12	327.035	4.376	3.440	0.936	322.659	323.595	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
WEST END								
MW-11 (cont'd)	5-Jun-12	327.035	4.324	2.810	1.514	322.711	324.225	
	4-Oct-11	327.035	4.282	3.212	1.070	322.753	323.823	
	27-Jun-11	327.035	4.227	3.017	1.210	322.808	324.018	
	4-Oct-10	327.035	4.320	2.986	1.334	322.715	324.049	
	22-Jun-10	327.035	4.407	3.196	1.211	322.628	323.839	
MW-12	15-Oct-14	326.875	2.375	-	-	324.500	-	
	10-Jun-14	326.875	1.840	-	-	325.035	-	
	7-Oct-13	326.875	2.542	-	-	324.333	-	
	11-Jun-13	326.875	2.255	-	-	324.620	-	
	2-Oct-12	326.875	3.000	-	-	323.875	-	
	5-Jun-12	326.875	2.238	-	-	324.637	-	
	4-Oct-11	326.875	2.605	-	-	324.270	-	
	27-Jun-11	326.875	2.478	-	-	324.397	-	
	4-Oct-10	326.875	2.428	-	-	324.447	-	
22-Jun-10	326.875	2.652	-	-	324.223	-		
MW-16	15-Oct-14	-	2.030	-	-	-	-	
	10-Jun-14	-	0.839	-	-	-	-	
	8-Oct-13	-	1.802	-	-	-	-	
	11-Jun-13	-	1.034	-	-	-	-	
	2-Oct-12	-	2.697	-	-	-	-	
	5-Jun-12	-	1.543	-	-	-	-	
	4-Oct-11	-	2.619	-	-	-	-	
	27-Jun-11	-	0.865	-	-	-	-	
	4-Oct-10	-	2.367	-	-	-	-	
22-Jun-10	-	2.443	-	-	-	-		
MW-17	15-Oct-14	-	0.555	-	-	-	-	
	10-Jun-14	-	0.053	-	-	-	-	
	8-Oct-13	-	0.538	-	-	-	-	
	11-Jun-13	-	0.045	-	-	-	-	
	2-Oct-12	-	-	-	-	-	-	Dry, DTB - 2.180 m
	5-Jun-12	-	0.150	-	-	-	-	
	4-Oct-11	-	1.782	-	-	-	-	
	27-Jun-11	-	1.784	-	-	-	-	
	4-Oct-10	-	1.283	-	-	-	-	
22-Jun-10	-	1.605	-	-	-	-		
MW-119	15-Oct-14	327.641	3.219	-	-	324.422	-	
	11-Jun-14	327.641	3.005	-	-	324.636	-	
	7-Oct-13	327.641	3.358	-	-	324.283	-	
	11-Jun-13	327.641	3.176	-	-	324.465	-	
	2-Oct-12	327.641	3.735	-	-	323.906	-	
	5-Jun-12	327.641	3.230	-	-	324.411	-	
	4-Oct-11	327.641	3.520	-	-	324.121	-	
	27-Jun-11	327.641	3.400	-	-	324.241	-	
	4-Oct-10	327.641	3.381	-	-	324.260	-	
22-Jun-10	327.641	3.519	-	-	324.122	-		

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
WEST END								
MW-120	15-Oct-14	327.331	0.858	-	-	326.473	-	
	11-Jun-14	327.331	0.641	-	-	326.690	-	
	7-Oct-13	327.331	1.474	-	-	325.857	-	
	11-Jun-13	327.331	0.941	-	-	326.390	-	
	2-Oct-12	327.331	2.060	-	-	325.271	-	
	5-Jun-12	327.331	0.960	-	-	326.371	-	
	4-Oct-11	327.331	1.595	-	-	325.736	-	
	27-Jun-11	327.331	1.119	-	-	326.212	-	
	4-Oct-10	327.331	1.144	-	-	326.187	-	
	22-Jun-10	327.331	1.213	-	-	326.118	-	
MW-121R	15-Oct-14	327.158	0.735	-	-	326.423	-	
MW-122	15-Oct-14	327.344	2.511	2.510	0.001	324.833	324.834	
	10-Jun-14	327.344	1.637	-	-	325.707	-	
	7-Oct-13	327.344	2.759	2.757	0.002	324.585	324.587	
	11-Jun-13	327.344	2.179	-	-	325.165	-	
	2-Oct-12	327.344	3.174	3.167	0.007	324.170	324.177	
	5-Jun-12	327.344	2.455	2.436	0.019	324.889	324.908	
	4-Oct-11	327.344	2.940	2.897	0.043	324.404	324.447	
	27-Jun-11	327.344	2.734	2.695	0.039	324.610	324.649	
	4-Oct-10	327.344	2.760	2.702	0.058	324.584	324.642	
	22-Jun-10	327.344	2.938	2.896	0.042	324.406	324.448	
MW-123R	15-Oct-14	327.050	2.835	-	-	324.215	-	
OW 8-1	15-Oct-14	327.506	2.890	-	-	324.616	-	
	11-Jun-14	327.506	2.665	-	-	324.841	-	
	7-Oct-13	327.506	3.304	-	-	324.202	-	
	11-Jun-13	327.506	2.823	-	-	324.683	-	
	2-Oct-12	327.506	3.766	-	-	323.740	-	
	5-Jun-12	327.506	2.830	-	-	324.676	-	
	4-Oct-11	327.506	3.313	-	-	324.193	-	
	27-Jun-11	327.506	3.335	-	-	324.171	-	
	4-Oct-10	327.506	3.221	-	-	324.285	-	
	22-Jun-10	327.506	3.438	-	-	324.068	-	
OW 8-2	15-Oct-14	327.474	3.056	-	-	324.418	-	
	11-Jun-14	327.474	2.595	-	-	324.879	-	
	7-Oct-13	327.474	1.841	-	-	325.633	-	
	11-Jun-13	327.474	2.765	-	-	324.709	-	
	2-Oct-12	327.474	3.632	-	-	323.842	-	
	5-Jun-12	327.474	2.811	-	-	324.663	-	
	4-Oct-11	327.474	3.374	-	-	324.100	-	
	27-Jun-11	327.474	3.193	-	-	324.281	-	
	4-Oct-10	327.474	3.145	-	-	324.329	-	
	22-Jun-10	327.474	3.384	-	-	324.090	-	
OW 8-3	15-Oct-14	327.669	3.440	3.434	0.006	324.229	324.235	
	11-Jun-14	327.669	3.118	-	-	324.551	-	
	7-Oct-13	327.669	3.566	3.555	0.011	324.103	324.114	
	11-Jun-13	327.669	3.303	-	-	324.366	-	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
WEST END								
OW 8-3 (cont'd)	2-Oct-12	327.669	3.997	3.960	0.037	323.672	323.709	
	5-Jun-12	327.669	3.380	3.378	0.002	324.289	324.291	
	4-Oct-11	327.669	3.775	-	-	323.894	-	
	27-Jun-11	327.669	3.552	3.548	0.004	324.117	324.121	
	4-Oct-10	327.669	3.564	-	-	324.105	-	
	22-Jun-10	327.669	3.727	3.722	0.005	323.942	323.947	
OW 9-3	15-Oct-14	325.520	0.752	-	-	324.768	-	
	10-Jun-14	325.520	0.051	-	-	325.469	-	
	7-Oct-13	325.520	0.908	-	-	324.612	-	
	11-Jun-13	325.520	0.479	-	-	325.041	-	
	2-Oct-12	325.520	1.475	-	-	324.045	-	
	5-Jun-12	325.520	0.570	-	-	324.950	-	
	4-Oct-11	325.520	1.198	-	-	324.322	-	
	27-Jun-11	325.520	0.964	-	-	324.556	-	
	4-Oct-10	325.520	0.985	-	-	324.535	-	
22-Jun-10	325.520	1.219	-	-	324.301	-		
OW-57R	15-Oct-14	326.395	2.178	-	-	324.217	-	
OW-60R	15-Oct-14	327.467	2.947	-	-	324.520	-	
EAST END								
MW-20	15-Oct-14	324.575	1.552	-	-	323.023	-	
	10-Jun-14	324.575	1.318	-	-	323.257	-	
	8-Oct-13	324.575	1.652	-	-	322.923	-	
	11-Jun-13	324.575	1.374	-	-	323.201	-	
	2-Oct-12	324.575	2.410	-	-	322.165	-	
	5-Jun-12	324.575	1.435	-	-	323.140	-	
	4-Oct-11	324.575	2.147	-	-	322.428	-	
	28-Jun-11	324.575	1.690	-	-	322.885	-	
	5-Oct-10	324.575	1.752	-	-	322.823	-	
22-Jun-10	324.575	2.179	-	-	322.396	-		
MW-21	15-Oct-14	325.243	4.280	3.693	0.587	320.963	321.550	
	10-Jun-14	325.243	4.064	2.986	1.078	321.179	322.257	
	8-Oct-13	325.243	4.560	4.198	0.362	320.683	321.045	
	11-Jun-13	325.243	4.154	3.634	0.520	321.089	321.609	
	2-Oct-12	325.243	4.816	4.504	0.312	320.427	320.739	
	5-Jun-12	324.475	4.226	3.412	0.814	320.249	321.063	
	4-Oct-11	325.243	4.625	4.335	0.290	320.618	320.908	
	28-Jun-11	324.475	3.701	3.316	0.385	320.774	321.159	
	5-Oct-10	324.475	3.705	3.193	0.512	320.770	321.282	
22-Jun-10	324.475	3.822	3.435	0.387	320.653	321.040		
MW-24	15-Oct-14	325.870	1.720	-	-	324.150	-	
	10-Jun-14	325.870	0.958	-	-	324.912	-	
	8-Oct-13	325.870	1.893	-	-	323.977	-	
	11-Jun-13	325.870	1.551	-	-	324.319	-	
	2-Oct-12	325.870	4.321	-	-	321.549	-	
	5-Jun-12	325.870	1.644	-	-	324.226	-	
4-Oct-11	325.870	2.770	-	-	323.100	-		

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
MW-24 (cont'd)	28-Jun-11	325.870	2.049	-	-	323.821	-	
	5-Oct-10	325.870	1.838	-	-	324.032	-	
	22-Jun-10	325.870	2.295	-	-	323.575	-	
MW-34R	15-Oct-14	325.516	3.430	3.215	0.215	322.086	322.301	
MW-40	15-Oct-14	324.140	1.974	-	-	322.166	-	
	10-Jun-14	324.140	1.395	-	-	322.745	-	
	8-Oct-13	324.140	2.660	-	-	321.480	-	
	11-Jun-13	324.140	1.843	-	-	322.297	-	
	2-Oct-12	324.140	3.287	-	-	320.853	-	
	5-Jun-12	324.140	1.823	-	-	322.317	-	
	4-Oct-11	324.140	2.965	-	-	321.175	-	
	28-Jun-11	324.140	2.756	-	-	321.384	-	
	5-Oct-10	324.140	2.336	-	-	321.804	-	
	22-Jun-10	324.140	2.961	-	-	321.179	-	
MW-43	15-Oct-14	323.695	1.626	-	-	322.069	-	
	10-Jun-14	323.695	0.936	-	-	322.759	-	
	8-Oct-13	323.695	2.002	-	-	321.693	-	
	11-Jun-13	323.695	1.542	-	-	322.153	-	
	2-Oct-12	323.695	2.550	-	-	321.145	-	
	5-Jun-12	323.695	1.474	-	-	322.221	-	
	4-Oct-11	323.695	2.239	-	-	321.456	-	
	28-Jun-11	323.695	1.937	-	-	321.758	-	
	5-Oct-10	323.695	1.929	-	-	321.766	-	
22-Jun-10	323.695	2.225	-	-	321.470	-		
MW-46	15-Oct-14	324.385	1.792	-	-	322.593	-	
	10-Jun-14	324.385	1.620	-	-	322.765	-	
	8-Oct-13	324.385	1.955	-	-	322.430	-	
	11-Jun-13	324.385	1.795	-	-	322.590	-	
	2-Oct-12	324.385	2.571	-	-	321.814	-	
	5-Jun-12	324.385	1.795	-	-	322.590	-	
	4-Oct-11	324.385	2.316	-	-	322.069	-	
	28-Jun-11	324.385	2.028	-	-	322.357	-	
	5-Oct-10	324.385	2.022	-	-	322.363	-	
22-Jun-10	324.385	2.366	-	-	322.019	-		
MW-49	15-Oct-14	325.260	1.300	-	-	323.960	-	
	10-Jun-14	325.260	0.385	-	-	324.875	-	
	8-Oct-13	325.260	1.168	-	-	324.092	-	
	11-Jun-13	325.260	0.765	-	-	324.495	-	
	2-Oct-12	325.260	2.695	-	-	322.565	-	
	5-Jun-12	325.260	0.980	-	-	324.280	-	
	4-Oct-11	325.260	2.338	-	-	322.922	-	
	28-Jun-11	325.260	1.161	-	-	324.099	-	
	5-Oct-10	325.260	1.664	-	-	323.596	-	
22-Jun-10	325.260	2.370	-	-	322.890	-		

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
MW-50	15-Oct-14	325.500	1.742	1.663	0.079	323.758	323.837	
	10-Jun-14	325.500	0.430	0.381	0.049	325.070	325.119	
	8-Oct-13	325.500	1.635	1.552	0.083	323.865	323.948	
	11-Jun-13	325.500	1.118	0.898	0.220	324.382	324.602	
	2-Oct-12	325.500	3.305	2.874	0.431	322.195	322.626	
	5-Jun-12	325.500	1.365	1.240	0.125	324.135	324.260	
	4-Oct-11	325.500	2.948	2.665	0.283	322.552	322.835	
	28-Jun-11	325.500	1.672	1.568	0.104	323.828	323.932	
	5-Oct-10	325.500	2.985	1.970	1.015	322.515	323.530	
22-Jun-10	325.500	3.153	2.673	0.480	322.347	322.827		
MW-51	15-Oct-14	324.235	2.614	-	-	321.621	-	
	10-Jun-14	324.235	1.823	-	-	322.412	-	
	8-Oct-13	324.235	3.095	-	-	321.140	-	
	11-Jun-13	324.235	2.469	-	-	321.766	-	
	2-Oct-12	324.235	3.567	3.476	0.091	320.668	320.759	
	5-Jun-12	324.235	2.374	-	-	321.861	-	
	4-Oct-11	324.235	3.310	3.290	0.020	320.925	320.945	
	28-Jun-11	324.235	3.016	-	-	321.219	-	
	5-Oct-10	324.235	2.903	2.865	0.038	321.332	321.370	
22-Jun-10	324.235	3.171	3.165	0.006	321.064	321.070		
MW-52	15-Oct-14	323.575	1.789	-	-	321.786	-	
	10-Jun-14	323.575	0.998	-	-	322.577	-	
	8-Oct-13	323.575	2.125	-	-	321.450	-	
	11-Jun-13	323.575	1.468	-	-	322.107	-	
	2-Oct-12	323.575	2.720	2.661	0.059	320.855	320.914	
	5-Jun-12	323.575	1.615	-	-	321.960	-	
	4-Oct-11	323.575	2.514	-	-	321.061	-	
	28-Jun-11	323.575	2.022	-	-	321.553	-	
	5-Oct-10	323.575	2.050	-	-	321.525	-	
22-Jun-10	323.575	2.345	-	-	321.230	-		
MW-101	15-Oct-14	324.120	2.614	2.432	0.182	321.506	321.688	
	10-Jun-14	324.120	1.843	1.665	0.178	322.277	322.455	
	8-Oct-13	324.120	3.150	2.915	0.235	320.970	321.205	
	11-Jun-13	324.120	2.845	2.255	0.590	321.275	321.865	
	2-Oct-12	324.120	3.590	3.256	0.334	320.530	320.864	
	5-Jun-12	324.120	2.209	-	-	321.911	-	
	4-Oct-11	324.120	3.367	3.072	0.295	320.753	321.048	
	28-Jun-11	324.120	3.098	2.835	0.263	321.022	321.285	
	5-Oct-10	324.120	2.879	2.697	0.182	321.241	321.423	
22-Jun-10	324.120	3.242	2.957	0.285	320.878	321.163		
MW-102	15-Oct-14	324.160	2.490	-	-	321.670	-	
	10-Jun-14	324.160	1.771	-	-	322.389	-	
	8-Oct-13	324.160	2.950	-	-	321.210	-	
	11-Jun-13	324.160	2.366	2.350	0.016	321.794	321.810	
	2-Oct-12	324.160	3.364	3.350	0.014	320.796	320.810	
5-Jun-12	324.160	2.270	-	-	321.890	-		

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
MW-102 (cont'd)	4-Oct-11	324.160	3.160	-	-	321.000	-	
	28-Jun-11	324.160	2.892	-	-	321.268	-	
	5-Oct-10	324.160	2.730	-	-	321.430	-	
	22-Jun-10	324.160	3.024	-	-	321.136	-	
MW-103	15-Oct-14	323.570	1.888	-	-	321.682	-	
	10-Jun-14	323.570	1.457	-	-	322.113	-	
	8-Oct-13	323.570	2.431	-	-	321.139	-	
	11-Jun-13	323.570	1.852	-	-	321.718	-	
	2-Oct-12	323.570	2.975	-	-	320.595	-	
	5-Jun-12	323.570	1.717	-	-	321.853	-	
	4-Oct-11	323.570	2.607	-	-	320.963	-	
	28-Jun-11	323.570	2.397	-	-	321.173	-	
	5-Oct-10	323.570	2.150	-	-	321.420	-	
	22-Jun-10	323.570	2.645	-	-	320.925	-	
MW-104	15-Oct-14	323.910	2.237	-	-	321.673	-	
	10-Jun-14	323.910	1.504	-	-	322.406	-	
	8-Oct-13	323.910	2.645	-	-	321.265	-	
	11-Jun-13	323.910	1.970	-	-	321.940	-	
	2-Oct-12	323.910	3.490	3.020	0.470	320.420	320.890	
	5-Jun-12	323.910	2.042	-	-	321.868	-	
	4-Oct-11	323.910	3.026	2.898	0.128	320.884	321.012	
	28-Jun-11	323.910	2.508	-	-	321.402	-	
	5-Oct-10	323.910	2.490	-	-	321.420	-	
22-Jun-10	323.910	2.761	-	-	321.149	-		
MW-106	15-Oct-14	323.900	1.796	1.770	0.026	322.104	322.130	
	10-Jun-14	323.900	0.761	0.727	0.034	323.139	323.173	
	8-Oct-13	323.900	2.010	1.953	0.057	321.890	321.947	
	11-Jun-13	323.900	1.457	1.339	0.118	322.443	322.561	
	2-Oct-12	323.900	3.292	2.728	0.564	320.608	321.172	
	5-Jun-12	323.900	1.610	1.582	0.028	322.290	322.318	
	4-Oct-11	323.900	2.703	2.581	0.122	321.197	321.319	
	28-Jun-11	323.900	1.874	-	-	322.026	-	
	5-Oct-10	323.900	2.035	-	-	321.865	-	
22-Jun-10	323.900	2.426	-	-	321.474	-		
MW-107	15-Oct-14	324.010	1.571	-	-	322.439	-	
	10-Jun-14	324.010	0.597	-	-	323.413	-	
	8-Oct-13	324.010	1.644	-	-	322.366	-	
	11-Jun-13	324.010	1.122	-	-	322.888	-	
	2-Oct-12	324.010	2.727	2.720	0.007	321.283	321.290	
	5-Jun-12	324.010	1.329	-	-	322.681	-	
	4-Oct-11	324.010	2.482	-	-	321.528	-	
	28-Jun-11	324.010	1.572	-	-	322.438	-	
	5-Oct-10	324.010	1.863	-	-	322.147	-	
22-Jun-10	324.010	2.322	-	-	321.688	-		

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
MW-108	15-Oct-14	324.870	0.940	-	-	323.930	-	
	10-Jun-14	324.870	0.197	-	-	324.673	-	
	8-Oct-13	324.870	0.977	-	-	323.893	-	
	11-Jun-13	324.870	0.514	-	-	324.356	-	
	2-Oct-12	324.870	2.403	-	-	322.467	-	
	5-Jun-12	324.870	0.711	-	-	324.159	-	
	4-Oct-11	324.870	2.042	-	-	322.828	-	
	28-Jun-11	324.870	0.995	-	-	323.875	-	
	5-Oct-10	324.870	1.088	-	-	323.782	-	
22-Jun-10	324.870	2.374	-	-	322.496	-		
MW-109	15-Oct-14	325.480	2.094	-	-	323.386	-	
	10-Jun-14	325.480	1.095	0.929	0.166	324.385	324.551	
	8-Oct-13	325.480	2.144	1.867	0.277	323.336	323.613	
	11-Jun-13	325.480	1.553	1.405	0.148	323.927	324.075	
	2-Oct-12	325.480	3.170	3.137	0.033	322.310	322.343	
	5-Jun-12	325.480	2.006	1.798	0.208	323.474	323.682	
	4-Oct-11	325.480	2.932	2.890	0.042	322.548	322.590	
	28-Jun-11	325.480	2.210	1.889	0.321	323.270	323.591	
	5-Oct-10	325.480	2.498	-	-	322.982	-	
22-Jun-10	325.480	2.935	-	-	322.545	-		
MW-110R	15-Oct-14	325.528	1.124	0.800	0.324	324.404	324.728	
MW-112R	15-Oct-14	325.312	1.301	1.294	0.007	324.011	324.018	
MW-114	15-Oct-14	325.410	3.000	-	-	322.410	-	
	10-Jun-14	325.410	2.389	-	-	323.021	-	
	8-Oct-13	325.410	3.343	-	-	322.067	-	
	11-Jun-13	325.410	2.785	-	-	322.625	-	
	2-Oct-12	325.410	-	-	-	-	-	Dry
	5-Jun-12	325.410	2.867	-	-	322.543	-	
	4-Oct-11	325.410	3.619	-	-	321.791	-	
	28-Jun-11	325.410	3.341	-	-	322.069	-	
	5-Oct-10	325.410	3.171	-	-	322.239	-	
22-Jun-10	325.410	3.577	-	-	321.833	-		
MW-115	15-Oct-14	325.910	2.305	-	-	323.605	-	
	10-Jun-14	325.910	1.809	-	-	324.101	-	
	8-Oct-13	325.910	2.733	-	-	323.177	-	
	11-Jun-13	325.910	2.195	-	-	323.715	-	
	2-Oct-12	325.910	3.375	-	-	322.535	-	
	5-Jun-12	325.910	2.210	-	-	323.700	-	
	4-Oct-11	325.910	3.037	-	-	322.873	-	
	28-Jun-11	325.910	2.769	-	-	323.141	-	
	5-Oct-10	325.910	2.530	-	-	323.380	-	
22-Jun-10	325.910	3.037	-	-	322.873	-		
MW-116	15-Oct-14	326.270	1.336	-	-	324.934	-	
	10-Jun-14	326.270	1.169	-	-	325.101	-	
	8-Oct-13	326.270	1.926	-	-	324.344	-	
	11-Jun-13	326.270	1.556	-	-	324.714	-	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
MW-116 (cont'd)	2-Oct-12	326.270	3.674	3.672	0.002	322.596	322.598	
	5-Jun-12	326.270	1.273	-	-	324.997	-	
	4-Oct-11	326.270	2.604	-	-	323.666	-	
	28-Jun-11	326.270	2.261	-	-	324.009	-	
	5-Oct-10	326.270	1.624	-	-	324.646	-	
	22-Jun-10	326.270	2.909	-	-	323.361	-	
MW-124R	15-Oct-14	325.202	3.520	2.428	1.092	321.682	322.774	
MW-125R	15-Oct-14	325.442	0.720	-	-	324.722	-	
MW-126	15-Oct-14	325.815	1.540	1.350	0.190	324.275	324.465	
	10-Jun-14	325.815	0.619	0.589	0.030	325.196	325.226	
	8-Oct-13	325.815	2.104	1.627	0.477	323.711	324.188	
	11-Jun-13	325.815	1.166	1.158	0.008	324.649	324.657	
	2-Oct-12	325.815	3.377	3.320	0.057	322.438	322.495	
	5-Jun-12	325.815	1.244	1.170	0.074	324.571	324.645	
	4-Oct-11	325.815	3.631	2.833	0.798	322.184	322.982	
	28-Jun-11	325.815	1.919	1.629	0.290	323.896	324.186	
	5-Oct-10	325.815	2.840	1.997	0.843	322.975	323.818	
	22-Jun-10	325.815	4.188	2.850	1.338	321.627	322.965	
OW 3-2	15-Oct-14	325.340	1.761	1.480	0.281	323.579	323.860	
	10-Jun-14	325.340	0.448	-	-	324.892	-	
	8-Oct-13	325.340	1.360	1.353	0.007	323.980	323.987	
	11-Jun-13	325.340	0.870	-	-	324.470	-	
	2-Oct-12	325.340	3.142	3.071	0.071	322.198	322.269	
	5-Jun-12	325.340	0.954	-	-	324.386	-	
	4-Oct-11	325.340	2.874	2.802	0.072	322.466	322.538	
	28-Jun-11	325.340	1.457	-	-	323.883	-	
	5-Oct-10	325.340	2.255	2.108	0.147	323.085	323.232	
22-Jun-10	325.340	2.938	2.835	0.103	322.402	322.505		
OW 5-1	15-Oct-14	324.365	3.140	-	-	321.225	-	
	10-Jun-14	324.365	2.489	-	-	321.876	-	
	8-Oct-13	324.365	3.646	-	-	320.719	-	
	11-Jun-13	324.365	2.924	-	-	321.441	-	
	2-Oct-12	324.365	4.280	-	-	320.085	-	
	5-Jun-12	324.365	3.085	-	-	321.280	-	
	4-Oct-11	324.365	4.096	-	-	320.269	-	
	28-Jun-11	324.365	2.919	-	-	321.446	-	
	5-Oct-10	324.365	2.766	-	-	321.599	-	
22-Jun-10	324.365	3.258	-	-	321.107	-		
OW 5-2	15-Oct-14	323.600	1.950	1.904	0.046	321.650	321.696	
	10-Jun-14	323.600	1.275	1.258	0.017	322.325	322.342	
	8-Oct-13	323.600	2.568	2.355	0.213	321.032	321.245	
	11-Jun-13	323.600	1.910	1.829	0.081	321.690	321.771	
	2-Oct-12	323.600	2.758	2.663	0.095	320.842	320.937	
	5-Jun-12	323.600	1.634	1.603	0.031	321.966	321.997	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
OW 5-2 (cont'd)	4-Oct-11	323.600	2.548	2.470	0.078	321.052	321.130	
	28-Jun-11	323.600	2.607	2.215	0.392	320.993	321.385	
	5-Oct-10	323.600	2.138	-	-	321.462	-	
	22-Jun-10	323.600	2.405	2.374	0.031	321.195	321.226	
OW 5-3	15-Oct-14	323.675	2.223	-	-	321.452	-	
	10-Jun-14	323.675	1.584	-	-	322.091	-	
	8-Oct-13	323.675	2.680	-	-	320.995	-	
	11-Jun-13	323.675	2.153	-	-	321.522	-	
	2-Oct-12	323.675	3.983	-	-	319.692	-	
	5-Jun-12	323.675	1.964	-	-	321.711	-	
	4-Oct-11	323.675	2.817	-	-	320.858	-	
	28-Jun-11	323.675	2.580	-	-	321.095	-	
	5-Oct-10	323.675	2.477	-	-	321.198	-	
22-Jun-10	323.675	2.708	-	-	320.967	-		
OW 5-4	15-Oct-14	324.400	3.980	2.770	1.210	320.420	321.630	
	10-Jun-14	324.400	3.953	2.037	1.916	320.447	322.363	
	8-Oct-13	324.400	4.688	3.201	1.487	319.712	321.199	
	11-Jun-13	324.400	4.038	2.683	1.355	320.362	321.717	
	2-Oct-12	324.400	4.627	3.547	1.080	319.773	320.853	
	5-Jun-12	324.400	2.680	2.678	0.002	321.720	321.722	
	4-Oct-11	324.400	4.320	3.410	0.910	320.080	320.990	
	28-Jun-11	324.400	4.375	3.134	1.241	320.025	321.266	
	5-Oct-10	324.400	3.658	3.120	0.538	320.742	321.280	
22-Jun-10	324.400	4.122	3.300	0.822	320.278	321.100		
OW 5-6	15-Oct-14	324.235	1.995	-	-	322.240	-	
	10-Jun-14	324.235	1.411	-	-	322.824	-	
	8-Oct-13	324.235	2.712	-	-	321.523	-	
	11-Jun-13	324.235	1.843	-	-	322.392	-	
	2-Oct-12	324.235	3.354	-	-	320.881	-	
	5-Jun-12	324.235	1.809	-	-	322.426	-	
	4-Oct-11	324.235	2.988	-	-	321.247	-	
	28-Jun-11	324.235	2.809	-	-	321.426	-	
	5-Oct-10	324.235	2.442	-	-	321.793	-	
22-Jun-10	324.235	3.083	-	-	321.152	-		

Notes:

"-" = No Data

1. Density correction applied to groundwater elevation for wells where free product exists.
2. Well casing was damaged by snow removal operations. Casing was adjusted in 2013 and re-surveyed.

TABLE 7
EAST END GROUNDWATER LABORATORY RESULTS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o,m,p)	F1 (C ₈ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	
EAST END - TABLE 9 (Within 30 m of the Little Jackfish River)										
MW-20	16-Oct-14	-	-	-	-	-	2,500	1,300	<200	
	11-Jun-14	<0.2	<0.2	<0.2	<0.4	86	11,000	4,200	<200	
	11-Jun-14	<0.2	<0.2	<0.2	<0.4	120	-	-	-	Lab Dup.
	8-Oct-13	-	-	-	-	-	3,900	2,000	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	89	10,000	5,500	<200	
	3-Oct-12	-	-	-	-	-	13,000	7,500	<100	
	6-Jun-12	0.60	<0.2	0.46	0.9	39	5,800	3,300	180	
	5-Oct-11	-	-	-	-	-	2,900	1,500	<100	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	2,200	920	<100	
	7-Oct-10	-	-	-	-	-	3,600	1,700	<100	
22-Jun-10	0.50	<0.2	0.9	2.7	110	2,600	1,100	<100		
MW-40	16-Oct-14	-	-	-	-	-	150	<200	<200	
	11-Jun-14	<0.2	<0.2	<0.2	<0.4	<25	130	<200	<200	
	9-Oct-13	-	-	-	-	-	480	310	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	<25	520	250	<200	
	3-Oct-12	-	-	-	-	-	410	280	<100	
	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<25	<100	<100	<100	
	5-Oct-11	-	-	-	-	-	930	630	<100	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
	7-Oct-10	-	-	-	-	-	<100	<100	<100	
	22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
MW-43	16-Oct-14	-	-	-	-	-	740	260	<200	⁽⁵⁾
	11-Jun-14	<0.2	0.21	<0.2	<0.4	<25	940	380	<200	⁽⁵⁾
	8-Oct-13	-	-	-	-	-	1,100	450	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	<25	640	<200	<200	
	3-Oct-12	-	-	-	-	-	270	<100	<100	⁽⁵⁾
	6-Jun-12	<0.2	<0.2	<0.2	0.4	<25	230	<100	<100	⁽⁵⁾
	5-Oct-11	-	-	-	-	-	300	110	<100	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	830	300	<100	
	7-Oct-10	-	-	-	-	-	660	170	<100	
	22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	740	400	<100	
MW-46	16-Oct-14	-	-	-	-	-	260	<200	<200	
	11-Jun-14	<0.2	<0.2	<0.2	<0.4	<25	230	<200	<200	
	8-Oct-13	-	-	-	-	-	3,400	1,800	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	<25	450	210	<200	
	3-Oct-12	-	-	-	-	-	1,400	2,000	550	⁽⁵⁾
	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
	5-Oct-11	-	-	-	-	-	620	350	<100	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
	7-Oct-10	-	-	-	-	-	<100	<100	<100	
	22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	Field Dup.
MW-52	16-Oct-14	-	-	-	-	-	27,000	8,800	<200	
	16-Oct-14	-	-	-	-	-	40,000	14,000	250	Field Dup.
	11-Jun-14	1.70	<0.2	3.5	3.2	160	54,000	17,000	<200	
	11-Jun-14	1.60	<0.2	3.4	3.6	1,300	94,000	29,000	<200	Field Dup.
	9-Oct-13	-	-	-	-	-	130,000	36,000	<200	
	9-Oct-13	-	-	-	-	-	51,000	13,000	<200	Field Dup.
	9-Oct-13	-	-	-	-	-	52,000	13,000	<200	Lab Dup.
	12-Jun-13	0.76	<0.2	4	6.6	140	37,000	11,000	<200	
	12-Jun-13	0.59	<0.2	3	5.8	280	65,000	20,000	<200	Field Dup.
	3-Oct-12	-	-	-	-	-	190,000	50,000	170	⁽⁵⁾
	6-Jun-12	<0.2	<0.2	6.1	6.8	390	54,000	16,000	120	
	6-Jun-12	<0.2	<0.2	3.1	2.4	560	36,000	11,000	120	Field Dup.

TABLE 7
EAST END GROUNDWATER LABORATORY RESULTS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o,m,p)	F1 (C ₈ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₈ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	
EAST END - TABLE 9 (Within 30 m of the Little Jackfish River)										
MW-52 (cont'd)	5-Oct-11	-	-	-	-	-	33,000	10,000	<100	
	5-Oct-11	-	-	-	-	-	9,700	2,800	<100	Lab Dup.
	5-Oct-11	-	-	-	-	-	17,000	4,800	<100	Field Dup.
	29-Jun-11	6.40	<0.2	52	2.8	280	5,500	1,400	<100	
	29-Jun-11	6.10	<0.2	51	2.3	300	8,900	2,700	<100	Field Dup.
	7-Oct-10	-	-	-	-	-	600	150	<100	
	22-Jun-10	2.90	0.40	24	2.0	<100	670	<100	<100	Field Dup.
	22-Jun-10	2.60	0.30	22	2.1	<100	580	<100	<100	
OW 5-1	16-Oct-14	-	-	-	-	-	<100	<200	<200	
	11-Jun-14	<0.2	<0.2	<0.2	<0.4	<25	1,100	940	<200	
	9-Oct-13	-	-	-	-	-	850	520	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	<25	770	470	<200	
	3-Oct-12	-	-	-	-	-	6,000	3,300	<100	
	3-Oct-12	-	-	-	-	-	8,400	4,400	<100	⁽⁵⁾ Field Dup.
	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<25	330	160	<100	
	5-Oct-11	-	-	-	-	-	3,100	1,800	120	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	210	120	<100	
	7-Oct-10	-	-	-	-	-	860	590	<100	
	22-Jun-10	-	-	-	-	-	1,800	1,000	<100	Lab Dup.
	22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	1,800	870	<100	
OW 5-2	16-Oct-14	-	-	-	-	-	-	-	-	⁽⁶⁾
	11-Jun-14	-	-	-	-	-	-	-	-	⁽⁶⁾
	9-Oct-13	-	-	-	-	-	1,100,000	470,000	17,000	
	12-Jun-13	1.00	0.24	1.2	42.0	770	1,300,000	620,000	24,000	
	3-Oct-12	-	-	-	-	-	470,000	210,000	7,700	
	6-Jun-12	-	-	-	-	-	-	-	-	Dry
	5-Oct-11	-	-	-	-	-	700,000	340,000	13,000	
	29-Jun-11	4.40	0.50	4.6	73.0	3,100	390,000	160,000	6,700	
	7-Oct-10	-	-	-	-	-	720,000	290,000	<10,000	⁽⁴⁾
22-Jun-10	<0.2	<0.2	<0.2	<0.4	18,000	3,000,000	1,300,000	33,000	⁽⁴⁾	
OW 5-3	16-Oct-14	-	-	-	-	-	8,100	5,100	220	⁽⁶⁾
	11-Jun-14	2.20	0.34	<0.2	<0.4	57	6,600	3,400	<200	
	9-Oct-13	-	-	-	-	-	20,000	12,000	770	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	240	63,000	38,000	1,800	
	3-Oct-12	-	-	-	-	-	15,000	9,500	690	
	6-Jun-12	<0.2	0.78	<0.2	<0.4	<25	15,000	8,100	440	
	5-Oct-11	-	-	-	-	-	11,000	7,000	540	
	29-Jun-11	4.00	<0.2	<0.2	<0.4	480	5,900	3,100	190	
	7-Oct-10	-	-	-	-	-	3,300	1,900	<100	
22-Jun-10	0.60	<0.2	<0.2	<0.4	<100	10,000	4,400	<100		
EAST END - TABLE 3 (Outside 30 m of the Little Jackfish River)										
MW-21	16-Oct-14	-	-	-	-	-	-	-	-	⁽⁶⁾
	9-Oct-13	-	-	-	-	-	380,000	140,000	730	⁽⁴⁾
	3-Oct-12	-	-	-	-	-	560,000	240,000	8,800	⁽⁵⁾
	5-Oct-11	-	-	-	-	-	1,600,000	680,000	26,000	
	7-Oct-10	-	-	-	-	-	1,600,000	610,000	11,000	⁽⁴⁾
MW-24	16-Oct-14	-	-	-	-	-	<100	<200	<200	
	8-Oct-13	-	-	-	-	-	<100	<200	<200	
	3-Oct-12	-	-	-	-	-	1,100	480	<100	⁽⁵⁾
	5-Oct-11	-	-	-	-	-	290	120	<100	
	5-Oct-11	-	-	-	-	-	270	110	<100	Lab Dup.
	7-Oct-10	-	-	-	-	-	<100	<100	<100	

TABLE 7
 EAST END GROUNDWATER LABORATORY RESULTS
 CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o,m,p)	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₈₀)	
EAST END - TABLE 3 (Outside 30 m of the Little Jackfish River)										
MW-49	16-Oct-14	-	-	-	-	-	1,500	1,400	<200	
	9-Oct-13	-	-	-	-	-	8,400	3,400	<200	
	3-Oct-12	-	-	-	-	-	3,300	4,500	510	
	5-Oct-11	-	-	-	-	-	120,000	130,000	14,000	
	7-Oct-10	-	-	-	-	-	1,500	1,200	<100	
MW-51	16-Oct-14	-	-	-	-	-	290,000	180,000	13,000	
	9-Oct-13	-	-	-	-	-	1,200,000	580,000	41,000	
	3-Oct-12	-	-	-	-	-	600,000	310,000	21,000	
	5-Oct-11	-	-	-	-	-	3,000,000	1,600,000	100,000	
	7-Oct-10	-	-	-	-	-	230,000	96,000	5,500	(4)
MW-101	16-Oct-14	-	-	-	-	-	-	-	-	(5)
	9-Oct-13	-	-	-	-	-	280,000	120,000	4,900	(4)
	3-Oct-12	-	-	-	-	-	380,000	160,000	6,500	(5)
	5-Oct-11	-	-	-	-	-	2,300,000	1,000,000	44,000	
	7-Oct-10	-	-	-	-	-	1,800,000	620,000	13,000	(4)
MW-102	16-Oct-14	-	-	-	-	-	4,500	2,700	<200	
	9-Oct-13	-	-	-	-	-	3,100	1,900	<200	
	3-Oct-12	-	-	-	-	-	1,500	690	<100	(5)
	5-Oct-11	-	-	-	-	-	1,800	840	<100	
	7-Oct-10	-	-	-	-	-	1,700	760	<100	
MW-103	16-Oct-14	-	-	-	-	-	5,600	2,500	<200	
	16-Oct-14	-	-	-	-	-	5,600	2,200	<200	Lab Dup.
	9-Oct-13	-	-	-	-	-	40,000	15,000	460	
	3-Oct-12	-	-	-	-	-	570	470	<100	(5)
	5-Oct-11	-	-	-	-	-	2,100	1,200	<100	
	5-Oct-11	-	-	-	-	-	1,200	580	<100	Lab Dup.
	7-Oct-10	-	-	-	-	-	100	190	<100	
MW-104	16-Oct-14	-	-	-	-	-	56,000	19,000	390	
	9-Oct-13	-	-	-	-	-	150,000	45,000	380	
	3-Oct-12	-	-	-	-	-	1,400,000	420,000	1,700	(5)
	5-Oct-11	-	-	-	-	-	1,100,000	340,000	3,200	
	7-Oct-10	-	-	-	-	-	17,000	4,600	<100	
MW-106	16-Oct-14	-	-	-	-	-	-	-	-	(5)
	8-Oct-13	-	-	-	-	-	220,000	69,000	<200	
	6-Oct-12	-	-	-	-	-	280,000	90,000	630	
	5-Oct-11	-	-	-	-	-	4,900,000	1,700,000	<100	
	7-Oct-10	-	-	-	-	-	220,000	79,000	210	
MW-107	16-Oct-14	-	-	-	-	-	15,000	67,000	<200	
	8-Oct-13	-	-	-	-	-	27,000	12,000	<200	
	6-Oct-12	-	-	-	-	-	170,000	69,000	340	
	5-Oct-11	-	-	-	-	-	65,000	31,000	170	
	7-Oct-10	-	-	-	-	-	43,000	19,000	<100	
MW-108	16-Oct-14	-	-	-	-	-	1,400	780	<200	
	8-Oct-13	-	-	-	-	-	3,200	1,600	<200	
	6-Oct-12	-	-	-	-	-	1,400	690	<100	
	5-Oct-11	-	-	-	-	-	4,500	2,200	140	
	7-Oct-10	-	-	-	-	-	1,600	400	<100	
MW-109	16-Oct-14	-	-	-	-	-	20,000	6,500	<200	
	8-Oct-13	-	-	-	-	-	2,000,000	850,000	77,000	
	3-Oct-12	-	-	-	-	-	560,000	210,000	6,400	
	5-Oct-11	-	-	-	-	-	150,000	58,000	1,300	
	7-Oct-10	-	-	-	-	-	42,000	14,000	<100	

TABLE 7
EAST END GROUNDWATER LABORATORY RESULTS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o,m,p)	F1 (C ₈ -C ₁₀)	F2 (C ₁₀ -C ₁₈)	F3 (C ₁₈ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	
EAST END - TABLE 3 (Outside 30 m of the Little Jackfish River)										
MW-114	16-Oct-14	-	-	-	-	-	45,000	28,000	810	
	16-Oct-14	-	-	-	-	-	54,000	36,000	990	Field Dup.
	8-Oct-13	-	-	-	-	-	100,000	61,000	1,400	
	3-Oct-12	-	-	-	-	-	-	-	-	Dry
	5-Oct-11	-	-	-	-	-	77,000	44,000	1,100	
	7-Oct-10	-	-	-	-	-	87,000	37,000	1,100	
MW-115	16-Oct-14	-	-	-	-	-	<100	<200	<200	
	8-Oct-13	-	-	-	-	-	380	220	<200	
	3-Oct-12	-	-	-	-	-	3,900	1,500	<100	
	3-Oct-12	-	-	-	-	-	3,300	1,300	<100	Lab Dup.
	5-Oct-11	-	-	-	-	-	410	130	<100	
	7-Oct-10	-	-	-	-	-	<100	<100	<100	
MW-126	16-Oct-14	-	-	-	-	-	-	-	-	⁽⁶⁾
	8-Oct-13	-	-	-	-	-	420,000	150,000	5,000	⁽⁴⁾
	3-Oct-12	-	-	-	-	-	1,000,000	440,000	32,000	
	5-Oct-11	-	-	-	-	-	1,300,000	520,000	45,000	
	7-Oct-10	-	-	-	-	-	690,000	260,000	21,000	
OW 3-2	16-Oct-14	-	-	-	-	-	-	-	-	⁽⁶⁾
	8-Oct-13	-	-	-	-	-	1,100,000	430,000	15,000	
	3-Oct-12	-	-	-	-	-	190,000	81,000	1,900	
	5-Oct-11	-	-	-	-	-	3,000,000	1,200,000	30,000	
	7-Oct-10	-	-	-	-	-	1,000,000	390,000	11,000	
QA / QC										
Method Blank	16-Oct-14	-	-	-	-	-	<100	<200	<200	
Method Blank	3-Oct-12	-	-	-	-	-	<100	<100	<100	
Method Blank	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<25	-	-	-	
Method Blank	5-Oct-11	-	-	-	-	-	<100	<100	<100	
Method Blank	29-Jun-11	<0.2	<0.2	<0.2	<0.4	-	-	-	-	
Travel Blank	16-Oct-14	-	-	-	-	-	<100	<200	<200	
Travel Blank	11-Jun-14	-	-	-	-	-	<100	<200	<200	
Travel Blank	3-Oct-12	-	-	-	-	-	<100	<100	<100	
Travel Blank	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<25	<100	<100	<100	
Travel Blank	5-Oct-11	-	-	-	-	-	<100	<100	<100	
Travel Blank	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
Travel Blank	7-Oct-10	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
Travel Blank	22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
MOE										
Table 3 ⁽²⁾		(430)	(18,000)	(2,300)	(4,200)	(750)	(150)	(500)	(500)	-
		44	18,000	2,300	4,200	750	150	500	500	-
Table 9 ⁽³⁾		44	14,000	1,800	3,300	420	150	500	500	-

Notes:

"-" = No Data

- All concentrations in micrograms per litre (µg/L).
- MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property) Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition () - Criterion value in brackets applies to medium and fine textured soils.
- MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property) Table 9 - Non-Potable Groundwater
- Due to the high concentration of target analytes, the sample required dilution. The reporting limits were adjusted accordingly.
- The sample bottle contained visible sediment, which was included in the analysis as per the Protocol for Analytical Methods Use in the Assessment of Properties, under part XV.1 of the Environmental Protection Act.
- Sample was not collected due to the presence of measurable LNAPL.

BOLD = Value exceeds MOE Table 9 Criteria

BOLD = Value exceeds MOE Table 3 Criteria

TABLE 8
 EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
 CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-20	16-Oct-14	6.90	841.0	1.77	9.2	-107	grey	turbid	h/c sheen	h/c odour	
	11-Jun-14	6.50	596.0	3.80	8.4	-115	light grey	turbid	h/c sheen	h/c odour	
	8-Oct-13	7.10	935.0	3.94	12.0	-107	light grey	turbid	h/c sheen	h/c odour	
	12-Jun-13	6.80	879.0	1.95	7.4	-115	dark grey	turbid	slight	h/c odour	
	3-Oct-12	7.10	883.0	2.08	13.3	-123	dark grey	turbid	none	none	
	6-Jun-12	7.03	811.0	3.19	17.3	-59	beige	turbid	none	h/c odour	
	5-Oct-11	7.01	665.0	2.30	11.7	-123	beige	turbid	none	h/c odour	
	29-Jun-11	6.55	851.0	3.24	13.4	-98	beige	slightly turbid	none	h/c odour	
	7-Oct-10	6.88	827.0	2.93	15.8	-84	yellow	turbid	none	h/c odour	
22-Jun-10	6.86	569.0	4.91	9.4	-76	black	turbid	none	h/c odour		
MW-21	16-Oct-14	-	-	-	-	-	-	-	-	-	(1)
	9-Oct-13	7.20	884.0	2.23	10.7	-137	clear	clear	h/c sheen	h/c odour	
	3-Oct-12	7.40	592.0	2.05	13.0	-121	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.95	352.0	4.35	11.1	-48	clear	clear	h/c sheen	h/c odour	
	7-Oct-10	7.29	590.0	1.51	16.7	under range	clear	clear	h/c sheen	h/c odour	
MW-24	16-Oct-14	7.40	760.0	-42.00	8.3	-50	clear	turbid	none	none	
	8-Oct-13	8.00	659.0	3.80	9.8	5	clear	clear	none	none	
	3-Oct-12	7.20	733.0	3.85	10.2	-50	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.39	411.0	4.71	9.2	60	beige	turbid	none	none	
	7-Oct-10	7.45	690.0	4.63	15.7	-20	clear	clear	none	none	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. ($\mu\text{S}/\text{cm}$)	D.O. (mg/L)	Temp. ($^{\circ}\text{C}$)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-40	16-Oct-14	7.00	943.0	1.95	9.6	-81	beige	turbid	none	none	
	11-Jun-14	6.80	540.0	9.00	6.2	-98	light grey	turbid	none	none	
	9-Oct-13	7.00	891.0	1.90	10.6	-80	light grey	turbid	none	h/c odour	
	12-Jun-13	7.40	652.0	3.14	6.9	-7	white	slightly turbid	none	none	
	3-Oct-12	7.30	763.0	2.94	11.6	-36	light grey	turbid	none	none	
	6-Jun-12	7.71	716.0	3.82	14.0	33	beige	turbid	none	none	
	5-Oct-11	7.13	496.0	3.42	11.3	-13	light yellow	turbid	h/c sheen	h/c odour	
	29-Jun-11	6.78	754.0	7.95	13.3	-54	beige	turbid	none	none	
	7-Oct-10	7.09	914.0	2.58	15.1	-45	white	turbid	none	none	
	22-Jun-10	7.07	504.0	7.49	10.6	115	beige	slightly turbid	none	h/c odour	
MW-43	16-Oct-14	7.00	805.0	1.99	9.3	-125	beige	turbid	none	none	
	11-Jun-14	6.80	491.0	7.22	7.5	-86	beige	turbid	h/c sheen	h/c odour	
	8-Oct-13	7.80	814.0	2.30	10.5	-65	grey	turbid	none	none	
	12-Jun-13	7.10	761.0	2.20	6.3	-77	light grey	turbid	none	none	
	3-Oct-12	7.00	854.0	1.19	11.4	-137	light grey	turbid	none	none	
	6-Jun-12	7.50	690.0	2.67	13.4	-65	beige	turbid	none	none	
	5-Oct-11	7.25	360.0	1.06	11.2	-123	beige	turbid	h/c sheen	h/c odour	
	29-Jun-11	6.59	568.0	6.89	12.1	-74	beige	turbid	none	none	
	7-Oct-10	7.21	807.0	2.15	14.0	-76	beige	turbid	h/c sheen	h/c odour	
	22-Jun-10	7.08	430.0	3.22	8.6	-51	beige	turbid	none	none	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-46	16-Oct-14	7.20	793.0	2.22	9.1	-82	grey	turbid	h/c sheen	h/c odour	
	11-Jun-14	6.10	566.0	4.25	6.5	-109	light grey	turbid	none	none	
	8-Oct-13	7.40	828.0	2.91	11.0	-71	light grey	turbid	h/c sheen	h/c odour	
	12-Jun-13	7.10	803.0	3.21	7.7	-74	light grey	turbid	none	none	
	3-Oct-12	6.90	830.0	2.96	12.3	-83	light grey	turbid	none	none	
	6-Jun-12	7.08	892.0	3.06	15.7	-52	beige	turbid	none	none	
	5-Oct-11	7.09	589.0	2.98	10.6	-62	beige	turbid	none	none	
	29-Jun-11	6.41	945.0	3.62	10.6	-78	beige	turbid	none	none	
	7-Oct-10	7.23	901.0	3.39	14.9	-77	beige	turbid	none	none	
	22-Jun-10	6.92	561.0	7.48	12.5	-25	grey	turbid	none	none	
MW-49	16-Oct-14	7.10	883.0	3.18	9.7	-93	light yellow	turbid	none	none	
	8-Oct-13	7.10	867.0	2.82	12.0	-73	light grey	turbid	none	h/c odour	
	3-Oct-12	-	-	-	-	-	-	-	-	-	Insufficient Sample
	5-Oct-11	-	-	-	-	-	-	-	-	-	Insufficient Sample
	7-Oct-10	6.87	984.0	2.36	15.7	14	yellow	clear	h/c sheen	h/c odour	
MW-51	16-Oct-14	6.70	897.0	1.94	9.9	-50	light grey	turbid	h/c sheen	h/c odour	
	9-Oct-13	7.60	892.0	4.22	12.5	-77	grey	turbid	none	none	
	3-Oct-12	7.40	534.0	2.27	11.5	-116	dark grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.97	579.0	1.48	10.3	-69	beige	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.94	1,113.0	1.40	15.6	-28	light grey	turbid	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. ($\mu\text{S}/\text{cm}$)	D.O. (mg/L)	Temp. ($^{\circ}\text{C}$)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-52	16-Oct-14	6.80	842.0	2.46	10.2	-93	light yellow	turbid	h/c sheen	h/c odour	
	11-Jun-14	7.10	315.0	6.11	7.2	-118	light grey	clear	none	none	
	9-Oct-13	7.30	902.0	2.58	9.2	-117	clear	slightly turbid	h/c sheen	h/c odour	
	12-Jun-13	7.50	406.0	2.42	6.9	-119	light grey	turbid	h/c sheen	h/c odour	
	3-Oct-12	6.90	975.0	2.03	10.9	-140	light grey	turbid	h/c sheen	h/c odour	
	6-Jun-12	7.46	479.0	2.68	14.4	-61	beige	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.94	810.0	2.41	9.4	-91	clear	turbid	none	none	
	29-Jun-11	6.81	904.0	3.30	11.6	-72	clear	turbid	none	h/c odour	
	7-Oct-10	6.95	929.0	1.72	14.6	-74	beigr	turbid	none	h/c odour	
	22-Jun-10	6.96	258.0	6.22	9.9	-93	clear	slightly turbid	none	h/c odour	
MW-101	16-Oct-14	-	-	-	-	-	-	-	-	-	(1)
	9-Oct-13	7.10	828.0	2.59	11.2	-72	clear	clear	h/c sheen	h/c odour	
	3-Oct-12	7.30	984.0	1.91	10.9	-114	clear	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.41	491.0	3.06	10.2	-88	clear	turbid	h/c sheen	h/c odour	
	7-Oct-10	7.02	1,203.0	0.93	15.8	-88	clear	clear	h/c sheen	h/c odour	
MW-102	16-Oct-14	7.00	1,006.0	1.83	8.9	-132	gre	turbid	h/c sheen	h/c odour	
	9-Oct-13	7.90	962.0	2.22	8.9	-119	black	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.30	717.0	1.80	12.6	-111	dark grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.22	800.0	1.30	9.6	-100	dark grey	turbid	h/c sheen	h/c odour	
	7-Oct-10	7.15	1,085.0	1.65	13.7	-45	dark grey	turbid	h/c sheen	h/c odour	

TABLE 8
 EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
 CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-103	16-Oct-14	6.90	756.0	1.77	9.5	-85	yellow	turbid	h/c sheen	h/c odour	
	9-Oct-13	7.70	934.0	3.11	10.1	-88	clear	clear	none	none	
	3-Oct-12	7.20	1,020.0	1.31	11.0	-33	clear	clear	none	none	
	5-Oct-11	7.07	548.0	6.27	10.7	71	clear	turbid	none	none	
	7-Oct-10	6.91	1,046.0	1.65	15.6	-42	clear	slightly turbid	none	none	
MW-104	16-Oct-14	6.60	904.0	2.47	10.5	-97	light yellow	turbid	h/c sheen	h/c odour	
	9-Oct-13	7.20	898.0	2.24	12.1	-73	yellow	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.10	112.0	1.99	11.8	-144	orange/brown	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.69	384.0	9.26	12.0	-53	yellow	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.81	994.0	2.71	16.2	-32	yellow	turbid	h/c sheen	h/c odour	
MW-106	16-Oct-14	-	-	-	-	-	-	-	-	-	(1)
	8-Oct-13	6.90	753.0	2.44	11.0	-111	light grey	turbid	h/c sheen	h/c odour	
	3-Oct-12	6.80	852.0	3.16	11.8	-137	yellow	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.98	840.0	2.04	10.8	-80	beige	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.84	945.0	1.39	14.7	-64	clear	turbid	h/c sheen	h/c odour	
MW-107	16-Oct-14	6.70	996.0	2.33	9.2	-115	light yellow	turbid	h/c sheen	h/c odour	
	8-Oct-13	7.00	1,076.0	2.93	10.8	-106	clear	slightly turbid	h/c sheen	h/c odour	
	3-Oct-12	7.00	1,198.0	1.96	12.8	-141	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.94	704.0	2.43	10.7	-73	beige	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.91	900.0	2.74	14.9	-49	light grey	turbid	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-108	16-Oct-14	6.60	982.0	1.61	9.6	-118	dark grey	turbid	none	h/c odour	
	8-Oct-13	7.10	816.0	2.56	10.5	-105	dark grey	turbid	h/c sheen	h/c odour	
	3-Oct-12	6.80	1,070.0	1.39	12.6	-124	dark grey	turbid	none	none	
	5-Oct-11	6.82	850.0	1.91	11.4	-106	beige	turbid	none	none	
	7-Oct-10	6.53	1,575.0	1.98	15.1	-31	grey	turbid	h/c sheen	h/c odour	
MW-109	16-Oct-14	6.70	787.0	2.62	8.8	-60	clear	slightly turbid	h/c sheen	h/c odour	
	8-Oct-13	7.20	872.0	2.01	9.8	-82	clear	clear	h/c sheen	h/c odour	
	3-Oct-12	6.80	1,049.0	2.15	11.2	-96	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.79	774.0	1.29	9.9	-75	light grey	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.88	1,073.0	1.86	13.9	-65	clear	clear	h/c sheen	h/c odour	
MW-114	16-Oct-14	7.10	959.0	3.24	8.7	-116	dark grey	turbid	h/c sheen	h/c odour	
	8-Oct-13	7.40	928.0	2.98	9.5	-120	dark grey	turbid	h/c sheen	h/c odour	
	3-Oct-12	-	-	-	-	-	-	-	-	-	Insufficient Sample
	5-Oct-11	7.62	562.0	3.90	10.8	-44	dark grey	turbid	h/c sheen	h/c odour	
	7-Oct-10	7.22	990.0	2.60	15.4	-81	dark grey	turbid	h/c sheen	h/c odour	
MW-115	16-Oct-14	6.60	1,870.0	2.44	10.0	-9	light grey	slight turbidity	none	none	
	8-Oct-13	7.10	1,762.0	2.58	10.9	35	light yellow	slight turbidity	none	none	
	3-Oct-12	6.80	2,360.0	4.45	11.6	-21	beige	turbid	none	none	
	5-Oct-11	6.79	652.0	3.21	11.2	144	clear	slight turbidity	none	none	
	7-Oct-10	6.74	1,926.0	3.48	17.2	40	yellow	turbid	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO
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TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-126	16-Oct-14	-	-	-	-	-	-	-	-	-	(1)
	8-Oct-13	7.00	748.0	2.91	12.5	-100	light yellow	clear	h/c sheen	h/c odour	
	3-Oct-12	7.10	712.0	1.46	12.6	-70	clear	turbid	h/c sheen	h/c odour	
	5-Oct-11	-	-	-	-	-	-	-	-	-	Insufficient Sample
	7-Oct-10	6.86	874.0	2.33	16.6	-54	clear	clear	h/c sheen	h/c odour	
OW 3-2	16-Oct-14	-	-	-	-	-	-	-	-	-	(1)
	8-Oct-13	7.00	682.0	4.28	12.1	-93	light brown	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.00	814.0	2.03	12.3	-97	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.90	465.0	2.40	10.5	-108	clear	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.83	993.0	2.26	16.9	-53	clear	clear	h/c sheen	h/c odour	
OW 5-1	16-Oct-14	6.70	871.0	2.11	9.2	-85	yellow	turbid	h/c sheen	h/c odour	
	11-Jun-14	6.80	550.0	11.10	7.5	-84	light grey	turbid	none	none	
	9-Oct-13	7.10	825.0	2.11	10.0	-92	orange	turbid	none	none	
	12-Jun-13	7.30	575.0	2.94	6.6	-66	light brown	turbid	none	none	
	3-Oct-12	7.40	662.0	1.40	11.2	-64	yellow/orange	turbid	none	none	
	6-Jun-12	7.71	756.0	1.80	12.3	17	orange/brown	turbid	none	none	
	5-Oct-11	7.19	418.0	3.08	9.1	5	beige	turbid	none	h/c odour	
	29-Jun-11	6.46	924.0	2.24	12.5	-14	light brown	turbid	none	none	
	7-Oct-10	7.21	837.0	2.11	13.4	-82	yellow	turbid	none	none	
	22-Jun-10	7.26	459.0	3.66	9.9	-46	beige	slightly turbid	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. ($\mu\text{S}/\text{cm}$)	D.O. (mg/L)	Temp. ($^{\circ}\text{C}$)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
OW 5-2	16-Oct-14	-	-	-	-	-	-	-	-	-	(1)
	11-Jun-14	-	-	-	-	-	-	-	-	-	(1)
	9-Oct-13	7.20	774.0	3.47	11.1	-88	clear	clear	h/c sheen	h/c odour	
	12-Jun-13	6.90	823.0	2.02	7.3	-103	light yellow	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.20	625.0	1.65	11.9	-104	clear	clear	none	none	
	5-Oct-11	7.23	537.0	3.44	10.2	-80	beige	turbid	h/c sheen	h/c odour	
	29-Jun-11	6.77	805.0	1.88	14.4	-79	clear	slightly turbid	h/c sheen	h/c odour	
	7-Oct-10	6.82	1,030.0	1.57	15.5	61	clear	clear	none	none	
	22-Jun-10	7.52	617.0	3.09	11.1	-118	beige	slightly turbid	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
OW 5-3	16-Oct-14	6.90	772.0	1.76	8.9	-125	grey	turbid	h/c sheen	h/c odour	
	11-Jun-14	6.90	440.0	10.70	6.7	-103	brown	turbid	h/c sheen	h/c odour	
	9-Oct-13	7.60	824.0	1.79	9.9	-84	grey	turbid	none	h/c odour	
	12-Jun-13	7.30	458.0	3.02	11.2	-14	yellow	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.30	1,108.0	1.64	11.4	-137	dark grey	turbid	h/c sheen	h/c odour	
	6-Jun-12	7.66	583.0	1.89	14.4	-63	yellow/brown	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.07	643.0	2.89	9.9	-102	grey	turbid	h/c sheen	h/c odour	
	29-Jun-11	6.40	954.0	0.46	12.2	-66	beige	turbid	none	h/c odour	
	7-Oct-10	7.14	836.0	1.51	14.4	-52	dark grey	turbid	h/c sheen	h/c odour	
	22-Jun-10	6.97	629.0	5.52	9.8	-73	beige	turbid	none	none	

Notes:

"-" = No Data

D.O. = Dissolved Oxygen

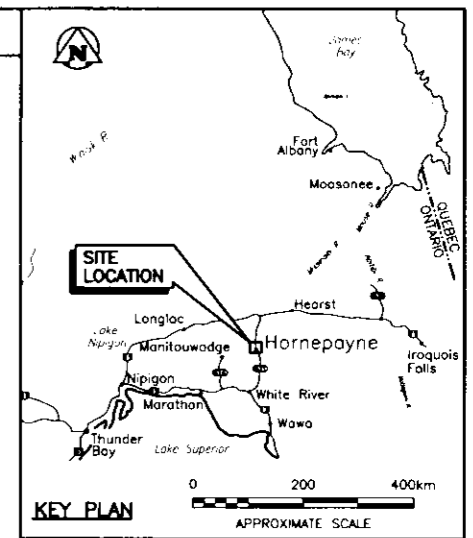
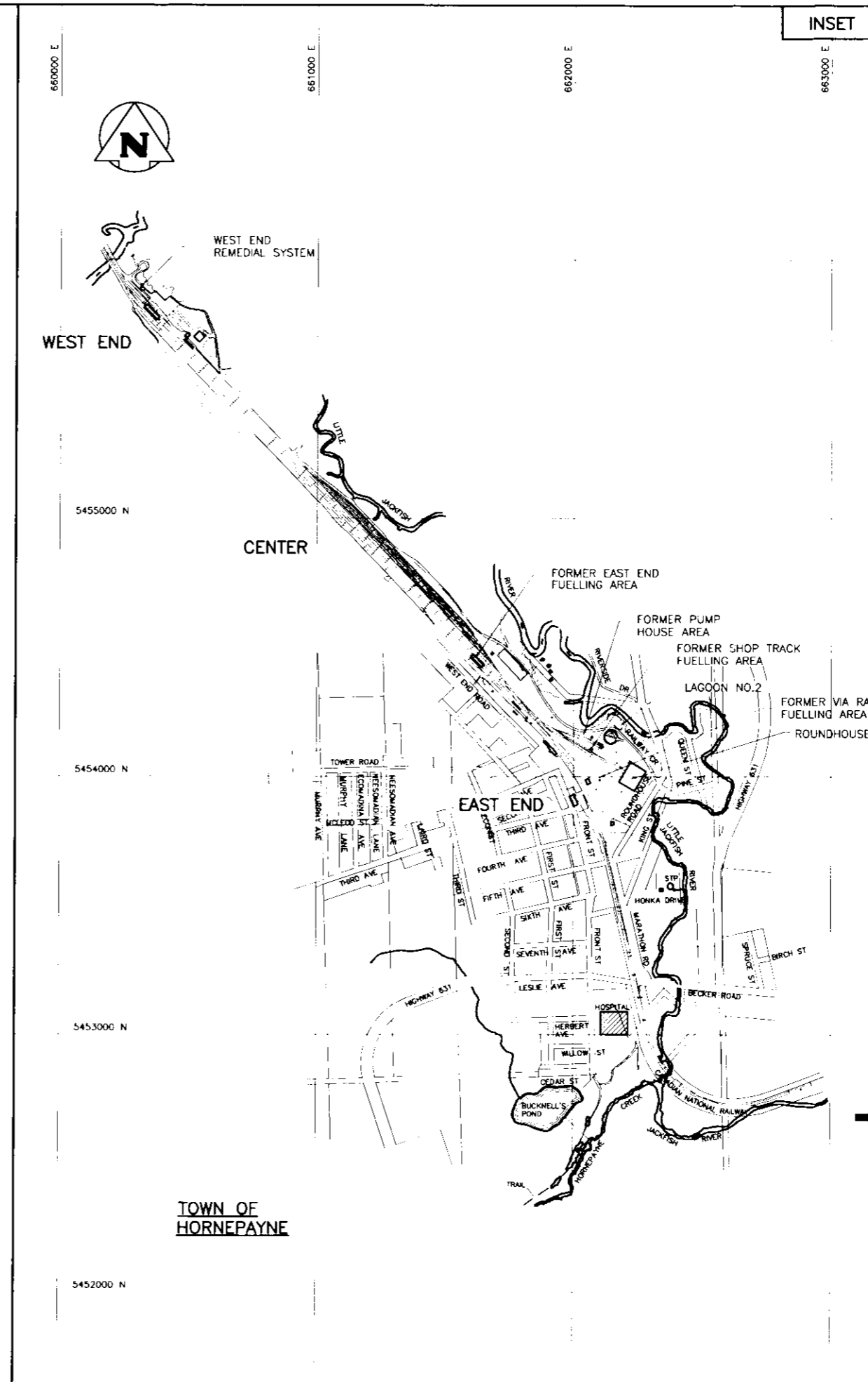
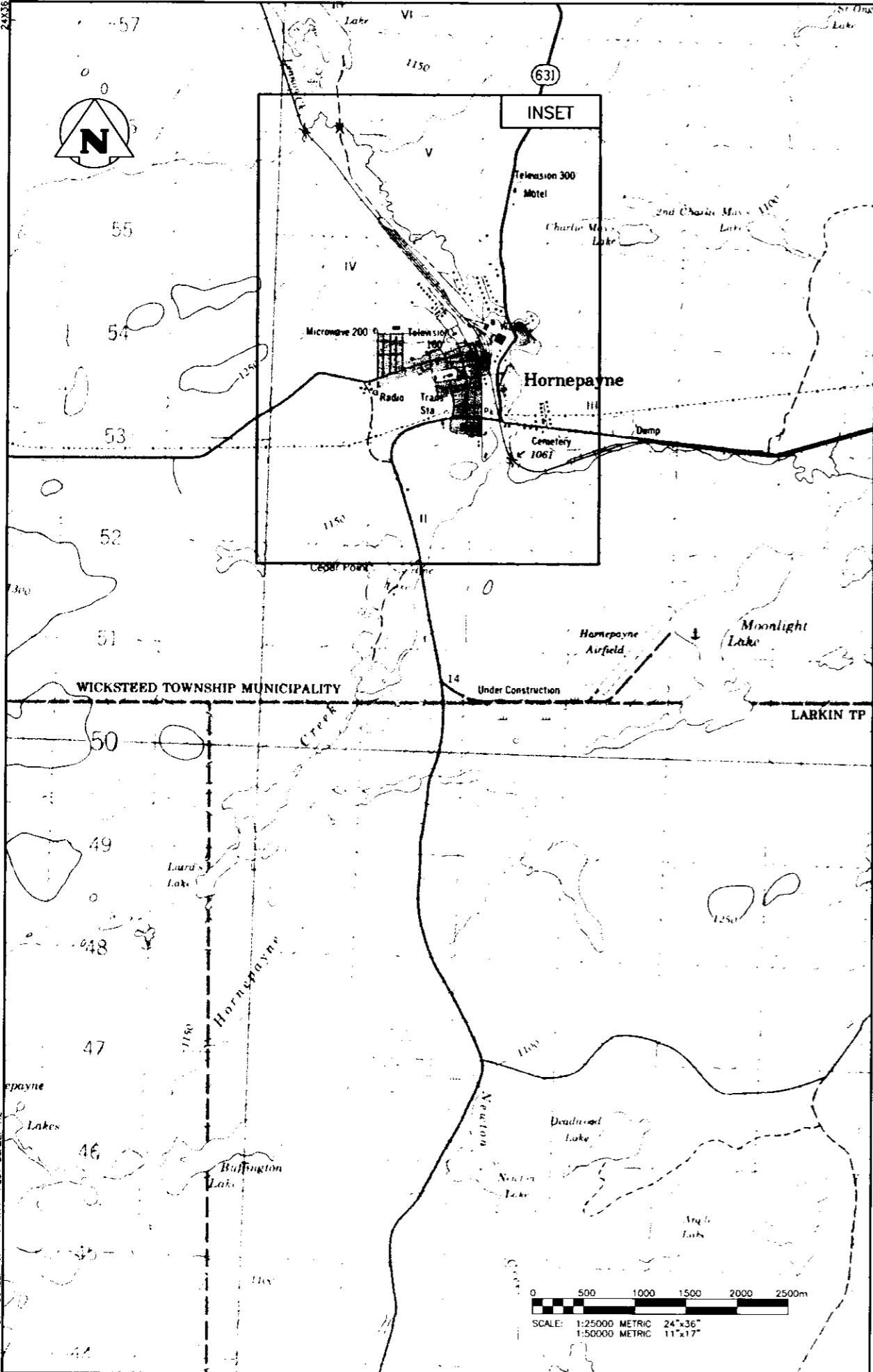
E.C. = Electrical Conductivity

O.R.P. = Oxidation Reduction Potential

1. Sample was not collected due to presence of measurable LNAPL.

FIGURES

File Name: P:\Projects\2014\14-0434-004.dwg User: MJOE Reports (Rev 0\14-0434-004_FIG 1-Rev 0.dwg - Tab: FIG 01 Plotted By: Williamson 02/09/2015 [Mon 9:46am]
 24"x36" PLOT SCALE: 1:11"x17" PLOT SCALE: 1:2

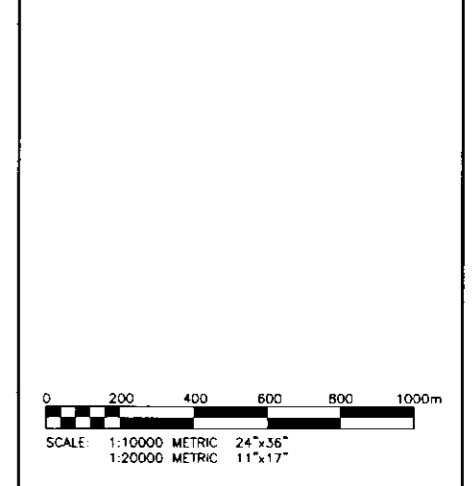


NOTES:

1. LOCATION OF INSET-PLAN IN RELATION TO COORDINATES IS APPROXIMATE

REFERENCE:

BASE MAP: 1:50,000 NTS MAP 42 F/2 (HORNEPAYNE), NAD 1927, EDITION 2, PUBLISHED 1979



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CONSULTING ENGINEERS			
2014 REMEDIAL OPERATIONS			
PIN# 1000/ONPR/100586, 100587 & 100591 - HORNEPAYNE YARD, ON			
SITE LOCATION PLAN			
FEBRUARY 2015		FIGURE 1	
		REV 0	

000513

File Name: P:\Projects\2014\14-0434-004\dwg\MOE Reports\Rev 0\14-0434-004_FIG 2-Rev 0.dwg - Tab: FIG 02 Plotted By: twilliamson 02/09/2015 [Mon 9:50am]
 24"x36" PLOT SCALE: 1:11,717 PLOT SCALE: 1:2



5456000 N

660000 E

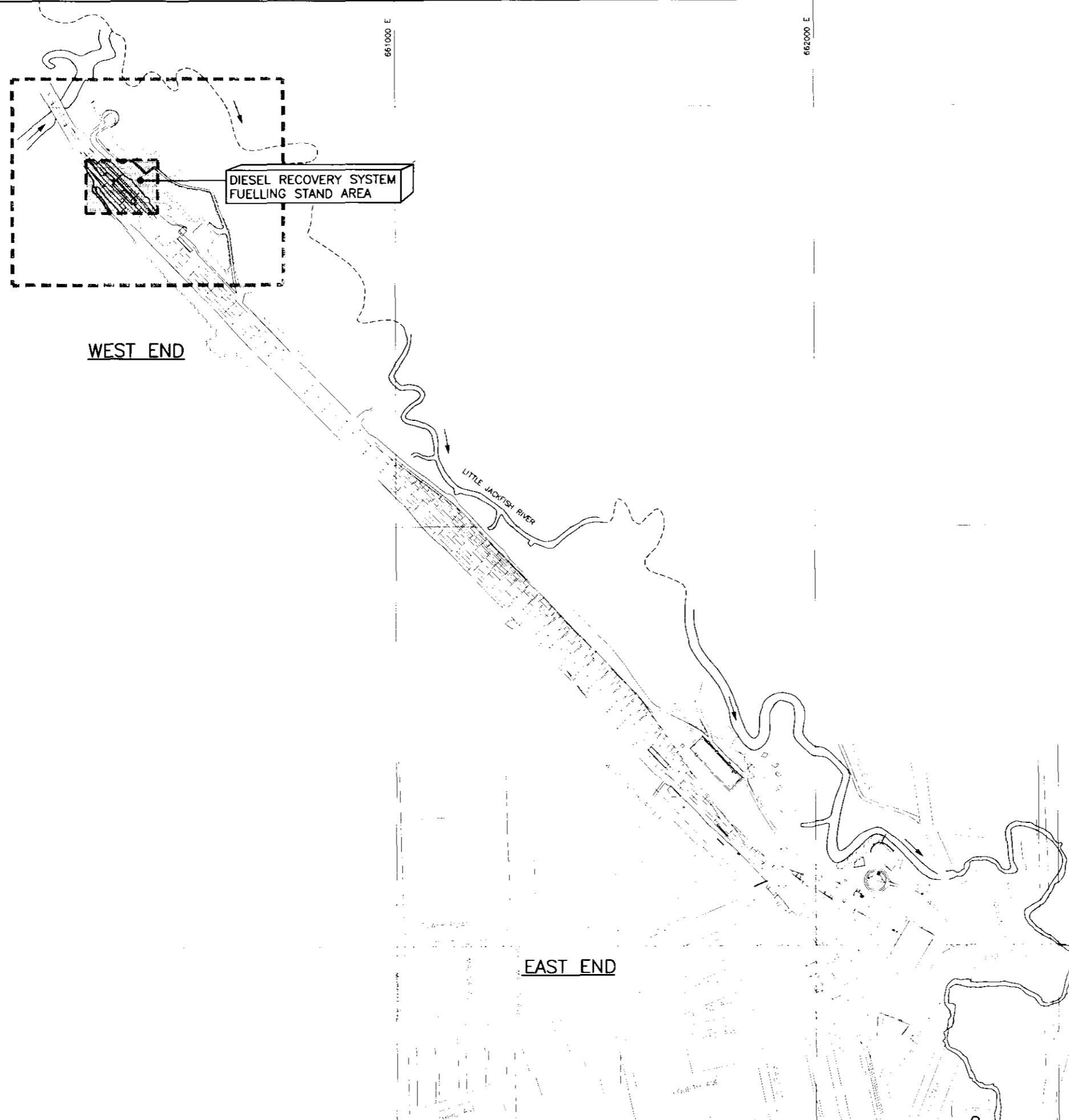
661000 E

662000 E

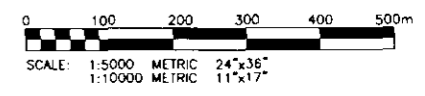
663000 E

5455000 N

5454000 N



- LEGEND**
- PLAN LIMITS
 - DIESEL RECOVERY SYSTEM DETAIL PLANS
 - RIVER FLOW DIRECTION



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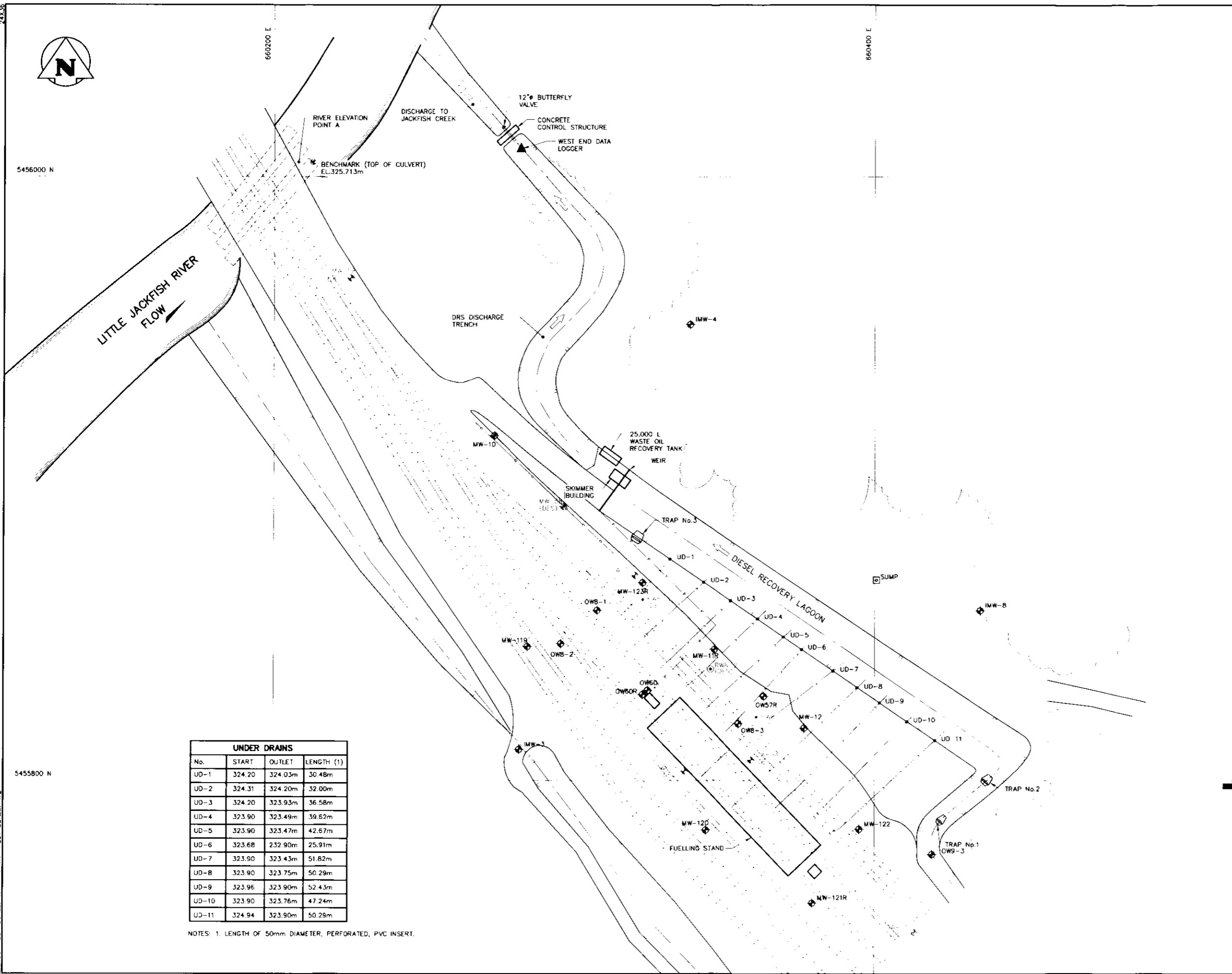
2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100587
 HORNEPAYNE YARD, ON

WEST END YARD PLAN

FEBRUARY 2015	FIGURE 2	DEC 0
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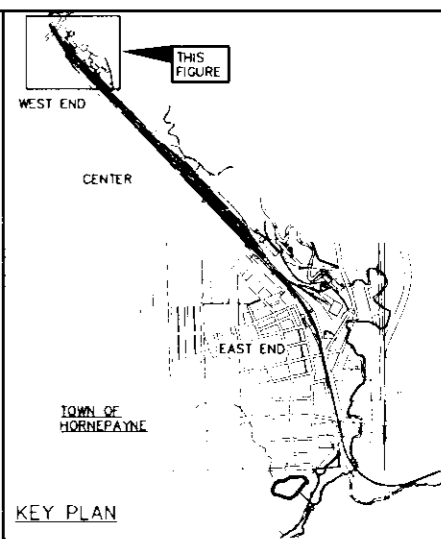
000514

File Name: P:\Projects\2014\14-0434-004\dwg\env\MOE Reports\Rev 0\14-0434-004_FIG 3-Rev 0.dwg - Tab: FIG 3 Plotted By: twilliamson 02/09/2015 [Mon 9:51am] 24"x36" PLOT SCALE: 1:1 "11"x17" PLOT SCALE: 1:2



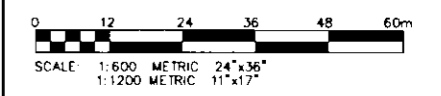
UNDER DRAINS			
No.	START	OUTLET	LENGTH (1)
UD-1	324.20	324.03m	30.48m
UD-2	324.31	324.20m	32.00m
UD-3	324.20	323.93m	36.58m
UD-4	323.90	323.49m	39.62m
UD-5	323.90	323.47m	42.67m
UD-6	323.68	232.90m	25.91m
UD-7	323.90	323.43m	51.82m
UD-8	323.90	323.75m	50.29m
UD-9	323.96	323.90m	52.43m
UD-10	323.90	323.76m	47.24m
UD-11	324.94	323.90m	50.29m

NOTES: 1. LENGTH OF 50mm DIAMETER, PERFORATED, PVC INSERT.



- LEGEND:**
- BERM
 - - - CENTERLINE OF DITCH
 - - - FENCE
 - - - BURIED ELECTRICAL CABLE
 - ▲ BENCHMARK
 - ◆ MW-119 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - ◆ MW-10 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - ◆ MW-123R REPLACEMENT MONITORING WELL (INSTALLED BY KGS GROUP - 2014)
 - ⊙ RWB-1 RECOVERY WELL
 - SUMP
 - - - RAILROAD TRACKS
 - - - UNDERGROUND DRAIN
 - ⊘ DESTROYED
 - ▲ FLOW MONITORING DATA LOGGER LOCATION

NOTES:
1. SITE PLAN BASED ON AUTOCAD FILE PROVIDED BY CN.



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PIN# 1000/ONPR/100587
HORNEPAYNE YARD, ON
WEST END SITE PLAN AND DIESEL RECOVERY SYSTEM COMPONENTS

000515

File Name: P:\Projects\2014\14-0434-004\dwg\env\MOE Reports\Rev 0\14-0434-004-FIG 4-Rev 0.dwg - Tab: FIG D1 Plotted By: twilliamson 02/09/2015 [Mon 9:54am]
 24x36 - PLOT SCALE: 1:1 - 11x17 - PLOT SCALE: 1:2



5456000 N

660000 E

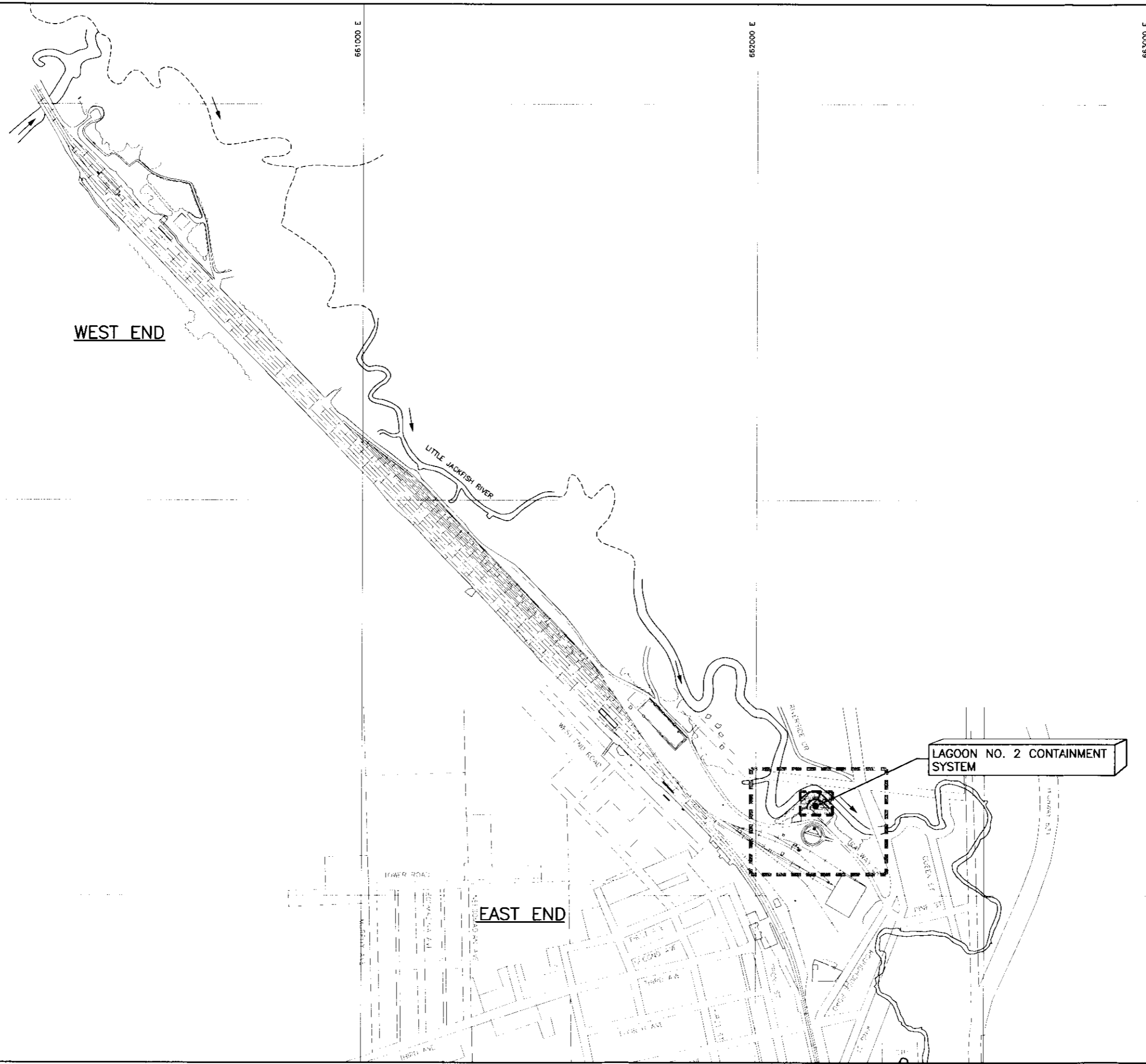
661000 E

662000 E

663000 E

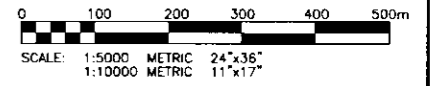
5455000 N

5454000 N



LEGEND

- PLAN LIMITS
- DIESEL RECOVERY SYSTEM DETAIL PLANS
- RIVER FLOW DIRECTION



0	15/02/09	ISSUED WITH MOE REPORT	TG
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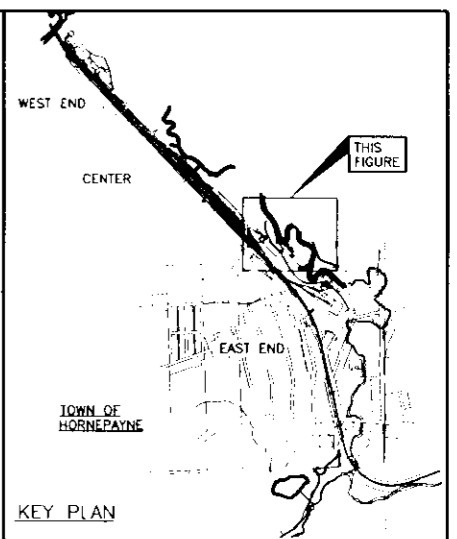
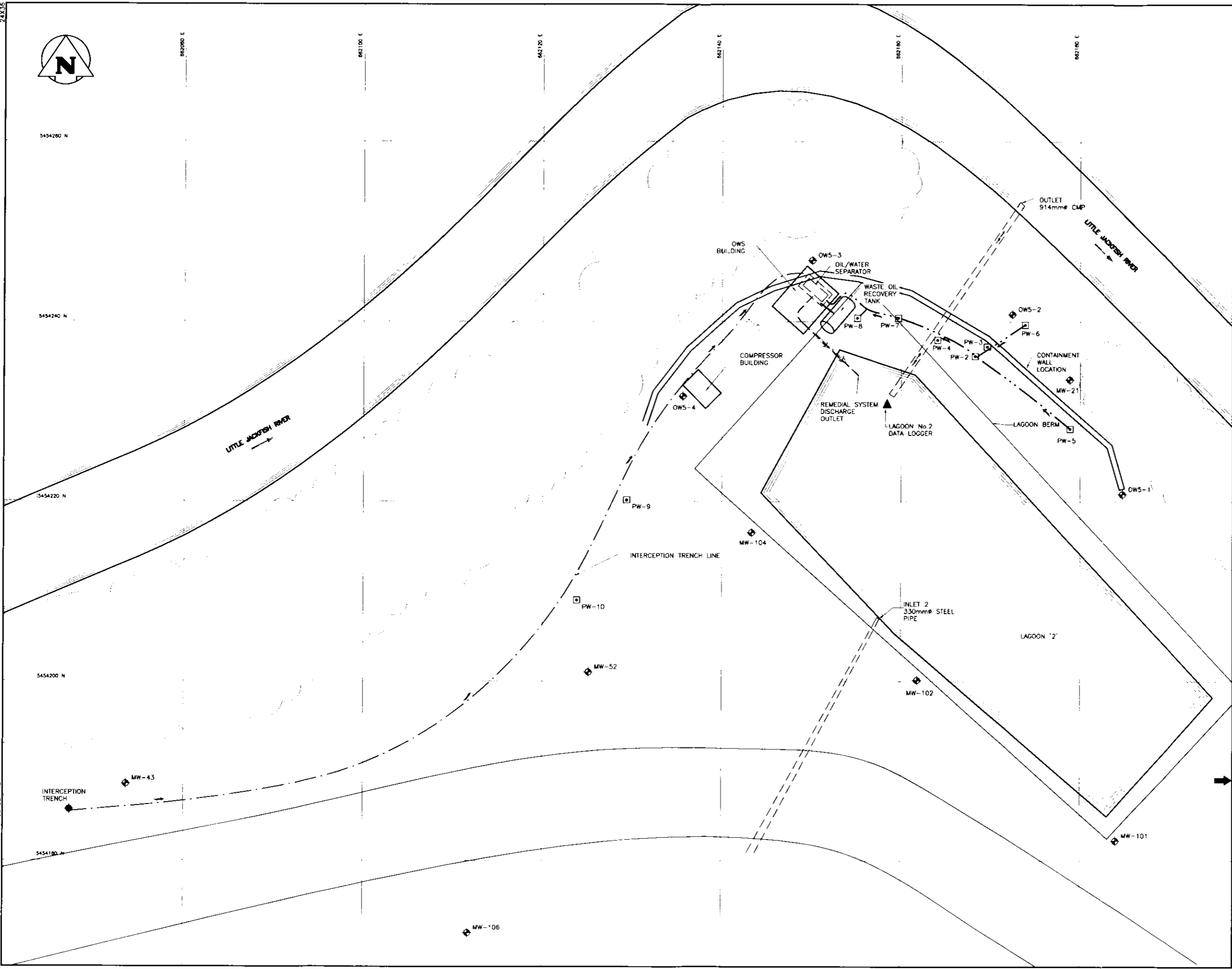
2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100591
 HORNEPAYNE YARD, ON

LAGOON No.2 SITE PLAN

FEBRUARY 2015	FIGURE 4	REV 0
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000516

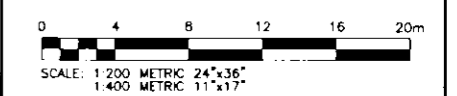
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 24x36 PLOT SCALE: 1:1 11x17 PLOT SCALE: 1:2



- LEGEND**
- APPROXIMATED LIMITS OF TREED AREA
 - EDGE OF WATER
 - CULVERT
 - DISCHARGE LINE
 - INTERCEPTION TRENCH LINE
 - ◆ MW-104 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - ◆ MW-52 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - ◆ INTERCEPTION TRENCH
 - PW-2 PUMPING WELL
 - TOTAL FLUIDS FLOW DIRECTION
 - LPH FLOW DIRECTION
 - WATER FLOW DIRECTION
 - SURFACE WATER FLOW DIRECTION
 - DESTROYED
 - ▲ FLOW MONITORING DATA LOGGER LOCATION

NOTES:

1. DRAWING BASED ON BIOGENIE ENVIRONMENTAL CN AUTO CAD FILE.



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KGS GROUP **CANADIAN NATIONAL**
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2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100591
 HORNEPAYNE YARD, ON

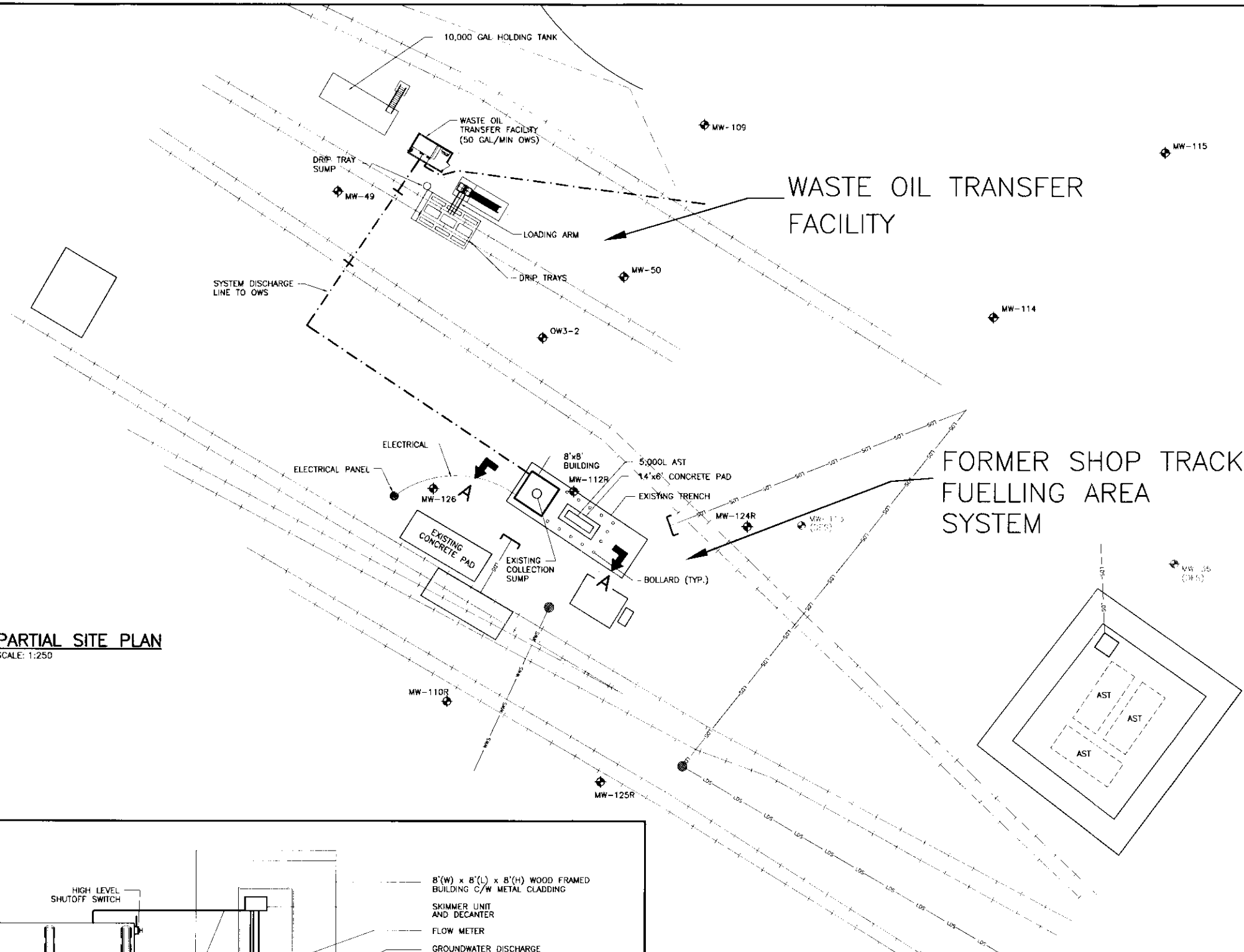
LAGOON NO.2
 CONTAINMENT SYSTEM
 COMPONENTS

000517

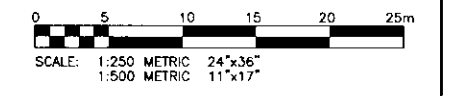
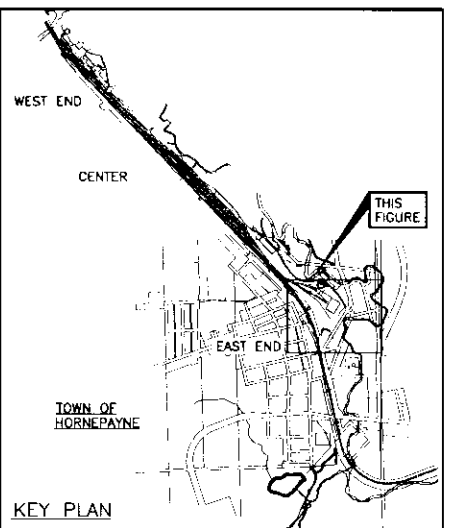
File Name: P:\Projects\2014\14-0434-00\dwg\env\MOE Reports\Rev 0\14-0434-004-FIG 7-Rev 0.dwg - Tab: FIG E2 Plotted By: twilliamson 02/09/2015 [Mon 9:59am]
 24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



PARTIAL SITE PLAN
SCALE: 1:250



- LEGEND**
- RAILROAD TRACK
 - SANITARY SEWER
 - STORM SEWER
 - DISCHARGE LINE
 - ◆ MW-126 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - ◆ MW-50 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - ◆ MW-110R REPLACEMENT MONITORING WELL (INSTALLED BY KGS GROUP - 2014)
 - (D.E.S.) DESTROYED
 - MANHOLES

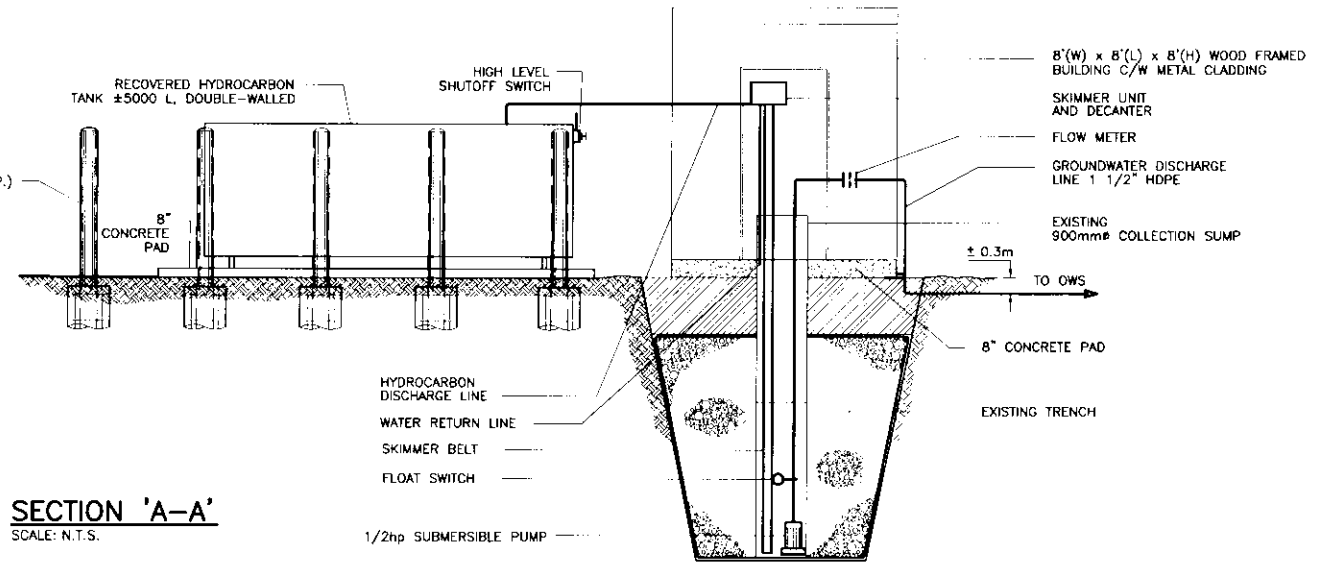


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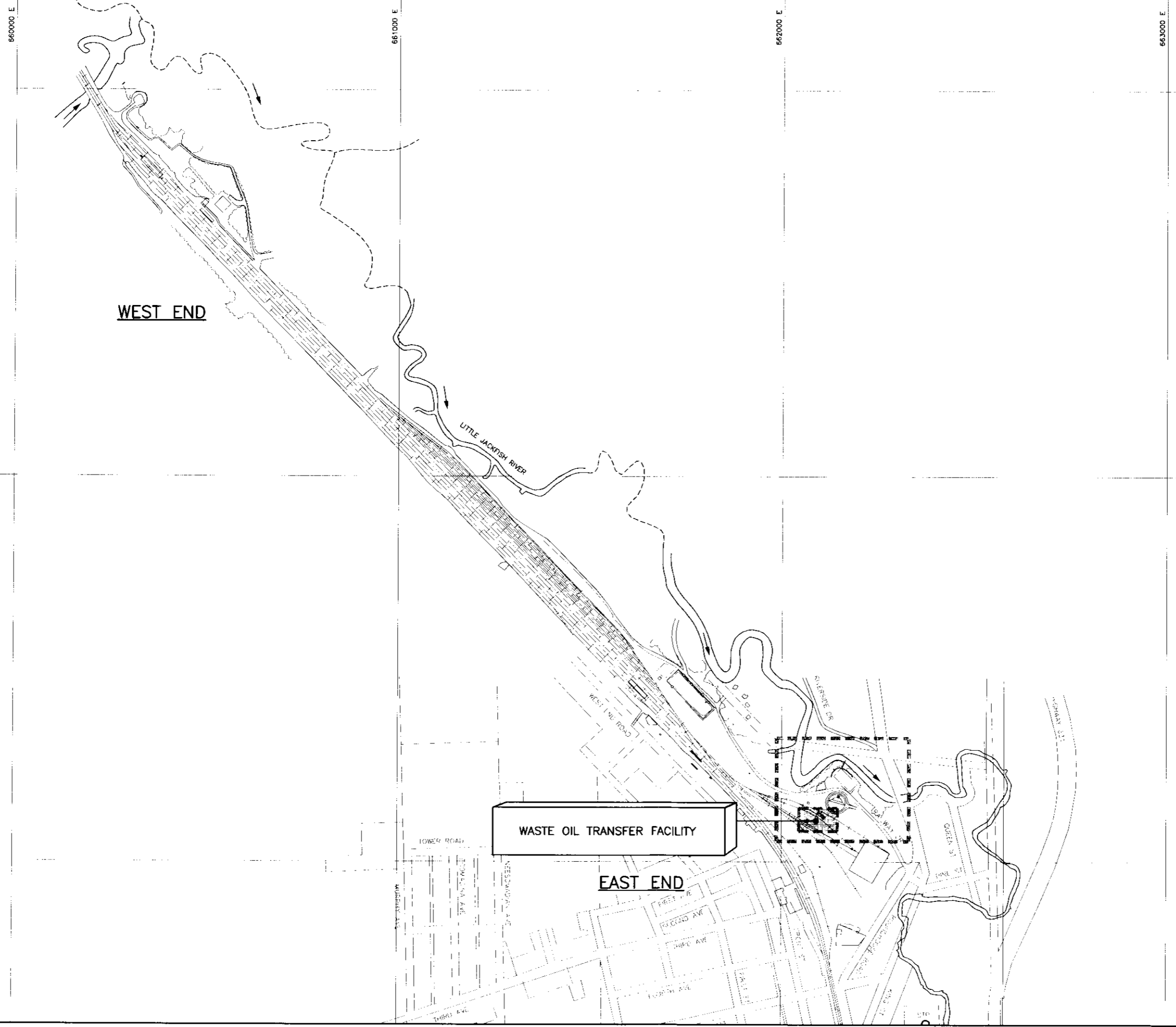
KGS GROUP **CN CANADIAN NATIONAL**
CONSULTING ENGINEERS

2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100591
 HORNEPAYNE YARD, ON
 FORMER SHOP TRACK FUELLING AREA SYSTEM COMPONENTS



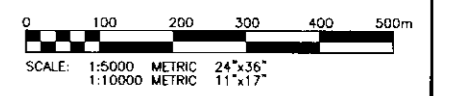
SECTION 'A-A'
SCALE: N.T.S.

File Name: P:\Projects\2014\14-0434-004\env\MOE Reports\Rev 0\14-0434-004_FIG 8-Rev D.dwg - Tab: FIG 8 Plotted By: twilliamson 02/09/2015 [Mon 10:37am]
 24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



LEGEND

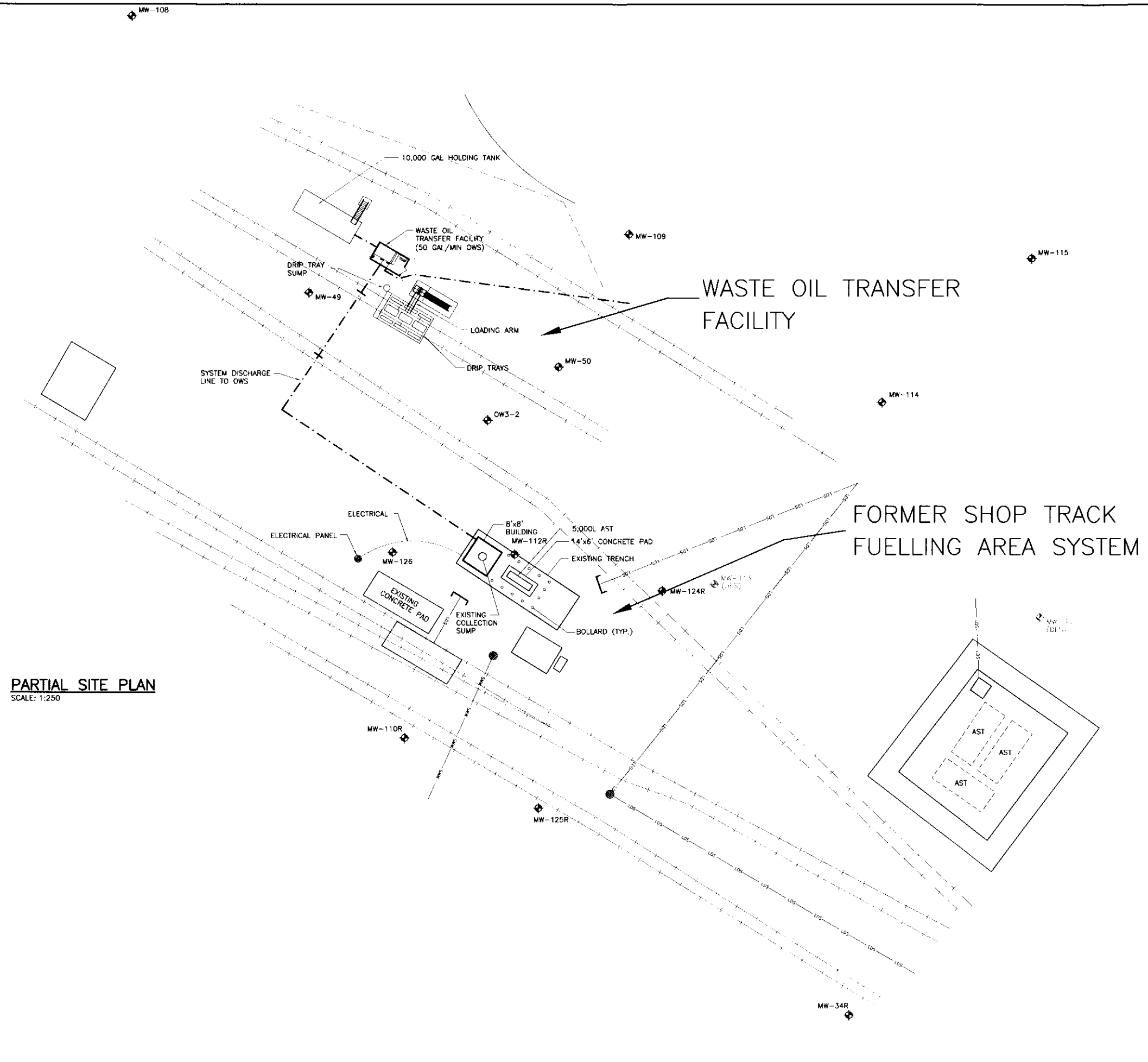
- PLAN LIMITS
- DIESEL RECOVERY SYSTEM DETAIL PLANS
- RIVER FLOW DIRECTION



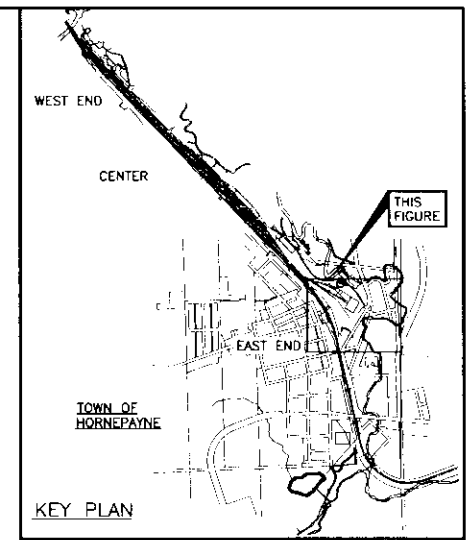
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NO	YY/MM/DD	DESCRIPTION	BY
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2014 REMEDIAL OPERATIONS PIN# 1000/ONPR/100591 HORNEPAYNE YARD, ON WASTE OIL TRANSFER FACILITY SITE PLAN			
FEBRUARY 2015		FIGURE 8	REV 0

000520

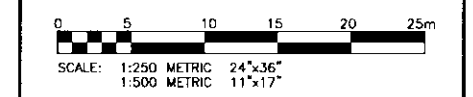
File Name: P:\Projects\2014\14-0434-004\dwg\env\MOE Reports\Rev 0\14-0434-004-FIG 9-Rev 0.dwg - Tab: FIG F2 Plotted By: twilliamson 02/09/2015 [Mon 10:40am]
 24x36 - PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



PARTIAL SITE PLAN
SCALE: 1:250



- LEGEND**
- RAILROAD TRACK
 - - - SANITARY SEWER
 - - - STORM SEWER
 - - - DISCHARGE LINE
 - ◆ MW-126 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - ◆ MW-50 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - ◆ MW-110R REPLACEMENT MONITORING WELL (INSTALLED BY KGS - 2014)
 - (H.S.) DESTROYED
 - MANHOLES



NO	DATE	DESCRIPTION	BY
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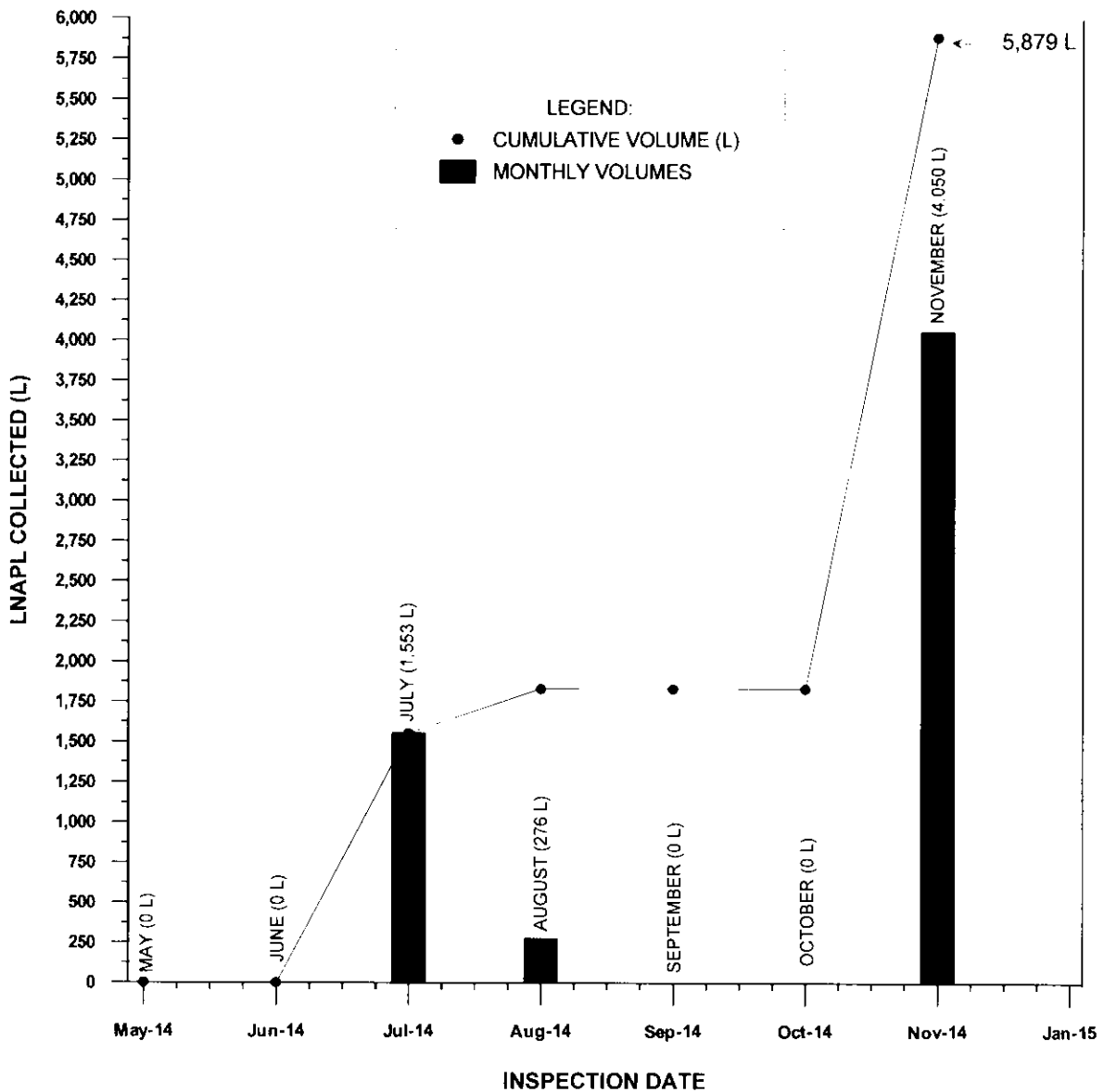
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CN CANADIAN NATIONAL

2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100591
 HORNEPAYNE YARD, ON
 WASTE OIL TRANSFER FACILITY
 SYSTEM COMPONENTS

FEBRUARY 2015	FIGURE 9	REV 0
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NOTES: 5,879 L OF LNAPL WAS COLLECTED AT THE WEST END IN 2014.

May
 - The skimmer unit was installed and activated on May 28.
 - The skimmer unit operated within normal parameters.

June
 - The skimmer unit operated within normal parameters.
 - 0 L of LNAPL was collected in June.

July
 - The skimmer unit operated within normal parameters.
 - 203 L of LNAPL was collected in July.
 - GFL removed approximately 1,350 L of LNAPL from Lagoon No. 5

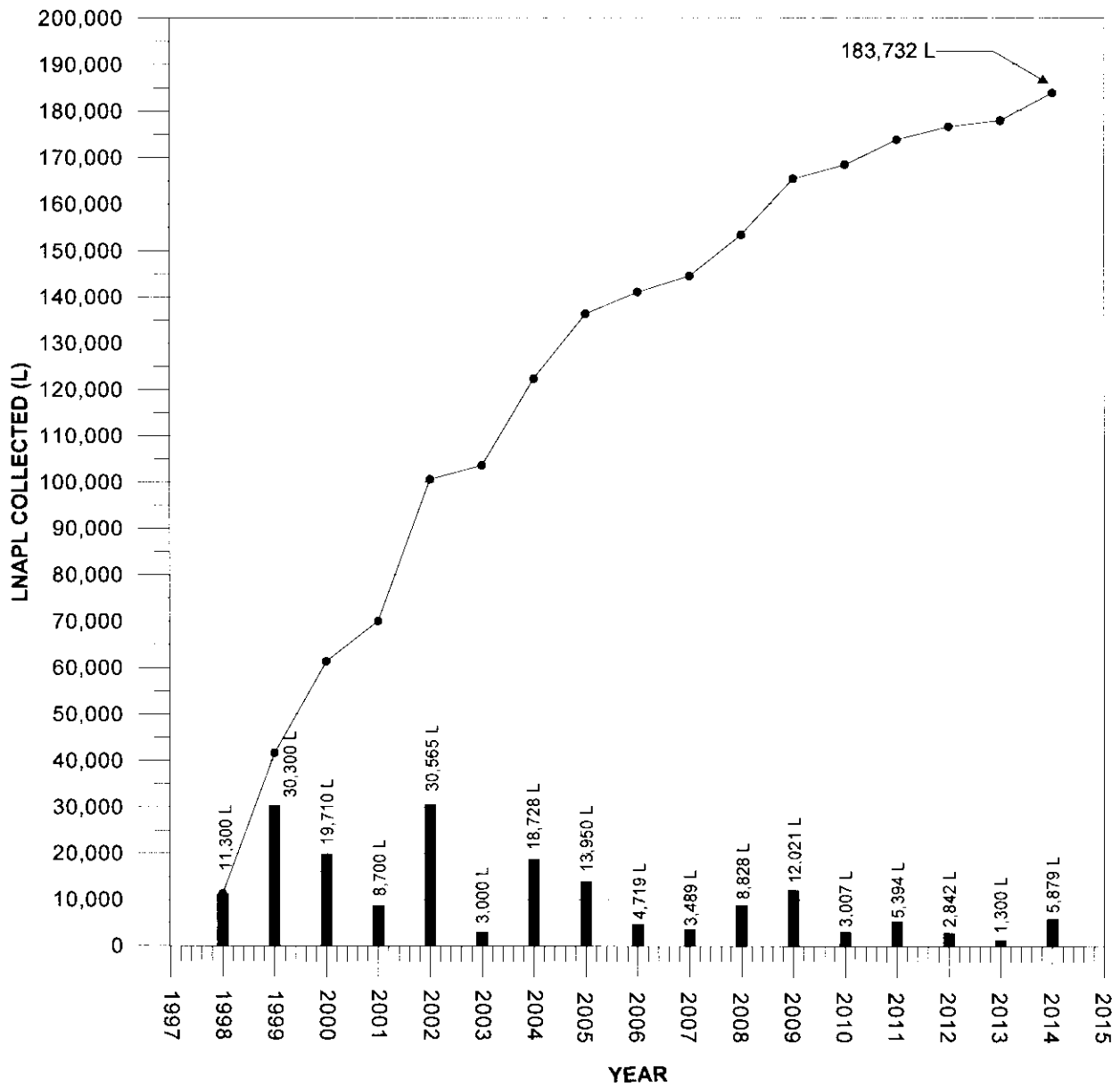
August
 - The skimmer unit operated within normal parameters.
 - 276 L of LNAPL was collected in August.

September
 - The skimmer unit operated within normal parameters.
 - 0 L of LNAPL was collected in September.

October
 - The skimmer unit operated within normal parameters.
 - 0 L of LNAPL was collected in October.

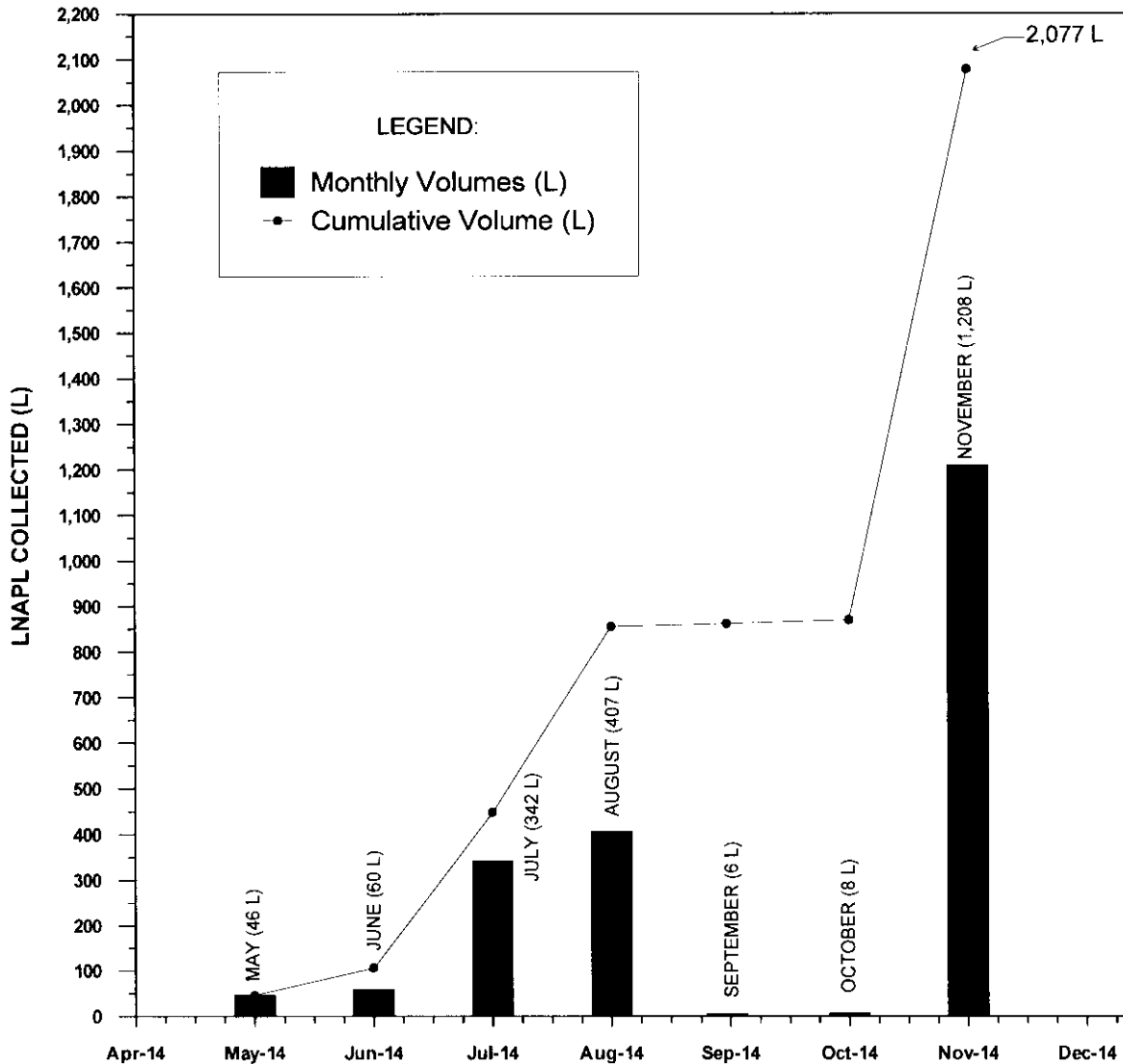
November
 - GFL removed approximately 4,050 L of LNAPL from Lagoon No. 5.
 - Skimmer unit was shutdown and winterized.

0	15/02/09	ISSUE D WITH MOE REPORT	TG
NO	YEAR(MM)	DESCRIPTION	BY
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2014 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
2014 LNAPL COLLECTION DATA WEST END			
FEBRUARY 2015		FIGURE 10	



● CUMULATIVE VOLUME (L)
 ■ YEARLY VOLUMES

0	150205	ISSUED WITH MOE REPORT	10
NO	ISSUED	DESCRIPTION	11
REVISIONS / ISSUE			
2014 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
HISTORICAL LNAPL COLLECTION DATA WEST END			
FEBRUARY 2015		FIGURE 11	
			REV 0



NOTES:
A total of 2,077 L of LNAPL was collected at Lagoon No.2 in 2014.

INSPECTION DATE

May

- System components installed and activated.
- System operated within normal parameters.
- 46 L of LNAPL was collected

June

- System operated within normal parameters.
- Minor interruption between June 9-10.
- 60 L of LNAPL was collected.

July

- System operated within normal parameters
- Full waste oil tank caused automatic shutdown on July 31.
- 126 L of LNAPL was collected.
- GFL removed approximately 200 L of LNAPL via maintenance activities.

August

- System maintenance completed by GFL on August 6.
- System operated within normal parameters.
- 407 L of LNAPL was collected.

September

- System operated under normal parameters until mid-September.
- 6 L of LNAPL was collected.

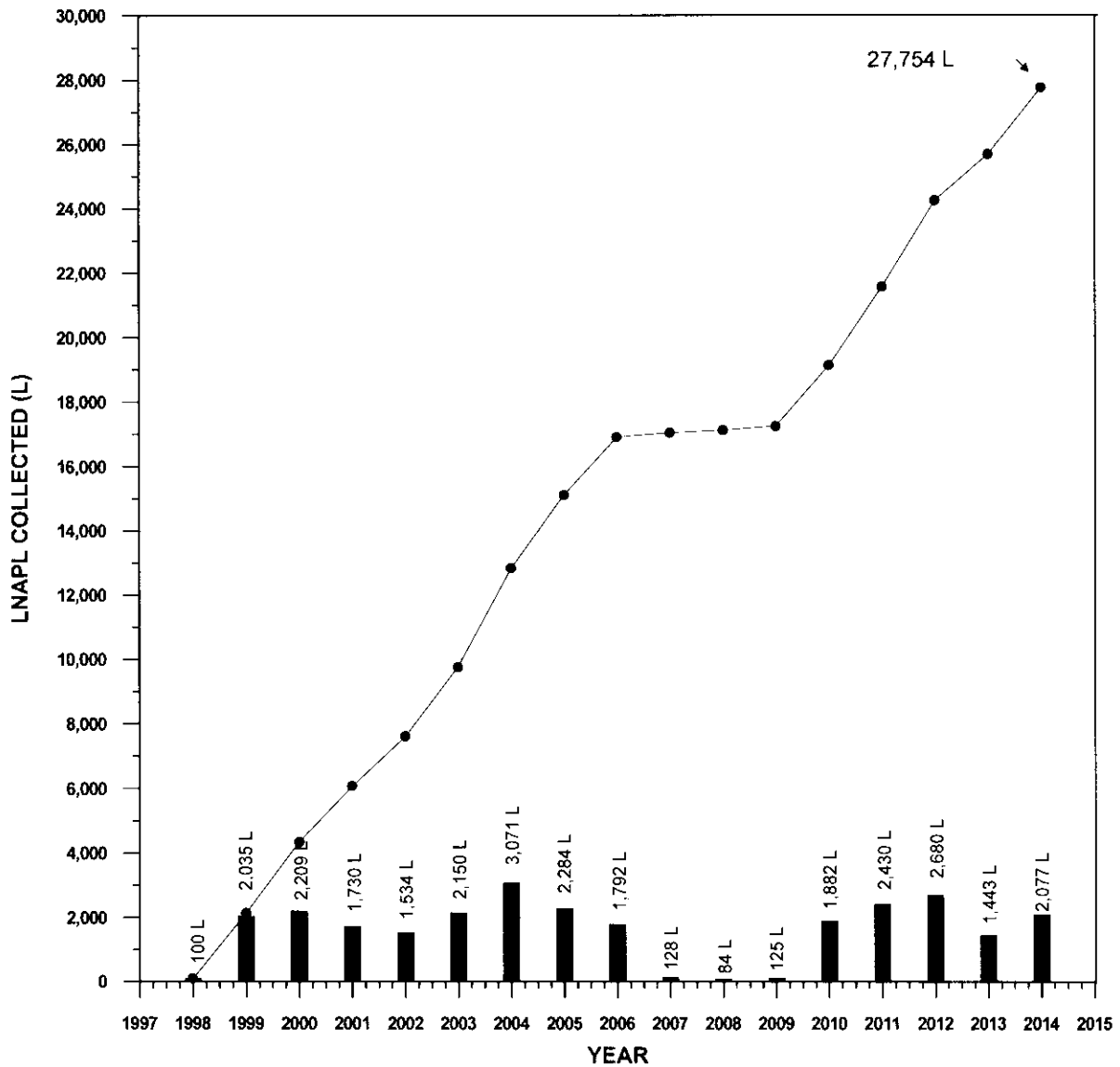
October

- System did not operate in October.
- 8 L of LNAPL was collected.

November

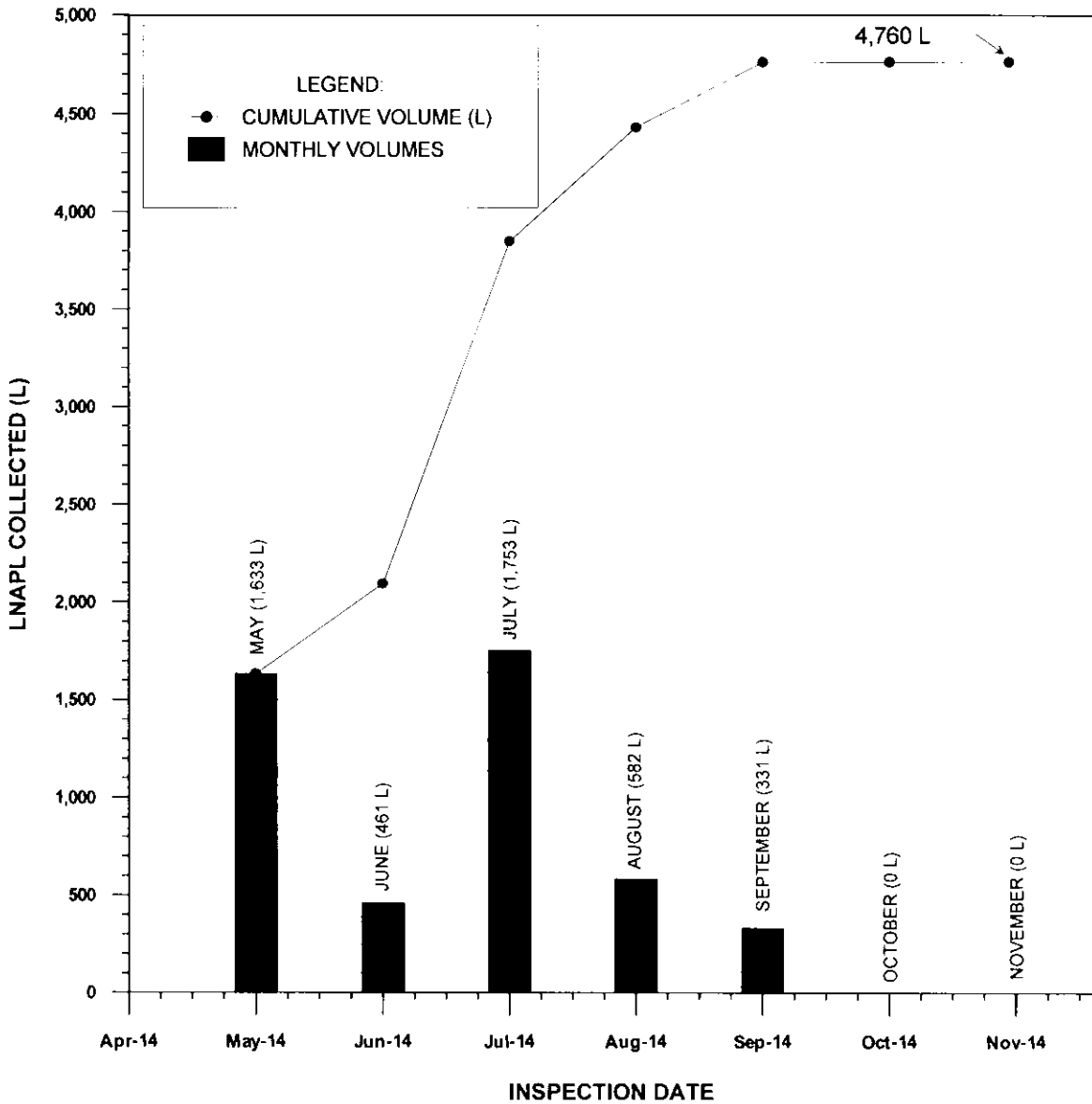
- System winterized
- GFL removed approximately 1,208 L of LNAPL via system maintenance.

0	15/02/09	ISSUED WITH MOE REPORT	TG
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KGS GROUP CONSULTING ENGINEERS		CN CANADIAN NATIONAL	
2014 REMEDIAL OPERATIONS PIN# 1000/DNPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
2014 LNAPL COLLECTION DATA LAGOON No. 2			
FEBRUARY 2015	FIGURE 12	REV	0



LEGEND:
 ● CUMULATIVE VOLUME (L)
 ■ YEARLY VOLUMES

0	15/02/09	ISSUED WITH MOE REPORT	TG
NO	YYYYMM	DESCRIPTION	BY
REVISIONS / ISSUE			
KGS GROUP		CN	
CONSULTING ENGINEERS		CANADIAN NATIONAL	
2014 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
HISTORICAL LNAPL COLLECTION DATA LAGOON No. 2			
FEBRUARY 2015		FIGURE 13	
			REV 0



NOTES: - A total of 4,760 L of LNAPL was collected by KGS Group and local personnel in 2014.

May

- Skimmer belt was installed and activated in May 2014
- The skimmer operated within normal parameters.
- 1,633 L of LNAPL was collected by CN Forces from January to May 2014.

June

- The skimmer unit operated within normal parameters.
- 461 L of LNAPL was collected.

July

- The skimmer unit did not operate until July 14.
- GFL removed approximately 1,753 L of LNAPL from the waste oil tank
- The skimmer unit operated within normal parameters.

August

- The skimmer unit operated within normal parameters.
- 582 L of LNAPL was collected.

September

- The skimmer unit operated under normal parameters.
- 331 L of LNAPL was collected.

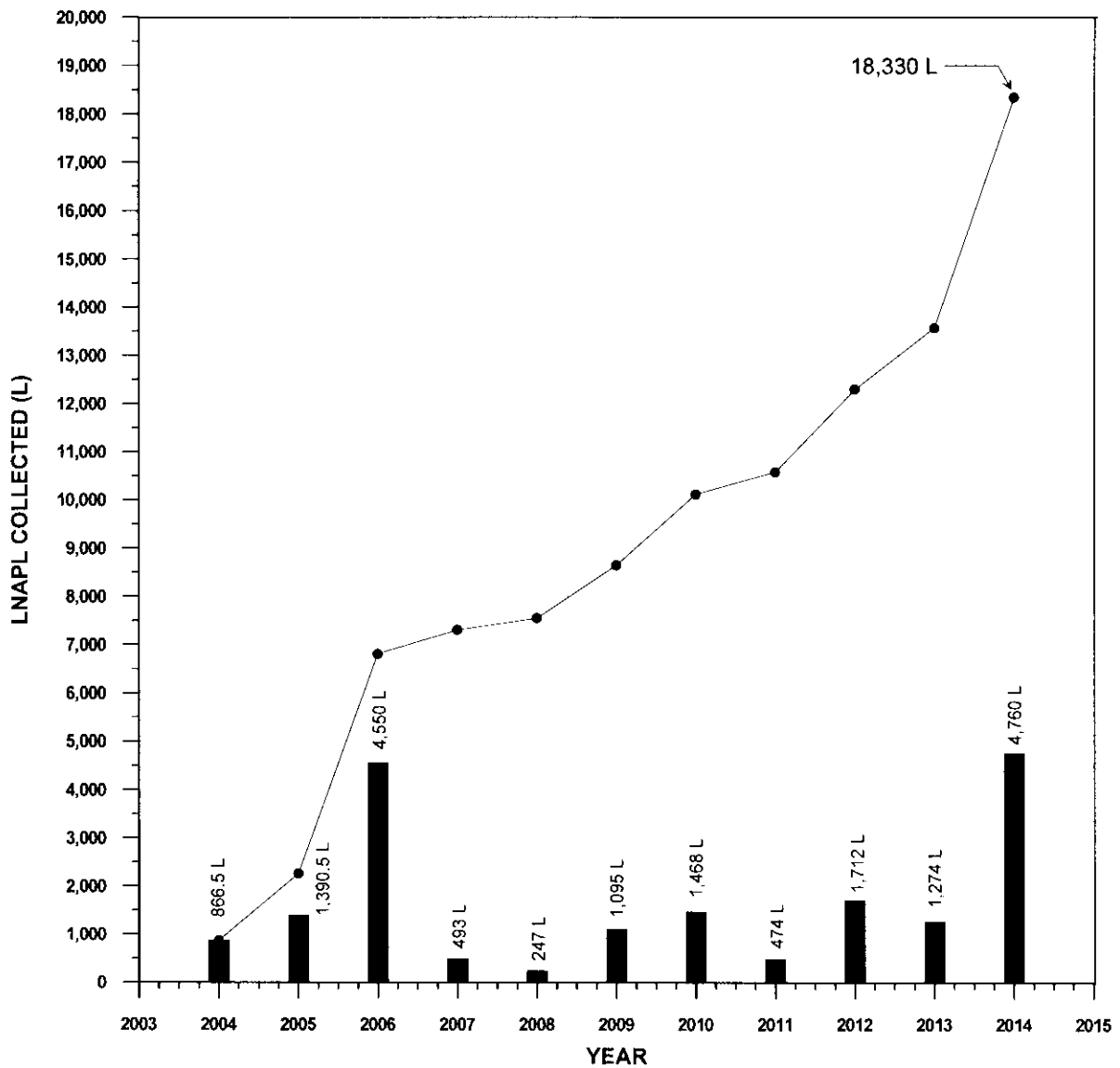
October

- The skimmer unit operated within normal parameters until October 14 when the skimmer unit was manually shutdown due to the absence of measurable LNAPL within the collection sump.
- 0 L of LNAPL was collected.

November

- Skimmer unit was winterized.

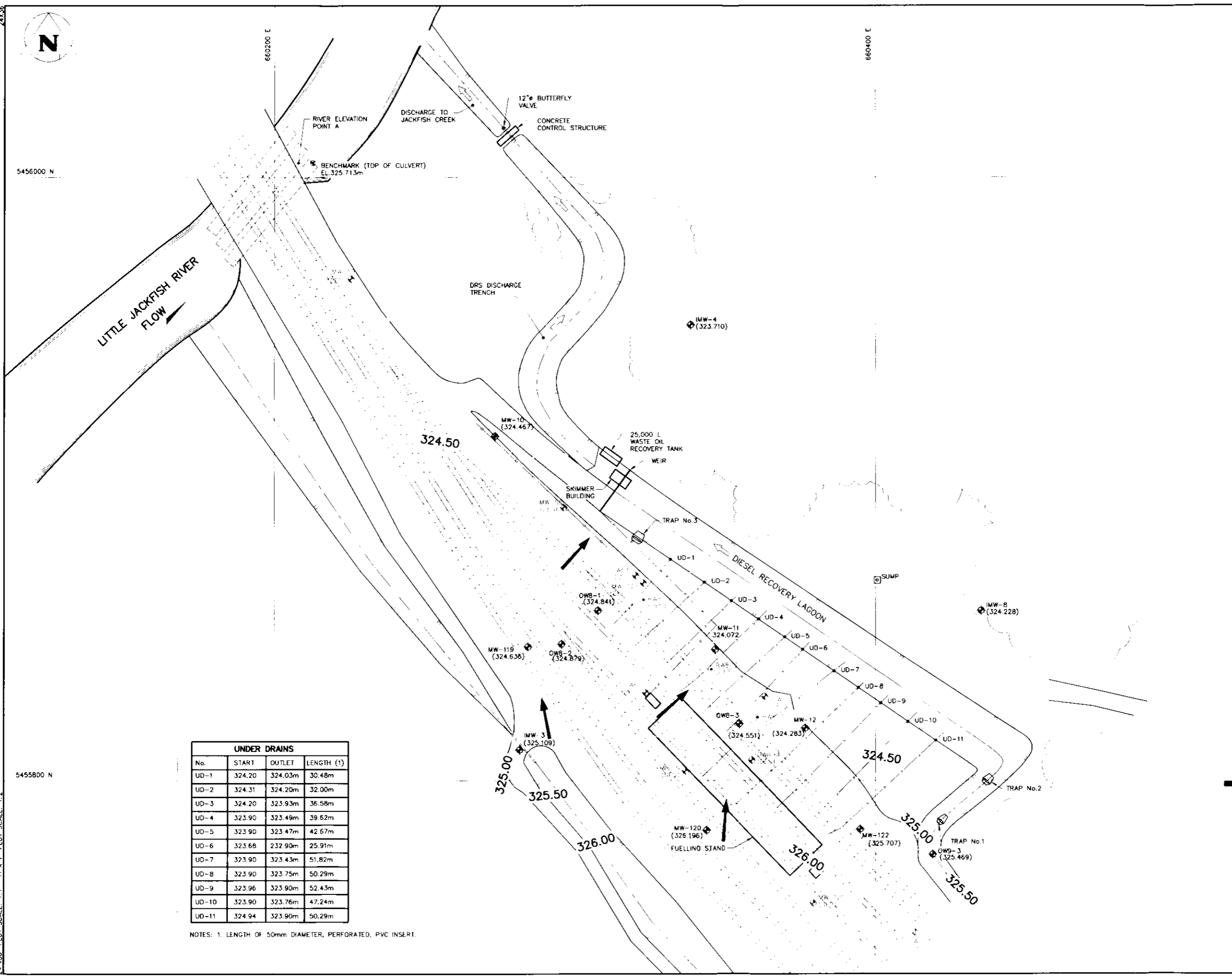
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KGS GROUP CONSULTING ENGINEERS		CN CANADIAN NATIONAL	
2014 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
2014 LNAPL COLLECTION DATA FORMER SHOP TRACK FUELLING AREA			
FEBRUARY 2015		FIGURE 14	
			0



LEGEND:
 ● CUMULATIVE VOLUME (L)
 ■ YEARLY VOLUMES

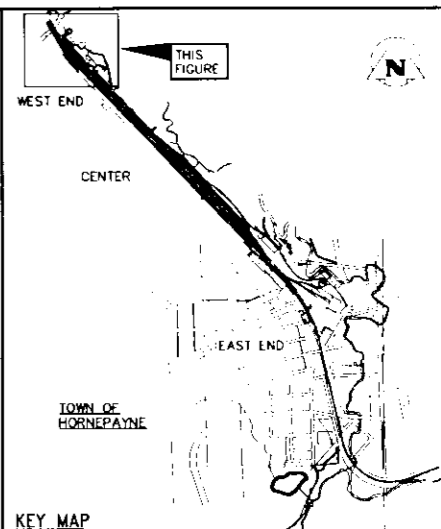
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KGS GROUP CONSULTING ENGINEERS		CN CANADIAN NATIONAL	
2014 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
HISTORICAL LNAPL COLLECTION DATA FORMER SHOP TRACK FUELLING AREA			
FEBRUARY 2015		FIGURE 15	
			REV# 0

File Name: P:\Projects\2014\14-0434-004\dwg\env\VOE Reports\Rev 0\14-0434-004-FIG 17-Rev 0.dwg - Tab: FIG 17 Plotted By: williamson 02/09/2015 [Mon 10:57am] 24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



UNDER DRAINS			
No.	START	OUTLET	LENGTH (1)
UD-1	324.20	324.03m	30.48m
UD-2	324.31	324.20m	32.00m
UD-3	324.20	323.93m	36.58m
UD-4	323.90	323.49m	39.62m
UD-5	323.90	323.47m	42.67m
UD-6	323.68	232.90m	25.91m
UD-7	323.90	323.43m	51.82m
UD-8	323.90	323.75m	50.29m
UD-9	323.96	323.90m	52.43m
UD-10	323.90	323.76m	47.24m
UD-11	324.94	323.90m	50.29m

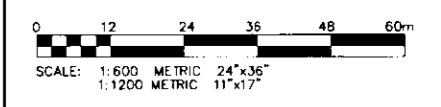
NOTES: 1. LENGTH OF 50mm DIAMETER, PERFORATED, PVC INSERT.



- KEY MAP**
- LEGEND:**
- BERM
 - - - CENTERLINE OF DITCH
 - FENCE
 - - - BURIED ELECTRICAL CABLE
 - ▲ BENCHMARK
 - ◆ MW-119 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - ◆ MW-10 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - ⊙ RWB-1 RECOVERY WELL
 - ⊞ SUMP
 - RAILROAD TRACKS
 - - - UNDERGROUND DRAIN
 - DESTROYED
 - 328.00 GEODETIC GROUNDWATER CONTOUR (m)
 - GROUNDWATER FLOW DIRECTION
 - (324.228) GROUNDWATER ELEVATION AT WELL

NOTES:

1. SITE PLAN BASED ON AUTOCAD FILE PROVIDED BY CN



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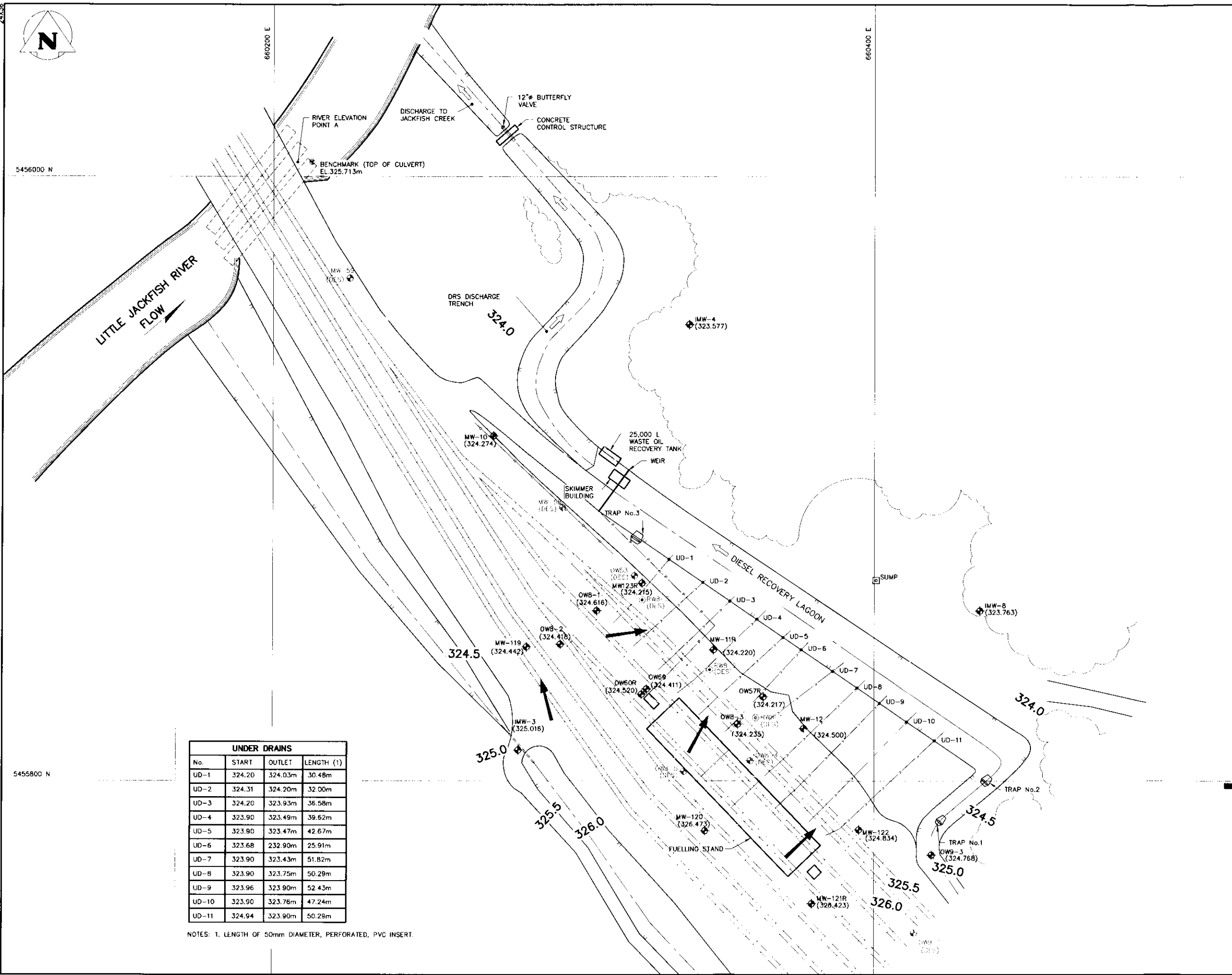
REVISIONS / ISSUE

KGS GROUP **CANADIAN NATIONAL**
CONSULTING ENGINEERS

2014 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100587
HORNEPAYNE YARD, ON
GROUNDWATER SURFACE CONTOURS
WEST END - SPRING 2014

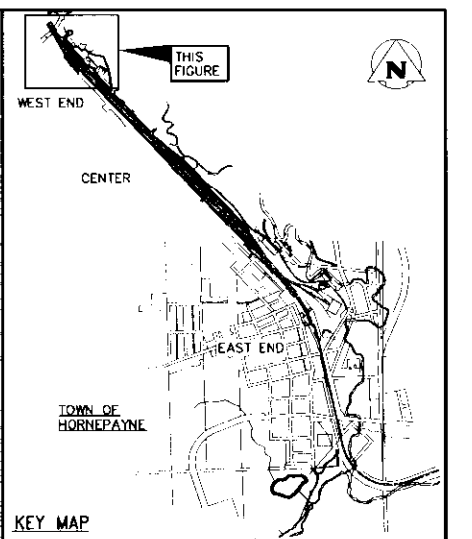
000529

File Name: P:\Projects\2014\14-0434-004\Wg\env\WDE Reports\Rev 0\14-0434-004_FIG 18-Rev 0.dwg - Tab: FIG 18 Plotted By: twilliamson 02/09/2015 [Mon 10:59am]
 24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2
 000530



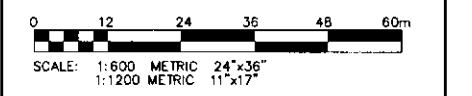
UNDER DRAINS			
No.	START	OUTLET	LENGTH (1)
UD-1	324.20	324.03m	30.48m
UD-2	324.31	324.20m	32.00m
UD-3	324.20	323.93m	36.58m
UD-4	323.90	323.49m	39.62m
UD-5	323.90	323.47m	42.67m
UD-6	323.68	232.90m	25.91m
UD-7	323.90	323.43m	51.82m
UD-8	323.90	323.75m	50.29m
UD-9	323.96	323.90m	52.43m
UD-10	323.90	323.76m	47.24m
UD-11	324.94	323.90m	50.29m

NOTES: 1. LENGTH OF 50mm DIAMETER, PERFORATED, PVC INSERT.



- LEGEND:**
- BERM
 - - - CENTERLINE OF DITCH
 - ○ ○ FENCE
 - - - BURIED ELECTRICAL CABLE
 - ▲ BENCHMARK
 - ◆ MW-119 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - ◆ MW-10 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - ◆ MW-121R REPLACEMENT MONITORING WELL (INSTALLED BY KGS - 2014)
 - RWB-1 RECOVERY WELL
 - SUMP SUMP WELL
 - - - RAILROAD TRACKS
 - - - UNDERGROUND DRAIN
 - (DE S) DESTROYED
 - 326.00 GEODETIC GROUNDWATER CONTOUR (m)
 - GROUNDWATER FLOW DIRECTION
 - (323.673) GROUNDWATER ELEVATION AT WELL

NOTES:
1. SITE PLAN BASED ON AUTOCAD FILE PROVIDED BY CN.



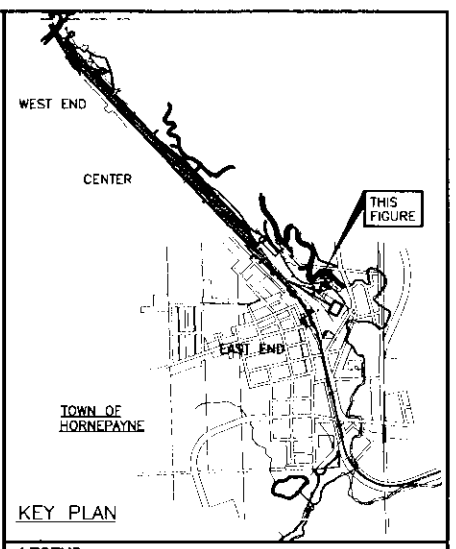
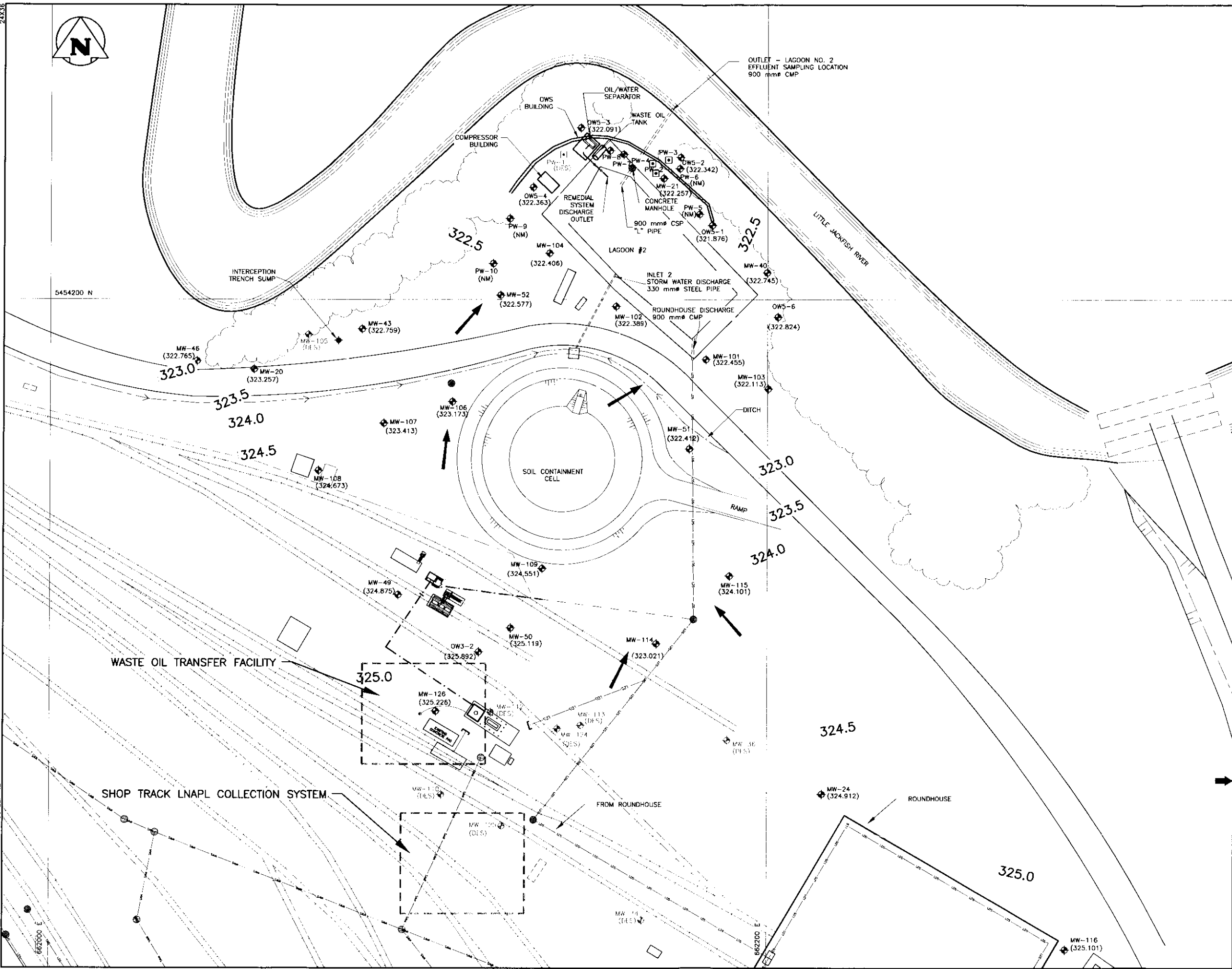
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KGS GROUP **CN CANADIAN NATIONAL**
CONSULTING ENGINEERS

2014 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100587
WEST END, HORNEPAYNE YARD, ON
GROUNDWATER SURFACE CONTOURS
WEST END - FALL 2014

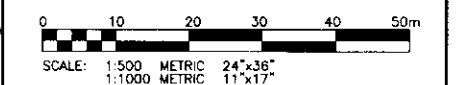
File Name: P:\Projects\2014\14-0434-004\env\MOE Reports\Rev 0\14-0434-004_FIG 19-Rev 0.dwg - Tab: FIG 19 Plotted By: twilliamson 02/09/2015 [Mon 11:01am]
 24x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2
 000531



- LEGEND**
- RAILROAD TRACK
 - CULVERT
 - CENTERLINE OF DITCH
 - SANITARY SEWER
 - STORM SEWER
 - FENCE
 - DISCHARGE LINE
 - TREES/ SHRUBS
 - MANHOLES
 - SURFACE WATER FLOW DIRECTION
 - MW-126 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-52 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - PW-1 PUMPING WELL
 - 323.00 GEOGNETIC GROUNDWATER CONTOUR (m)
 - (324.101) GROUNDWATER FLOW DIRECTION
 - (13.5) DESTROYED
 - (NM) NOT MONITORED

NOTE:

- REFERENCE JACQUES WHITFORD ENVIRONMENTAL LIMITED PROJECT 31004, DRAWING NO. 2, 1995.
- ELEVATIONS ARE ADJUSTED FOR PRESENCE OF LNAPL.

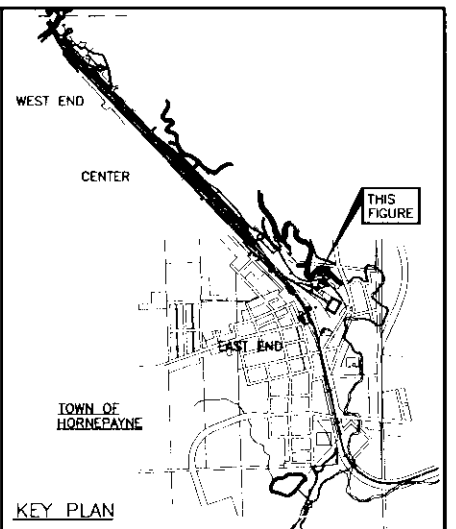
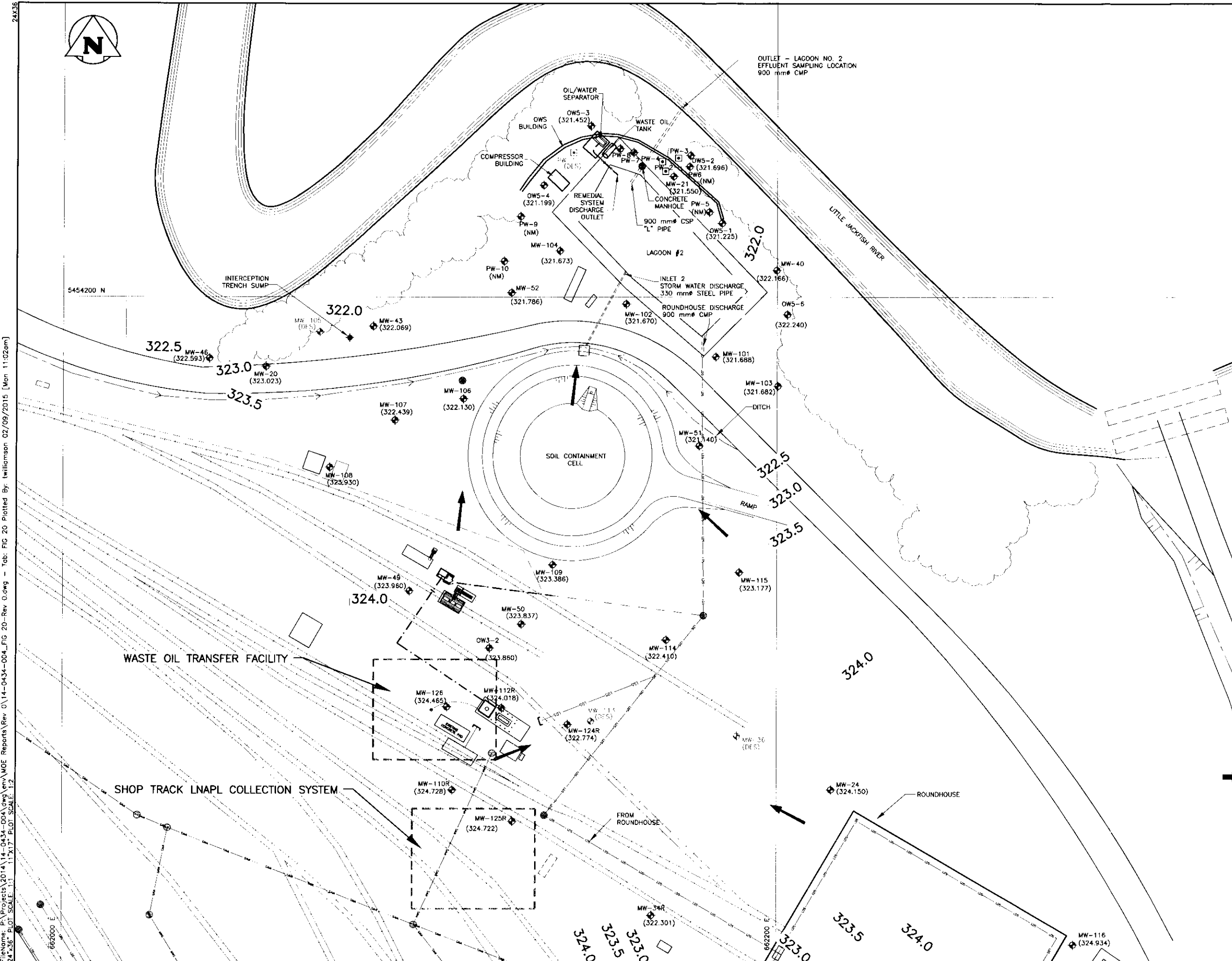


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KGS GROUP CONSULTING ENGINEERS
CANADIAN NATIONAL

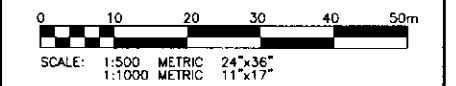
2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100591
 HORNEPAYNE YARD, ON
 GROUNDWATER SURFACE CONTOURS
 EAST END - SPRING 2014

File Name: P:\Projects\2014\14-0434-00A\env\MOE Reports\Rev 0\14-0434-00A_FIG 20-Rev 0.dwg - Tab: FIG 20 Plotted By: twilliamson 02/09/2015 [Mon 11:02am]
 24"x36" PLOT SCALE: 1:1171 PLOT SCALE: 1:1171



- LEGEND**
- RAILROAD TRACK
 - - - - - CULVERT
 - - - - - CENTERLINE OF DITCH
 - - - - - SANITARY SEWER
 - - - - - STORM SEWER
 - - - - - FENCE
 - - - - - DISCHARGE LINE
 - TREES/ SHRUBS
 - MANHOLES
 - SURFACE WATER FLOW DIRECTION
 - ◆ MW-126 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - ◆ MW-52 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - ◆ MW-110R REPLACEMENT MONITORING WELL (INSTALLED BY KGS - 2014)
 - PW-1 PUMPING WELL
 - GEODETIC GROUNDWATER CONTOUR (m)
 - GROUNDWATER FLOW DIRECTION
 - (323.177) GROUNDWATER ELEVATION AT WELL (OR 5)
 - (OR 5) DESTROYED
 - (NM) NOT MONITORED

- NOTE:**
1. REFERENCE JACQUES WHITFORD ENVIRONMENTAL LIMITED PROJECT 31004, DRAWING NO. 2, 1996.
 2. ELEVATIONS ARE ADJUSTED FOR PRESENCE OF LNAPL.



0	15/02/09 ISSUED WITH MOE REPORT	TG
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REVISIONS / ISSUE		



2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100591
 HORNEPAYNE YARD, ON
 GROUNDWATER SURFACE CONTOURS
 EAST END - FALL 2014

FEBRUARY 2015	FIGURE 20	REV 0
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000532

APPENDIX A
CERTIFICATE OF APPROVAL
No. 3528-83LQWT

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 3528-83LQWT
Issue Date: April 29, 2010

Canadian National Railway Company
1 Administration Road
PO Box, No. 1000, Concord, Ontario L4K 1B9

Site Location: 58 Front Street - Hornepayne Yard
East and West End Systems
Hornepayne Township, District of Algoma, ON P0M 1Z0

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of sewage works for the collection, transmission, treatment and disposal of stormwater, contact stormwater runoff from the CN Hornepayne Yard and industrial sewage generated from the Lagoon Light Non-Aqueous Phase Liquid (LNAPL) Containment System, the Shop Track LNAPL Recovery System, the Waste Oil Transfer Facility and melt water/seepage from the soil contaminated cell, discharging to Little Jackfish River, consisting of the following:

EAST END ENVIRONMENTAL PROTECTION SYSTEM

- A Lagoon System to provide quantity and quality controls for both stormwater runoff, off-site discharge of petroleum hydrocarbon spills and industrial sewage. The lagoon consists of:
 - a rectangular lagoon with an impermeable liner for a total capacity of approximately 1,936 m³, discharging to a 600 mm diameter corrugated steel pipe with an outlet at an elevation of 322.74 m, equipped with a 900 mm diameter concrete manhole acting as an settling basin for hydrocarbon and suspended solids.
 - an increase in the lagoon berm height by 0.8 m, including 0.3 m of freeboard, to increase the volumetric capacity 835 m³ for a total capacity of 2,771 m³, and slopes changes from 3:1 to 4:1.
- A Containment Recovery and Collection System to contain and recover local subsurface LNAPL identified in the area, consisting of:
 - A bentonite / concrete cut-off wall at the northwest corner of the lagoon to prevent the off-site migration of LNAPL into the Little Jackfish River, equipped with ten (10) pumping wells and an interception trench with 4.5 m depth, width of 0.6 to 1.1 m and 78.5 m in length, all located between the former Pump House area and the Little Jackfish River (upgradient and downgradient from the cut-off wall), and discharging into

the oil/water separator.

- An oil/water separator (fiberglass Parkson Medel SRM6 OWS, or approved equivalent) located at the Pollution Control Building and discharging into the lagoon, equipped with:

- A transfer tank with a total capacity of 171 L, a transfer pump directing sewage from the transfer tank to a 4,560 L double walled waste oil tank located adjacent to the Pollution Control Building, prior to treatment at the Oil Transfer Facility.

- A Shop Track LNAPL Recovery System to contain and recover local subsurface LNAPL identified in the area, consisting of:
 - An oil skimmer, Abinaki Model 8 Oil Grabber, used to collect LNAPL draining to the Recovery Trench.
 - A rock filled Recovery Trench (20 m long, 5 m wide and 5 m depth) with a non woven geotextile to collect groundwater and LNAPL to be pumped through a 38 mm diameter HDPE discharge line to the oil water separator located at the waste oil transfer facility. This System is equipped with a collection sump located within the Pollution Control Building, transferring collected LNAPL, by gravity, to the oil recovery tank.
 - An oil recovery tank, double walled with a capacity of 5,000 L.
- A Waste Oil Transfer Facility to process petroleum hydrocarbons collected from all LNAPL collection systems within the Yard, as well as waste oil generated from both Yard and remote site operations, consisting of a waste oil holding tank of 38 m³ double walled discharging to the oil water separator and an oil water separator.
- A Soil Containment Cell to contain hydrocarbon impacted soils generated from former and future spills within the Yard and at remote rail locations, consisting of a circular cell with a non permeable liner with a holding capacity of 13,600 m³, equipped with a rubber tire excavator to treat top soil at 0.3 to 0.5 m depth.

All other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works.

WEST END FUELLING STAND SYSTEM

These works include the West End Fuelling Stand at the Hornepayne Yard and included in Certificate 5146-7F2H6J issued on June 17, 2008, consisting of the following:

- Approximately eleven (11) 50 mm diameter perforated pipe underdrains installed under the trackage adjacent to the West End Fuelling Platform and the contaminated soil stockpile, discharging to the retention lagoon;
- One (1) retention lagoon with a storage capacity of approximately 960 m³ (at the maximum operating water elevation of 324.4 m), including a sheet pile weir and belt oil skimmer seasonally operated

(normally April to November) with product recovery storage tank, discharging to the lined drainage ditch;

- One (1) polyvinyl chloride lined drainage ditch extending from the retention pond to the Little Jackfish River, including the relocation of the existing concrete discharge control structure;

All other controls, electrical equipment, instrumentation, piping, valves and appurtenances essential for the proper operation of the aforementioned sewage works

All in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Alexandre Borges, CN Environment Officer of Canadian National Railway Company dated August 4, 2009;
2. Application's appendix A to H prepared by KGS Group Consulting Engineers, dated August 10, 2009.
3. Application for the Approval of Industrial Sewage Works submitted by Mr. Erwin Waldinsperger dated January 1998 and attachments and associated drawings, all prepared by KGS Group Consulting Engineers.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act*;

"District Manager" means the District Manager of the Thunder Bay District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Regional Director" means the Regional Director of the Northern Region of the Ministry;

"Source Protection Plan" means a drinking water source protection plan prepared under the *Clean Water Act, 2006*;

"Owner" means Canadian National Railway Company and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

(1) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

(2) Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of Owner or operating authority, or both;

(b) change of address of Owner or operating authority or address of new owner or operating authority;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Partnerships Registration Act* ;

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the *Corporations Information Act* shall be included in the notification to the District Manager;

(2) In the event of any change in ownership of the works, the Owner shall notify in writing the succeeding owner of the existence of this certificate, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition will refer to this certificate's number.

3. CHANGES IN PROCESSES OR PROCESS MATERIALS

The Owner shall give written notice to the District Manager of any plans to change the processes or process materials in the Owner's enterprise serviced by the works where the change may significantly

alter the quantity or quality of the influent to or effluent from the works, and no such change(s) shall be made unless with the written concurrence or approval of the District Manager.

4. OPERATIONS MANUAL

(1) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

- (a) operating procedures for routine operation of the works;
- (b) inspection programs, including frequency of inspection, for the works and the methods or tests employed to detect when maintenance is necessary;
- (c) repair and maintenance programs, including the frequency of repair/maintenance;
- (d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager; and
- (e) complaint procedures for receiving and responding to public complaints.

(2) The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

5. EFFLUENT LIMITS

(1) The Owner shall design, construct and operate the works that discharge to the Little Jackfish River such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the works.

Table 2 - Effluent Limits	
Effluent Parameter	Concentration Limit (mg/L)
Column 1	Column 2
Petroleum Hydrocarbons (F1+F2)	1000
Petroleum Hydrocarbons (F3+F4)	1000
Benzene	5
Toluene	0.8
Ethylbenzene	2.4
m&p-Xylene	32
o-Xylene	40
Methyl-t-butyl-Ether (MTBE)	200
Lead	See subsection 2
pH of the effluent maintained between 6.5 to 8.5, inclusive, at all times	

(2) The limit for Lead shall be determined based on the hardness of the water. If the hardness is less than 30 mg/L, the limit is 1 µg/L. If the hardness is between 30 mg/L and 80 mg/L, inclusive, the limit is 3 µg/L. If the hardness is greater than 80 mg/L, the limit is 5 µg/L.

(3) For the purposes of determining compliance with and enforcing subsection (1):

(a) non-compliance with respect to a Concentration Limit is deemed to have occurred when any single sample analyzed for a parameter named in Column 1 of subsection (1) is greater than the corresponding maximum concentration set out in Column 2 of subsection (1);

(b) non-compliance with respect to pH is deemed to have occurred when any single measurement is outside of the indicated range.

6. EFFLUENT - VISUAL OBSERVATIONS

Notwithstanding any other condition in this certificate, the Owner shall ensure that the effluent from the works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen or foam on the receiving waters.

7. EFFLUENT MONITORING - SURFACE WATER

(1) All samples and measurements taken for the purposes of this certificate are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Samples shall be collected and analyzed at the following sampling point(s), at the sampling frequencies and using the sample type specified for each parameter listed:

Table 3 - Effluent Monitoring - Surface Water	
Sample Points: To be established to the satisfaction of the District Manager prior to commencement of operations of the works. Sampling includes estimated flows.	
Sampling locations at a minimum to include (as per Drawing No. 09-0434-01 H1, Rev. A, Appendix H of the Application package dated August 2009, prepared by KGS Group):	
1. Effluent from Discharge Control Gate;	
2. Little Jackfish River: HOR 005 05 (mid stream); and HOR 004 05 (down stream)	
3. Yard discharge: HOR 002 05 (Lagoon No.2), at the end of the discharge culvert.	
Frequency	Once each month (April to November) in ice-free conditions
Sample Type	Grab
Parameters	Petroleum Hydrocarbons (F1+F2), Petroleum Hydrocarbons (F3+F4), Benzene, Toluene, Ethylbenzene, m&p-Xylene, o-Xylene, Methyl-t-butyl-Ether (MTBE), Lead, pH, hardness, alkalinity, Total Purgeable Hydrocarbons, Total Extractable Hydrocarbons, Total Oil and Grease, and Mineral Oil and Grease

(3) The Owner shall supplement the monitoring program in subsection (1) with visual inspections which shall include, but not be limited to the following:

(a) A weekly inspection (April to November) of the effluent from the Discharge Control Gate and the river during discharge of treated wastewater for any visible oil sheens, colour and odours; and

(b) A weekly inspection (April to November) of the level of material in the recovered product storage tank.

(4) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and,

(c) the Environment Canada publications "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" (July 1990) and "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna" (July 1990);

(5) The measurement frequencies specified in subsection (2) in respect of any parameter are minimum requirements which may, after twelve (12) months of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

(6) A continuous flow measuring device(s) or an alternate method approved by the District Manager shall be installed and maintained to measure the flowrate of the effluent from the sewage works, with an accuracy to within plus or minus twenty per cent (20%) of the actual flowrate for the entire design range of the flow measuring device and the Owner shall measure, record and calculate the flowrate for each effluent stream on each day of sampling.

8. EFFLUENT MONITORING - GROUNDWATER

(1) All samples and measurements taken for the purposes of this certificate are to be taken at a time and in a location characteristic of the quality and quantity of the groundwater over the time period being monitored.

(2) Samples shall be collected and analyzed at the following sampling point(s), at the sampling frequencies, including groundwater levels and thickness of any light non-aqueous phase liquids (LNAPLs) using an interface probe (IP) at all monitoring wells:

Table 3 - Effluent Monitoring - Groundwater		
Sample Points: Sampling locations as per Drawing No. 09-0434-01 G1, Rev. A, Appendix G of the Application package dated August 2009, prepared by KGS Group).		
Effluent Parameter	Frequency	Sample Location
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and Hydrocarbon fraction F1	Monitored and sampled once per year	Wells: MW-20, MW-40, MW-43, MW-46, MW-52, OW 5-1, OW 5-2 and OW 5-3
Hydrocarbon fraction F2 to F4	Monitored twice per year (Spring and Fall) and Sampled once per year	Wells: MW-21, MW-24, MW-49, MW-51, MW-52, MW-101, MW-102, MW-103, MW-104, MW-106, MW-107, MW-108, MW-109, MW-114, MW-115, MW-126, and OW 3-2
Hydrocarbon fraction F2 to F4	Monitored and sampled twice per year (Spring and Fall)	Wells: MW-20, MW-40, MW-43, MW-46, MW-52, OW 5-1, OW 5-2 and OW 5-3

Note: Duplicate groundwater samples shall be taken for field monitoring of Dissolved Oxygen, pH, Conductivity, Temperature and Oxidation-reduction potential.

(3) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions.

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions.

(5) The measurement frequencies specified in subsection (2) in respect of any parameter are minimum requirements which may, after twelve (12) months of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

9. REPORTING

(1) The Owner shall report to the District Manager or designate, any exceedance of any parameter specified in Condition 6 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedance.

(2) In addition to the obligations under Part X of the *Environmental Protection Act*, the Owner shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(4) The Owner shall prepare and submit a performance report to the District Manager on an annual basis within thirty (30) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

- (a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 5, including an overview of the success and adequacy of the sewage works;
- (b) a description of any operating problems encountered and corrective actions taken;
- (c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works;
- (d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;
- (e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
- (f) a site plan illustrating the location of all site infrastructure, environmental protection system components, monitoring wells and surface water monitoring stations;
- (g) a location map illustrating the site relative to nearby potentially sensitive groundwater/surface water features (i.e., lakes, streams, wells);
- (h) a water level contour map for each monitoring event carried out during the previous year;
- (i) stratigraphic cross-sections which clearly illustrate the subsurface distribution of geological materials;
- (j) boreholes logs for all monitoring wells;
- (k) tables illustrating historical chemistry and water level data;
- (l) graphs illustrating historical water quality trends for hydrocarbon parameters at key monitoring wells;

- (m) an assessment of monitoring data to evaluate system effectiveness and compliance with the applicable water quality protection criteria;
- (n) recommendations for future monitoring and/or further remedial actions;
- (o) a section detailing the field sampling protocols and QA/QC measures;
- (p) a copy of the Certificate of Approval and any amendments;
- (q) copies of laboratory reports for all sampling events in that year; and
- (r) all monitoring and sampling data should also be submitted in an electronic format (i.e. a Microsoft Excel spreadsheet).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.
3. Condition 3 is included to ensure that the works is operated in accordance with the information submitted by the owner relating to the process and materials which are served by the works, and to ensure that any contemplated changes in them which could potentially affect the characteristics of effluent from the works will be properly reviewed and approved.
4. Condition 4 is included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the work.
5. Conditions 5 and 6 are imposed to ensure that the effluent discharged from the works to the Little Jackfish River meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.
6. Conditions 7 and 8 are included to require the owner to demonstrate on a continual basis that the quality and quantity of the effluent from the approved works is consistent with the design and effluent limits specified in the certificate and that the approved works does not cause any impairment to the receiving

watercourse.

7. Condition 9 is included to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 5146-7F2H6J issued on June 17, 2008.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

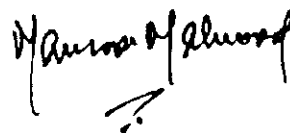
AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 29th day of April, 2010



Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

ET/

c: District Manager, MOE Sault Ste. Marie Area Office
Tony Gallo, Kontzamanis Graumann Smith MacMillan Inc.

APPENDIX B
WASTE MANIFEST FORMS

APPENDIX C
PRESSURE TRANSDUCER CALCULATIONS

Pressure transducers measure ambient pressure, which, in conjunction with a local datum (the top of the pipe), allows for the calculation of the height of the water over the transducer. This was completed by subtracting the datum (distance from the top of the pipe to the top of the transducer) from the elevation of the top of pipe and adding the recorded height of water above the transducer. As the transducers measure absolute pressure (water pressure + atmospheric pressure), the atmospheric pressure, recorded by the barometric pressure logger, is subtracted to compensate for the influence of changing barometric pressures on the water level readings. This compensated reading is the height of the water column within the diesel recovery trench. A level survey was conducted to establish reference elevations at this discharge location. Elevations of required variables, including the top and bottom of the diesel recovery trench discharge pipe and the top and bottom of the pipe and block transducer housing, were surveyed with level loops closed within an acceptable level of error. The survey benchmark used in the west end was the top of the cement control structure at the west end. The reference elevations, in addition to the ambient pressure data points (corrected for atmospheric pressure), allow for the determination of the height of water in relation to the discharge pipe in the west end. Since the compensated height of water is known and the discharge pipe size and slope are measured, then a flow rate can be calculated using Manning's Equation, which is presented below.

$$Q = VA = \left(\frac{K_n}{n}\right) AR^{\frac{2}{3}} \sqrt{S}$$

- where: n = the interior surface of the pipe, in this case PVC which uses the constant 0.012
 S = the slope of the water, in this case 0.001 %
 K_n = Manning's Equation Conversion Factor (for Metric calculations $K_n = 1/\text{sec}$)
 A = the area (in meters²) of water within the pipe determined by:

$$A = \frac{[\theta - \sin(\theta)](D)^2}{8}$$

R = The Hydraulic Radius (in meters) is determined by:

$$R = \left[\frac{(\theta - \sin\theta)}{\theta} \right] \left[\frac{D}{4} \right]$$

D = Diameter of the pipe (m)

$$\theta = \pi + 2(\sin^{-1}) \left[\left(\frac{(2)(h_2)}{D} \right) - 1 \right]$$

h_2 = h_1 - height (in meters) of pipe base

h_1 = Initial transducer height (in meters) below water line + compensated height of water above transducer

Measurements from the west end effluent stream are collected during the operating year. Recorded water depths and barometric pressure are transferred to an excel spreadsheet, which is used to calculate flows from the west end location based on the specific flow formulae developed. The median calculation is used to describe the central tendency of flow data due to the skewed nature (non normal distribution) of flow, and was chosen over the mean because the median is not impacted by extreme values in the data sets. Daily, weekly, and monthly statistical values, summarizing the median, 25th percentiles, and 75th percentiles are generated and used for comparisons of the spread between data sets, as it is less affected by extreme values in the data sets compared to the range.

Calibration consists of taking physical measurements of flow by using a calibrated twenty (20) L pail. Five (5) separate measurements are collected and the median value is recorded as the flow rate. This value is then compared to calculated flow and used to ensure that the calculated flow is within 20% of the actual flow rate.

APPENDIX D
DRILL LOGS



Environmental
Services
Inc.

Log of Well MW-10
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 327.365m

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED	Started	NOVEMBER 10/94	
Sample Method: STANDARD SPLIT SPOON	Finished	NOVEMBER 10/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P.: 3.53m	Logged By: D. E. W.	Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: sand and gravel fill, occasional cobbles	Protective cover
SS1		<1	1			Cement
						Fill
SS2	5/18 27/27	<1	2		SILTY SAND: medium brown grey with stone and cobbles, dry to moist, no odour	5cm Ø Sch.40 Blank PVC
					grey, densely packed, gravel, dry	
SS3	13/41 58	<1	3			Bentonite Pellet Seal
SS4	8/23 32/24	<1	4		SAND: densely packed coarse and fine grained sand, moist, no odour	11/10/94
SS5	3/1 3/4	<1	4		dark red brown peat, moist, no odour	
SS6	5/11 11/9	<1	5		SILTY SAND: grey, moist to wet, no odour	Silica Sand
SS7	3/5 7/3	<1	6		COARSE SAND: grey, fine gravel, saturated, no odour	5cm Ø Sch.40 Slotted PVC (cont)
					END OF BOREHOLE	



Environmental
Services
Inc.

Log of Well MW-11
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 327.184m

Driller: BOART LONGYEAR DRILLING INC.		Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED		Started	NOVEMBER 11/94	
Sample Method: STANDARD SPLIT SPOON		Finished	NOVEMBER 11/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 2.82m	Logged By: D. G. W.		Checked By: O. P. L.

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
			0		SAND AND GRAVEL: sand and gravel fill	Protective cover
SS1		15	1		medium brown sand and gravel, dry, no odour	Cement
					dark grey sand and gravel, no odour	Fill
SS2	refusal	2	2		grey sand and gravel fill, boulders and cobbles	5cm Ø Sch. 40 Blank PVC
						Bentonite Pellet Seal
SS3	refusal	140	3			▼ 11/11/94 (free product)
					grey stained coarse sand with gravel, odours	
SS4	17/27 15/7	90	4		moist	Silica Sand
SS5	1/21 21/18	58	5			5cm Ø Sch. 40 Slotted PVC (3mm)
SS6	8/12 12/11	135	6		FINE SAND: grey stained, odorous, saturated, free product in split spoon	
			7		END OF BOREHOLE	
			8			

CLIENT CANADIAN NATIONAL
PROJECT CN Hornepayne Monitoring Well Replacement Program
SITE CN Hornepayne Yard, West End
LOCATION 25m North of OW8-3
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 327.24 m
TOP OF CASING ELEV. 326.88 m
WATER ELEV. 322.99 m
DATE DRILLED 9/9/2014
UTMs (NAD83) N
E

ENVIRO & GEO P:\PROJECTS\2014\14-0434-01\9\GENERAL\DOC\SOIL LOGS\11-17-2014_LBP.GPJ

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	Cu TORVANE (kPa)				SPT (N) blows/0.15 m				FIELD HEADSPACE TEST Photoionizable Vapours (ppm)				
							20	40	60	80	20	40	60	80	100	200	300	400	
	0.5		SAND AND GRAVEL FILL - Medium brown, dry, dense, poorly graded, fine to medium grained sand and medium to coarse grained gravel.		0.36														
	1.5		- Dark grey below 1.2 m. - some cobbles and boulders at 1.4 m.		1.94														
	2.0				2.24														
	3.0		- hydrocarbon odours and staining below 3.05 m.																
	3.5																		
	4.0		- moist below 3.8 m.																
322.67	4.5																		
322.06	5.0		SAND - Grey, saturated, firm, fine grained, poorly graded.		5.18														
	5.5		END OF BOREHOLE AT 5.18 m		5.29														
	6.0		Notes: 1. Monitoring well installed to a depth of 5.28 m with 3.05 m of screen. 2. Borehole backfilled with sand to 1.9 m then bentonite to surface. 3. Monitoring well completed with a flush mount casing and protective steel vault.																

CONTRACTOR
Strata Drilling

INSPECTOR
G. CREWDSON

APPROVED

DATE
12/18/14



Environmental
Services
Inc.

Log of Well MW-12
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 328.965m

Driller: BOART LONGYEAR DRILLING INC.		Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED		Started	NOVEMBER 11/94	
Sample Method: STANDARD SPLIT SPOON		Finished	NOVEMBER 11/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 2.26m	Logged By: D. G. W.		Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: medium brown sand and gravel, dry, no odours	Protective cover
					odorous	Cement
SS1		80	1			Fill
						5cm Ø Sch.40 Blank PVC
SS2	4/4 8/11	18	2		occasional rocks, cobbles and boulders	Bentonite Pellet Seal
						▼ 11/11/94
SS3	14/19 11/12	8	3		grey, coarse sand and fine gravel, wet, odorous	
SS4	3/9 4/4	11	4		red brown peat and bits of wood	
					coarse sand and gravel, grey with traces of silt, odorous, wet to saturated	
SS5	4/7 9/8	30	4		red grey oily sand with gravel, odorous	
						Silica Sand
SS6	22 refusal	30/40	5		saturated	
SS7	20/8 5/8	40	6		SILTY SAND grey, slight odour	5cm Ø Sch.40 Slotted PVC (1mm)
					END OF BOREHOLE	



Environmental
Services
Inc.

Log of Well MW-16
PHASE 2
CN
FORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 325.474m

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED	Started	NOVEMBER 11/94	
Sample Method: STANDARD SPLIT SPOON	Finished	NOVEMBER 11/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P.: 1.3m	Logged By: P. M.	Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SILTY SAND: light brown, moist, no odour	
SS1		1.3	1			
SS2	8/13 14/7	2	2		wet to saturated, some iron staining in fractures	
SS3	4 spoon refusal	2	3		END OF BOREHOLE (refusal on bedrock)	
			4			
			5			
			6			



Environmental
Services
Inc.

Log of Well MW-17
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 325.481m

Driller: BOART LONGYEAR DRILLING INC.		Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED		Started	NOVEMBER 10/94	
Sample Method: STANDARD SPLIT SPOON		Finished	NOVEMBER 10/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 2.3m	Logged By: P. M.		Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND:reddish brown, dry	
SS1		2	1			
					light brown, coarse sand, dry, moist, no odour	
SS2	3/5 5/8	2	2			
					light brown, fine sand, wet to saturated, no odour	
SS3	3/4 4/2	2	3			
SS4	4/9 11/11	1	4		SILTY SAND saturated, no odour	
			4		END OF BOREHOLE	



Environmental
Services
Inc.

Log of Well MW-20
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 324.676m

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED	Started	NOVEMBER 12/94	
Sample Method: STANDARD SPLIT SPOON	Finished	NOVEMBER 12/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P.: 1.992m	Logged By: D. G. W.	Checked By: O. P. L.

Sample No.	Blow Counts	H _{Nu}	Depth (meters)	Graphic Log	Materials Description	Well Completion
			0		SAND AND GRAVEL: light brown	<p>Protective cover</p> <p>Cement Fill</p> <p>5cm Ø Sch. 40 Blank PVC</p> <p>Bentonite Pellet Seal</p> <p>▼ 11/12/94</p> <p>Silica Sand</p> <p>5cm Ø Sch. 40 Slotted PVC (1mm)</p>
			0.5		SILTY SAND: dark brown black, organic topsoil grey, moist	
AS1		1.5	1		black, organic, topsoil, slight oily odour	
AS2		2.0	1.5			
SS3	4/8 8/7	100	2		coarse sand with grey staining, hydrocarbon odours	
			2.5		coarse sand, heavily stained, grey oily, saturated	
SS4	4/4 7/8	75	3		light brown grey, saturated, odorous	
			3.5			
SS5		55	4			
			4		END OF BOREHOLE	



Environmental
Services
Inc.

Log of Well MW-21
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 324.549m

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED	Started	NOVEMBER 12/94	
Sample Method: STANDARD SPLIT SPOON	Finished	NOVEMBER 12/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 3.335m	Logged By: D. G. W.	Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
SS1		3	1		SAND AND GRAVEL: light brown grey brown	
SS2	3/4 4/4	30	2		sand and gravel fill, red brick, loosely packed, slight hydrocarbon odour	
SS3	1/2 4/10	95	3		SILTY SAND: dark brown black, topsoil, slight odour light brown, grey staining, slight odour moist, slight staining and odour	
SS4	12/18 17/12	80	4		SAND AND GRAVEL: coarse, grey staining, saturated, slight odour	
SS5	11/12 10/10	75	4			
			5		END OF BOREHOLE	
			6			



Environmental
Services
Inc.

Log of Boring BH-22
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94580

G.S. Elevation: 324.350m

Driller: BOART LONGYEAR DRILLING INC.		Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED		Started	NOVEMBER 12/94	
Sample Method: STANDARD SPLIT SPOON		Finished	NOVEMBER 12/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P.:	Logged By: D. G. W.		Checked By: O. P. L.

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Monitor Vapour	Liquid Limit	Plastic Limit	RQD
					SILTY SAND: light brown grey, moist				
SS1		1.5	1		dark brown, moist				
SS2	3/14 35	4	2		SAND AND GRAVEL: black, oily odour, dry oily odour				
SS3	31/25 28/23	55	3		END OF BOREHOLE (auger refusal in 2 attempts within 4.57m radius)				
			4						
			5						
			6						



Environmental
Services
Inc.

Log of Well MW-24
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 325.959m

Driller: BOART LONGYEAR DRILLING INC.		Drilling	Date	Time
Drill Method: AD-2 TRACK MOUNTED		Started	NOVEMBER 12/94	
Sample Method: STANDARD SPLIT SPOON		Finished	NOVEMBER 12/94	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 3.795m	Logged By: D. G. W.		Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					FILL:slag ballast	Protective cover
					pieces of iron	Cement
SS1		0	1			5cm Ø Sch.40 Blank PVC Fill
					SILTY SANDlight brown, dry to moist	
					light brown grey, moist to wet, no odour	Bentonite Pellet Seal
SS2	8/10 11/10	0	2			
						Silica Sand
SS3	5/8 5/8	0	3			5cm Ø Sch.40 Slotted PVC (1mm)
						▼ 11/12/94
SS4	11/12 15/8	0	4		wet to saturated	
SS5	4/7 7/8	0	4		saturated	
SS6	4/8 5/10	0	5			
					END OF BOREHOLE	
			6			



Environmental
Services
Inc.

Log of Well MW-34
PHASE 2
CN
FORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94580

G.S. Elevation: 325.787m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 14/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 14/94

Borehole Diameter: 15.2 cm

Water Level T.O.P.: 3.85m

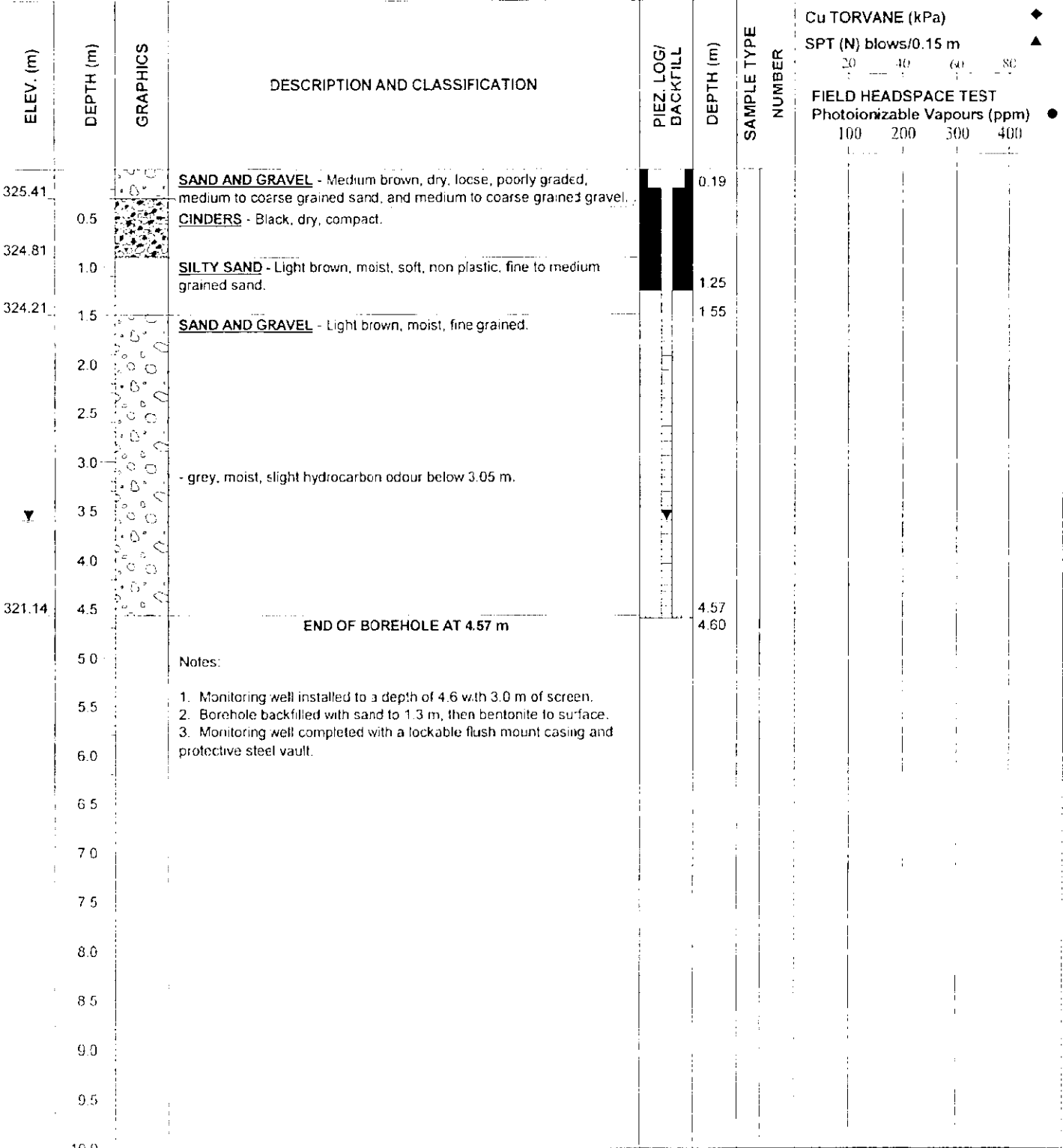
Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: medium brown, crushed stone	<p>Well Completion</p> <ul style="list-style-type: none"> Protective cover Cement 5cm Ø Sch. 40 Blank PVC Fill Bentonite Pellet Seal 11/14/94 (free product) Silica Sand 5cm Ø Sch. 40 Slotted PVC (1mm)
					SAND: black slag sand, dry	
SS1		2	1		SILTY SAND: light brown, moist	
					SAND AND GRAVEL: light brown, fine grain, moist	
SS2	8/8 8/8	1	2			
					grey, moist, slight odour	
SS3	4/7 11/9	23	3		black grey stained, fine gravel chips, oily odours	
SS4	4/10 15/10	120	4			
SS5	5/10 14/10	130	5		SAND: fine sand, grey stained, odorous	
					layered black grey stained sand	
SS6	4/7 18/17	130	6			
					SAND AND GRAVEL: densely packed sand and coarse gravel	
SS7	15/25 23/23	70	7			
SS8	8/11 25/21	55	8			
					END OF BOREHOLE (SILTY SAND: grey, slight odour)	

CLIENT CANADIAN NATIONAL
PROJECT CN Hornepayne Monitoring Well Replacement Program
SITE CN Hornepayne Yard, Former Shop Track Area
LOCATION 95 m SE of MW-125
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 325.71 m
TOP OF CASING ELEV. 325.52 m
WATER ELEV. 322.09 m
DATE DRILLED 10/9/2014
UTMs (NAD83) N 5,454,271
 E 662,194



Notes:

- Monitoring well installed to a depth of 4.6 with 3.0 m of screen.
- Borehole backfilled with sand to 1.3 m, then bentonite to surface.
- Monitoring well completed with a lockable flush mount casing and protective steel vault.

SAMPLE TYPE

CONTRACTOR
Strata Drilling

INSPECTOR
G. CREWDSON

APPROVED

DATE
12/8/14

ENVIRONMENTAL PROJECTS 2014\14-0434-019\SENIOR\KGS\SCIL LOGS\MW_HORNEPAYNE_REPLACEMENT_WELL_LOGS_11-17-2014_LBP.CPJ



Environmental
Services
Inc.

Log of Well MW-40
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 324.34

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 7/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 7/95

Borehole Diameter: 15.2 cm

Water Level T.O.P.: 2.45

Logged By: TMM

Checked By: OPL

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
SS1	7/2 3/1	33	1		SAND: medium to coarse, brown colour, trace of gravel, moist	
SS2	1/8 8/8	34	2		SANDY SILT: fine grained, tan colour, trace of clay and gravel, no odours	
SS3	4/5 8/5	52	3		saturated at: 2.89 metres below ground surface	
SS4	4/4 4/3	23				
SS5	2/3 4/3	28	4			
			5		END OF BOREHOLE	
			6			



Environmental Services Inc.

Log of Well MW-43
 PHASE 3
 CN
 HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 323.68

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 8/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 8/95

Borehole Diameter: 15.2 cm

Water Level T.O.P.: 2.16

Logged By: TMM

Checked By: OPL

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND: fine to medium, grey brown colour, trace of gravel, moist	Protective cover
SS1	4/5 7/4	300	1			Cement
					saturated at 1.88 metres below ground surface	5cm Ø Sch.40 Blank PVC
SS2	5/8 7/7	53	2			18/9/95
					SANDY SILT: fine grained, grey colour, trace of clay, slight HC odour	Bentonite Pellet Seal
SS3	5/7 8/8	140	3			Silica Sand
SS4	4/4 4/4	83				5cm Ø Sch.40 Slotted PVC (1mm)
SS5	3/3 5/3	92	4			
SS8	1/1 2/1	57	5			
SS7	1/3 4/3	102	6			
					END OF BOREHOLE	



Environmental
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Log of Well MW-48
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 324.66

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: Track Mounted CME 75	Started	September 8/95	
Sample Method: STANDARD SPLIT SPOON	Finished	September 8/95	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 2.17	Logged By: TMM	Checked By: OPL

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
			1		SAND: medium dark brown colour, trace of gravel, no odour trace of organic material, becoming coarser with depth	<p>Protective cover</p> <p>Cement</p> <p>5cm Ø Sch.40 Blank PVC</p> <p>Bentonite Pellet Seal</p> <p>18/9/95</p>
SS1	5/5 3/5	45	2			
SS2	1/1 1/1	48	3			
SS3	1/8 7/8	28	4			
SS4	1/4 4/5	38	5		SANDY SILT: fine grained, grey mottled, trace of clay, saturated no odour	<p>Silica Sand</p> <p>5cm Ø Sch.40 Slotted PVC (1mm)</p>
			6		END OF BOREHOLE	



Environmental
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Log of Well MW-48
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 325.83

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: Track Mounted CME 75	Started	September 8/95	
Sample Method: STANDARD SPLIT SPOON	Finished	September 8/95	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 1.72	Logged By: TMM	Checked By: OPL

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
SS1	8/5 4/2	10	1		SAND: medium, tan colour, trace of gravel and cobbles, no HC odour	<p>Protective cover</p> <p>Cement 5cm Ø Sch.40 Blank PVC</p> <p>Bentonite Pellet Seal</p> <p>18/9/95</p> <p>Silica Sand</p> <p>5cm Ø Sch.40 Slotted PVC (1mm)</p>
SS2	8/3 3/3	11	2		becoming finer	
SS3	4/2 2/1	38	3		SANDY SILT: fine grained, grey colour, trace of clay and gravel, slight HC odour, saturated	
SS4	4/3 2/2	11	4			
SS5	1/1 1/1	18	4			
			5		END OF BOREHOLE	
			6			



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Log of Well MW/PW-50
PHASE 3
CN
FORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 325.81

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: Track Mounted CME 75	Started	September 9/95	
Sample Method: STANDARD SPLIT SPOON	Finished	September 9/95	
Borehole Diameter: 38 cm	Water Level T.O.P: 1.98	Logged By: TMM	Checked By: OPL

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
						Protective cover
SS1	2/2/2	15	1		SAND: medium to coarse, grey black colour, trace of gravel, moist no odour	Cement 10cm Ø Sch.40 Blank PVC Bentonite Pellet Seal
SS2	2/9/8	88	2		SANDY SILT: fine grained, grey colour, trace of clay, slight HC odour. saturated. HC odour increases with depth	▼ 18/9/95
SS3	3/8/7	87	3			Silica Sand
SS4	8/5/5	39	4			10cm Ø Sch.40 Slotted PVC (1mm)
			5			
SS6	4/3/3	11	5			
			6			
SS7	2/3/2	28	6			
			6		END OF BOREHOLE	



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Log of Well MW-51
PHASE 3
CN
FORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 324.26

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: Track Mounted CME 75	Started	September 9/95	
Sample Method: STANDARD SPLIT SPOON	Finished	September 9/95	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 3.09	Logged By: TMM	Checked By: OPL

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
						Protective cover
SS1	no recovery		1		SAND: fine, medium and coarse, brown/black colour with slight HC odour	Cement 5cm Ø Sch.40 Blank PVC
SS2	3/2 2/2	29	2			Bentonite Pellet Seal
SS3	3/4 4/7	33	3			Silica Sand
SS4	3/3 7/4	42	4		saturated at 3.04 metres below ground surface.	18/9/95
SS5	3/2 2/2	15	4			5cm Ø Sch.40 Slotted PVC (1mm)
SS6	5/4 3/2	38	5			
			6		END OF BOREHOLE	



Environmental Services Inc.

Log of Well MW/PW-52
 PHASE 3
 CN
 HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 323.91

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 9/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 9/95

Borehole Diameter: 38 cm

Water Level T.O.P.: 2.17

Logged By: TNM

Checked By: OPL

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
			0			Protective cover
			0.5		SAND: fine, tan grey colour trace of gravel, moist no odour	Cement Bentonite Pellet Seal
			1			10cm Ø Sch.40 Blank PVC
SS1	2/4/5	54	2			18/9/95
			3		FINE SAND AND SILT: saturated at 3.04 mbgs	Silica Sand
SS2	3/5/3	19	4		becoming finer with depth	10cm Ø Sch.40 Slotted PVC (1mm)
			5			
SS3	1/1/1	21	6			
SS4	no recovery					
					END OF BOREHOLE	



Environmental Services Inc.

Log of Well MW-58
 PHASE 3
 CN
 HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-04

Ground Elevation: 327.63 masl

Driller: BOART LONGYEAR DRILLING INC.		Drilling	Date	Time
Drill Method: Track Mount Hollow Stem Auger, CME 75		Started	May 14, 1996	NA
Sample Method: STANDARD SPLIT SPOON		Finished	May 14, 1996	NA
Borehole Diameter: 38 cm	Water Level:	Logged By: TMM	Checked By: KMM	

SAMPLE NO.	BLOW COUNTS	MINIRAE (ppm)	Depth (meters)	Graphic Log	Materials Description	Well Completion
SS1					FILL - Coarse grained sand and gravel.	Protective cover
SS2	20/50	5.5	1		SAND - Grey/green sand and silt, fine grained with pebbles and trace of gravel (till like), moist to wet (partially frozen), dense. - As above, with more fine grained sand, uniform, no odour.	Bentonite Seal
SS3	20/50	14.9	2		- As above, no odour.	Silica Sand
SS4	5/50	8.5	3		No sample recovery in this interval.	05/30/96 water table
SS5	7/9 14/8	7.7	4		SAND AND GRAVEL - Coarse grained, moderately saturated, faint hydrocarbon odour. - Moist to wet.	Well screen 5cm. Sch. 40 Slotted PVC (IMM)
SS6	4/6 7/9	5.3	5		PEAT	
					SAND AND GRAVEL	
SS7	5/9 8/12	6.7	6		SAND - Tan/grey fine grained, uniform, saturated.	
			6		End of borehole at 6.10 m.b.g.s.	



Environmental Services Inc.

Log of Well MW-59
 PHASE 3
 CN
 HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-04

Ground Elevation: 327.58 masl

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: Track Mount Hollow Stem Auger, CME 75	Started	May 15, 1996	NA
Sample Method: STANDARD SPLIT SPOON	Finished	May 15, 1996	NA
Borehole Diameter: 38 cm	Water Level:	Logged By: TMM	Checked By: KMM

SAMPLE NO.	BLOW COUNTS	MINIRAE (ppm)	Depth (meters)	Graphic Log	Materials Description	Well Completion
SS1					FILL -Sand and gravel	Protective cover
SS2	10/25 35/50	5.5	1		-Brown to tan sand and silt, fine grained, with gravel, some pebbles, dense, frozen.	Backfill
SS3	30/50	4.8	2		SAND AND GRAVEL -Coarse grained sand, moist with some saturated zones.	
SS4	3/5 50	21.3			-Dry to moist.	
SS5	50/17 21/20	6.4	3			05/30/96 water table
SS6	15/17 14/10	8.2	4		SAND -Fine to medium grained, trace gravel. SAND AND GRAVEL -Tan to brown medium and coarse grained sand.	Bentonite seal
SS7	4/5 6/72	7.5	5		PEAT -Dark brown peat layer, moist, musty odour, soft.	Silice sand
SS8	11/22 24/20	9.1				Well screen 5cm. Sch 40 Slotted PVC (1MM)
SS9	3/5 4/2	9.3	6		SAND -Grey, fine grained, uniform, saturated.	
					End of borehole at 6.9 m.b.g.s.	

BOREHOLE LOG

BOREHOLE #: OW3-2
 SHEET: 1 OF 1
 FILE #: CN-6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 28-09-96 COMPLT. DATE: 28-09-96
 LOCATION: AREA OF PLUME 3 SLOTTED PIPE Ø : 50 mm TUBING Ø : 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc. DRILL TYPE: CME 75 CORE SAMPLER Ø : ---
 OPERATOR: C. Pullen METHOD (SOIL): Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING		MONITORING WELL			SAMPLE				GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)		STRATIGRAPHY	SOIL/ROCK DESCRIPTION
0	0.00	325.51	Steel Cap	Cap Cement								No Soil Description	
1				Bentonite									
2	2.13	323.38	Water Table	PVC Tubing									
3				Silica Sand									
4				Screen, Opening 0.05 cm									
5	5.15	320.36		Cap								End of Borehole at a Depth of 5.15 m	
6													
7													
8													
9													

STATE OF SAMPLE: Intact Disturbed Post-Core Sample

OBSERVATIONS: WATER TABLE

SURFACE PROTECTION: Steel Cap ELEVATION: _____

SURFACE SEALANT: Cement/Bentonite REFERENCE LEVEL: Real

SEALANT DEPTH: 1.00 m BEDROCK LEVEL: _____

SCREEN LENGTH: 4.00 m GROUND LEVEL: 325.51 m

TUBING LENGTH: 1.15 m WATER TABLE LEVEL: _____

48 HOUR(s) AFTER DRILLING: 323.38



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BOREHOLE LOG

BOREHOLE #: OW5-1
 SHEET: 1 OF 1
 FILE #: CN-6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 01-10-96 COMPLT. DATE: 01-10-96
 LOCATION: AREA OF PLUME B SLOTTED PIPE Ø : 50 mm TUBING Ø : 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc DRILL TYPE: CME 75 CORE SAMPLER Ø : ---
 OPERATOR: C. Pullen METHOD (SOIL): Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING			MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	0.00 324.47		Steel Cap	Cap Cement								Light Brown Sand and Gravel, Dry		
0.60	323.87			Bentonite								Medium Brown Fine Sand with Traces of Gravel, Dry		
1				PVC Tubing										
2.40	322.07											Dark Brown Sandy Silt with Traces of Gravel, Dry		
3				Silica Sand								Light Brown Sandy Silt with Traces of Gravel, Humid		
3.10	321.37													
3.27	321.20													
4														
5				Screen, Opening 0.06 cm										
6	6.00 318.47											Grey Clayey Silt, Humid		
7														
8														
8.68	315.79			Cap								End of Borehole at a Depth 8.68 m		

STATE OF SAMPLE: INTACT DISRUINED LOST CORE SAMPLE

TYPE OF SAMPLE: SS - SPLIT SPOON SAMPLER, IW - THIN WALL SAMPLER, CS - CORE SAMPLER

OBSERVATIONS: O - ADDRESS, W - WIACK, I - INTERMEDIATE, P - PERSISTENT, NE - NON EXISTENT, SC - SCATTERED, SA - SATURATED

∇ = WATER TABLE

SURFACE PROTECTION: Steel Cap

SURFACE SEALANT: Bentonite

SEALANT DEPTH: 0.90 m

SCREEN LENGTH: 7.48 m

TUBING LENGTH: 1.20 m

ELEVATION: _____

REFERENCE LEVEL: Real

BEDROCK LEVEL: _____

GROUND LEVEL: 324.47 m

WATER TABLE LEVEL: 24 HOUR(s) AFTER DRILLING: 321.20



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BOREHOLE LOG

BOREHOLE #: OW5-2
 SHEET: 1 OF 1
 FILE #: CN 6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 01-10-96 COMPLT. DATE: 01-10-96
 LOCATION: AREA OF PLUME 8 SLOTTED PIPE Ø : 50 mm TUBING Ø : 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc DRILL TYPE: CME 75 CORE SAMPLER Ø : ..
 OPERATOR: C. Pullan METHOD (SOIL): Auger METHOD (ROCK): ..
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING		MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
													U	W
0	323.69		Steel Cap	Cap								Light Brown Sand and Gravel, Dry		
			Bentonite											
			PVC Tubing											
1														
1.80	321.89													
2				Silice Sand								Greyish Clayey Silt		
2.40	321.29													
2.89	320.80													
3				Screen Opening 0.05 cm										
3.00	320.69													
4				Cap										
4.00	319.59											End of Borehole at a Depth of 4.00 m		
5														
6														
7														
8														
9														

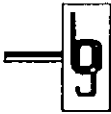
STATE OF SAMPLE: OBSERVATIONS: ∇ = WATER TABLE SURFACE PROTECTION: Steel Cap ELEVATION: ..
 SURFACE SEALANT: Bentonite REFERENCE LEVEL: Real
 SEALANT DEPTH: 0.90 m BEDROCK LEVEL: ---
 SCREEN LENGTH: 3.10 m GROUND LEVEL: 323.69 m
 TUBING LENGTH: 1.20 m WATER TABLE LEVEL: 24 HOUR(S) AFTER DRILLING 320.80

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 28-09-96 COMPLT. DATE: 28-09-96
 LOCATION: AREA OF PLUME 8 SLOTTED PIPE Ø : 50 mm TUBING Ø : 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc DRILL TYPE: CME 75 CORE SAMPLER Ø : ---
 OPERATOR: C. Pullen METHOD (SOIL): Hollow Stem Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING		MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	323.75			Steel Cap										
				Cap		SS1	75	N=5				Fine to Coarse Sand with Traces of Gravel, Loose, Dry		
				Bentonite		SS2	100	N=8						
				PVC Tubing		SS3	100	N=16						
1.60	322.15					SS4	50	N=8				Dark Brown Organic Matter with Traces of Glass		
2.20	321.55					SS6	100	N=8				Brown Clayey Silt, Dry		
2.74	321.01					SS8	18	N=16				-Presence of Pieces of Wood		
3.50	320.25					SS7	25	N=17				Black Fine to Coarse Sand, Dense, Saturated		
4.25	319.60			Silica Sand		SS8	50	N=32				Ligth Brown Coarse Sand, Medium to Very Dense, Saturated, Presence of Gravel		
						SS9	50	N=57						
				Screen, Opening 0.05 cm		SS10	16	N=21						
						SS11	50	N=15						
						SS12	16	N=35						
7.20	316.55			Cap								End of Borehole at a Depth of 7.20 m		

STATE OF SAMPLE: OBSERVATIONS: = WATER TABLE SURFACE PROTECTION: Steel Cap ELEVATION: Real
 SURFACE SEALANT: Bentonite SEALANT DEPTH: 0.80 m BEDROCK LEVEL: ---
 SCREEN LENGTH: 6.00 m GROUND LEVEL: 323.75 m
 TUBING LENGTH: 1.20 m WATER TABLE LEVEL: 48 HOUR(S) AFTER DRILLING 321.01



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BOREHOLE LOG

BOREHOLE #: OW5-4
 SHEET: 1 OF 1
 FILE #: CN-6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 28-09-96 COMPLT. DATE: 28-09-96
 LOCATION: AREA OF PLUME B SLOTTED PIPE Ø: 50 mm TUBING Ø: 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc DRILL TYPE: CME 75 CORE SAMPLER Ø: ---
 OPERATOR: C. Pullen METHOD (SOIL): Hollow Stem Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING		MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS			
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	OTHER	VISUAL
0	324.46		Steel Cap											
				Cep		SS1	79	N=13				Light Brown Fine to Coarse Sand with Traces of Gravel, Medium Dense, Dry		
				Bentonite		SS2	100	N=13						
1				PVC Tubing		SS3	100	N=20						
1.90	322.56					SS4	100	N=17				Grey Fine Sand with Traces of Silt, Medium Dense, Dry to Humid		
2						SS5	100	N=12						
3						SS6	100	N=7						
3.68	320.78					SS7	75	N=13				-Becoming Loose and Saturated, Sheen of the Water		
3.80	320.68					SS8	100	N=8				Grey Medium to Coarse Sand with Little Gravel, Loose, Saturated		
4.25	320.21			Silica Sand		SS9	100	N=12				Light Brown Coarse Sand with Some Gravel, Medium Dense, Saturated		
5						SS10	60	N=16						
6				Screen, Opening 0.05 cm		SS11	25	N=13						
7						SS12	0	N=24						
7.20	317.20			Cep								End of Borehole at a Depth 7.20 m		
8														
9														

NOTE: 0.29 m of Free-phase product observed on 08-10-96

STATE OF SAMPLE: OBSERVATIONS: SURFACE PROTECTION: Steel Cap ELEVATION: ---
 SURFACE SEALANT: Bentonite REFERENCE LEVEL: Real
 SEALANT DEPTH: 0.80 m BEDROCK LEVEL: ---
 SCREEN LENGTH: 6.00 m GROUND LEVEL: 324.46 m
 TUBING LENGTH: 1.20 m WATER TABLE LEVEL: 24 HOUR(S) AFTER DRILLING 320.78



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BOREHOLE LOG

BOREHOLE #: OW5-6
 SHEET: 1 OF 1
 FILE #: CN-6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 28-09-96 COMPLT. DATE: 28-09-96
 LOCATION: AREA OF PLUME B SLOTTED PIPE Ø: 50 mm TUBING Ø: 60 mm
 CONTRACTOR: Boart Longyear Drilling Inc DRILL TYPE: CME 75 CORE SAMPLER Ø: ---
 OPERATOR: C. Pullen METHOD (SOIL): Hollow Stem Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouelletto

LEVELING		MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	0.00 324.30		Steel Cap	Cap		SS1	4	N=12	...	...		Light Brown Fine to Coarse Sand, Traces of Silt, Loose, Dry		
				Bentonite		SS2	4	N=4	...	...		
				PVC Tubing		SS3	100	N=12	...	...		
1.50	322.80					SS4	100	N=15	...	...		Light Brown Clayey Silt with Traces of Sand, Stiff, Humid		
2						SS5	75	N=18	...	...		
2.80	321.50					SS6	75	N=8	...	...		
3						SS7	91	N=11	...	...		
4				Silica Sand		SS8	79	N=3	...	...		
4.80	319.50					SS9	100	N=3	...	...		Light Brown Fine Sand to Sandy Silt, Very Loose, Saturated		
6				Screen, Opening 0.05 cm		SS10	100	N=5	...	...		
6.00	318.30					SS11	25	N=7	...	...		Light Brown Medium to Coarse Sand, with Traces of Gravel, Loose, Saturated		
7				Cap		SS12		N=6	...	...		
7.20	317.10											End of Borehole at a Depth of 7.20 m		
8														
9														

STATE OF SAMPLE: OBSERVATIONS: SURFACE PROTECTION: Steel Cap ELEVATION: ---
 SURFACE SEALANT: Bentonite REFERENCE LEVEL: Real
 SEALANT DEPTH: 0.80 m BEDROCK LEVEL: ---
 SCREEN LENGTH: 6.00 m GROUND LEVEL: 324.30 m
 TUBING LENGTH: 0.70 m WATER TABLE LEVEL: ---
 48 HOUR(S) AFTER DRILLING: 321.50

TYPE OF SAMPLE:
 SS - SPLIT SPOON SAMPLER
 TW - TURN WALL SAMPLER
 CS - CORE SAMPLER

OBSERVATIONS:
 O - ODORLESS
 W - WEAK
 I - INTERMEDIATE
 P - PERSISTENT
 NF - NON EXISTENT
 SC - SCATTERED
 SA - SATURATED

LEGEND:
 // = FIELD
 ** = DUPLICATE
 * = ANALYZED SAMPLE



BIOGÉNIE Inc
 ENVIRONMENTAL SPECIALISTS
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 Tel. : (418) 653-4422 Fax : (418) 653-0589

BOREHOLE LOG

BOREHOLE #: OW8-1
 SHEET: 1 OF 1
 FILE #: CN 6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 27-09-96 COMPL.T. DATE: 27-09-96
 LOCATION: AREA OF PLUME 8 SLOTTED PIPE Ø : 50 mm TUBING Ø : 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc DRILL TYPE: CME 75 CORE SAMPLER Ø : ---
 OPERATOR: C. Pullen METHOD (SOIL): Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING		MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS			
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	DOOR	VISUAL
0	327.67													
0	327.67		Steel Cap	Cap Cement Bentonite								Light Brown to Grey Fine to Coarse Sand with Traces of Gravel, Dry		
1				PVC Tubing										
2														
3				Silice Sand										
3.70	323.97													
4	323.37											Grey Clayey to Sandy Silt, Dry		
5				Screen, Opening 0.05 cm										
5.80	321.87											Brown Clayey Silt, Dry		
6.35	321.32											Grey Clayey Silt, Saturated		
7														
8	319.67			Cap								End of Borehole at a Depth of 8.00 m		
9														

STATE OF SAMPLE: OBSERVATIONS: ∇ = WATER TABLE

SURFACE PROTECTION: Steel Cap ELEVATION: _____
 SURFACE SEALANT: Cement/Bentonite REFERENCE LEVEL: Roal
 SEALANT DEPTH: 0.75 m BEDROCK LEVEL: _____
 SCREEN LENGTH: 6.80 m GROUND LEVEL: 327.67 m
 TUBING LENGTH: 1.20 m WATER TABLE LEVEL: _____
 48 HOUR(s) AFTER DRILLING: 323.97

TYPE OF SAMPLE:
 SS - SPLIT SPHON SAMPLER
 TW - THIN WALL SAMPLER
 CS - CORE SAMPLER
 O - OILLESS
 W - WEAK
 I - INTERMEDIATE
 P - PERSISTENT
 NE - NON EXISTENT
 SC - SCATTERED
 SA - SATURATED
 * = FIELD
 ** = DUPLICATE
 * = ANALYZED SAMPLE



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BOREHOLE LOG

BOREHOLE #: OW8-2
 SHEET: 1 OF 1
 FILE #: CN-60B9

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 27-09-96 COMPLT. DATE: 27-09-96
 LOCATION: AREA OF PLUME B SLOTTED PIPE Ø : 50 mm TUBING Ø : 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc DRILL TYPE: CME 75 CORE SAMPLER Ø : ---
 OPERATOR: C. Pullen METHOD (SOIL): Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING		MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	327.56		Steel Cap	Cap Cement Bentonite								Light Brown Sand, Dry		
1				PVC Tubing										
3	324.58			Silica Sand								Light Brown Clayey Silt, Dry		
3.60	323.96											Dark Brown Clayey Silt, Dry		
3.87	323.69													
4														
6	322.66			Screen, Opening 0.05 cm								Grey Clayey Silt, Saturated		
6														
7														
8	319.66			Cap								End of Borehole at a Depth of 7.90 m		
												NOTE: 0.34 m of Free-phase product observed on 29-09-96		
9														

STATE OF SAMPLE: INTACT DISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE:
 SS - SPLIT SPOON SAMPLER
 TW - THIN WALL SAMPLER
 CS - CORE SAMPLER

OBSERVATIONS:
 O - ODDLESS
 W - WEAK
 I - INTERMEDIATE
 P - PERSISTENT
 NE - NON EXISTENT
 SC - SCATTERED
 SA - SATURATED

∇ = WATER TABLE
 ** = FIELD DUPLICATE
 * = ANALYZED SAMPLE

SURFACE PROTECTION: Steel Cap ELEVATION: _____
 SURFACE SEALANT: Cement/Bentonite REFERENCE LEVEL: Real
 SEALANT DEPTH: 0.75 m BEDROCK LEVEL: _____
 SCREEN LENGTH: 6.70 m GROUND LEVEL: 327.56 m
 TUBING LENGTH: 1.20 m WATER TABLE LEVEL: _____
48 HOUR(s) AFTER DRILLING: 323.69



BIOGÉNIE Inc
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BOREHOLE LOG

BOREHOLE #: **OW8-3**
 SHEET: 1 OF 1
 FILE #: CN-6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 27-09-96 COMPLT. DATE: 27-09-96
 LOCATION: AREA OF PLUME B SLOTTED PIPE Ø : 50 mm TUBING Ø : 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc DRILL TYPE: CME 76 CORE SAMPLER Ø : ---
 OPERATOR: C. Pullen METHOD (SOIL): Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING		MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)		STRATIGRAPHY	SOIL/ROCK DESCRIPTION
0	0.00	327.79	Steel Cap	Cap Cement Bentonite								Light Brown Fine Sand, Dry	
1				PVC Tubing									
3	3.00	324.79		Silica Sand								Grey Sand and Gravel with Traces of Silt, Dry	
5	4.75	323.04	▽	Screen, Opening 0.05 cm									
6	5.80	321.99										Grey Clayey Silt, Saturated	
8	7.90	319.89		Cap								End of Borehole at a Depth of 7.90 m	
NOTE: 2.22 m of Free-phase product observed on 29-09-96													

STATE OF SAMPLE: OBSERVATIONS ▽ = WATER TABLE SURFACE PROTECTION: Steel Cap ELEVATION: _____
 █ = FIELD SURFACE SEALANT: Cement/Bentonite REFERENCE LEVEL: Real
 ⊞ = ANALYZED SAMPLE SEALANT DEPTH: 0.60 m BEDROCK LEVEL: _____
 TYPE OF SAMPLE: SS - SPLIT SPOON SAMPLER TW - THIN WALL SAMPLER CS - CORE SAMPLER
 O - FIRMNESS W - WEAK I - INTERMEDIATE P - PERSISTENT NE - NON-EXISTENT SC - SCATTERED SA - SATURATED

SCREEN LENGTH: 6.70 m GROUND TABLE LEVEL: 327.79 m
 TUBING LENGTH: 1.20 m WATER TABLE LEVEL: 48 HOUR(S) AFTER DRILLING: 323.04



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BOREHOLE LOG

BOREHOLE #: **OW9-3**
 SHEET: 1 OF 1
 FILE #: CN-6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 29-09-96 COMPLT. DATE: 29-09-96
 LOCATION: AREA OF PLUME 9 SLOTTED PIPE Ø : 50 mm TUBING Ø : 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc. DRILL TYPE: CME 75 CORE SAMPLER Ø : ---
 OPERATOR: C. Pullen METHOD (SOIL): Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Ouellette

LEVELING			MONITORING WELL			SAMPLE				GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	OTHER	VISUAL
0	0.00	326.52	Steel Cap	Cap								Light Brown Clayey Silt, Saturated		
1	1.18	324.34	Bentonite											
			PVC Tubing											
2														
3			Silica Sand											
4	3.60	321.92										Greyish Clayey Silt, Saturated		
5														
6			Screen, Opening 0.05 cm											
6	6.10	319.42	Cap									Refusal of Auger to Penetration at a Depth of 6.10 m		
7														
8														
9														

STATE OF SAMPLE: INTACT DISTURBED LOST CORE SAMPLE

OBSERVATIONS: 0 - OBVIOUS, W - WEAK, I - INTERMEDIATE, P - PERSISTENT, NE - NON EXISTENT, SC - SCATTERED, SA - SATURATED

∇ = WATER TABLE

FIELD INDICATE ANALYZED SAMPLE

SURFACE PROTECTION: Steel Cap ELEVATION: _____

SURFACE SEALANT: Cement/Bentonite REFERENCE LEVEL: Real

SEALANT DEPTH: 0.70 m BEDROCK LEVEL: _____

SCREEN LENGTH: 4.60 m GROUND LEVEL: 326.52 m

TUBING LENGTH: 1.50 m WATER TABLE LEVEL: 72 HOUR(S) AFTER DRILLING: 324.34

TYPE OF SAMPLE: SS - SPUD SHOON SAMPLER, IW - THIN WALL SAMPLER, CS - CORE SAMPLER



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BOREHOLE LOG

BOREHOLE #: OW57
 SHEET: 1 OF 1
 FILE #: CN-6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 03-10-96 COMPLT. DATE: 03-10-96
 LOCATION: AREA OF PLUME B SLOTTED PIPE Ø: 50 mm TUBING Ø: 50 mm
 CONTRACTOR: Boar Longyear Drilling Inc DRILL TYPE: CME 76 CORE SAMPLER Ø: ---
 OPERATOR: C. Pullen METHOD (SOIL): Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Quelletto

LEVELING		MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	DATE	INITIALS
0	0.00	327.09	Steel Cap	Cap Cement								No Soil Description		
1			Bentonite	PVC Tubing										
2														
3				Silica Sand										
4														
5														
6	6.37	321.72		Screen, Opening 0.05 cm										
7														
8	7.90	319.19		Cap								End of Borehole at a Depth of 7.90 m		
9												NOTE: 2.80 m of Free-phase product observed on 12-10-96		

STATE OF SAMPLE: INTACT DISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE: SS - SPLIT SPOON SAMPLER, TW - THIN WALL SAMPLER, CS - CORE SAMPLER

OBSERVATIONS: O - ODORLESS, W - WEAK, I - INTERMEDIATE, P - PERSISTENT, NE - NON EXISTENT, SC - SCATTERED, SA - SATURATED

WATER TABLE: FIELD, DUPLICATE, ANALYZED SAMPLE

SURFACE PROTECTION: Steel Cap SURFACE SEALANT: Bentonite SEALANT DEPTH: 0.80 m SCREEN LENGTH: 6.70 m TUBING LENGTH: 1.20 m

ELEVATION: REFERENCE LEVEL: Real BEDROCK LEVEL: --- GROUND LEVEL: 326.96 m WATER TABLE LEVEL: >96 HOUR(S) AFTER DRILLING: 321.72

CLIENT CANADIAN NATIONAL
PROJECT CN Homepayne Monitoring Well Replacement Program
SITE CN Homepayne Yard, West End
LOCATION 15m NW of MW-12
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 326.64 m
TOP OF CASING ELEV 326.40 m
WATER ELEV. 324.22 m
DATE DRILLED 9/9/2014
UTMs (NAD83) N 5,456,070
 E 660,422

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	Cu TORVANE (kPa) ◆			
							20	40	60	80
							SPT (N) blows/0.15 m ▲			
							FIELD HEADSPACE TEST ●			
							Photoionizable Vapours (ppm)			
							100	200	300	400
	0.5		SAND AND GRAVEL FILL - Brown, moist, dense, poorly graded, fine to medium grained sand and medium to coarse grained gravel.		0.25					
	1.5		- wet below 1.4 m.		1.74					
324.54	2.0		SAND - Dark brown, wet, compact, poorly graded, fine grained, trace fine to medium grained gravel.		2.04					
323.59	3.0		SILT - Grey, wet, dense, non plastic, trace fine to medium grained sand.							
321.46	5.0		END OF BOREHOLE AT 5.18 m		5.09					
	5.18				5.18					
	6.0		Notes: 1. Installed monitoring well to a depth of 5.1 m with 3.05 m of screen. 2. Borehole backfilled with sand to 1.7 m, then bentonite to surface. 3. Monitoring well completed with a lockable flush mount casing and protective steel vault.							

#:\MRO & GEO P.\PROJECTS\2014\14-0434-019\GENERAL\DOCS\SOIL LOGS\THL_HORNAPAYNE REPLACEMENT WELL LOGS_11-17-2014_LBP.GPJ

SAMPLE TYPE

CONTRACTOR
Strata Drilling

INSPECTOR
G. CREWSON

APPROVED

DATE
12/18/14



BIOGÉNIE Inc
 ENVIRONMENTAL SPECIALISTS
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BOREHOLE LOG

BOREHOLE #: OW60
 SHEET: 1 OF 1
 FILE #: CN-6089

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: HORNEPAYNE CN STARTING DATE: 03-10-96 COMPLT. DATE: 03-10-96
 LOCATION: AREA OF PLUME 8 SLOTTED PIPE Ø: 50 mm TUBING Ø: 50 mm
 CONTRACTOR: Boart Longyear Drilling Inc. DRILL TYPE: CME 75 CORE SAMPLER Ø: ---
 OPERATOR: C. Pufen METHOD (SOIL): Auger METHOD (ROCK): ---
 TYPE OF TUBING: PVC DRILLING FLUID: --- COMPILED BY: P. Oullette

LEVELING		MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	COOR	ORIENT
0	0.00	327.82	Steel Cap	Cap Cement Bentonite PVC Tubing								Medium Brown Sand and Gravel with Traces of Silt, Dry		
2.35	325.47			Silica Sand								Gray Fine to Medium Sand with Traces of Gravel, Humid		
4.60	323.22			Screen, Opening 0.06 cm								Brown Silt, Dry		
6.05	321.77											Grey Clayey Silt, Saturated		
7.90	319.92			Cap								End of Borehole at a Depth of 7.90 m		
NOTE: 2.29 m of Free phase product observed on 12-10-96														

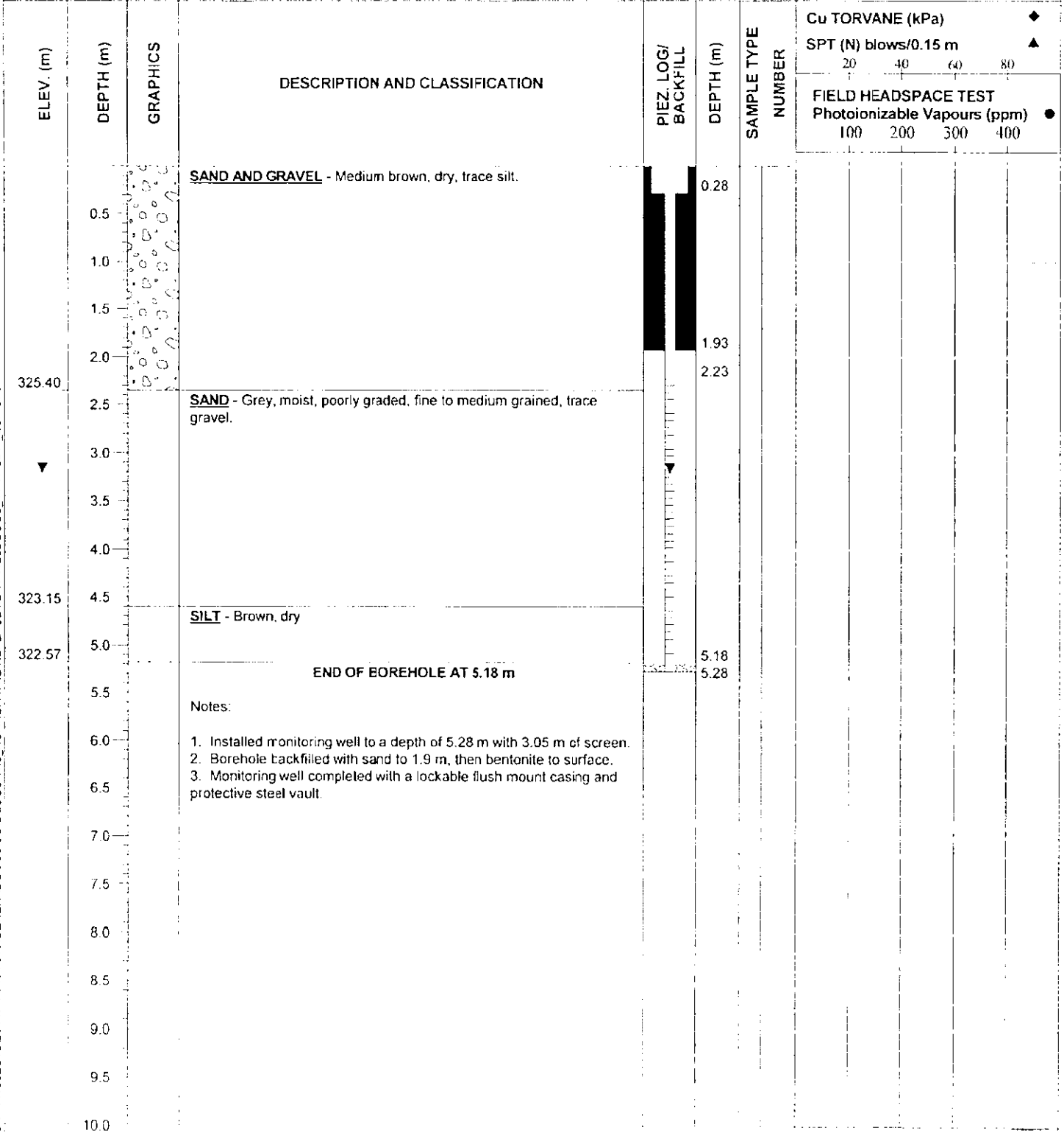
STATE OF SAMPLE: OBSERVATIONS: = WATER TABLE SURFACE PROTECTION: Steel Cap ELEVATION: Realt
 SURFACE SEALANT: Cement/Bentonite REFERENCE LEVEL: ---
 SEALANT DEPTH: 0.60 m BEDROCK LEVEL: ---
 SCREEN LENGTH: 6.70 m GROUND LEVEL: 327.61 m
 TUBING LENGTH: 1.20 m WATER TABLE LEVEL: >90 HOUR(S) AFTER DRILLING: 322.38

TYPE OF SAMPLE:
 SS - SPLIT SPOON SAMPLE
 TW - THIN WALL SAMPLE
 CS - CORE SAMPLE
 II - IDUBLESS
 W - WEAK
 I - INTERMEDIATE
 P - PERSISTENT
 NE - NON-EXISTENT
 SC - SCATTERED
 SA - SATURATED
 ** = FIELD INDICATE
 * = ANALYZED SAMPLE

CLIENT CANADIAN NATIONAL
PROJECT CN Homepayne Monitoring Well Replacement Program
SITE CN Homepayne Yard, West End
LOCATION northwest of former fueling stand
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 327.75 m
TOP OF CASING ELEV. 327.47 m
WATER ELEV. 324.52 m
DATE DRILLED 8/9/2014
UTMS (NAD83) N E

ENVIRO & GEO P:\PROJECTS\201414-0434-019\GENERAL\DOC\SOIL LOGS\THL_HORNPAYNE REPLACEMENT WELL LOGS_11-17-2014_1BP.GPJ



CONTRACTOR
Strata Drilling

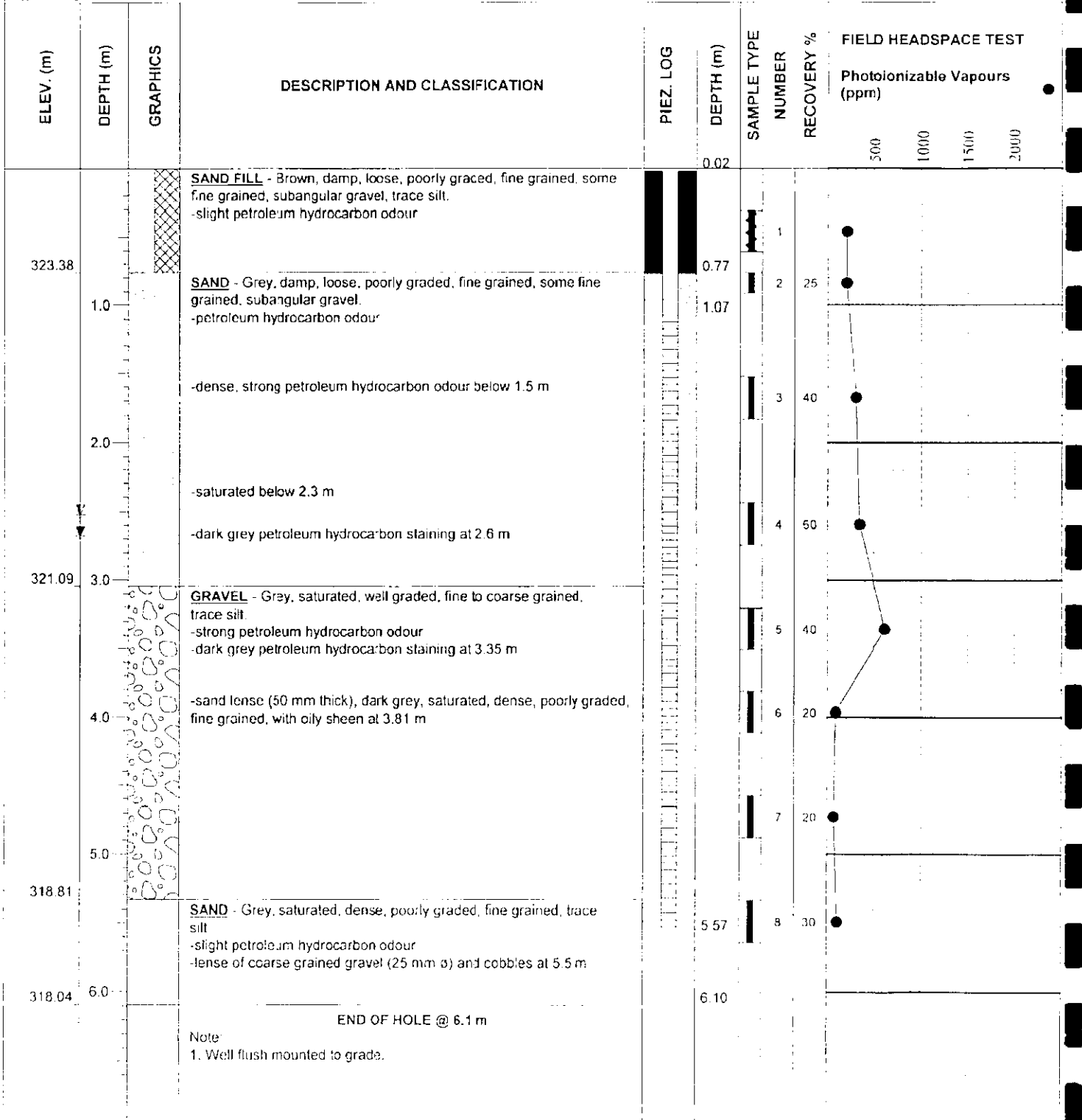
INSPECTOR
G. CREWSON

APPROVED

DATE
12/18/14

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 1.5 m East of Southeast Corner of Railing at Lagoon 2
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 324.14 m, Geodetic
TOP OF PVC ELEV. 324.12 m
WATER ELEV. 321.46 m, 26/05/00
DATE DRILLED 09/05/00



SAMPLE TYPE: [Symbol] AUGER GRAB [Symbol] SPLIT BARREL

CONTRACTOR

Paddock Drilling Ltd.

INSPECTOR

T. GALLO

APPROVED

DATE 19 06 03

000589

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 220°, 1.5 m from East to North running Barrier
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 324.19 m, Geodetic
TOP OF PVC ELEV. 324.16 m
WATER ELEV. 321.59 m, 26/05/00
DATE DRILLED 09/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
									Photoionizable Vapours (ppm)			
									500	1000	1500	2000
323.43	0.03		SAND AND GRAVEL FILL - Brown, damp, loose, poorly graded, fine grained sand and fine grained gravel, subangular grains, trace silt.		0.03		1					
	0.63				0.63							
	0.93		SAND - Brown, damp, loose, poorly graded, fine to medium grained, trace fine grained gravel, trace silt.		0.93		2	60				
	1.0		-brown to grey with depth below 1.5 m									
	2.0		-slight petroleum hydrocarbon odour at 2.1 m and strong below 2.3 m				3	60				
	3.0		-saturated below 2.4 m -petroleum hydrocarbon staining between 2.45 and 2.6 m -layer of coarse grained sand and fine grained gravel at 2.6 m				4	50				
	3.0		-grey, fine to coarse grained, with fine to coarse grained gravel, occ. subangular cobbles below 3.05 m				5	5				
320.38	4.0		-no sample recovery on cobbles between 3.8 and 4.55 m									
	5.0		SAND AND GRAVEL - Grey, saturated, some cobbles, trace silt. -petroleum hydrocarbon odour				6	10				
318.86	5.44		SAND - Grey, saturated, loose, poorly graded, coarse grained, trace gravel and cobbles. -petroleum hydrocarbon odour, sheen on water -fine grained sand lense (25 mm thick), dark grey at 5.5 m		5.44		7	30				
318.09	6.0				6.10							

END OF HOLE @ 6.1 m

Note:
1. Well flush mounted to grade.

KXX 024343 GPJ

SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED



DATE 19.06.000590

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 154°, 20 m from East-West running Barrier of Lagoon #2
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 323.66 m, Geodetic
TOP OF PVC ELEV. 323.57 m
WATER ELEV. 321.57 m, 26/05/00
DATE DRILLED 10/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
								Photoionizable Vapours (ppm)			
								500	1000	1500	2000
			SILT AND SAND - Dark brown, moist, soft, non plastic, and fine to medium grained sand, trace fine grained gravel.		0.09						
					0.12						
					0.37						
					0.67	1	●				
	1.0		-light brown below 0.75 m -damp between 0.75 and 1.5 m			2	●				
	2.0		-saturated, silt and fine grained sand, trace oxidation below 1.5 m			3	70 ●				
	3.0					4	80 ●				
	4.0										
319.09					4.57						
	5.0		END OF HOLE @ 4.57 m								
	6.0		Note: 1. Well flush mounted just above grade. Flush mount was built up with cuttings to elev. 323.86 m.								

CAK-03-3463 GPJ

SAMPLE TYPE  AUGER GRAB  SPLIT BARREL
CONTRACTOR Paddock Drilling Ltd. **INSPECTOR** T. GALLO

APPROVED

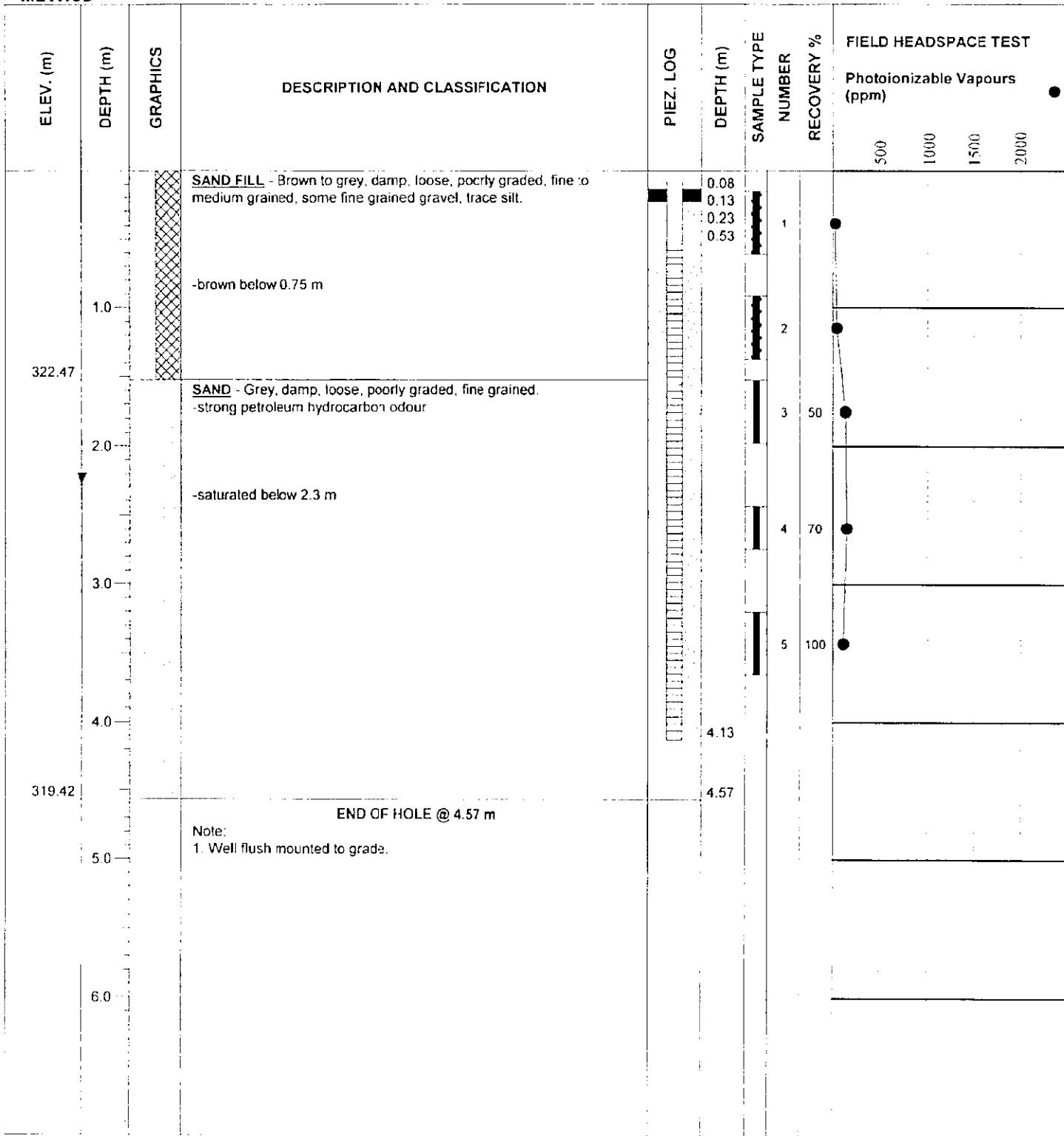
DATE 10/05/00

000591

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 220°, 8 m from East-West running Barrier of Lagoon #2

JOB NO. 00-434-08
GROUND ELEV. 323.99 m, Geodetic
TOP OF PVC ELEV. 323.91 m
WATER ELEV. 321.72 m, 26/05/00
DATE DRILLED 10/05/00

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX



KXX 0043408 GPJ

SAMPLE TYPE [Symbol] AUGER GRAB [Symbol] SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd.

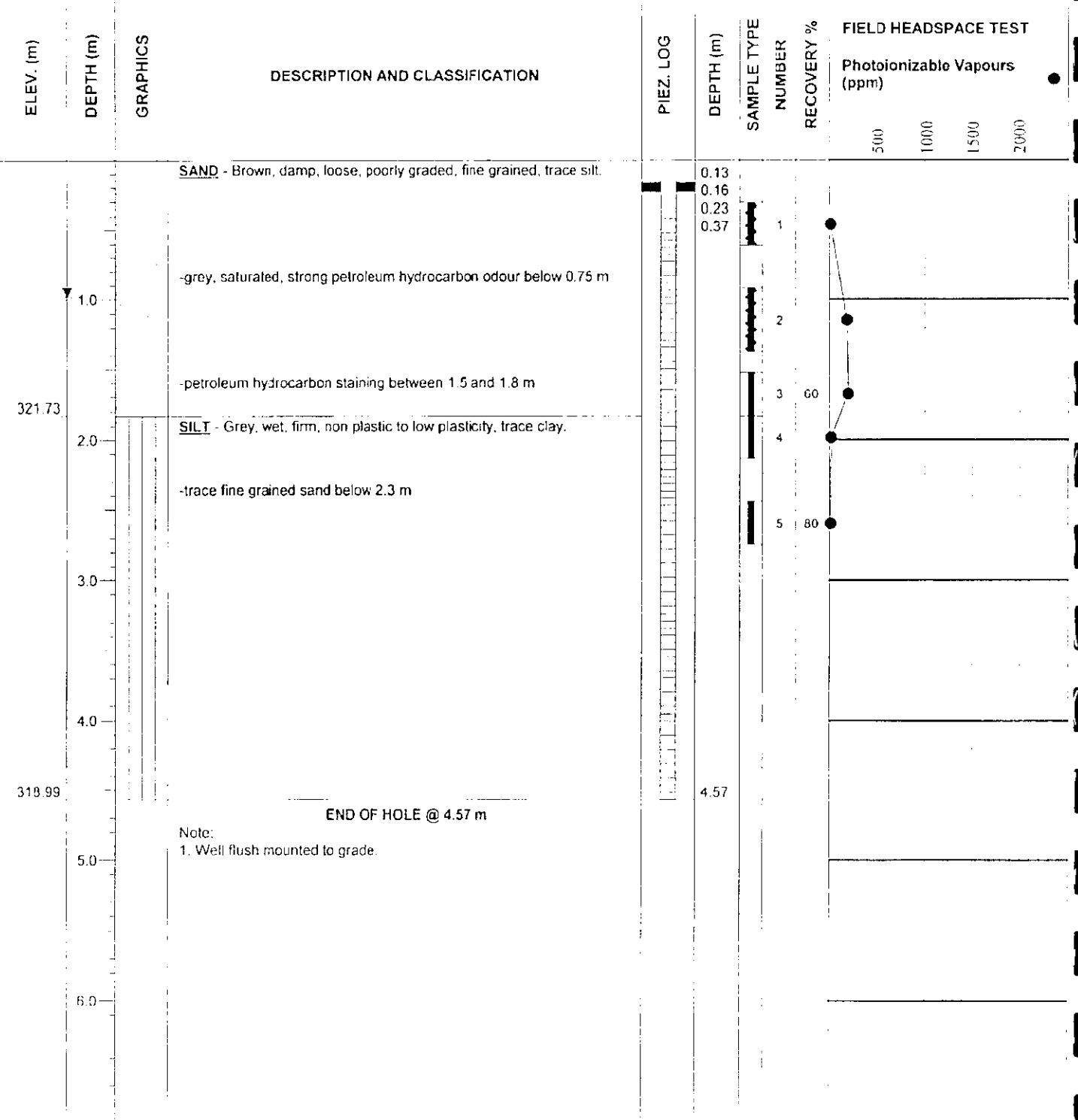
INSPECTOR T. GALLO

APPROVED

DATE 19/06/00 **000592**

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 173°, 12 m from an exposed rock located 3 m from Jackfish River
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 323.56 m, Geodetic
TOP OF PVC ELEV 323.43 m
WATER ELEV. 322.58 m, 26/05/00
DATE DRILLED 10/05/00



SAMPLE TYPE AUGER GRAB SPLIT BARREL
CONTRACTOR Paddock Drilling Ltd. **INSPECTOR** T. GALLC

APPROVED

DATE 19 06 00

000593

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 250°, 3.5 m from a hydro pole

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08

GROUND ELEV. 323.95 m, Geodetic

TOP OF PVC ELEV. 323.90 m

WATER ELEV. 322.18 m, 26/05/00

DATE DRILLED 10/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
								Photoionizable Vapours (ppm)			
								500	1000	1500	2000
323.19	0.05	[Cross-hatch pattern]	SAND FILL - Dark brown, damp, loose, poorly graded, fine to medium grained, and silt. -petroleum hydrocarbon odour	[Piezometer log]	0.05 0.08 0.11 0.40	1					
322.43	1.0	[Dotted pattern]	SAND AND SILT - Dark grey, moist, loose, poorly graded, fine grained, and silt. -petroleum hydrocarbon odour -wet below 1.2 m	[Piezometer log]		2					
321.66	2.0	[Vertical lines pattern]	SILT AND SAND - Grey, saturated, firm, non plastic, and fine grained sand. -petroleum hydrocarbon staining at 1.5 m -sand lense (50 mm thick), fine grained, stained with petroleum hydrocarbons at 1.83 m	[Piezometer log]		3	60				
	2.44		SAND AND SILT - Grey, saturated, dense, poorly graded, fine grained, and silt. -petroleum hydrocarbon staining and odour at 2.44 m	[Piezometer log]		4					
	3.05		-with silt below 3.05 m	[Piezometer log]		5	70				
319.38	4.45			[Piezometer log]	4.45 4.57	6	60				
	4.57		END OF HOLE @ 4.57 m								
	5.0		Note: 1. Well flush mounted to grade.								

SAMPLE TYPE [Symbol] AUGER GRAB [Symbol] SPLIT BARREL

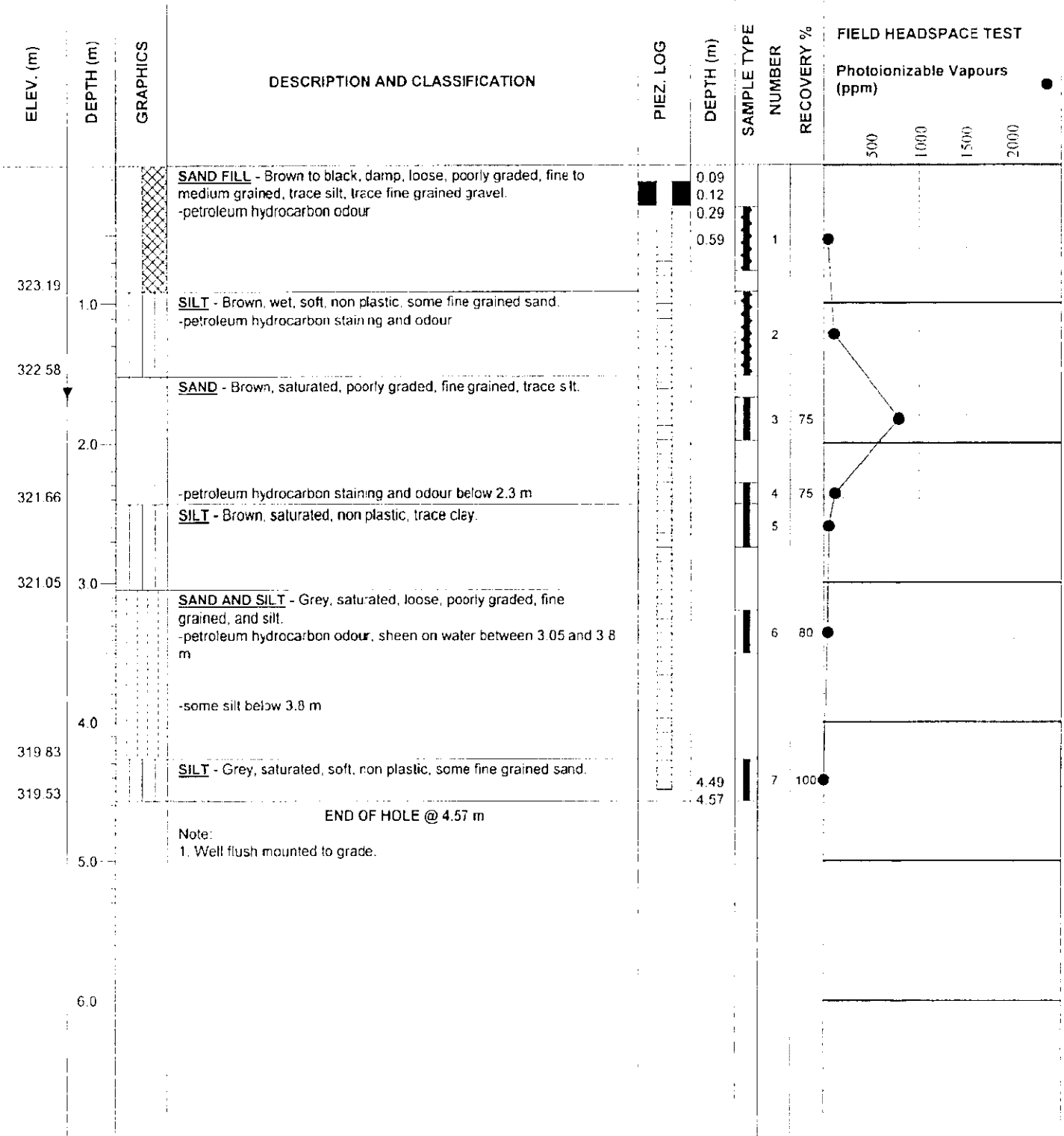
CONTRACTOR Paddock Drilling Ltd. INSPECTOR T. GALLO

APPROVED

DATE 10/05 000594

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 226°, 14 m from a yellow painted metal well, and 1.5 m from Road
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 324.10 m, Geodetic
TOP OF PVC ELEV. 324.01 m
WATER ELEV. 322.43 m, 26/05/00
DATE DRILLED 10/05/00





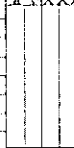

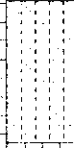
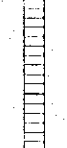
XXX 00-434-08 G.P.U.

SAMPLE TYPE [Symbol] AUGER GRAB [Symbol] SPLIT BARREL
CONTRACTOR Paddock Drilling Ltd.
INSPECTOR T. GALLO

APPROVED [Signature] **DATE** 10/06/00 **000595**

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 1.5 m from concrete conduite running West from Roundhouse
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 325.01 m, Geodetic
TOP OF PVC ELEV. 324.87 m
WATER ELEV. 323.40 m, 26/05/00
DATE DRILLED 10/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
								Photoionizable Vapours (ppm)			
								500	1000	1500	2000
323.49	0.14		SAND AND GRAVEL FILL - Brown, wet, loose, sand fine to coarse grained and fine grained, subangular gravel. -petroleum hydrocarbon odour		0.14						
	0.17						1				
	0.79		-dark grey, and silt, petroleum hydrocarbon staining and odour below 0.75 m		0.79						
	1.09				1.09	2					
322.72	2.0		SILT - Brown damp, firm, non plastic, trace fine grained sand. -petroleum hydrocarbon odour			3	90				
								4			
			-sand lense (25 mm thick), grey, saturated, fine grained, petroleum hydrocarbon staining and odour at 2.1 m								
			SILTY SAND - Grey, saturated, dense, poorly graded, fine grained, with silt. -petroleum hydrocarbon staining and odour			5	80				
321.96	3.0		SILT - Brown wet, firm, non plastic, trace clay.			6	80				
320.44	4.54		END OF HOLE @ 4.57 m		4.54						
	4.57		Note: 1. Well flush mounted to grade.		4.57						
	5.0										
	6.0										

XXX 0043408 GPJ

SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd.

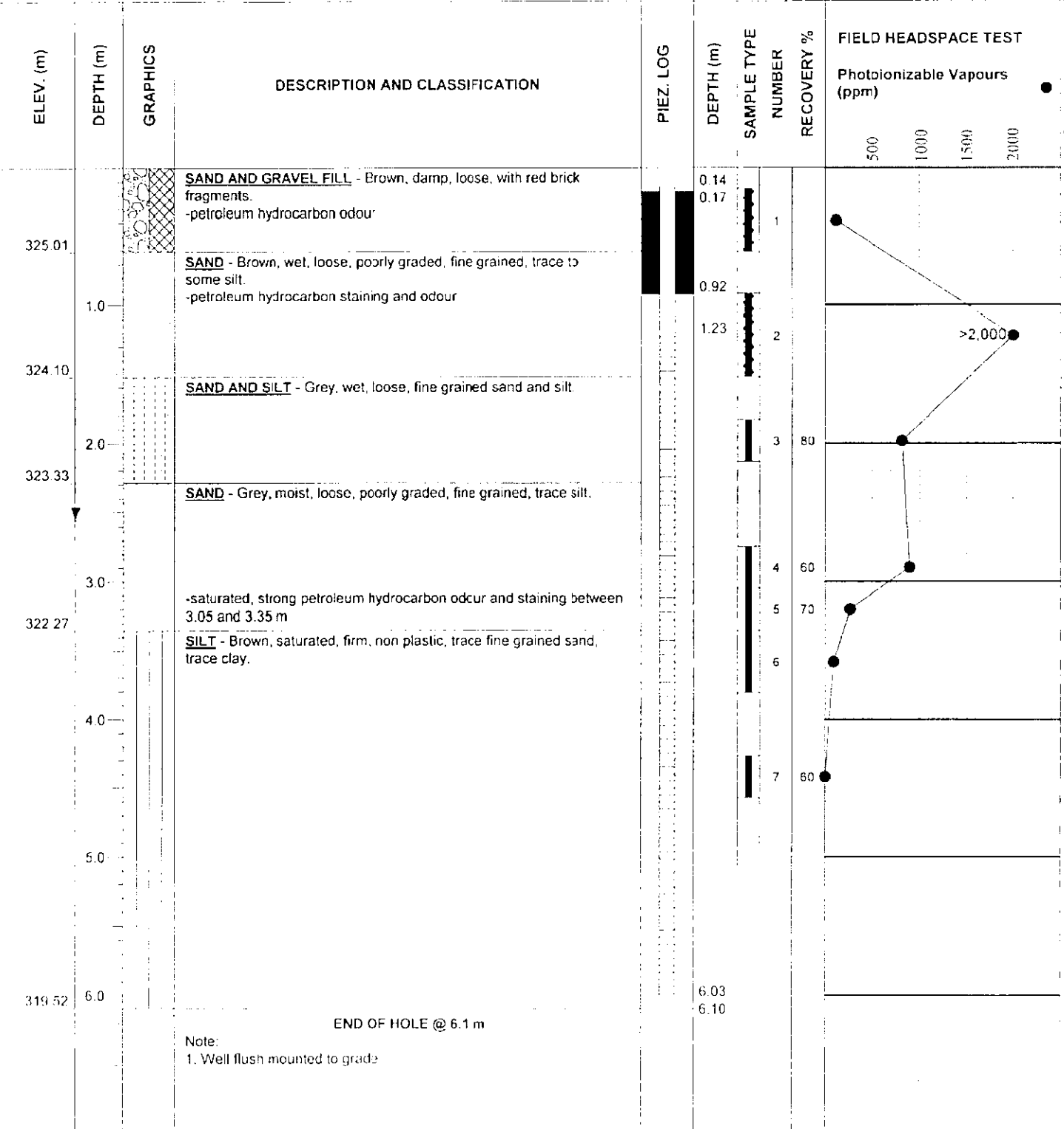
INSPECTOR T. GALLO

APPROVED

DATE 19/06/000596

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 90°, 20 m from hydro pole, and 14°, 24 m from Waste Oil/Water Separator Building
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 325.62 m, Geodetic
TOP OF PVC ELEV. 325.48 m
WATER ELEV. 323.08 m, 26/05/00
DATE DRILLED 10/05/00



Note:
1. Well flush mounted to grade

SAMPLE TYPE [Auger Grab] [Split Barrel]
CONTRACTOR Paddock Drilling Ltd.
INSPECTOR T. GALLO

APPROVED

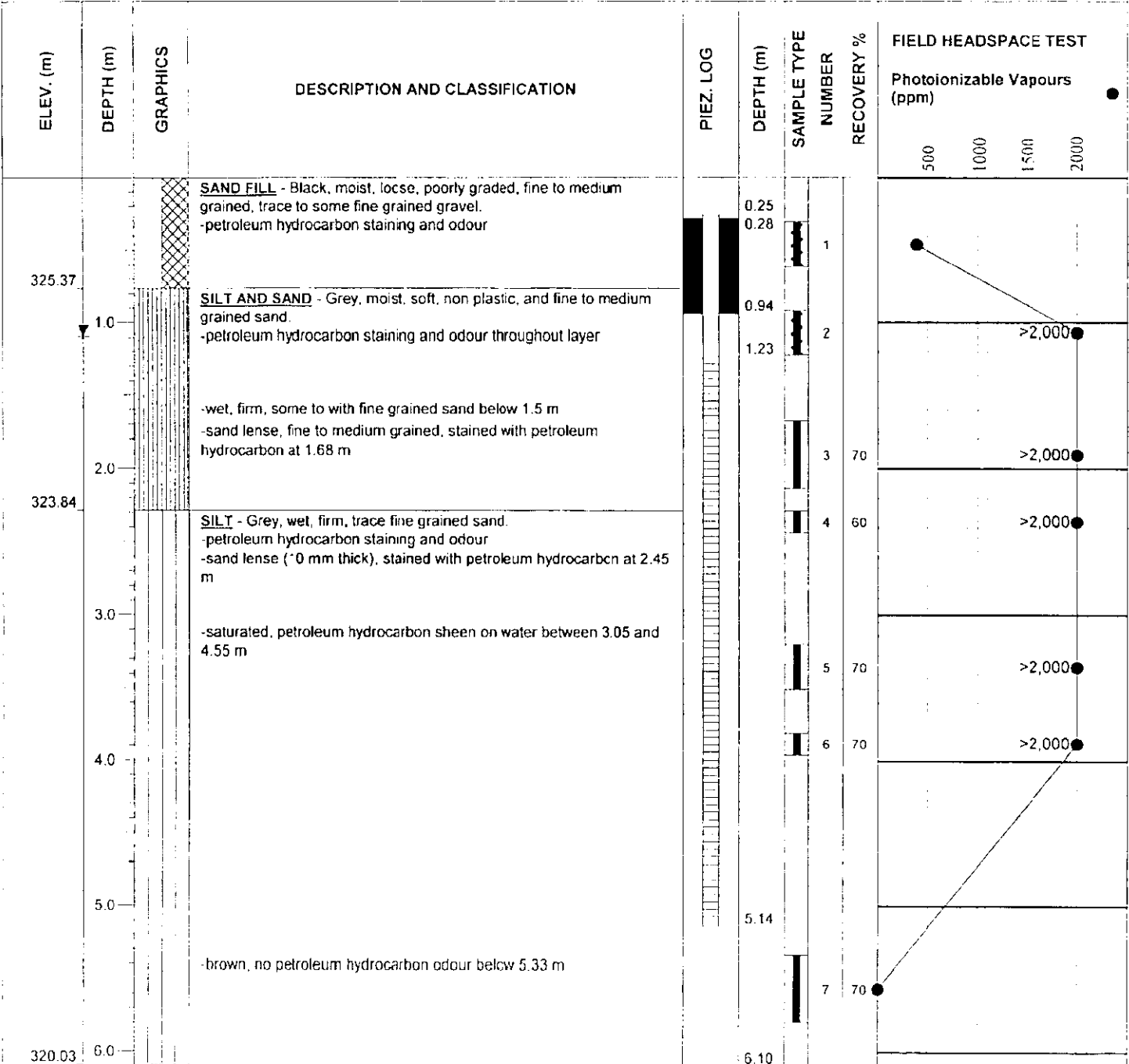
DATE: 19/06/00

000597

KGS 00-434-08 GFL

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 236°, 1.5 m from track entering South-West train door in Roundhouse
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 326.13 m, Geodetic
TOP OF PVC ELEV. 325.88 m
WATER ELEV. 325.04 m, 26/05/00
DATE DRILLED 11/05/00



Note:
1. Well flush mounted to grade.

XXX 00434-08 GPU

SAMPLE TYPE [Symbol] AUGER GRAB [Symbol] SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR T. GALLO

APPROVED

DATE 12/06/00 000598

CLIENT CANADIAN NATIONAL
PROJECT CN Hornepayne Monitoring Well Replacement Program
SITE CN Hornepayne Yard, East End
LOCATION 235° 1.5 m from track entering South-West train door in Roundhouse
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 325.74 m
TOP OF CASING ELEV 325.53 m
WATER ELEV. 324.36 m
DATE DRILLED 10/9/2014
UTMs (NAD83) N 5,454,318
 E 662,126

ENV-RC & GEO-P-PROJECTS/2014-0434-019-GENERAL/DOCS/SO1 LOGS/HL_HORNEPAYNE REPLACEMENT WELL LOGS_11-17-2014_LBF.GPJ

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	Cu TORVANE (kPa)		FIELD HEADSPACE TEST Photoionizable Vapours (ppm)					
							20	40	60	80	100	200	300	400
324.98	0.5	[Pattern]	SAND FILL - Black, moist, loose, poorly graded, fine to medium grained, trace to some fine grained gravel. - petroleum hydrocarbon staining and odour	[Bar]	0.21									
	1.0	[Pattern]	SILT AND SAND - Grey, moist, soft, non plastic, and fine to medium grained sand. - petroleum hydrocarbon staining and odour throughout layer	[Bar]	0.63									
	1.5	[Pattern]	- wet, firm, some to with fine grained sand below 1.5 m	[Bar]	0.93									
	2.0	[Pattern]	- sand lense, fine to medium grained, stained with petroleum hydrocarbon at 1.68 m	[Bar]										
323.46	2.5	[Pattern]	SILT - Grey, wet, firm, trace fine grained sand. - petroleum hydrocarbon staining and odour - sand lense (10 mm thick), stained with petroleum hydrocarbon at 2.45 m	[Bar]										
	3.0	[Pattern]		[Bar]										
	3.5	[Pattern]		[Bar]										
	4.0	[Pattern]		[Bar]	4.00									
321.48	4.26	[Pattern]	END OF BOREHOLE AT 4.26 m	[Bar]	4.26									
	4.5													
	5.0		Notes: 1. Monitoring well installed to a depth of 4.0 m with 3.0 m of screen. 2. Borehole backfilled with sand to 0.63 m, then bentonite to surface 3. Monitoring well completed with a flush mount casing and steel protective vault											
	5.5													
	6.0													
	6.5													
	7.0													
	7.5													
	8.0													
	8.5													
	9.0													
	9.5													
	10.0													

SAMPLE TYPE

CONTRACTOR
Strata Drilling

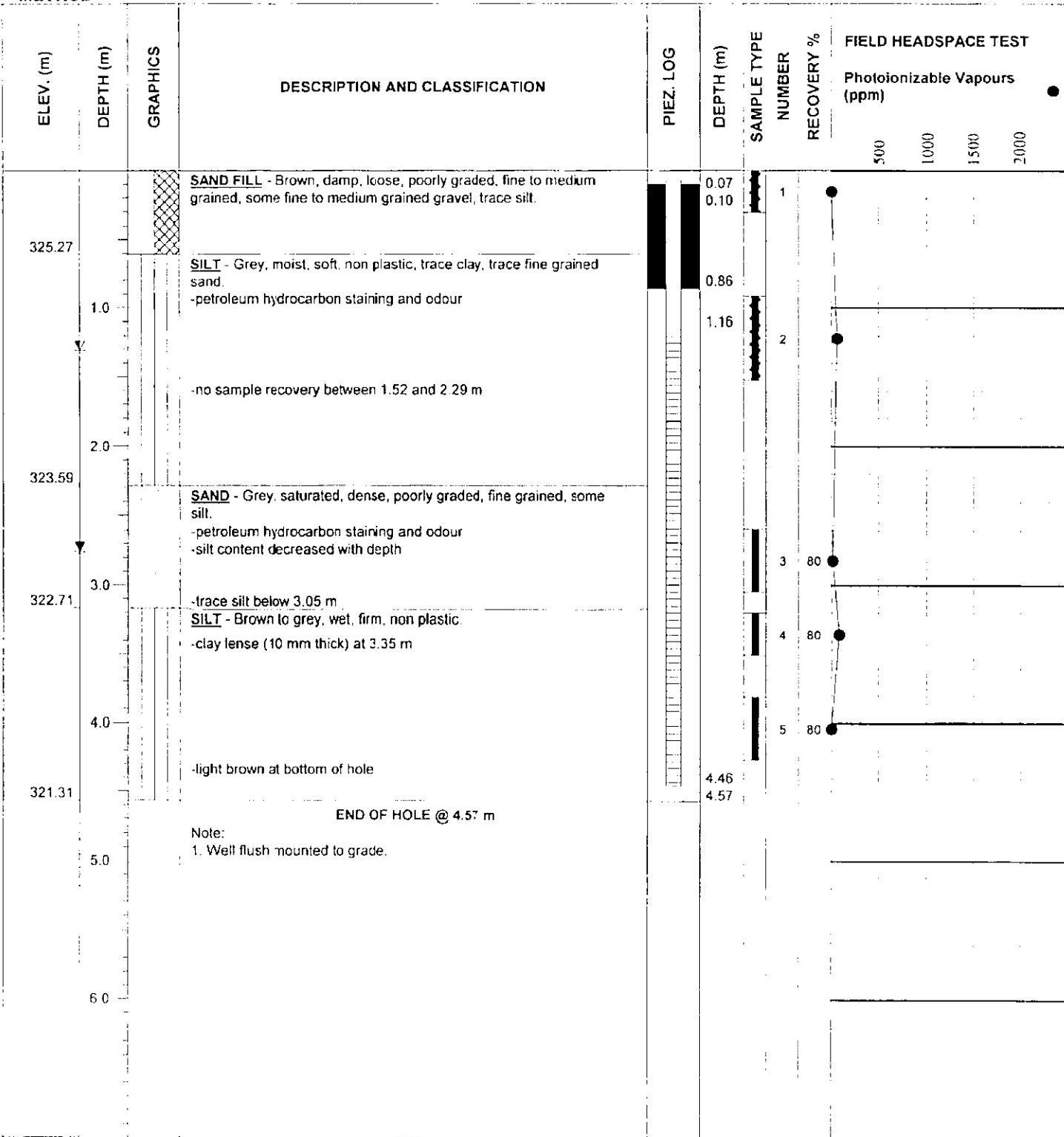
INSPECTOR
G. CREWDSON

APPROVED

DATE
12/18/14

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 335°, 2 m from yellow post marking concrete underground Oil/Water Separator
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 325.88 m, Geodetic
TOP OF PVC ELEV. 325.81 m
WATER ELEV. 323.12 m, 26/05/00
DATE DRILLED 11/05/00



XXX 31-43-03 GPJ

SAMPLE TYPE [Symbol] AUGER GRAB [Symbol] SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR T. GALLO

APPROVED

DATE 29/06/000600

CLIENT CANADIAN NATIONAL
PROJECT CN Homepayne Monitoring Well Replacement Program
SITE CN Homepayne Yard, East End
LOCATION 335°, 2m from yellow post marking concrete underground Oil/Water Separator
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 325.55 m
TOP OF CASING ELEV 325.31 m
WATER ELEV. 323.35 m
DATE DRILLED 10/9/2014
UTMs (NAD83) N 5,454,337
 E 662,158

ENVIRO & GEO PROJECTS\2014\14-0434-01\GENERAL\DOCS\SOIL LOGS\11-17-2014_LBP.GPJ

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	Cu TORVANE (kPa)		SPT (N) blows/0.15 m		FIELD HEADSPACE TEST Photoionizable Vapours (ppm)	
							20	40	60	80	100	200	300	400
324.94	0.5		SAND FILL - Brown, damp, loose, poorly graded, fine to medium grained, some fine to medium grained gravel, trace silt.		0.24							
	1.0		SILT - Grey, moist, soft, non plastic, trace clay, trace fine grained sand. - petroleum hydrocarbon staining and odour		0.85							
323.27	2.0				1.15							
	2.5		SAND - Grey saturated, dense, poorly graded, fine grained, some silt. - petroleum hydrocarbon staining and odour - silt content decreased with depth									
322.37	3.0		- trace silt below 3.05 m									
	3.5		SILT - Brown to grey, wet, firm, non plastic. - clay lense (10 mm thick) at 3.35 m									
321.59	4.0		END OF BOREHOLE AT 3.96 m		3.96							
	4.5		Notes: 1. Monitoring well installed to a depth of 4.2 m with 3.0 m of screen. 2. Borehole backfilled with sand to 0.85 m, then bentonite to surface. 3. Monitoring well completed with a flush mount casing and protective steel vault.		4.19							
	5.0											
	5.5											
	6.0											
	6.5											
	7.0											
	7.5											
	8.0											
	8.5											
	9.0											
	9.5											
	10.0											

SAMPLE TYPE

CONTRACTOR
Strata Drilling

INSPECTOR
G. CREWDSON

APPROVED

DATE
12/18/11

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 223°, 18 m from concrete lid on Manhole #1

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08

GROUND ELEV. 325.45 m, Geodetic

TOP OF PVC ELEV. 325.41 m

WATER ELEV. 322.41 m, 26/05/00

DATE DRILLED 12/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
								Photolizable Vapours (ppm)			
								500	1000	1500	2000
324.54	0.04		SAND FILL - Black, moist, loose, poorly graded, fine to medium grained, and fine grained, subangular gravel.		0.04						
	0.07				0.07						
	0.24				0.24	1	●				
	0.54				0.54						
323.93	1.0		SILTY SAND - Grey, moist, loose, poorly graded, fine grained, and silt, with oxidation.								
						2	●				
						3	●				
						40	●				
323.16	2.0		GRAVEL AND SAND - Grey, damp to moist, fine to coarse grained gravel and fine to medium grained sand.								
						40	●				
322.40	3.0		SAND - Grey to brown, moist, loose, poorly graded, fine grained. -sand and fine grained gravel below 2.45 m								
						40	●				
						30	●				
321.18	4.0		GRAVEL - Saturated, petroleum hydrocarbon staining and odour, with oily sheen on water.								
						10	●				
					4.15						
					4.27						
			AUGER REFUSAL ON POSSIBLE BOULDER @ 4.27 m Note: 1. Well flush mounted to grade.								
	5.0										
	6.0										

XXX-00-434-08-GPJ

SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR T. GALLO

APPROVED

DATE 19/06/000602



SUMMARY LOG

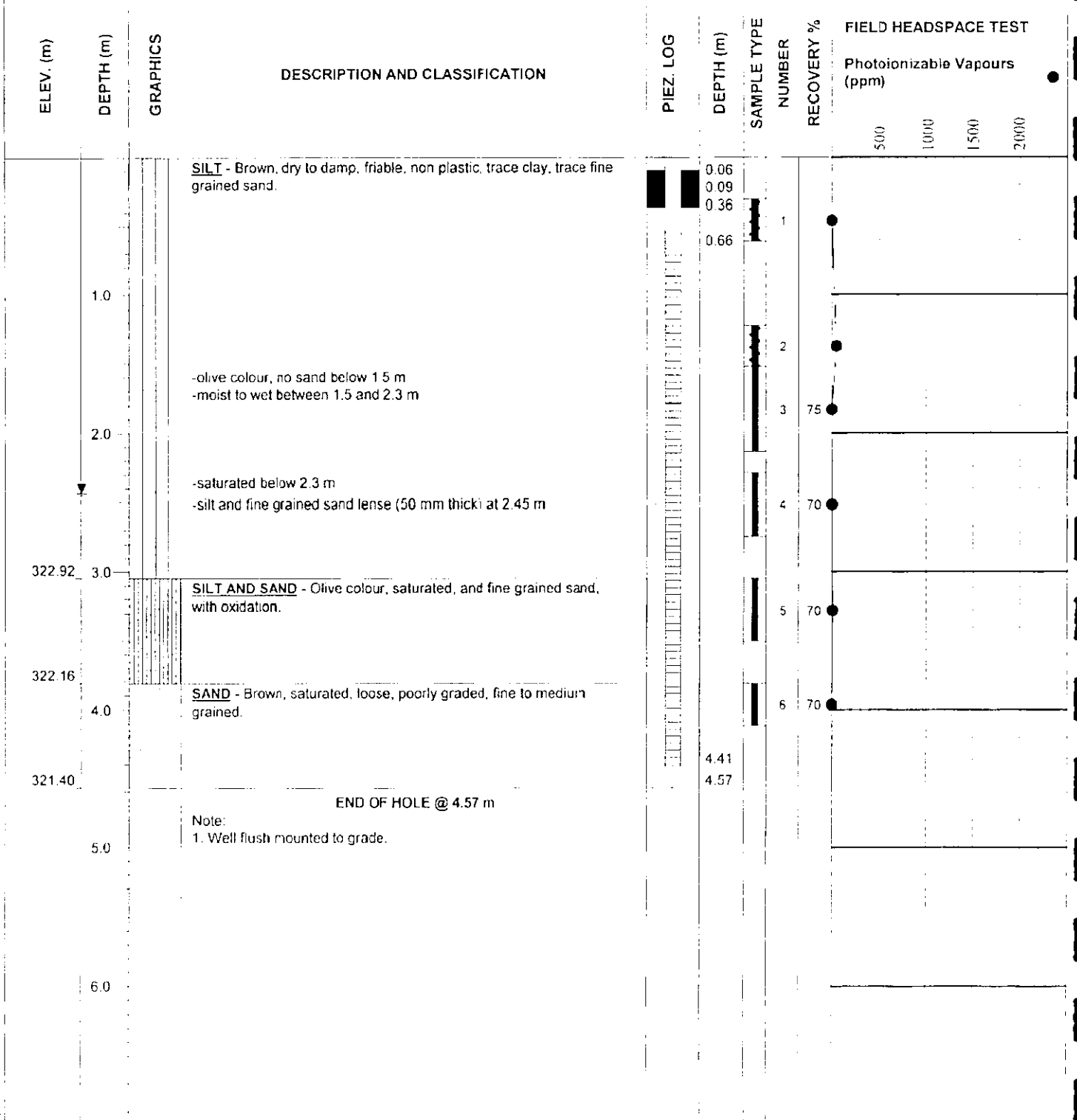
HOLE NO.

MW-115

SHEET 1 of 1

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 56°, 14 m from Manhole #1
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 325.97 m, Geodetic
TOP OF PVC ELEV. 325.91 m
WATER ELEV. 323.54 m, 26/05/00
DATE DRILLED 12/05/00



XXX 0043408 GFSJ

SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd. INSPECTOR T. GALLC

APPROVED

DATE 19/06/00 000603



SUMMARY LOG

HOLE NO.

MW119

SHEET 1 of 1

CLIENT CN CORPORATE ENVIRONMENT EAST

PROJECT ENVIRONMENTAL INVESTIGATION

SITE HORNEPAYNE YARD

LOCATION 7.5 m S of OW8-2 and 3.5 m W of OW8-2

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

JOB NO. 01-434-07

GROUND ELEV. 327.76 m, Geodetic

TOP OF PVC ELEV. 327.64 m

WATER ELEV. 323.72 m, 22/08/01

DATE DRILLED 26/07/01

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)			
								500	1000	1500	2000
								FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm)			
								1000	2000	3000	4000
326.85	0.5		SAND AND GRAVEL FILL - Brown, damp, loose, poorly graded, fine grained sand, and fine to coarse grained, subangular gravel.				1				
326.09	1.0		SILTY SAND - Brown, moist to wet, loose, poorly graded, fine to medium grained, some silt, trace fine to coarse grained, subangular gravel.		1.22		2				
	1.5		-occ. cobbles at 1.2 m		1.52						
325.33	2.0		SILT - Grey, damp, dense, non plastic, trace fine grained sand and fine grained, subangular gravel.				3				
	2.5		SILTY SAND - Grey, damp, dense, poorly graded, fine grained, some fine grained gravel.				4				
324.72	3.0		PEAT - Black, moist to wet, compact, some wood fragments.				5				
324.56	3.5		SILTY SAND - Grey, moist to wet, dense, poorly graded, medium to coarse grained, some silt, some fine to medium grained gravel.				6				
	4.0		-trace clay between 3.35 and 3.8 m		3.96						
	4.5		-compact below 3.35 m				7				
323.50	5.0		SILT - Grey, wet, dense, non plastic, trace fine grained sand.				8				
	5.5				5.49						
321.67	6.0		END OF HOLE @ 6.1 m		6.10						
	6.5		Note: 1. Well flush mounted to grade.								
	7.0										
	7.5										
	8.0										
	8.5										
	9.0										
	9.5										

VAPOURS FT. M 0143407.GPJ

SAMPLE TYPE AUGER GRAB

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR D. B. KASUR

APPROVED

DATE 16/05/02 000604



SUMMARY LOG

HOLE NO.

MW120

SHEET 1 of 1

CLIENT CN CORPORATE ENVIRONMENT EAST

PROJECT ENVIRONMENTAL INVESTIGATION

SITE HORNEPAYNE YARD

LOCATION Halfway between Ends of Concrete Pad, 2 Tracks South of Fuelling Stand

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

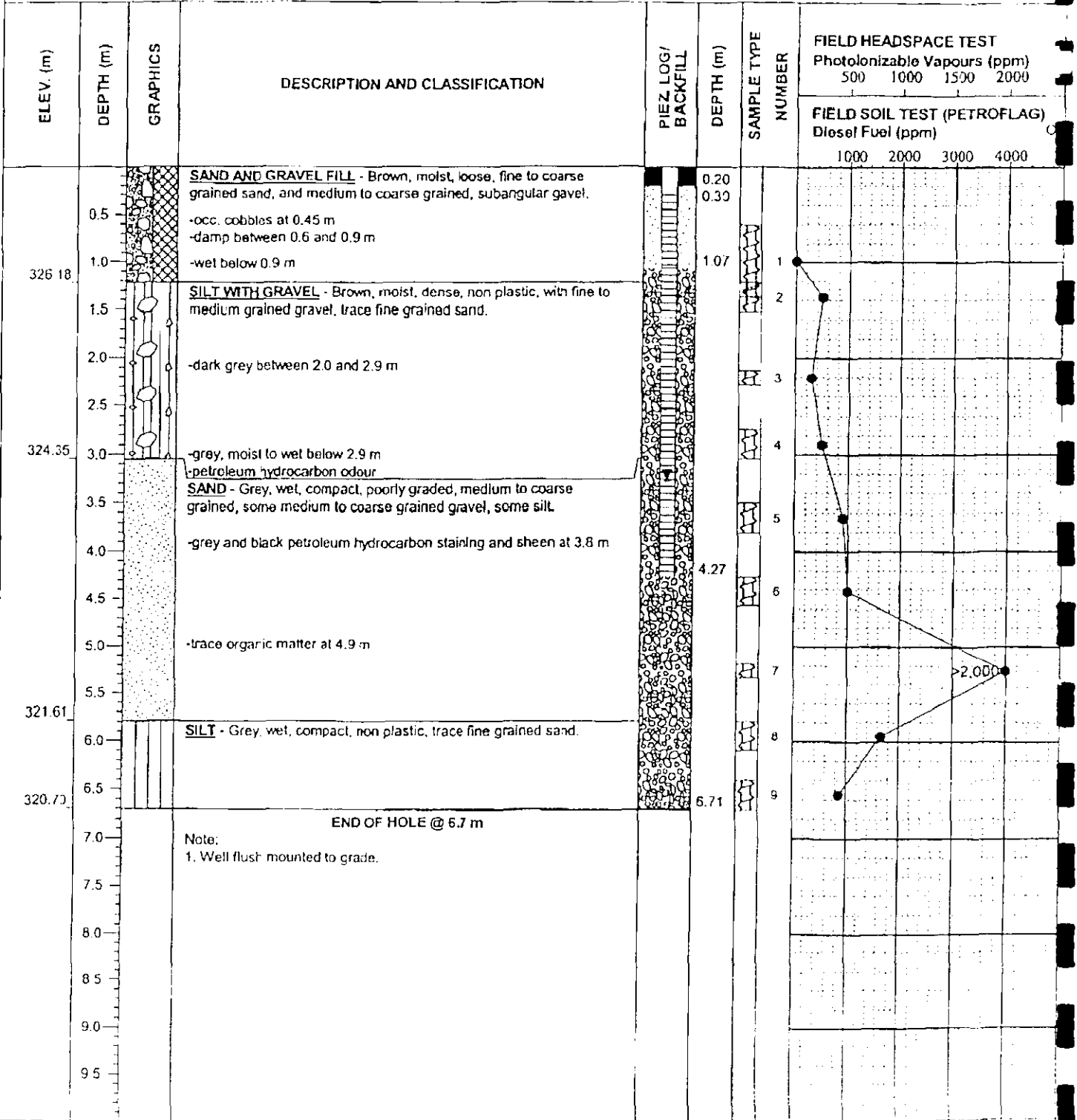
JOB NO. 01-434-07

GROUND ELEV. 327.40 m, Geodetic

TOP OF PVC ELEV. 327.33 m

WATER ELEV. 324.14 m, 22/08/01

DATE DRILLED 26/07/01



VAPOURPS_FT_M 01-434-07 001

SAMPLE TYPE [Symbol] AUGER GRAB

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR D. B. KASUR

APPROVED _____

DATE 16/05/000605



SUMMARY LOG

HOLE NO.

MW121

SHEET 1 of 1

CLIENT CN CORPORATE ENVIRONMENT EAST
PROJECT ENVIRONMENTAL INVESTIGATION
SITE HORNEPAYNE YARD
LOCATION 1.5 m S and 20 m E of SE Corner of Fuelling Stand Concrete Pad
DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

JOB NO. 01-434-07
GROUND ELEV. 327.45 m, Geodetic
TOP OF PVC ELEV. 327.31 m
WATER ELEV. 323.31 m, 22/08/01
DATE DRILLED 26/07/01

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
								500	1000	1500	2000
								FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
								1000	2000	3000	4000
326.08	0.5		SAND AND GRAVEL FILL - Brown, damp, compact, poorly graded, fine to medium grained sand, and medium to coarse grained, subangular gavel, some silt, trace cobbles.		0.46 0.61		1				
	1.0		-moist to wet, petroleum hydrocarbon odour at 0.9 m				2				
	1.5		SILT - Grey, moist, dense, non plastic, some fine grained sand and gravel.				3				
	2.0		-brown, damp between 1.5 and 2.45 m				4				
	2.5		-very dense below 1.5 m				5				
324.25	3.0		-grey, moist to wet, petroleum hydrocarbon odour below 2.45 m				6				
323.79	3.5		PEAT - Dark brown, wet, dense, some wood fragments.				7				
	4.0		INTERLAYERED SILTY SAND AND SANDY SILT - Grey, moist to wet, compact, interlayered sandy silt and medium to coarse grained sand, with fine to coarse grained gravel, layers 50-125 mm thick.				8				
323.03	4.5		PEAT - Dark brown, wet, dense, some wood fragments.				9				
322.88	5.0		SILT - Grey, wet, dense, non plastic, trace fine grained sand, traces of clay.				10				
322.27	5.5		SILTY SAND - Grey, wet, loose, poorly graded, medium to coarse grained, some silt, trace fine to medium grained gravel.		5.18		11				
321.35	6.0		END OF HOLE @ 6.1 m		6.10		12				
	6.5		Note: 1. Well flush mounted to grade.								
	7.0										
	7.5										
	8.0										
	8.5										
	9.0										
	9.5										

VAPOURS_FT_M 01-43407.GPJ

SAMPLE TYPE AUGBR GRAB

CONTRACTOR Paddock Drilling Ltd.

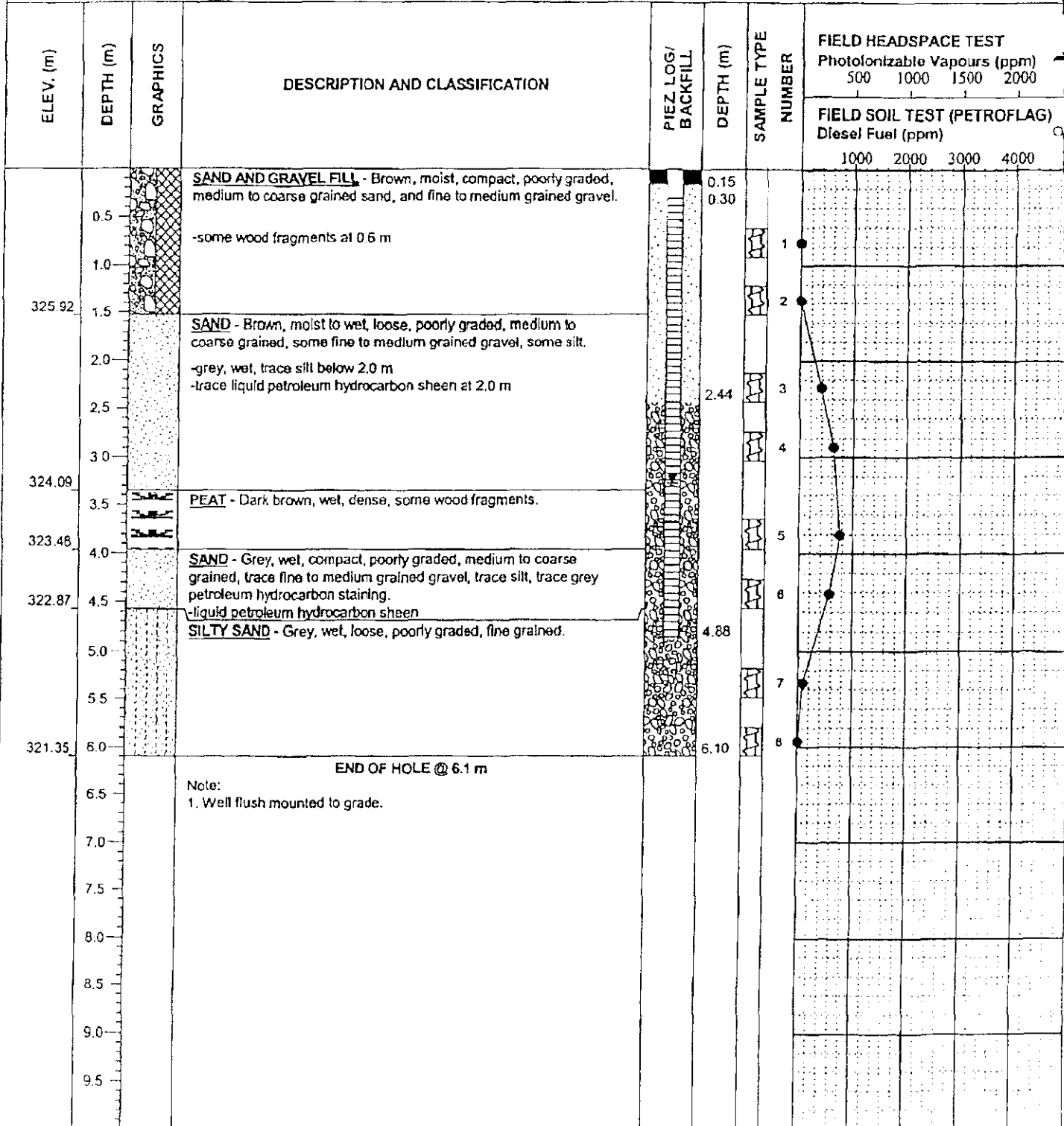
INSPECTOR D. B. KASUR

APPROVED

DATE 16/05/02 000606

CLIENT CN CORPORATE ENVIRONMENT EAST
PROJECT ENVIRONMENTAL INVESTIGATION
SITE HORNEPAYNE YARD
LOCATION 1.5 m N of N Track and 1.25 m W of SE Corner of Concrete Pad Fuelling Stand
DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

JOB NO. 01-434-07
GROUND ELEV. 327.45 m, Geodetic
TOP OF PVC ELEV. 327.34 m
WATER ELEV. 324.17 m, 22/08/01
DATE DRILLED 26/07/01



VAPOURS FT M 0143407 GPJ

SAMPLE TYPE AUGER GRAB

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR D. B. KASUR

APPROVED _____

DATE 16/05/02

000607

CLIENT CN CORPORATE ENVIRONMENT EAST
PROJECT ENVIRONMENTAL INVESTIGATION
SITE HORNEPAYNE YARD
LOCATION 1.5 m S of 2nd Post on Fence and 0.5 m E of OW8-1
DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

JOB NO. 01-434-07
GROUND ELEV. 327.40 m, Geodetic
TOP OF PVC ELEV. 327.31 m
WATER ELEV. 323.23 m, 22/08/01
DATE DRILLED 26/07/01

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
							500	1000	1500	2000
							FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
							1000	2000	3000	4000
	0.5		SAND AND GRAVEL FILL - Brown, moist, dense, poorly graded, fine to medium grained sand, and medium to coarse grained, subangular gravel.		0.15					
326.33	1.0		SAND - Dark brown, damp, compact, poorly graded, fine grained, trace fine to medium grained gravel, some organics to 1.4 m depth. -grey below 1.4 m		0.91	1 ●				
325.57	1.5					2 ●				
	2.0		SILT - Grey, damp, dense, non plastic, trace fine grained sand.			3 ●				
	2.5		-brown below 2.45 m			4 ●				
324.35	3.0		SILTY SAND - Grey, moist to wet, dense, poorly graded, medium to coarse grained, some silt, some fine to medium grained gravel.			5 ●				
	3.5		-wet, black petroleum hydrocarbon staining, trace sheen below 3.5 m			6 ●				
323.43	4.0		PEAT - Dark brown, moist to wet, compact, some wood fragments.			7 ●				
	4.5				4.88	8 ●				
322.37	5.0		SILT - Grey, wet, dense, non plastic, trace fine grained sand, petroleum hydrocarbon staining.			9 ●				
	5.5					10 ●				
321.60	6.0		SAND - Grey, wet, compact, poorly graded, medium to coarse grained, trace fine grained gravel, trace silt, petroleum hydrocarbon staining.		6.10					
320.69	6.5									
	7.0		SILT - Grey, wet, dense, non plastic, trace fine to medium grained gravel.							
319.78	7.5				7.62					
	8.0		END OF HOLE @ 7.62 m							
	8.5		Note: 1. Well flush mounted to grade.							
	9.0									
	9.5									

VAPOURS P.T.M. C143407 GPJ

SAMPLE TYPE AUGER GRAB

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR D. B. KASUR

APPROVED _____

 DATE 16/08/01 **000608**

CLIENT CANADIAN NATIONAL
PROJECT CN Homepayne Monitoring Well Replacement Program
SITE CN Homepayne Yard, West End
LOCATION 1.5m S of 2nd Post on Fence and 0.5m E of OW8-1
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 327.37 m
TOP OF CASING ELEV. 327.05 m
WATER ELEV. 324.00 m
DATE DRILLED 9/9/2014
UTMs (NAD83) N 5,456,114
 E 660,380

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	Cu TORVANE (kPa)		SPT (N) blows/0.15 m		FIELD HEADSPACE TEST Photoionizable Vapours (ppm)			
							20	40	60	80	100	200	300	400
326.31	0.5		SAND AND GRAVEL FILL - Brown, moist, dense, poorly graded, fine to medium grained sand and medium to coarse grained subangular gravel.		0.32									
325.55	1.5		SAND - Dark brown, damp, compact, poorly graded, fine grained, trace fine to medium grained gravel, some organics to 1.4 m depth. - grey below 1.4 m											
	2.0		SILT - Grey, damp, dense, non plastic, trace fine grained sand.		2.12									
	2.5		- brown below 2.45 m		2.42									
324.32	3.0		SILTY SAND - Grey, moist to wet, dense, poorly graded, medium to coarse grained, some silt, some fine to medium grained gravel.											
	3.5		- wet, black petroleum hydrocarbon staining, trace sheen below 3.5 m											
323.41	4.0		PEAT - Dark brown, moist to wet, compact, some wood fragments.											
322.34	5.0		SILT - Grey, wet, dense, non plastic, trace fine grained sand, petroleum hydrocarbon staining		5.18									
322.19	5.5		END OF BOREHOLE AT 5.18 m		5.47									
	6.0		Notes: 1. Monitoring well installed to a depth of 5.5 m with 3.0 m of screen. 2. Borehole backfilled with sand to 2.1 m, then bentonite to surface. 3. Monitoring well completed with a flush mount casing and protective steel vault.											

ENV/RC & CEO P:\PROJETS\2014\14-0434-019\GENERAL\DOCS\SOIL LOGS\11-17-2014_LBP.GPJ

SAMPLE TYPE

CONTRACTOR
Strata Drilling

INSPECTOR
G. CREWSON

APPROVED

DATE
12/18/14

000609

CLIENT CN CORPORATE ENVIRONMENT EAST
PROJECT ENVIRONMENTAL INVESTIGATION
SITE HORNEPAYNE YARD
LOCATION 41 m E of OW3-2, 23.5 m E of small Hydro Post and Light, 0.5 m from Rail
DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

JOB NO. 01-434-07
GROUND ELEV. 325.97 m, Geodetic
TOP OF PVC ELEV. 325.79 m
WATER ELEV. 323.06 m, 09/10/01
DATE DRILLED 27/07/01

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
							500	1000	1500	2000
							FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
							1000	2000	3000	4000
325.36	0.5		SAND AND GRAVEL FILL - Brown, damp, dense, poorly graded, medium to coarse grained sand, and medium to coarse grained, subangular gravel.		0.46	1 ●				
	1.0		SILT - Brown, moist, compact, non plastic, trace fine grained sand.		0.61	2 ●				
	1.5		-wet below 1.5 m			3 ●				
	2.0		-compact to dense between 1.5 and 3.5 m			4 ●				
	2.5		-sand lense (25 mm thick), fine to medium grained, wet, loose at 2.15 m			5 ●				
	3.0					6 ●				
	3.5		-dense, trace sand seams (1-5 mm thick), trace oxidation below 3.5 m			7 ●				
	4.0					8 ●				
	4.5		-trace clay below 4.25 m			9 ●				
	5.0				4.57	10 ●				
	5.5									
	6.0				5.18					
	6.5									
	7.0									
318.35	7.5		END OF HOLE @ 7.62 m		7.62					
	8.0		Note: 1. Well flush mounted to grade.							
	8.5									
	9.0									
	9.5									

VAPOURS - I.T.M. 01-43407.GPJ

SAMPLE TYPE AUGER GRAB

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR D. B. KASUR

APPROVED

DATE 16/05/02 000610

CLIENT CANADIAN NATIONAL
PROJECT CN Hornepayne Monitoring Well Replacement Program
SITE CN Hornepayne Yard, Former Shop Track Area
LOCATION 41m E of OW3-2, 23.5m E of small Hydro Post and Light, 0.5m from Rail
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 325.42 m
TOP OF CASING ELEV. 325.20 m
WATER ELEV. 321.81 m
DATE DRILLED 10/9/2014
UTMs (NAD83) N 5,454,331
 E 662,158

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	Cu TORVANE (kPa)				SPT (N) blows/0.15 m				FIELD HEADSPACE TEST Photoionizable Vapours (ppm)				
							20	40	60	80	20	40	60	80	100	200	300	400	
324.81	0.5		SAND AND GRAVEL FILL - Brown, damp, dense, poorly graded, medium to coarse grained sand, and medium to coarse grained subangular gravel.		0.22														
	0.62		SILT - Brown, moist, compact, non plastic, trace fine grained sand.		0.62														
	0.92				0.92														
	1.0																		
	1.5		- wet below 1.5 m																
	2.0		- compact to dense between 1.5 and 3.5 m																
	2.5		- sand lense (25 mm thick), fine to medium grained, wet, loose at 2.15 m																
	3.0																		
	3.5																		
	3.96				3.96														
321.46	4.0		END OF BOREHOLE AT 3.96 m		3.97														
	4.5		Notes:																
	5.0		1. Monitoring well installed at a depth of 4.0 m with 3.0 m of screen.																
	5.5		2. Borehole backfilled with sand to 0.62 m, then bentonite to surface.																
	6.0		3. Monitoring well completed with a flush mount casing and protective steel vault.																
	6.5																		
	7.0																		
	7.5																		
	8.0																		
	8.5																		
	9.0																		
	9.5																		
	10.0																		

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CLIENT CN CORPORATE ENVIRONMENT EAST
PROJECT ENVIRONMENTAL INVESTIGATION
SITE HORNEPAYNE YARD
LOCATION 10 m E of MW110, 3.5 m S of Rail

JOB NO. 01-434-07
GROUND ELEV. 326.08 m, Geodetic
TOP OF PVC ELEV. 325.86 m
WATER ELEV. 321.52 m, 09/10/01
DATE DRILLED 27/07/01

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)					
								500	1000	1500	2000		
								FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm)					
								1000	2000	3000	4000		
325.31	0.5		SAND AND GRAVEL FILL - Brown, damp, dense, poorly graded, medium to coarse grained sand, and medium to coarse grained, subangular gravel.		0.45 0.61								
	1.0		SILT - Grey, moist, compact to dense, non plastic, trace fine grained sand, some grey and black petroleum hydrocarbon staining.				1						
	1.5		-wet below 1.5 m										
	2.0												
	2.5		-silty clay layer (50 mm thick), low plasticity, soft at 2.3 m -trace oxidation at 2.45 m				2						
	3.0												
	3.5		-brown between 3.5 and 5.35 m -dense between 3.5 and 6.7 m										
	4.0		-silty clay layer (25 mm thick), Intermediate plasticity, soft at 3.65 m		3.56		3						
	4.5												
	5.0				4.57								
	5.5		-grey below 5.35 m				4						
	6.0												
	6.5												
	7.0		-loose to compact, some fine grained sand between 6.7 and 7.3 m				5						
	7.5		-dense, trace sand below 7.3 m		7.62								
318.46	7.5												
	8.0		END OF HOLE @ 7.62 m										
	8.5		Note: 1. Well flush mounted to grade.										
	9.0												
	9.5												

VAPOURS.FT.M.01-434-07.GPJ

SAMPLE TYPE AUGER GRAB

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR D. B. KASUR

APPROVED

DATE 16/05/03

000612

CLIENT CANADIAN NATIONAL
PROJECT CN Homepayne Monitoring Well Replacement Program
SITE CN Homepayne Yard, Former Shop Track Area
LOCATION 10 m East of MW-110, 3.5 m South of Rail
DRILLING METHOD 100 mm ø Hollow Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 14-0434-019
GROUND ELEV. 325.67 m
TOP OF CASING ELEV. 325.44 m
WATER ELEV. 324.72 m
DATE DRILLED 10/9/2014
UTMs (NAD83) N 5,454,303
 E 662,142

Cu TORVANE (kPa) ◆
 SPT (N) blows/0.15 m ▲
 20 40 60 80
 FIELD HEADSPACE TEST ●
 Photoionizable Vapours (ppm)
 100 200 300 400

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER
324.91	0.5		SAND AND GRAVEL FILL - Brown, damp, dense, poorly graded, medium to coarse grained sand, medium to coarse grained, subangular gravel.		0.22 0.42 0.72	
	1.0		SILT - Grey, moist, compact to dense, low plasticity, trace fine grained sand, some grey and black petroleum hydrocarbon staining.			
	1.5		- wet below 1.5 m			
	2.5		- silty clay layer (50 mm thick), low plasticity, soft at 2.3 m - trace oxidation at 2.45 m			
	3.5		- brown between 3.5 and 4.26 m - dense between 3.5 and 4.26 m		3.77	
321.41	4.0		- silty clay layer (25 mm thick), intermediate plasticity, soft at 3.65 m		4.26	
	4.5		END OF BOREHOLE AT 4.26 m			
	5.0		Notes: 1. Monitoring well installed at a depth of 3.8 m with 3.0 m of screen. 2. Borehole backfilled with sand to 0.42 m, then bentonite to surface. 3. Monitoring well completed with a flush mount casing and protective steel vault.			

ENVIRO & GEO. P. \PROJECTS\2014\14-0434-01\GENERAL\DCS\SOIL LOGS\11-17-2014_LBP.GPJ

SAMPLE TYPE

CONTRACTOR
Strata Drilling

INSPECTOR
G. CREWDSON

APPROVED

DATE
12/18/14

CLIENT CN CORPORATE ENVIRONMENT EAST
PROJECT ENVIRONMENTAL INVESTIGATION
SITE HORNEPAYNE YARD
LOCATION 2 m North of NW Corner of Concrete Pad
DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

JOB NO. 01-434-07
GROUND ELEV. 325.98 m, Geodetic
TOP OF PVC ELEV. 325.82 m
WATER ELEV. 320.77 m, 09/10/01
DATE DRILLED 27/07/01

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoclonizable Vapours (ppm) ●					
								500	1000	1500	2000		
								FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
								1000	2000	3000	4000		
325.06	0.5		SAND AND GRAVEL FILL - Brown, damp, loose, poorly graded, fine to medium grained sand, and medium to coarse grained, subangular gravel. -black between 0.45 and 0.53 m -brown between 0.53 and 0.84 m -black below 0.84 m		0.46 0.61								
324.30	1.0		SILT - Grey, moist, compact, non plastic, trace fine grained sand. -wet, trace wood fragments, some black petroleum hydrocarbon staining and sheen at 1.05 m -dark brown below 1.45 m			1	●						
322.93	2.0		SAND - Grey, wet, loose, poorly graded, fine grained, trace silt, some silt lenses (20-50 mm thick) to 2.6 m depth. -stained grey, some petroleum hydrocarbon sheen below 2.6 m			2	●						
	3.0		SILT - Grey, wet, dense, non plastic. -silty clay lens (75 mm thick), intermediate plasticity, soft at 3.95 m -brown, trace oxidation between 4.05 and 6.25 m			3	●						
	4.0					4	●						
	5.0				5.18								
	5.5					5	●						
	6.0												
	6.5		-compact, some fine grained sand below 6.1 m -grey below 6.25 m										
	7.0												
318.36	7.5		END OF HOLE @ 7.62 m		7.62								
	8.0		Note: 1. Well flush mounted to grade.										
	8.5												
	9.0												
	9.5												

VAPOURS FT M 0143407.GPJ

SAMPLE TYPE AUGER GRAB

CONTRACTOR Paddock Drilling Ltd.

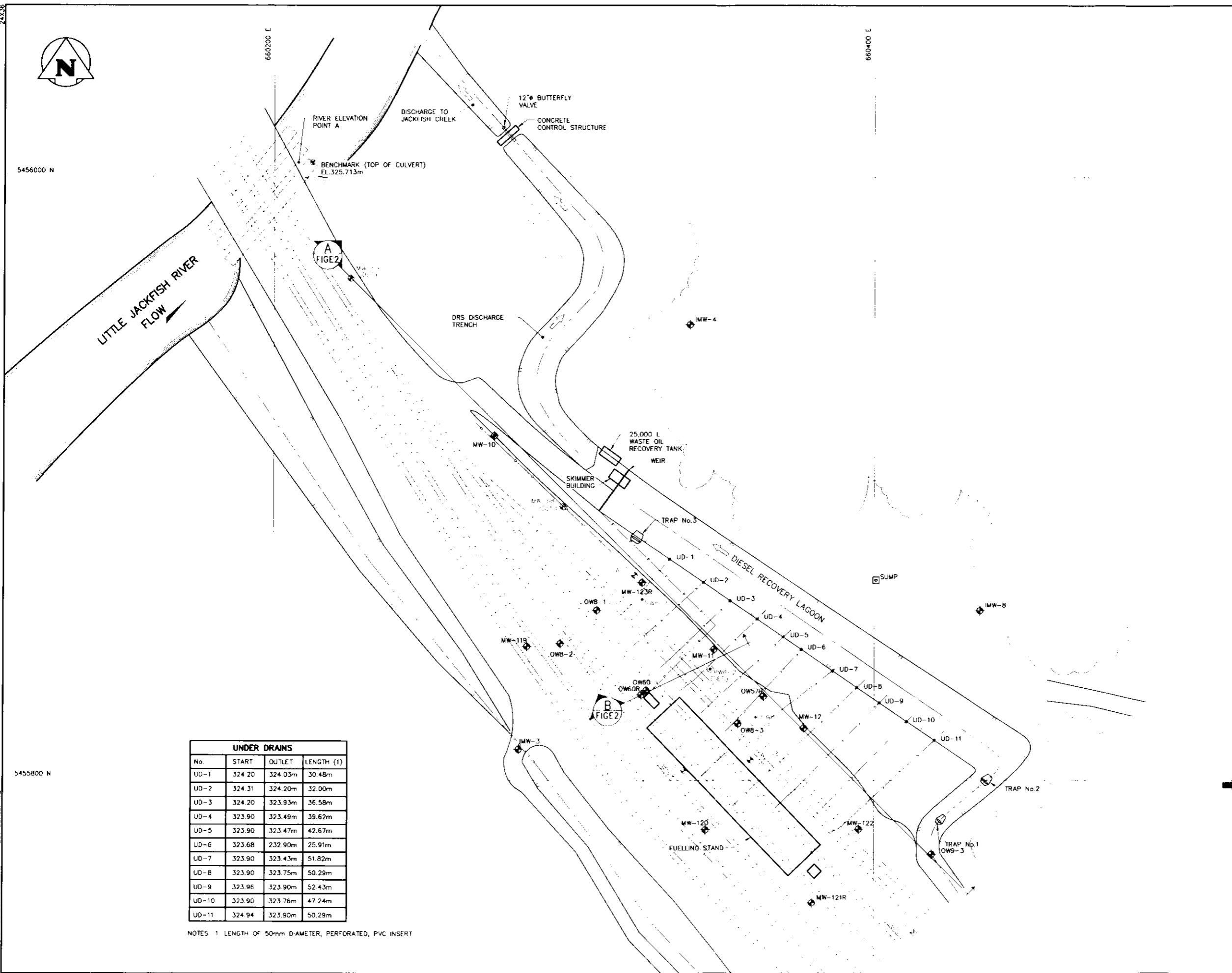
INSPECTOR D. B. KASUR

APPROVED _____

DATE 16/05/02 **000614**

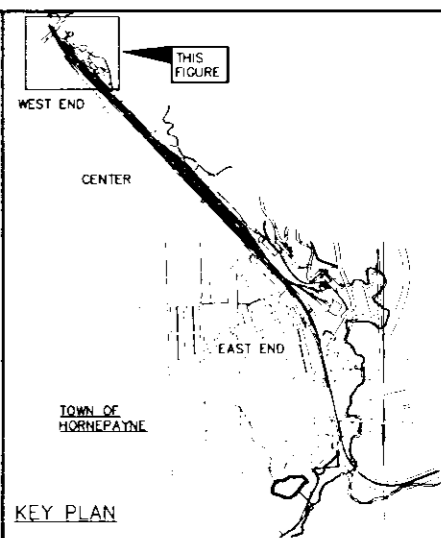
APPENDIX E
STRATIGRAPHIC CROSS SECTIONS

File Name: P:\Projects\2014\14-04-04-004\dwg\env\MOE_Reports\Rev 0\14-04-04-004_FIG E1-Rev 0.dwg - Tab: FIG E1 Plotted By: twilliamson 02/09/2015 [Mon 11:04am]
 24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



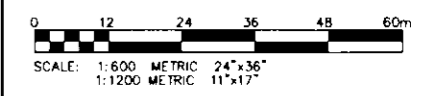
UNDER DRAINS			
No.	START	OUTLET	LENGTH (1)
UD-1	324.20	324.03m	30.48m
UD-2	324.31	324.20m	32.00m
UD-3	324.20	323.93m	36.58m
UD-4	323.90	323.49m	39.62m
UD-5	323.90	323.47m	42.67m
UD-6	323.68	232.90m	25.91m
UD-7	323.90	323.43m	51.82m
UD-8	323.90	323.75m	50.29m
UD-9	323.96	323.90m	52.43m
UD-10	323.90	323.76m	47.24m
UD-11	324.94	323.90m	50.29m

NOTES: 1 LENGTH OF 50mm DIAMETER, PERFORATED, PVC INSERT



- LEGEND:**
- BERM
 - - - CENTERLINE OF DITCH
 - - - FENCE
 - - - BURIED ELECTRICAL CABLE
 - ⊕ BENCHMARK
 - ⊕ MW-119 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - ⊕ MW-10 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - ⊕ MW-121R REPLACEMENT MONITORING WELL (INSTALLED BY KGS - 2014)
 - ⊕ RWB-1 RECOVERY WELL
 - ⊕ SUMP SUMP WELL
 - - - RAILROAD TRACKS
 - - - UNDERGROUND DRAIN
 - ⊕ DESTROYED
 - ⊕ A FIGE2 CROSS SECTION LOCATION AND REFERENCE

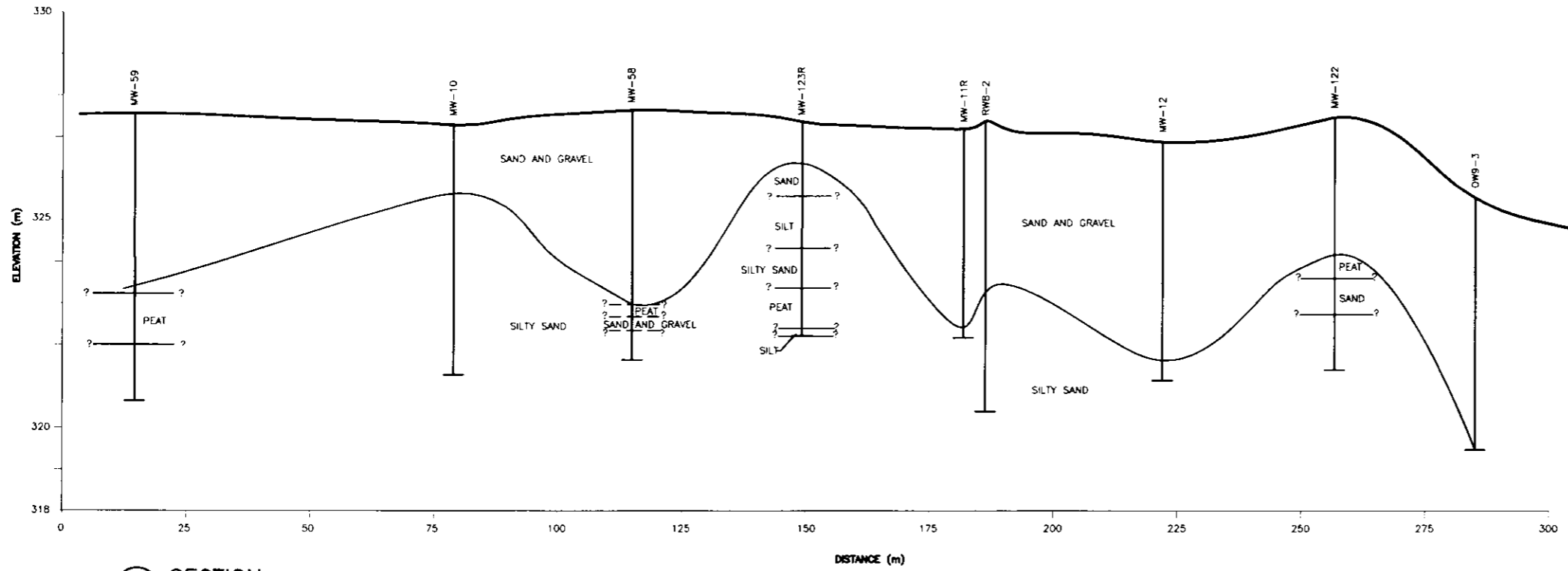
NOTES:
1. SITE PLAN BASED ON AUTOCAD FILE PROVIDED BY CN



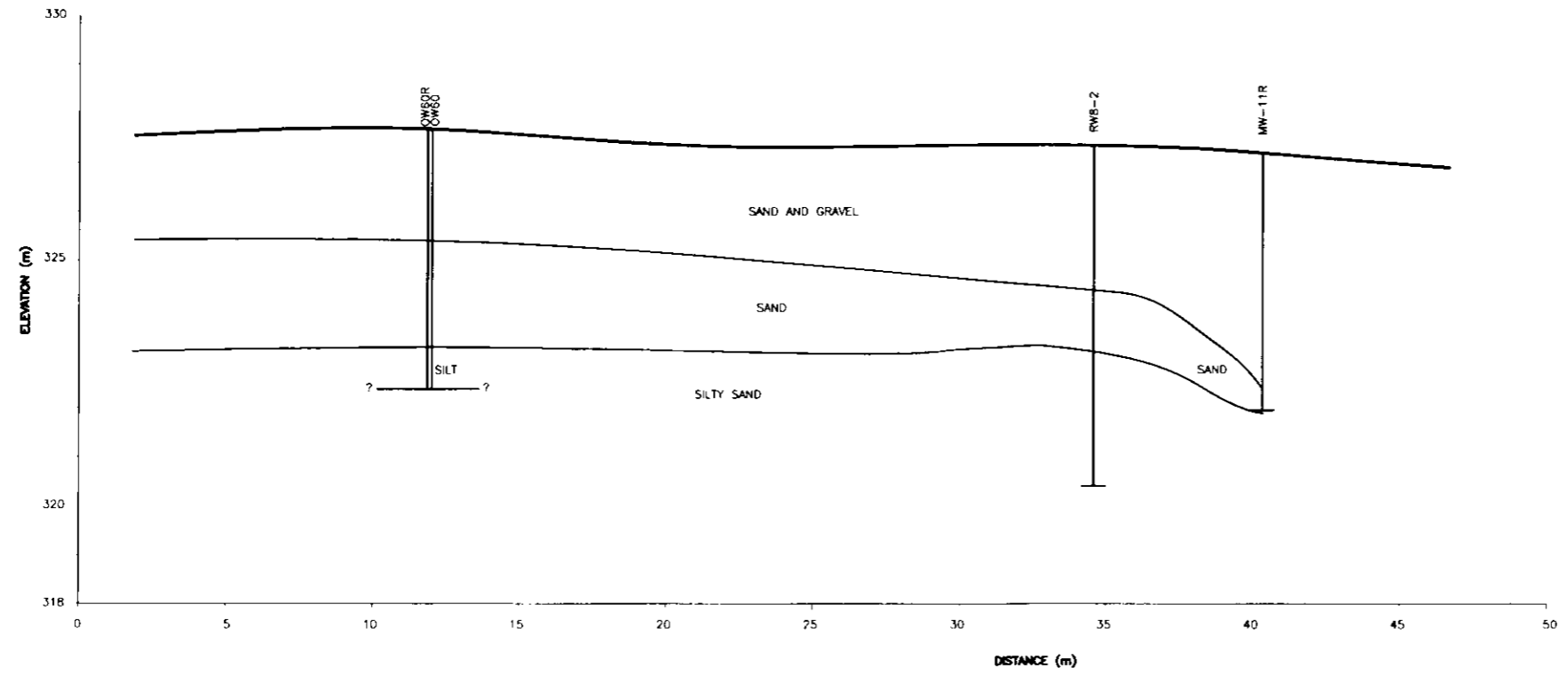
015/02/09	ISSUED WITH MOE REPORT	TG
REVISIONS / ISSUE		
2014 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587 HORNEPAYNE YARD, ON STRATIGRAPHIC CROSS SECTION REFERENCE - WEST END		
FEBRUARY 2015	FIGURE E1	0

000616

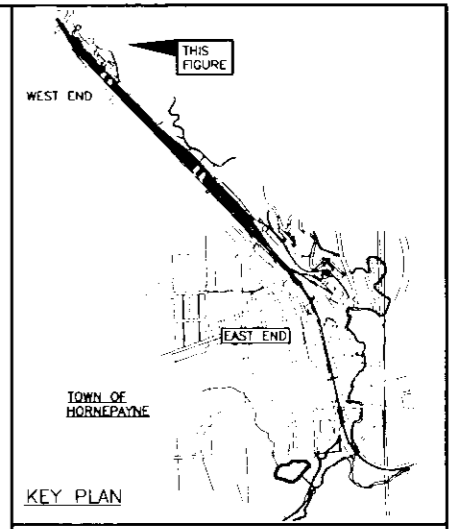
File Name: C:\Projects\2014\14-0434-004\dwg\env\MOE Reports\Rev 0\14-0434-004_FIG E2-Rev 0.dwg - Tab: FIG 02 Plotted By: williamson 02/09/2015 [Mon 11:05am]
 24.238 Plot Scale: 1:1 11X17 Plot Scale: 1:2



A
E1 SECTION



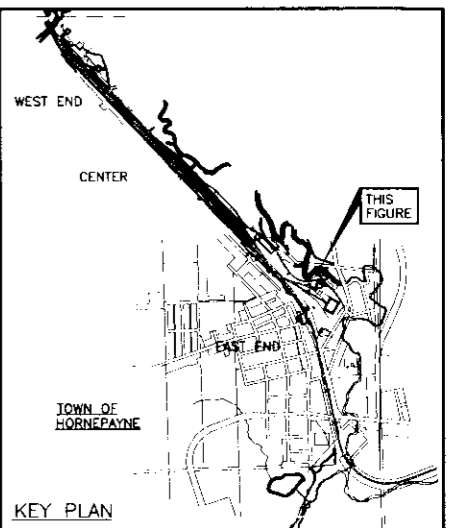
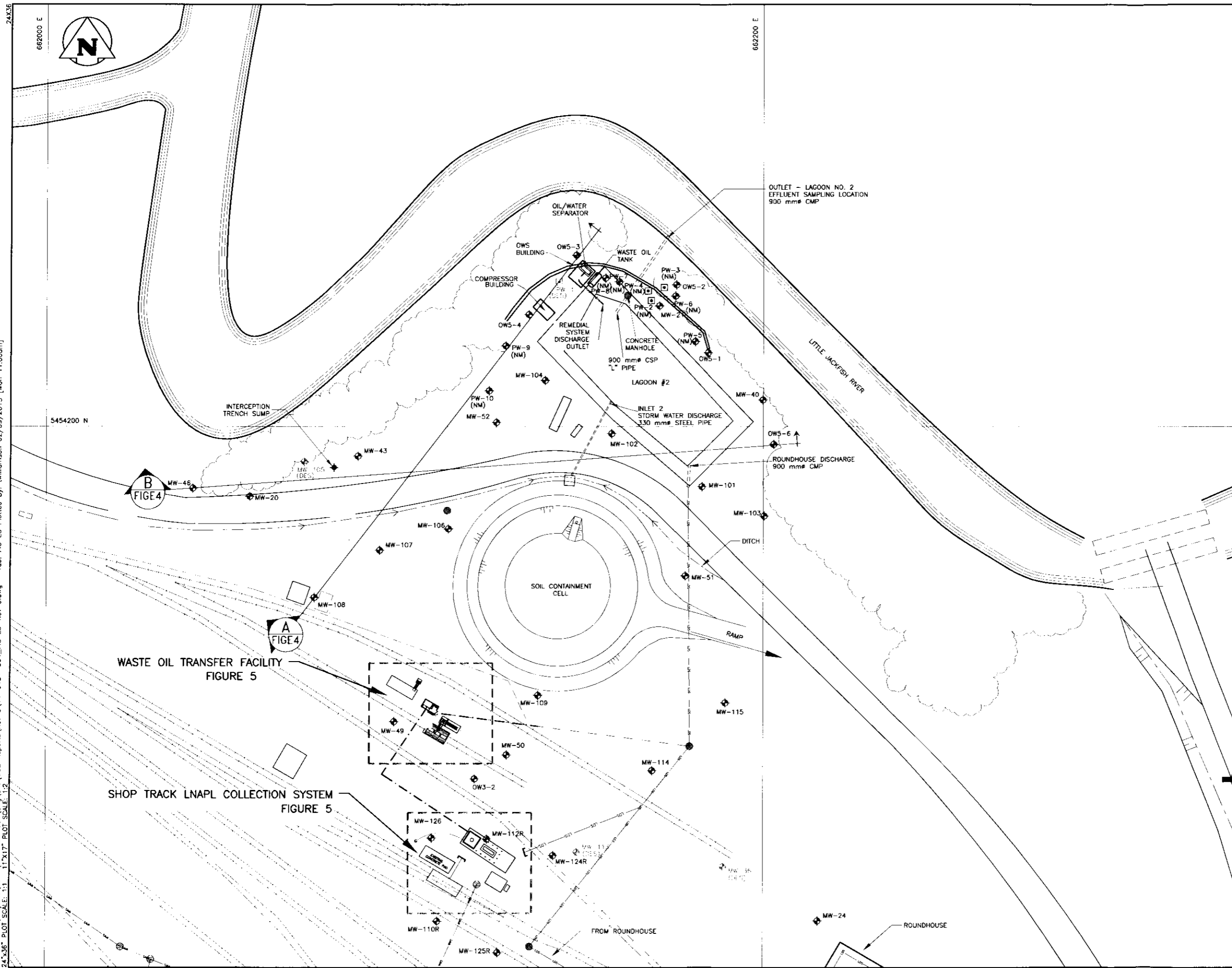
B
E1 SECTION



- LEGEND:**
- MONITORING WELL OFFSET DISTANCE FROM CROSS SECTION A:
- MW-59 = 0.0m
 - MW-10 = 3.5m WEST
 - MW-58 = 3.8m WEST
 - MW-123R = 3.0m WEST
 - MW-11R = 2.0m EAST
 - RWB-2 = 7.0m WEST
 - MW-12 = 0.0m
 - MW-122 = 10.7m WEST
 - OWS-3 = 0.0m
- MONITORING WELL OFFSET DISTANCE FROM CROSS SECTION B:
- OW-60R = 0.0m
 - OW-60 = 0.0m
 - RWB-2 = 3.2 m SOUTH
 - MW-11R = 3.2m NORTH

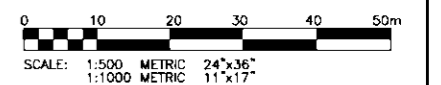
0	15/02/09	ISSUED WITH MOE REPORT	TO
NO.	DATE	DESCRIPTION	BY
REVISIONS / ISSUE			
KGS GROUP		CN CANADIAN NATIONAL	
CONSULTING ENGINEERS			
2014 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587 HORNEPAYNE YARD, ON			
STRATIGRAPHIC CROSS SECTIONS WEST END			
FEBRUARY 2015		FIGURE E2 0	

File Name: P:\Projects\2014\14-0434-004\env\MOE Reports\Rev 0\14-0434-004_FIG E3-Rev 0.dwg - Tab: FIG E3 Plotted By: twilliamson 02/09/2015 [Mon 11:06am]
 24x36 PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



- LEGEND**
- RAILROAD TRACK
 - CULVERT
 - CENTERLINE OF DITCH
 - SANITARY SEWER
 - STORM SEWER
 - FENCE
 - DISCHARGE LINE
 - TREES/ SHRUBS
 - MANHOLES
 - SURFACE WATER FLOW DIRECTION
 - MW-52 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-20 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - MW-112R REPLACEMENT MONITORING WELL (INSTALLED BY KGS 2014)
 - PW-1 PUMPING WELL
 - (Df S) DESTROYED
 - (B FIG4) CROSS SECTION LOCATION AND REFERENCE

NOTE:
 1. REFERENCE JACQUES WHITFORD ENVIRONMENTAL LIMITED PROJECT 31004, DRAWING NO. 2, 1996.



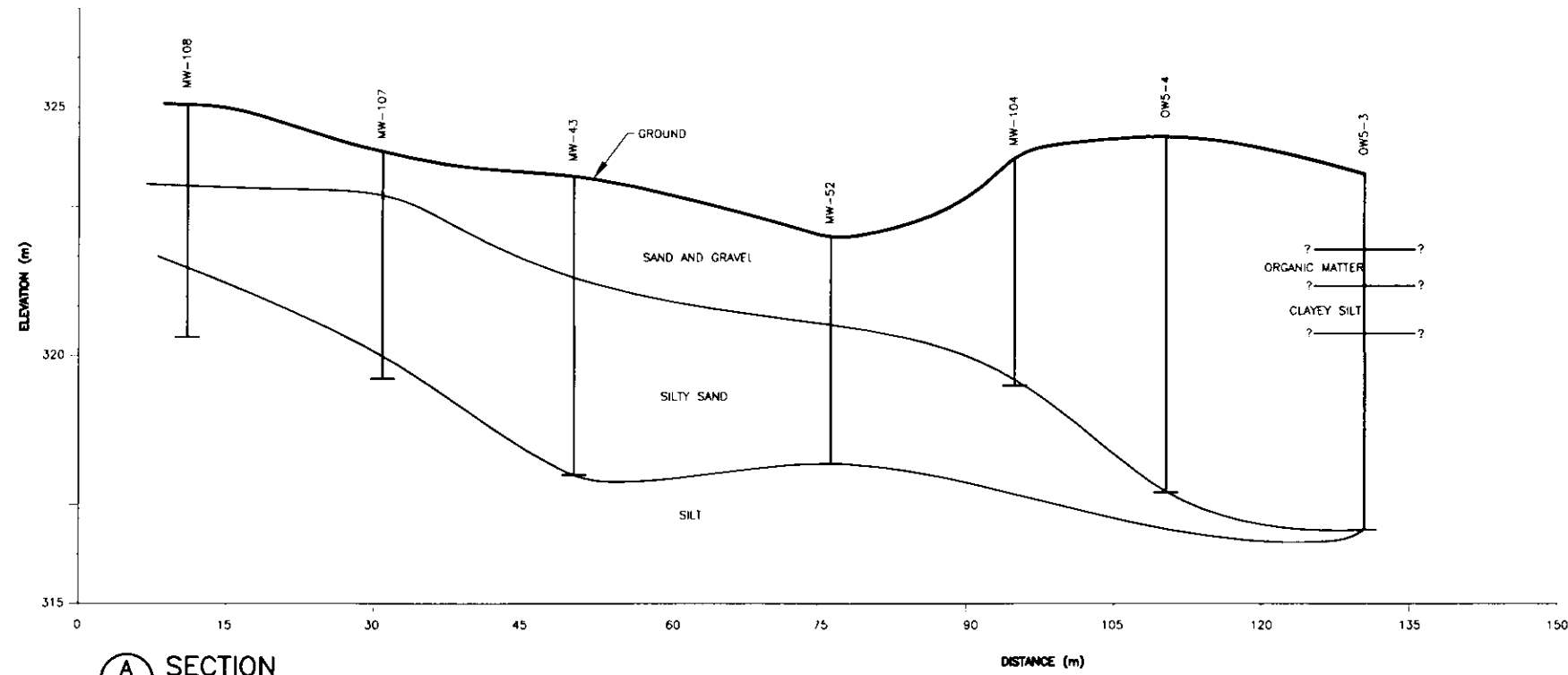
015/02/09	ISSUED WITH MOE REPORT	TC
NO	DESCRIPTION	BY
REVISIONS / ISSUE		

KGS GROUP CONSULTING ENGINEERS

CN CANADIAN NATIONAL

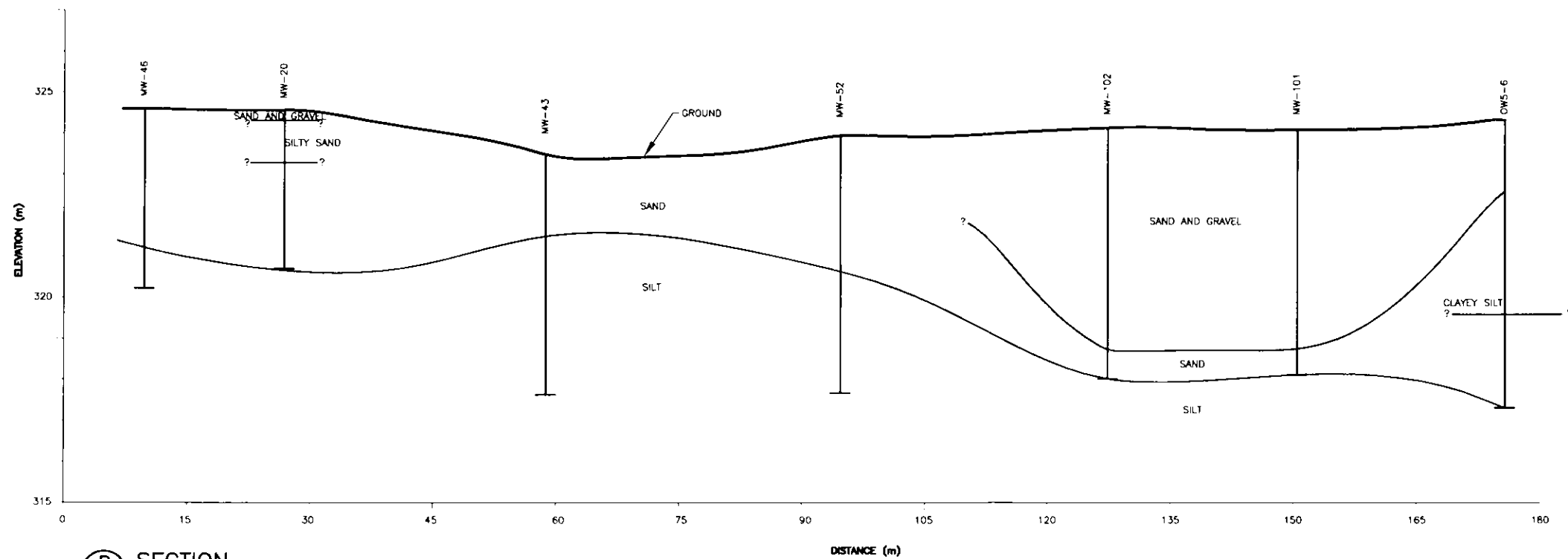
2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100591
 HORNEPAYNE YARD, ON
 STRATIGRAPHIC CROSS SECTION
 REFERENCE - LAGOON 2

FEBRUARY 2015 FIGURE E3 0



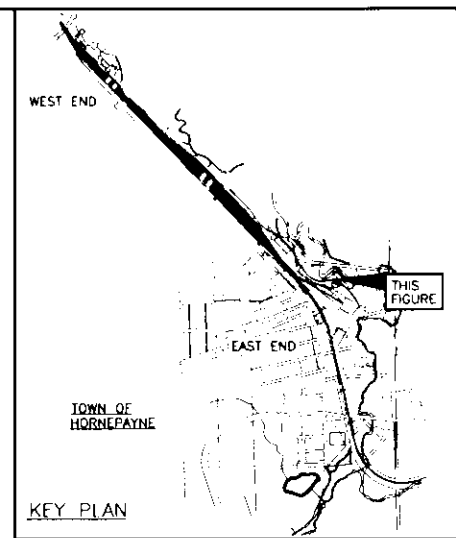
A SECTION

SECTION A - CROSS SECTION (NORTH TO SOUTH)



B SECTION

SECTION B - CROSS SECTION (WEST TO EAST)



KEY PLAN

LEGEND:

- MONITORING WELL OFFSET DISTANCE FROM CROSS SECTION A:
- MW-108 = 0.0m
 - MW-107 = 7.4m EAST
 - MW-43 = 16.7m WEST
 - MW-52 = 10m EAST
 - MW-104 = 12.6m EAST
 - OWS-4 = 0.0m
 - OWS-3 = 0.0m
- MONITORING WELL OFFSET DISTANCE FROM CROSS SECTION B:
- MW-45 = 0.0m
 - MW-20 = 3.6m SOUTH
 - MW-43 = 5.0m NORTH
 - MW-52 = 11.0m NORTH
 - MW-102 = 6.6m NORTH
 - MW-101 = 10.3m SOUTH
 - OWS-6 = 0.0m

0 15/02/09	ISSUED WITH MOE REPORT	TG
NO	DESCRIPTION	BY

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

CN CANADIAN NATIONAL

2014 REMEDIAL OPERATIONS
 PIN# 1000/ONPR/100587
 HORNEPAYNE YARD, ON
 STRATIGRAPHIC CROSS SECTIONS
 LAGOON 2