APPENDI X ‘ D’

REMEDIATION PLAN AND MANITOBA SUSTAINABLE DEVLOPMENT APPROVAL

Manitoba
Sustainable Development

Environmental Stewardship Division
Environmental Approvals Branch
1007 Century Street, Winnipeg, Manitoba R3H 0W4
T 204-945-8321 F 204-948-2338
www.manitoba.ca/sd

Matthew Hildebrand, P.Eng.
Streets Project Engineer
City of Winnipeg
106-1155 Pacific Avenue
Winnipeg, MB R3E 3P1

March 20, 2018

Dear Mr. Hildebrand:

Re: Proposed Remediation Plan for McPhillips Street Reconstruction Project;
Approval under the Contaminated Sites Remediation Act

This will acknowledge receipt of the Remediation Plan for the above noted property (the site) dated March 2018 and prepared by Dillon Consulting Limited.

This letter constitutes written authorization as specified under The Contaminated Sites Remediation Act, C.C.S.M, c. C205, s. 17.1 (1) for City of Winnipeg to proceed with the remediation of the site as described in the Remediation Plan. Any change to the Remediation Plan must be approved by the undersigned prior to initiating the change.

It is requested that a Summary Report documenting the remediation is submitted to this office for review at the completion of the Remediation Plan.

It should be noted that the position of Manitoba Sustainable Development as stated in this letter is based on the information provided to this office by Dillon Consulting Limited and relates only to the matters within the scope of the Remediation Plan submitted by Dillon Consulting Limited.

If you have any questions regarding this letter, please contact Warren Rospad, Contaminated Sites Program Specialist at 204-330-2685 or warren.rospad@gov.mb.ca. Please note that electronic submissions are preferred for documents and correspondence.

Sincerely,

Tracey Braun

Tracey Braun
Director

c. File: 68551
Vanessa Krahn (Dillon Consulting Limited)
Environmental Compliance and Enforcement Branch

DILLON CONSULTING

THE CITY OF WINNIPEG

McPhillips Street Reconstruction Project

Remediation Plan

March 2018 – FINAL – 17-6152

March 12, 2018

1558 Willson Place
Winnipeg, Manitoba
Canada
R3T 0Y4
Telephone
204.453.2301
Fax
204.452.4412

Manitoba Sustainable Development
Environmental Approvals
1007 Century Street
Winnipeg, Manitoba
R3H 0W4

Attention: Mr. Warren Rospad
Contaminated Sites Program Specialist/Environment Officer

Remediation Plan –McPhillips Street Reconstruction Project, Winnipeg, Manitoba (FINAL)

Dear Mr. Rospad:

Dillon Consulting Limited (Dillon) is pleased to submit the following Remediation Plan (RP) for the excavation and risk management measures for impacted material encountered within the southbound lanes of the McPhillips Street Underpass between Logan Avenue and Jarvis Avenue as part of the City of Winnipeg, 2018 Regional Street Renewal Program. This RP provides a summary of previous assessment work, proposed procedures and methods, assessment criteria, the destination of material for treatment, and proposed project schedule

Sincerely,

DILLON CONSULTING LIMITED

Vanessa Krahn, M.Sc., P.Eng.
Environmental Engineer

VMK:jef

Our file: 17-6152
City of Winnipeg file: 18-C-02

Table of Contents

1.0 Background

Dillon Consulting Limited (Dillon) has been retained by the City of Winnipeg to reconstruct McPhillips Street from Logan Avenue to Jarvis Avenue as part of the 2018 Regional Streets Program. Impacted material was discovered during subsurface investigation and we were asked to also provide environmental consulting services in regards to impacted material encountered within the southbound curb lane of the McPhillips Underpass.

On September 20, 2017, hydrocarbon impacted material was encountered during a hydro excavation program to determine the depth of the footing on the structure at the McPhillips Underpass at one of the locations. The approximate Univeral Transverse Mercator (UTM) coordinates of the hydro excavation is 14U 631351 m E 5530955 m N. A Dillon environmental technician attended the excavation to record environmental site observations and collect soil and water samples from the extents of the hydro excavation.

Dillon collected a soil and water sample from the hydro excavation for testing of benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbons (PHC) F1-F4, and Polycyclic Aromatic Hydrocarbons (PAHs). Vanessa Krahn of Dillon, notified Warren Rospad from Manitoba Sustainable Development (MSD), on September 20, 2017, to update on the field observations and that laboratory results would be supplied once available. On September 22, 2017, an email was sent to Warren Rospad of MSD indicating that the soil and water had elevated levels of PHC F2 and detectable PAH parameters. The material was removed from the excavation by the hydro excavator and delivered to MidCanada for appropriate disposal. The facility accepted approximately 5.58 metric tonnes of material on September 22, 2017. The soil and water results from the initial testing of the impacted material are discussed in more detail in Section 4.0.

The hydro excavation was backfilled with granular fill and topped with asphalt to open the roadway to traffic. Dillon discussed with MSD that managing of the impacts encountered would be included in the summer of 2018 Regional Street Renewal Program, which includes roadway improvements on McPhillips Street from Logan Avenue to Jarvis Avenue.

2.0 Remediation Plan Objectives

The objectives of the RP is to provide due diligence on the City of Winnipeg's behalf for managing impacts encountered during the upcoming 2018 Regional Street Renewal Project and to provide guidance to the Contractor on remedial efforts required. The proposed work area as part of the Regional Street Renewal and Area of Potential Concern for the impacted material is noted in Figure 1, appended.

The following Section 3.0 assesses the potentially complete exposure pathways on the site. The risk management strategy for the site is focused on eliminating pathways that are related to the direct exposure to impacted surface soil, namely the inadvertent ingestion of surface soil, dermal contact with surface soil and the inhalation of soil particles.

3.0 Development of Soil Remediation Criteria

The next sections highlight the applicable exposure pathways based on land use, predominant soil texture and soil and groundwater receptors. Pathway elimination was conducted in accordance with Canadian Council of Ministers of the Environment (CCME) and did not include the adjustment of parameters or corresponding calculations of the guidelines.

3.1 Contaminants of Potential Concern

Based on field observations and initial laboratory analytical testing, contaminants of concern for the site include BTEX, PHC fractions F1 to F4, and PAHs.

3.2 Land Use and Soil Texture

The CCME Canadian Environmental Quality Guidelines (CEQGs) are based on land use at the subject site. Land use is assigned according to the following categories: Industrial, Commercial, Residential/Parkland, and Agricultural. Although the roadway does not clearly fall into one of the above land use, it mostly resembles the lower-frequency and lower intensity exposure for humans as identified in the industrial land use category. Also, according to the City of Winnipeg Property Map, the majority of adjacent properties are zoned for manufacturing purposes, most emulating the industrial land use. As such industrial guidelines are expected to be used for the assessment criteria to be protective of current land use on and surrounding the site.

The CCME guidelines for hydrocarbons are dependent on soil texture. CCME defines a coarse-grained soil as having a median grain size of greater than 75 µm and fine-grained soil as having a median grain size of less than 75 µm. Based on visual observations of the soil during Dillon's September site visit the soil is coarse grain in nature (granular and clay fill).

3.3 Receptors – Soil and Groundwater

A brief overview of the potential receptors that may apply to the site and the rationale for selection or pathway elimination are discussed in the table on the following page.

Table 3.1: Exposure Pathway Summary Table

Exposure Pathway	Applicability	Rationale
Human Health Exposure Pathways		
Direct Contact – Long-Term Exposure	No	Following construction, as part of the Regional Streets Renewal Program, the residual impacts will not be accessible. A hardscape cap of concrete or asphalt will be present along the roadway.
Direct Contact – Short-Term Exposure (Construction Workers)	Yes	During the construction as part of the Regional Streets Renewal Program workers may come into direct contact with the impacted material. This low-frequency, high-intensity human health exposure and has been included to be protective during this time frame.
Vapour Inhalation	No	The site is a roadway; no buildings are present on the road nor are they anticipated to be present in the future.
Potable Groundwater	No	The City of Winnipeg is supplied with municipal water supply.
Ecological Health Exposure Pathways		
Ecological Soil Contact	Yes	The final surface material at the site will be a hardscape (asphalt or concrete surface) minimizing plant, mammals and bird contact with the soil. However, the ecological soil contact has been included for the protection of soil-dwelling organisms, though this is anticipated to be a conservative approach.
Groundwater Check – Livestock	No	Livestock watering is not expected to occur within 500 m from the site.
Groundwater Check – Aquatic Life	No	The nearest surface water body is the Red River, located approximately 3 km east of the site. CCME indicates that the aquatic life exposure needs to be evaluated if within 10 m of the site (fine-grained) and 500 m of the site (coarse-grained). As such, the aquatic life pathway is not applicable.
Off-Site Migration Check	Yes	Protective of more sensitive land uses.
Management Limits	Yes	Protective of more sensitive land uses and utility corridors in the area.

The most stringent of the applicable guidelines presented above will be used as the selected applicable guidelines for the site.

The assessment criteria selected for comparison of analytical data results for the site are referenced and described in more detail below:

Soil

- CCME. 1999, updated 2016 Canadian Soil Environmental Quality Guidelines (CEQGs) for the Protection of Environmental and Human Health.
- CCME. 2001, updated 2008. Canada Wide Standards (CWS) for PHCs in Soil.
- Ontario Ministry of the Environment and Climate Change (MOECC), 2011. Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario.

The CCME task groups were established to develop the CEQGs and CWS for PHCs, which are nationally endorsed, science-based goals for the quality of atmospheric, aquatic and terrestrial ecosystems.

The CWS for PHCs in soil have been established pursuant to the 1998 Canada wide Accord on Environmental Harmonization of the CCME. The CWS for PHCs are remedial standards for contaminated soil and subsoil based on the same four land uses as the CEQGs, as well as soil texture (coarse or fine-grained). The PHC properties differ in relation to the size of the PHC molecule. Therefore, the various PHCs have been grouped into four (4) size fractions to effectively manage the risk they pose to environmental and human health. The fractions refer to the equivalent normal straight-chain hydrocarbon boiling point ranges and are subdivided as follows: Fraction 1 (C6 to C10), Fraction 2 (>C10 to C16), Fraction 3 (>C16 to C34), and Fraction 4 (C35+).

The CCME CEQGs provide for the protection of environmental and human health. Detailed fact sheets published by the CCME for various compounds provide brief summaries of the parameter's chemical and physical properties, production, and use in Canada, fate and behaviour in the environment, toxic effects and a description of how the guidelines have been developed.

In the absence of available CCME criteria for parameters or pathway, MSD allows for the use of criteria from other sources and jurisdictions. CCME CEQG pathway-specific values are not available for the protection of construction worker receptors via the soil direct contact pathway. However, the MOECC provides criteria values for this receptor category (i.e. Table 3, S3), which are established to be protective of direct soil contact for the construction worker in an industrial/commercial site with a coarse-textured soil. *These values have been used to ensure the health of on-site workers has been considered during the remediation program.*

Water

- Federal Contaminated Sites Action Plan (FCSAP). 2010, revised 2015 (Version 3). Interim Groundwater Quality Guidelines for Federal Contaminated Sites (FIGQG).

Groundwater was not encountered in the excavation; however, water from the use of the hydro excavation was present. The hydro excavation water was compared to FIGQGs to assist with comparing encountered concentrations. As discussed in Section 4.0 groundwater was not encountered in the geotechnical investigation at depths of approximately 2.0 m below the road surface. It is not anticipated that groundwater will be present during construction.

4.0 Initial Results

On September 20, 2017, a Dillon environmental technician attended the excavation to record environmental site observations and collect soil and water samples from the extents of the hydro excavation. General observations included the following:

- The hydro excavation was advanced to approximately 0.85 m below the road surface;
- The east portion of the excavation was bounded by the concrete retaining wall and structural bottom footing;
- A hydrocarbon sheen was encountered on the hydro excavation water remaining in the excavation at the time of the site visit;
- Soil hydrocarbon staining was visible from approximately 0.4 m below the road surface to the termination of the hydro excavation at 0.85 m below the road surface; and,
- A PVC slotted pipe was encountered within the hydro excavation along with wood debris.

A soil sample was collected and submitted for laboratory analytical results of BTEX, PHC F1-F4 and PAHs. In addition, one water sample from the hydro excavation was submitted for laboratory analysis of BTEX, PHC F1-F4. The results are shown in Table 4.1 and Table 4.2 for the soil and hydro excavation water, respectively indicate elevated levels of PHC F2 exceeding the assessment criteria. However, the PHC F2 concentration did not exceed the screening values for the protection of construction workers.

In September 2017, Stantec Consulting Ltd. (Stantec) advanced seven (7) boreholes within McPhillips Street as part of a geotechnical investigation to determine the thickness of the pavement structure and observe the soil conditions. The boreholes were advanced to a depth of 0.45 to 2.1 m below the road surface and no groundwater seepage or soil sloughing was observed during or upon completion of drilling. Based on discussion with Stantec, one (1) of the boreholes (TH07) was terminated due to possible hydrocarbon odours.

The source and extent of the impacts are unknown; however, based on Dillon's work during the footing exposure investigation and Stantec's geotechnical investigation, the impacts appear to be contained within the southbound lane of McPhillips near the underpass.

Table 4.1: Soil Laboratory Results

Chemical Name	Units	EQL	Assessment Criteria [1,2]	Protection for Construction Workers [3]	Sample ID: PIT-S Sample Date: 9/20/2017
Petroleum Hydrocarbons					
Benzene	mg/kg	0.005	180 [4]	480	<0.0050
Toluene	mg/kg	0.05	250 [4]	180000	<0.050
Ethyl benzene	mg/kg	0.015	300 [4]	22000	<0.015
o-Xylene	mg/kg	0.05	NG	NG	<0.050
m+p-Xylenes	mg/kg	0.05	NG	NG	<0.050
Xylenes (Total)	mg/kg	0.071	350 [4]	88000	<0.071
F1 (C6-C10)	mg/kg	10	NG	NG	<10
F1-BTEX	mg/kg	10	320 [5]	100000	<10
F2 (C10-C16)	mg/kg	25	260 [5]	48000	796
F3 (C16-C34)	mg/kg	50	1700 [5]	260000	453
F4 (C34-C50)	mg/kg	50	3300 [5]	400000	<50
Chrom. to baseline at nC50	-	-	NG	NG	YES
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	mg/kg	0.005	NG	3600	0.162
Acenaphthylene	mg/kg	0.005	NG	360	<0.0050
Acridine	mg/kg	0.01	NG	NG	0.107
Anthracene	mg/kg	0.004	32 [4]	420000	0.0853
Benzo(a)anthracene	mg/kg	0.01	10 [6]	36	0.016
Benzo(a)pyrene	mg/kg	0.01	1.4 [6]	3.6	0.015
Benzo(b&j)fluoranthene	mg/kg	0.01	10 [6]	36	0.017
Benzo(b+j+k)fluoranthene	mg/kg	0.014	10 [6]	36	0.017
Benzo(g,h,i)perylene	mg/kg	0.01	NG	360	0.011
Benzo(k)fluoranthene	mg/kg	0.01	10 [6]	36	<0.010
Chrysene	mg/kg	0.01	NG	360	0.015
Dibenzo(a,h)anthracene	mg/kg	0.005	10 [6]	3.6	<0.0050
Fluoranthene	mg/kg	0.01	180 [4]	360	0.031
Fluorene	mg/kg	0.01	NG	56000	0.108
Indeno(1,2,3-cd)pyrene	mg/kg	0.01	10 [6]	36	<0.010
1-Methyl Naphthalene	mg/kg	0.05	NG	560	<0.050

Chemical Name	Units	EQL	Assessment Criteria [1,2]	Protection for Construction Workers [3]	Sample ID: PIT-S Sample Date: 9/20/2017
2-Methyl Naphthalene	mg/kg	0.01	NG	560	<0.010
Naphthalene	mg/kg	0.01	22 [6]	28000	0.082
Phenanthrene	mg/kg	0.01	50 [6]	NG	0.592
Pyrene	mg/kg	0.01	100 [6]	3600	0.117
Quinoline	mg/kg	0.01	NG	NG	<0.010
B(a)P Total Potency Equivalent	mg/kg	0.02	NG	5.3	0.025
IACR (CCME)	mg/kg	0.15	NG	NG	0.23
Notes:					
Bold		Exceeds Assessment Criteria			
Bold		Exceeds Protection for Constructions Workers			
NG - No Guideline					
[1] CCME. 1999, updated 2016. CEQGs based on coarse grain soil, surface soil and industrial land use criteria					
[2] CCME. 2001. Updated 2008. CWS for Petroleum Hydrocarbons (PHCs) in Soil, based on coarse grain soil, surface soil and industrial land use criteria					
[3] Ontario MOECC. 2011. Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario. Table 3, S3					
[4] CCME CEQG for Ecological Soil Contact Guideline					
[5] CWS for Eco Soil Contact					
[6] CCME CEQG Interim Soil Quality Criteria					

Table 4.2: Hydro Excavation Water Laboratory Results (Sample ID: PIT-W, Sample Date: September 20, 2017)

Chemical Name	Units	EQL	Assessment Criteria [1]	Sample ID: PIT-W Sample Date: 9/20/2017
Petroleum Hydrocarbons				
Benzene	mg/L	0.0005	61	<0.00050
Toluene	mg/L	0.001	59	<0.0010
Ethyl benzene	mg/L	0.0005	20	0.00076
o-Xylene	mg/L	0.0005	NG	0.00081
m+p-Xylenes	mg/L	0.0004	NG	0.00071
Xylenes (Total)	mg/L	0.00064	31	0.00153
F1 (C6-C10)	mg/L	0.1	NG	1.24
F1-BTEX	mg/L	0.1	7.1	1.24
F2 (C10-C16)	mg/L	0.1	1.8	153

Chemical Name	Units	EQL	Assessment Criteria [1]	Sample ID: PIT-W Sample Date: 9/20/2017
F3 (C16-C34)	mg/L	0.25	NG	83
F4 (C34-C50)	mg/L	0.25	NG	4.66

Notes:

Bold	Exceeds Assessment Criteria

NG - No Guideline

[1] FCSAP, November 2015. Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites. Based on Soil Organisms Direct Contact

5.0 Remediation Plan

5.1 Implementation of Remediation Plan

The anticipated McPhillips Reconstruction will occur in the summer of 2018. The project includes the reconstruction of the northbound and southbound lanes from Logan Avenue to Jarvis Avenue for a total length of approximately 500 m. Overall the street is to be reconstructed with geometric improvements and a lowering of the roadway through the underpass to gain additional clearance to the Canadian Pacific (CP) Rail Bridge. The depth of the roadway excavation adjacent to the retaining wall and structural footing of the CP Rail Bridge is limited to a maximum of 0.9 m below the current roadway surface to ensure structural integrity. As such, impacted material may be managed in place to ensure the structural quality of the retaining wall and CP Rail Bridge. Based on Dillon's footing exposure investigation and Stantec's geotechnical investigation the area of expected impacts is highlighted in Figure 1, appended, with the estimated surface area of 300 m^2.

To assist with surface water drainage during heavy rainstorms, a sub-drainage layer will be included in the underpass. Following the excavation, a separation fabric will be placed at the extent of the excavation and clean fill will be set and compacted. A sub-drainage layer will be installed within the clean fill with perforated pipes which tie into the adjacent catch basins. This sub-drainage layer is to protect the integrity of the roadway and minimizes surface drainage water vertical migration. Stantec completed a geotechnical investigation as part of the street renewals program and drilled several boreholes to 2.1 m below the road surface. The report indicates that no groundwater seepage or soil sloughing was observed during or upon completion of drilling at these depths. Based on the expected excavation depth of 0.9 m groundwater seepage is not likely to be encountered.

As part of the McPhillips Reconstruction the Contractor will complete the following in accordance with this RP which will be part of the technical specifications outlined in City of Winnipeg Bid Opportunity 775-2017, currently being drafted for tendering purposes:

- Strip the concrete or asphalt material for removal;
- Remove the top 0.40 m (or until impacts are encountered through visual staining or odours) of non-impacted granular fill material for removal off-site. Based on field observations the granular fill underlying the concrete/asphalt surface was not impacted;
- The On-Site Dillon Contract Administrator is to be notified if suspected impacted material is encountered outside the area of expected impacts as shown in Figure 1, appended, with the area summarized in Table 5.1. The Contractor will notify Dillon if an increase in area of impacted material identified in Table 5.1 is expected before removal of additional material;
- The impacted soil shall be removed to a licenced soil treatment facility as per MSDs information bulletin entitled "Contaminated Soil Treatment Facilities in Manitoba." The Contractor will

contact the soil treatment facility in advance to determine if the facility can and will accept the soil;

- The Contractor shall work alongside the Dillon environmental site assessor to determine the extent of the impacted material for disposal and closure sampling; and,
- Provide documentation to Dillon, from the licenced soil disposal treatment facility, indicating the amount of material accepted and at which dates.

As part of the McPhillips Street Reconstruction Project Dillon will complete the following as part of the completion of the RP:

- Dillon will update MSD, as required, regarding any changes to the RP and once the Contractor has selected an appropriate soil treatment facility;
- Dillon will assist the Contractor with coordinating the material acceptance approval requirements for the selected soil disposal facility, such as supplying the appropriate soil analytical data;
- A Dillon environmental assessor will be On-Site during the excavation of the expected area of impacts to assist in coordinating disposal and environmental sampling from the extents of the excavation (assumed two (2) days);
- Dillon will assist the Contractor in determining disposal requirements for material encountered near the impacted material;
- Once the extents of the excavation are reached, Dillon will collect soil samples at regular depth and length intervals across the excavation floor and walls (approximate 2 m grid spacing) for field-screening of hydrocarbon vapours. Select soil samples will be submitted for laboratory analysis from the walls and the floor of the excavation based on the field-screening results. It is anticipated that up to twenty (20) soil samples for PHC analysis and ten (10) samples for PAH analysis will sufficiently classify residual concentrations at the extent of the excavation. These samples include a landfill acceptance samples (if required), and a 10% submission of samples for QA/QC purposes; and,
- Dillon will compile the results of the remediation program in a closure report detailing the methodology and results of the confirmatory sampling. The report will include complete analytical data sheets and a site plan showing the limits of the remedial excavation as well as closure sample locations.

5.2 Risk Management

Based on the initial results discussed in Section 4.0 the PHC concentrations encountered are several orders of magnitude lower than the MOECC guidelines for protection of construction workers. Therefore, the short-term exposure to human health during the remediation program is anticipated to

be acceptable. These values have been used to ensure the health of On-Site workers has been considered during the remediation program.

The RP anticipated for the site include the excavation of impacted materials to a depth of approximately 0.9 m below the current road surface (described in Section 5.1) followed by risk management measures if impacts remain in place. The risk management measures include eliminating direct contact with the impacted material with the placement of clean fill followed by a hardscape cap of a 300 mm concrete slab from the roadway reconstruction. This surface barrier mitigates risk associated with soil direct contact for human health and ecological health. As identified in Section 3.0, the risk management measure is anticipated to minimize plant, mammals and bird contact with the soil; however, soil invertebrates are currently expected to be exposed to the contaminants of concern through direct contact (i.e., earthworms burrowing in soil), and through ingestion pathways. Typically soil invertebrates are limited to surface soil, and following the removal of the top 0.9 m of material from the site backfilled with clean fill the exposure pathway for soil invertebrates are expected to be minimized. Dillon's closure report will assess the final closure sample concentrations and risk management measure approach as part of the RP.

A summary of the proposed RP is included in Table 5.1 below:

Table 5.1: Remediation Plan Summary

Remediation Plan	Description
Proposed Remediation Method	Remedial Excavation and Risk Management Measures.
Target Remediation Criteria	CWS for PHCs and CCME's CEQG's; however, residual impacts may be managed in place due to structural requirements of the roadway design.
Quantities of Contaminated Material	Surface Area of approximately 300 m^2 with an excavation depth of 0.4 to 0.9 m. The estimated volume is 150 m^3 of material, equivalent to approximately 250 metric tonnes.
Approximate Number of Confirmatory Samples	20 samples for BTEX, PHC F1-F4 and ten samples for PAH
Off-Site Soil Treatment	Licenced soil disposal treatment facility.
Schedule – Remedial Activities	Between June and September 2018, dependent on traffic staging during the reconstruction program.
Schedule - Closure Report	December 2018.

6.0 Closure

This report has been prepared exclusively for the purposes, project and site location outlined in the plan. The plan is based on information provided to, or obtained by Dillon as indicated in the plan, and applies solely to site conditions and the regulatory and planning frameworks existing at the time of the site investigation. Although Dillon conducted a reasonable investigation, the investigation was by no means exhaustive. Rather, Dillon's findings represent a reasonable review of available information within an established work scope and schedule.

This report was prepared by Dillon for the sole benefit of the City of Winnipeg and reflects Dillon's best judgment given the information available at the time of the report preparation. Any use which a third party makes of this plan, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this plan.

We trust that the information provided herein is satisfactory for your present requirements. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

DILLON CONSULTING LIMITED

Vanessa Krahn, M.Sc., P.Eng.
Environmental Engineer

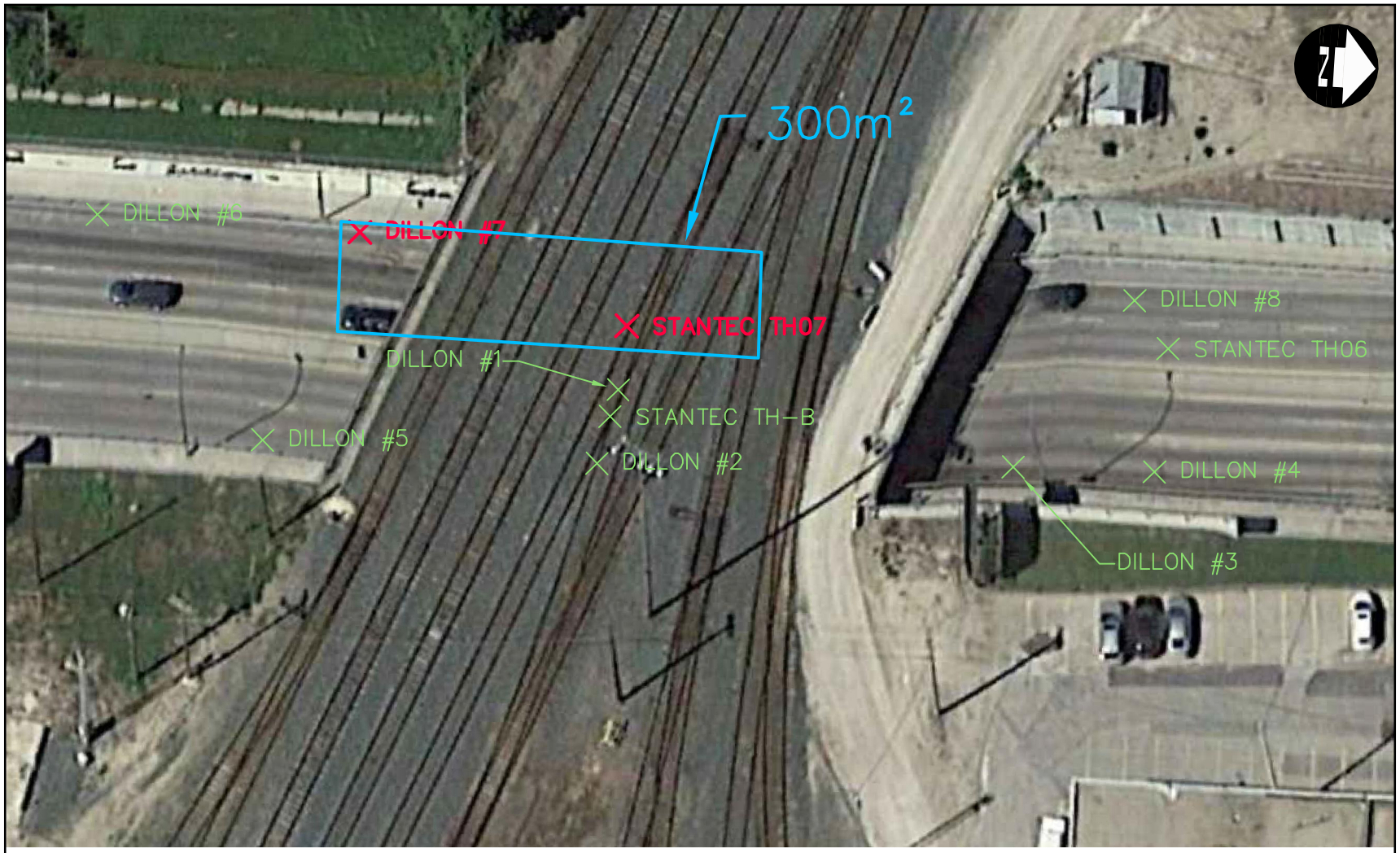
Doug Bell, P.Geo., M.Sc., FGC
Technical Reviewer

VMK:jef

PROVINCE OF MANITOBA
V.M.
KRAHN
Member
34912
March 12, 2018
REGISTERED PROFESSIONAL ENGINEER

APEGM
Certificate of Authorization
Dillon Consulting Limited (MB)
No. 1789 Date: March 12, 2018

Figure



Notes:
1. Image retrieved from Google Earth.
2. Dillon locations refer to footing exposure investigation.
3. Stantec locations refer to boreholes performed by Stantec in the fall of 2017.

LEGEND
- NON-IMPACTED TEST SITES
- IMPACTED TEST SITES
- AREA OF EXPECTED IMPACTS

DILLON CONSULTING

NOT TO SCALE

TITLE
17-6152 Regional Streets - McPhillips St
Impacted Soil Locations

DRAWING NO.
Figure

Appendix A

Laboratory Certificates of Analysis

Dillon Consulting Engineers
ATTN: VANESSA KRAHN
1558 Willson Place
Winnipeg MB R3T 0Y4

Date Received: 20-SEP-17
Report Date: 21-SEP-17 18:20 (MT)
Version: FINAL

Client Phone: 204-453-2301

Certificate of Analysis

Lab Work Order #: L1994507

Project P.O. #: NOT SUBMITTED
Job Reference: 17-6152-6000
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1994507-1 PIT-S							
Sampled By: CLIENT on 20-SEP-17 @ 14:45							
Matrix: SOIL							
BTEX and F1-F4 by Tumbler Method							
BTX plus F1 by GCMS							
Benzene	<0.0050		0.0050	mg/kg	20-SEP-17	21-SEP-17	R3835314
Toluene	<0.050		0.050	mg/kg	20-SEP-17	21-SEP-17	R3835314
Ethyl benzene	<0.015		0.015	mg/kg	20-SEP-17	21-SEP-17	R3835314
o-Xylene	<0.050		0.050	mg/kg	20-SEP-17	21-SEP-17	R3835314
m+p-Xylenes	<0.050		0.050	mg/kg	20-SEP-17	21-SEP-17	R3835314
F1 (C6-C10)	<10		10	mg/kg	20-SEP-17	21-SEP-17	R3835314
Surrogate: 4-Bromofluorobenzene (SS)	129.1		70-130	%	20-SEP-17	21-SEP-17	R3835314
CCME Total Extractable Hydrocarbons							
F2 (C10-C16)	796		25	mg/kg	21-SEP-17	21-SEP-17	R3835301
F3 (C16-C34)	453		50	mg/kg	21-SEP-17	21-SEP-17	R3835301
F4 (C34-C50)	<50		50	mg/kg	21-SEP-17	21-SEP-17	R3835301
Surrogate: 2-Bromobenzotrifluoride	88.0		60-140	%	21-SEP-17	21-SEP-17	R3835301
Chrom. to baseline at nC50	YES				21-SEP-17	21-SEP-17	R3835301
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		21-SEP-17	
F2-Naphth	796		25	mg/kg		21-SEP-17	
F3-PAH	453		50	mg/kg		21-SEP-17	
Total Hydrocarbons (C6-C50)	1250		76	mg/kg		21-SEP-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	<0.071		0.071	mg/kg		21-SEP-17	
Miscellaneous Parameters							
Moisture	34.0		0.10	%		21-SEP-17	R3835147
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.050	DLCI	0.050	mg/kg	21-SEP-17	21-SEP-17	R3835175
2-Methyl Naphthalene	<0.010		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Acenaphthene	0.162		0.0050	mg/kg	21-SEP-17	21-SEP-17	R3835175
Acenaphthylene	<0.0050		0.0050	mg/kg	21-SEP-17	21-SEP-17	R3835175
Acridine	0.107	EMPC	0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Anthracene	0.0853	EMPC	0.0040	mg/kg	21-SEP-17	21-SEP-17	R3835175
Benzo(a)anthracene	0.016		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Benzo(a)pyrene	0.015		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Benzo(b&j)fluoranthene	0.017		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Benzo(g,h,i)perylene	0.011		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Benzo(k)fluoranthene	<0.010		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Chrysene	0.015		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Dibenzo(a,h)anthracene	<0.0050		0.0050	mg/kg	21-SEP-17	21-SEP-17	R3835175
Fluoranthene	0.031		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Fluorene	0.108		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Indeno(1,2,3-cd)pyrene	<0.010		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Naphthalene	0.082	EMPC	0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Phenanthrene	0.592		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Pyrene	0.117		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
Quinoline	<0.010		0.010	mg/kg	21-SEP-17	21-SEP-17	R3835175
B(a)P Total Potency Equivalent	0.022		0.020	mg/kg	21-SEP-17	21-SEP-17	R3835175
IACR (CCME)	0.24		0.15	mg/kg	21-SEP-17	21-SEP-17	R3835175
Benzo(b+j+k)fluoranthene	0.017		0.014	mg/kg	21-SEP-17	21-SEP-17	R3835175
Surrogate: Acenaphthene d10	93.7		50-130	%	21-SEP-17	21-SEP-17	R3835175
Surrogate: Chrysene d12	114.7		50-130	%	21-SEP-17	21-SEP-17	R3835175
Surrogate: Naphthalene d8	98.3		50-130	%	21-SEP-17	21-SEP-17	R3835175
Surrogate: Phenanthrene d10	113.6		50-130	%	21-SEP-17	21-SEP-17	R3835175

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1994507-2 PIT-W							
Sampled By: CLIENT on 20-SEP-17 @ 14:45							
Matrix: WATER							
BTEX plus F1-F4							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		21-SEP-17	R3834859
Toluene	<0.0010		0.0010	mg/L		21-SEP-17	R3834859
Ethyl benzene	0.00076	EMPC	0.00050	mg/L		21-SEP-17	R3834859
o-Xylene	0.00081	EMPC	0.00050	mg/L		21-SEP-17	R3834859
m+p-Xylenes	0.00071	EMPC	0.00040	mg/L		21-SEP-17	R3834859
F1 (C6-C10)	1.24		0.10	mg/L		21-SEP-17	R3834859
Surrogate: 4-Bromofluorobenzene (SS)	129.0		70-130	%		21-SEP-17	R3834859
CCME PHC F2-F4 in Water							
F2 (C10-C16)	153		0.10	mg/L	21-SEP-17	21-SEP-17	R3833141
F3 (C16-C34)	83.0		0.25	mg/L	21-SEP-17	21-SEP-17	R3833141
F4 (C34-C50)	4.66		0.25	mg/L	21-SEP-17	21-SEP-17	R3833141
Surrogate: 2-Bromobenzotrifluoride	117.3		60-140	%	21-SEP-17	21-SEP-17	R3833141
CCME Total Hydrocarbons							
F1-BTEX	1.24		0.10	mg/L		21-SEP-17	
Total Hydrocarbons (C6-C50)	242		0.38	mg/L		21-SEP-17	
Sum of Xylene Isomer Concentrations							
Xylenes (Total)	0.00153		0.00064	mg/L		21-SEP-17	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTEXS+F1-HSMS-WP	Soil	BTX plus F1 by GCMS	EPA 8260C

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA 8260C / EPA 5021A

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

F1-F4-CALC-WP	Soil	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F2-F4-FID-WP	Water	CCME PHC F2-F4 in Water	EPA 3511

Petroleum hydrocarbons in water are determined by liquid-liquid micro-scale solvent extraction using a reciprocal shaker extraction apparatus prior to capillary column gas chromatography with flame ionization detection (GC-FID) analysis.

F2-F4-TMB-FID-WP	Soil	CCME Total Extractable Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001

A soil or sediment sample is extracted with 1:1 hexane/acetone in a tumbler, followed by a silica gel clean up to facilitate separation of the hydrocarbons from other polar extractions. An aliquot of the solvent is analyzed using a gas chromatograph equipped with a flame -ionization detector.

MOISTURE-WP	Soil	% Moisture	CCME CWS-PHC, Pub #1310, Dec 2001

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
Moisture content in solid matrices is determined gravimetrically after drying to constant weight at 105°C.			
PAH,PANH-WP	Soil	Polyaromatic Hydrocarbons (PAHs)	EPA SW 846/8270-GC/MS
Samples are rotary extracted using a 1:1 mixture of acetone and dichloromethane. Extracts are concentrated and solvent exchanged to toluene. The toluene extract is analyzed by GCMS.			
XYLENES-SUM-CALC-WP	Soil	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
Total xylenes represents the sum of o-xylene and m&p-xylene.			
XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT
Total xylenes represents the sum of o-xylene and m&p-xylene.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Dillon Consulting Engineers
1558 Willson Place
Winnipeg MB R3T 0Y4
Contact: VANESSA KRAHN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEXS+F1-HSMS-WP	**Water**							
Batch R3834859								
WG2620784-2 LCS								
Benzene			94.3		%		70-130	20-SEP-17
Toluene			93.5		%		70-130	20-SEP-17
Ethyl benzene			92.9		%		70-130	20-SEP-17
o-Xylene			103.5		%		70-130	20-SEP-17
m+p-Xylenes			93.1		%		70-130	20-SEP-17
WG2620784-3 LCS								
F1 (C6-C10)			107.1		%		70-130	20-SEP-17
WG2620784-1 MB								
Benzene			<0.00050		mg/L		0.0005	21-SEP-17
Toluene			<0.0010		mg/L		0.001	21-SEP-17
Ethyl benzene			<0.00050		mg/L		0.0005	21-SEP-17
o-Xylene			<0.00050		mg/L		0.0005	21-SEP-17
m+p-Xylenes			<0.00040		mg/L		0.0004	21-SEP-17
F1 (C6-C10)			<0.10		mg/L		0.1	21-SEP-17
Surrogate: 4-Bromofluorobenzene (SS)			83.0		%		70-130	21-SEP-17
F2-F4-FID-WP	**Water**							
Batch R3833141								
WG2621520-2 LCS								
F2 (C10-C16)			110.1		%		70-130	21-SEP-17
F3 (C16-C34)			104.3		%		70-130	21-SEP-17
F4 (C34-C50)			122.8		%		70-130	21-SEP-17
WG2621520-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	21-SEP-17
F3 (C16-C34)			<0.25		mg/L		0.25	21-SEP-17
F4 (C34-C50)			<0.25		mg/L		0.25	21-SEP-17
Surrogate: 2-Bromobenzotrifluoride			72.7		%		60-140	21-SEP-17
BTEXS+F1-HSMS-WP	**Soil**							
Batch R3835314								
WG2620501-6 LCS								
Benzene			78.9		%		70-130	21-SEP-17
Toluene			73.4		%		70-130	21-SEP-17
Ethyl benzene			73.7		%		70-130	21-SEP-17
o-Xylene			80.1		%		70-130	21-SEP-17
m+p-Xylenes			79.0		%		70-130	21-SEP-17
F1 (C6-C10)			90.9		%		70-130	21-SEP-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEXS+F1-HSMS-WP	**Soil**							
Batch R3835314								
WG2620501-5 MB								
Benzene			<0.0050		mg/kg		0.005	21-SEP-17
Toluene			<0.050		mg/kg		0.05	21-SEP-17
Ethyl benzene			<0.015		mg/kg		0.015	21-SEP-17
o-Xylene			<0.050		mg/kg		0.05	21-SEP-17
m+p-Xylenes			<0.050		mg/kg		0.05	21-SEP-17
F1 (C6-C10)			<10		mg/kg		10	21-SEP-17
Surrogate: 4-Bromofluorobenzene (SS)			103.4		%		70-130	21-SEP-17
F2-F4-TMB-FID-WP	**Soil**							
Batch R3835301								
WG2620538-7 IRM		**ALS PHC2 IRM**						
F2 (C10-C16)			85.1		%		70-130	21-SEP-17
F3 (C16-C34)			93.8		%		70-130	21-SEP-17
F4 (C34-C50)			88.7		%		70-130	21-SEP-17
WG2620538-6 LCS								
F2 (C10-C16)			100.3		%		70-130	21-SEP-17
F3 (C16-C34)			105.9		%		70-130	21-SEP-17
F4 (C34-C50)			108.4		%		70-130	21-SEP-17
WG2620538-5 MB								
F2 (C10-C16)			<25		mg/kg		25	21-SEP-17
F3 (C16-C34)			<50		mg/kg		50	21-SEP-17
F4 (C34-C50)			<50		mg/kg		50	21-SEP-17
Surrogate: 2-Bromobenzotrifluoride			97.5		%		60-140	21-SEP-17
MOISTURE-WP	**Soil**							
Batch R3835147								
WG2621540-3 DUP		**L1994507-1**						
Moisture		34.0	34.1		%	0.2	20	21-SEP-17
WG2621540-2 LCS								
Moisture			97.9		%		90-110	21-SEP-17
WG2621540-1 MB								
Moisture			<0.10		%		0.1	21-SEP-17
PAH,PANH-WP	**Soil**							
Batch R3835175								
WG2621487-3 DUP		**L1994507-1**						
1-Methyl Naphthalene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	21-SEP-17
2-Methyl Naphthalene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	21-SEP-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Soil**							
Batch R3835175								
WG2621487-3 DUP		**L1994507-1**						
Acenaphthene		0.162	0.134		mg/kg	18	50	21-SEP-17
Acenaphthylene		<0.0050	0.0063	RPD-NA	mg/kg	N/A	50	21-SEP-17
Acridine		0.107	0.097		mg/kg	9.5	50	21-SEP-17
Anthracene		0.0853	0.0673		mg/kg	24	50	21-SEP-17
Benzo(a)anthracene		0.016	0.012		mg/kg	29	50	21-SEP-17
Benzo(a)pyrene		0.015	0.013		mg/kg	9.9	50	21-SEP-17
Benzo(b&j)fluoranthene		0.017	0.013		mg/kg	22	50	21-SEP-17
Benzo(g,h,i)perylene		0.011	0.011		mg/kg	3.8	50	21-SEP-17
Benzo(k)fluoranthene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	21-SEP-17
Chrysene		0.015	<0.010	RPD-NA	mg/kg	N/A	50	21-SEP-17
Dibenzo(a,h)anthracene		<0.0050	<0.0050	RPD-NA	mg/kg	N/A	50	21-SEP-17
Fluoranthene		0.031	0.026		mg/kg	17	50	21-SEP-17
Fluorene		0.108	0.088		mg/kg	20	50	21-SEP-17
Indeno(1,2,3-cd)pyrene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	21-SEP-17
Naphthalene		0.082	0.074		mg/kg	10	50	21-SEP-17
Phenanthrene		0.592	0.508		mg/kg	15	50	21-SEP-17
Pyrene		0.117	0.090		mg/kg	26	50	21-SEP-17
Quinoline		<0.010	0.010	RPD-NA	mg/kg	N/A	50	21-SEP-17
WG2621487-2 LCS								
1-Methyl Naphthalene			101.0		%		60-130	21-SEP-17
2-Methyl Naphthalene			98.6		%		60-130	21-SEP-17
Acenaphthene			95.7		%		60-130	21-SEP-17
Acenaphthylene			98.1		%		60-130	21-SEP-17
Acridine			111.3		%		60-130	21-SEP-17
Anthracene			96.7		%		60-130	21-SEP-17
Benzo(a)anthracene			111.5		%		60-130	21-SEP-17
Benzo(a)pyrene			97.7		%		60-130	21-SEP-17
Benzo(b&j)fluoranthene			101.6		%		60-130	21-SEP-17
Benzo(g,h,i)perylene			121.9		%		60-130	21-SEP-17
Benzo(k)fluoranthene			106.8		%		60-130	21-SEP-17
Chrysene			115.3		%		60-130	21-SEP-17
Dibenzo(a,h)anthracene			113.6		%		60-130	21-SEP-17
Fluoranthene			112.3		%		60-130	21-SEP-17
Fluorene			100.7		%		60-130	21-SEP-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Soil**							
Batch R3835175								
WG2621487-2 LCS								
Indeno(1,2,3-cd)pyrene			110.7		%		60-130	21-SEP-17
Naphthalene			101.7		%		50-130	21-SEP-17
Phenanthrene			109.0		%		60-130	21-SEP-17
Pyrene			116.7		%		60-130	21-SEP-17
Quinoline			102.3		%		60-130	21-SEP-17
WG2621487-1 MB								
1-Methyl Naphthalene			<0.010		mg/kg		0.01	21-SEP-17
2-Methyl Naphthalene			<0.010		mg/kg		0.01	21-SEP-17
Acenaphthene			<0.0050		mg/kg		0.005	21-SEP-17
Acenaphthylene			<0.0050		mg/kg		0.005	21-SEP-17
Acridine			<0.010		mg/kg		0.01	21-SEP-17
Anthracene			<0.0040		mg/kg		0.004	21-SEP-17
Benzo(a)anthracene			<0.010		mg/kg		0.01	21-SEP-17
Benzo(a)pyrene			<0.010		mg/kg		0.01	21-SEP-17
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	21-SEP-17
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	21-SEP-17
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	21-SEP-17
Chrysene			<0.010		mg/kg		0.01	21-SEP-17
Dibenzo(a,h)anthracene			<0.0050		mg/kg		0.005	21-SEP-17
Fluoranthene			<0.010		mg/kg		0.01	21-SEP-17
Fluorene			<0.010		mg/kg		0.01	21-SEP-17
Indeno(1,2,3-cd)pyrene			<0.010		mg/kg		0.01	21-SEP-17
Naphthalene			<0.010		mg/kg		0.01	21-SEP-17
Phenanthrene			<0.010		mg/kg		0.01	21-SEP-17
Pyrene			<0.010		mg/kg		0.01	21-SEP-17
Quinoline			<0.010		mg/kg		0.01	21-SEP-17
Surrogate: Acenaphthene d10			81.3		%		50-130	21-SEP-17
Surrogate: Chrysene d12			110.7		%		50-130	21-SEP-17
Surrogate: Naphthalene d8			71.4		%		50-130	21-SEP-17
Surrogate: Phenanthrene d10			95.9		%		50-130	21-SEP-17

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

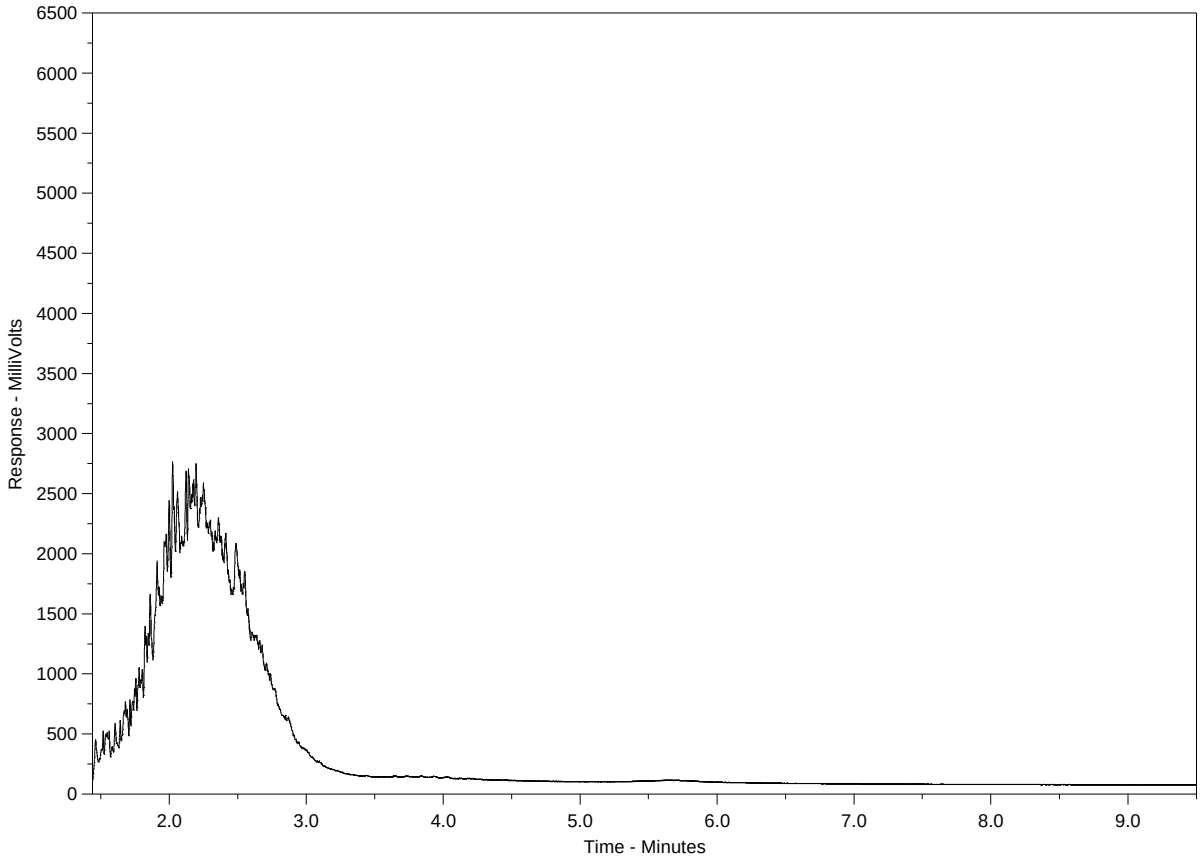
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

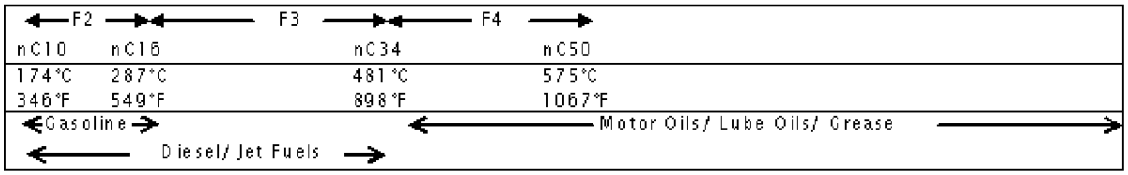
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1994507-1
Client Sample ID: PIT-S





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

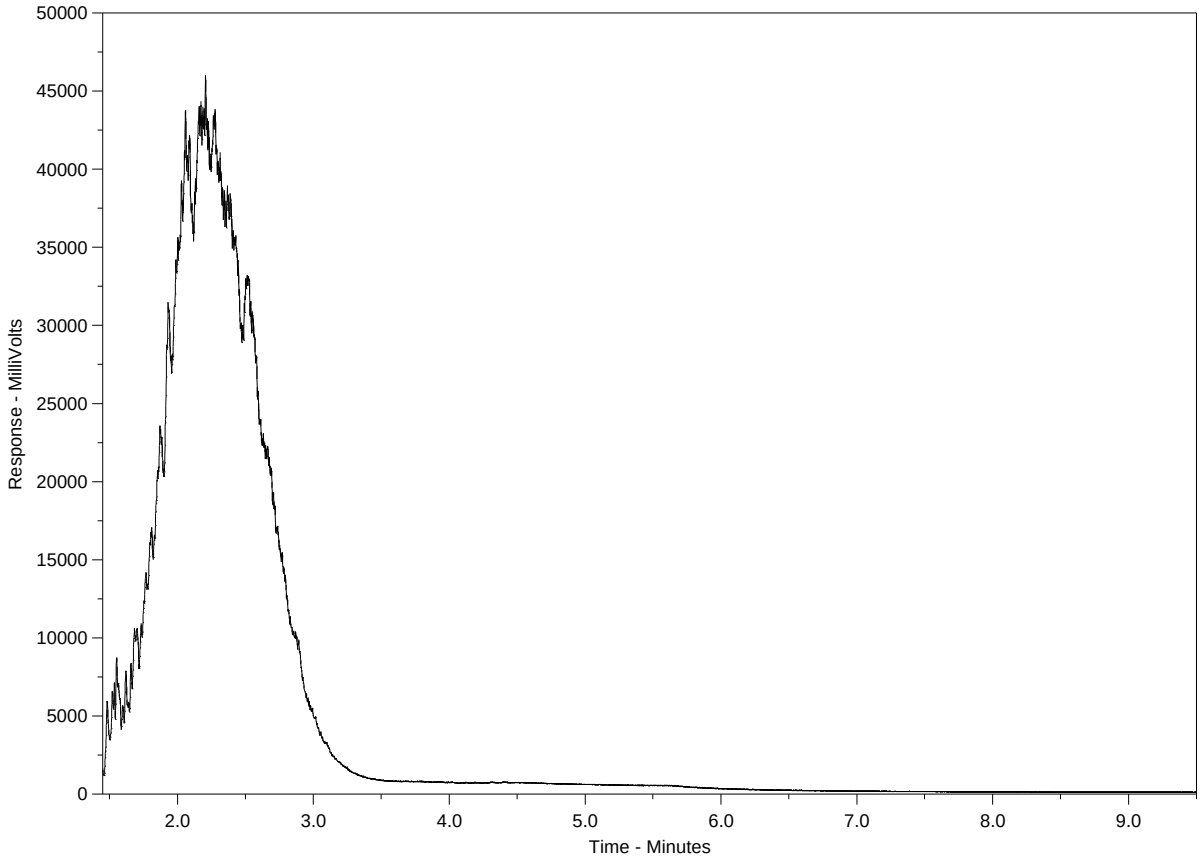
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

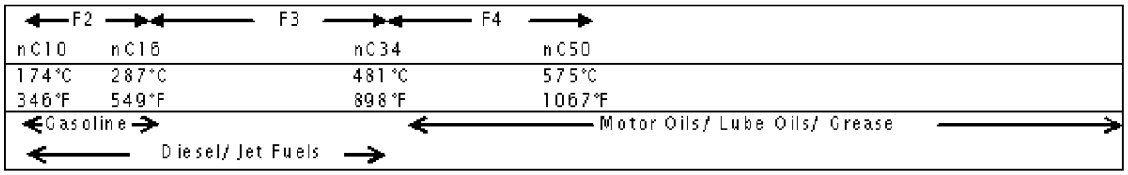
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1994507-2
Client Sample ID: PIT-W





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Environmental

L1994507-COFC

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Report To	Report Format / Distribution	Service Request (Rush subject to availability - Contact ALS to confirm TAT)
Company: DILLON CONSULTING	Standard: ✓ Other (specify):	Regular (Standard Turnaround Times - Business Days)
Contact: VANESSA KRAHN	Select: PDF ✓ Excel ✓ Digital ✓ Fax	Priority (2-4 Business Days) - 50% surcharge - Contact ALS to confirm TAT
Address: 1558 WILLSON PL	Email 1: vkrahn@dillon.ca	Emergency (1-2 Business Days) - 100% Surcharge - Contact ALS to confirm TAT
	Email 2:	X Same Day or Weekend Emergency - Contact ALS to confirm TAT 200% TAT
Phone: 204-453-2301 Fax:		Analysis Request
Invoice To Same as Report ? (circle) Yes or (No) (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P) (SEE JOB)
Copy of Invoice with Report? (circle) Yes or No	Job #: 17-6152-6000	
Company: CITY OF WPG	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #: Q63493	
Lab Work Order # (lab use only)	ALS Contact: Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX	F1-F4	PAH	Number of Containers
1	PIT-S	20 SEP 17	14:45	Soil	X	X	X	3
2	PIT-W	↓	14:45	Water (ground)	X	X		5

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
[signature]	SEP 20/17	15:27	DRT	20-9-17	3:30	16 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front