

Appendix N

Remediation Plan

To:

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October 30, 2024

NEWPCC Primary Scum Building
Remediation Plan**Project Reference**
60661262**Remediation Plan for Arsenic Impacted Soil at the Proposed Primary Scum Building Location, North End Water Pollution Control Centre (NEWPCC), 2230 Main Street, Winnipeg, Manitoba**

1 Introduction

The City of Winnipeg (the City) retained AECOM Canada Ltd. (AECOM) to complete a Remediation Plan (RP) at the North End Water Pollution Control Centre (NEWPCC) at the Proposed Primary Scum Building Location (the Site) at 2230 Main Street in Winnipeg, Manitoba. The purpose of this RP is to describe the remedial activities to be undertaken at the Site.

1.1 Objective

The objective of this report is to provide a summary of the proposed soil remediation activities during the excavation of arsenic impacted soil to determine disposal methods during construction.

2 Background

2.1 Site Description and Surrounding Land Use

The Site is located within the NEWPCC facilities and comprises a portion of land in the developed NEWPCC facilities at 2230 Main Street. The Site can be accessed west from Main Street. The Site is zoned as M1-M3 Industrial Land Use (City of Winnipeg, 2024). The Site Plan is shown on **Figure 1**.

The Site is approximately 12 metres (m) x 21 m, is vegetated and consists of an access road to the main facility. The nearest surface water body to the Site is the Red River located about 800 metres (m) east of the Site.

2.2 Previous Environmental Activities

Between July 10-11, 2024, AECOM completed environmental sampling in conjunction with the geotechnical investigation within the footprint of the Primary Scum Building. Two test holes were advanced at the Site (TH24-01 and TH24-02) and soil samples were collected directly from the solid stem auger at specified intervals and distinct soil layers. Three samples were collected from each test holes and

submitted for analysis of BTEX, PHC F1-F4, PAH's and metals. Based on the results of the laboratory analyses, one of the six soil samples analyzed, TH24-01-01 at depth of 0.30 – 0.45 m below ground surface (bgs), had concentrations of arsenic that exceeded the applied soil quality guidelines (SQGs). The next sample below this depth was collected at depth of 0.75 m bgs and had results below SQGs. Soil results are shown on **Table 1** to **Table 3** and the sample exceeding guidelines are shown on **Figure 1**.

3 Soil Quality Guidelines

The Province of Manitoba currently references documents from the Canadian Council of Ministers of the Environment (CCME) and Ontario Ministry of the Environment (Ontario MOE) as Primary and Secondary standards under the *Contaminated Sites Remediation (CSR) Act*. The applicable standards are summarized below.

Primary standards:

- Canadian Environmental Quality Guidelines (CEQG), Canadian Council of Ministers of the Environment (CCME) (most recent online version).

Secondary standard:

- Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Ontario Ministry of the Environment, April 15, 2011.

Tier I metal SQGs have been applied at the Site. The waste disposal ground acceptance criteria are based on the CCME for fine-grained surface soil for industrial land use sites, the environmental health guideline, and the soil contact pathway as outlined in the MECC guidance document Criteria for Acceptance of Contaminated Soil at Waste Disposal Grounds guidance document (MECC, 2016).

The applicable site-specific factors at the Site for the use of CCME Tier I SQGs are described below.

- The Site is zoned as M3 Industrial Land Use (City of Winnipeg, 2024) and industrial land use EQGs has been applied to the Site.
- Soil encountered at the Site generally consisted of concrete/asphalt pavement, followed by clay fill overlaying a silt layer. The silt layer was underlain by a thick clay layer. The clay layer was followed by a silt till layer, prior to reaching bedrock therefore, the soil type governing the transport and fate of contaminants in the surface and subsurface is fine-grained.
- Potable water for the Site and surrounding area is provided by the City of Winnipeg via a piped municipal distribution system fed by Shoal Lake located approximately 145 km southeast of the city. The potable water pathway is not considered applicable to the Site.
- The freshwater aquatic life pathway is considered applicable if contaminants of concern are located within 500 m of a surface water body (Federal Contaminated Sites Action Plan, 2016). The closest surface water body to the Site is the Red River, which is located approximately 800 m east of the Site and the freshwater aquatic life pathway is not considered applicable to the Site.

4 Proposed Remedial Actions

4.1 Soil Volume Estimate

The estimated extent of the remedial excavation is the building footprint area, which is approximately 250 m². The estimated average depth of the excavation will be 0.9 m, implying a total of approximately 225 m³ of excavated material.

4.2 Excavation of Impacted Soil and Sampling Methodology

Soil will likely be excavated using a track-mounted excavator. AECOM personnel will directly supervise all stages of soil excavation. Soil from the building footprint area will be excavated to a depth of 0.9 m bgs and stockpiled and sampled in accordance with CCME guidelines. One composite sample will be submitted to the lab for analysis of metals. Each composite sample will be composed of five discrete soil samples collected per 50 m³. The excavation is anticipated for spring 2025. Soil samples will be collected with stainless steel sampling utensils to prevent cross-contamination. The selected soil samples will be placed into laboratory-supplied glass sampling jars for laboratory analysis of metals.

4.3 Soil Disposal

Soil stockpiles with results exceeding industrial land use, fine grained soil quality guidelines will be disposed of at a licensed facility that accepts impacted soil.

4.4 Water Management

If required, any accumulated seepage water or precipitation affecting excavation activities will either be pumped to temporary storage tanks and water will be sampled and submitted for laboratory analysis as required. Based on the laboratory results, water will be disposed of by the contractor at an approved location. Mitigations to minimize surface water infiltration into the excavation includes perimeter berms or swales to direct surface water away from the excavation area.

4.5 Site Restoration

There are plans to construct a building in the current remediation area, so site restoration does not need to be completed due to the ongoing activities on site.

4.6 Supply of Backfill

Backfill is unlikely to be needed due to the ongoing construction on site. If backfill is required, then the backfill will be sampled and sent for laboratory analysis of metals to verify the soil meets the Site remedial guidelines.

5 Conclusions

The RP presented in this report describes the activities that are recommended to be undertaken in cooperation with The City of Winnipeg to remediate and dispose of the arsenic impacted soil at the location of the proposed Scum Building at NEWPCC. The key activities in the RP include the following:

- Excavation to a depth of 0.9 m bgs and stockpiling of approximately 225 m³ of potentially metal impacted soil from the Scum Building footprint.

- Soil with arsenic concentrations in excess of the applied CCME guidelines will be disposed offsite to a licensed facility that accepts impacted soil.
- Dispose of any water accumulated in the excavation at an approved disposal location.
- Special care should be taken during construction and excavation to protect workers from inhalation of soil particles. Mitigation measures include keeping the dust down during excavation, not excavating during high winds or very dry conditions, using wetting agents, implementing segregation or work zones, workers wearing half mask respirators, as well as washing work clothes.

Should you have any questions or require further information, please contact Jen Murray, as signed below.

Sincerely,
AECOM Canada Ltd.



Jen Murray, B.Env.Sc., EP
Environmental Scientist
Remediation
jen.murray@aecom.com

Attachments:

Figure 1

Tables 1 to 3

References

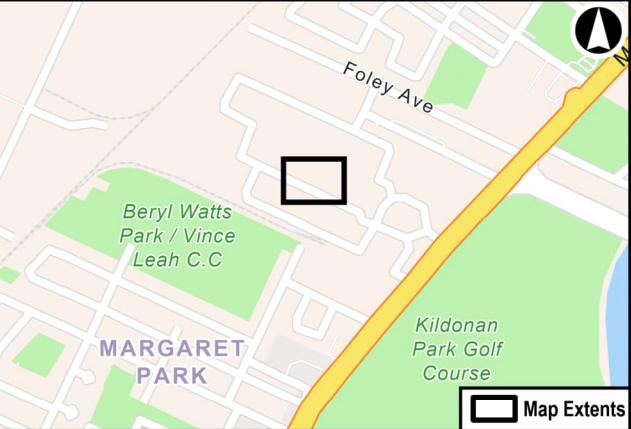
AECOM, 2024. Environmental Soil Analysis at the Proposed Primary Scum Location, 2230 Main Street, Winnipeg, Manitoba.

Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (most recent online version) - Industrial Land Use

City of Winnipeg, 2024. Planning, Property & Planning. Property Map/Aerial Photography.
https://legacy.winnipeg.ca/ppd/maps_aerial.stm

Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Ontario Ministry of the Environment, November 30, 2023.

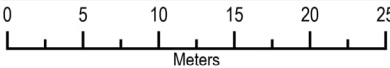
Figure



- Legend**
- Test Hole Locations
 - Sample Above Soil Quality Guideline
 - Sample Below Soil Quality Guideline
 - Proposed Scum Dewatering Building Footprint

NEWPCC PRIMARY SCUM BUILDING
REMEDATION PLAN

SOIL SAMPLES ABOVE
SOIL QUALITY GUIDELINES



Datum: NAD 1983 UTM Zone 14N

Oct, 2024

PN#: 60661262

1:500
* when printed 11"x17"

AECOM

Figure 1

Test hole ID	Depth (meters)	Parameter	Analytical Results (mg/kg)	Applied SQG (mg/kg)
TH24-01	0.3-0.45	Aresenic	13.6	12
	0.75-0.9		7.71	
	3.55-3.7		8.73	

Test hole ID	Depth (meters)	Parameter	Analytical Results (mg/kg)	Applied SQG (mg/kg)
TH24-02	0.2-0.35	Aresenic	11.7	12
	0.7-0.9		7.88	
	2.2-2.4		2.65	

mg/kg: Unit for all soil quality guideline criteria and analytical results is milligrams per kilogram unless otherwise stated

XX: Red and bold analytical results exceeded applied standards

SQG: Canadian Council of ministers of the Environment (CCME) Soil Quality Guidelines (2024) - Industrial Land Use, Fine Grained Soil

Data Sources: NRCan - CanVec
Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/INASA, USGS, EPA, US Census Bureau, USDA, NRCan, Parks Canada, Maxar
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Tables

Table 1: Soil Analytical Results - Metals

Sample ID:	SQG ^a	RDL	Units	TH24-01-01	TH24-01-02	TH24-01-05	TH24-02-01	TH24-02-02	TH24-02-04
Date Sampled (dd-mmm-yyyy)				11-Jul-24	11-Jul-24	11-Jul-24	10-Jul-24	10-Jul-24	10-Jul-24
Depth (mbgs)				0.30 - 0.45	0.75 - 0.90	3.55 - 3.70	0.20 - 0.35	0.70 - 0.90	2.20 - 2.40
Antimony (Sb)	40	0.1	mg/kg	0.33	0.31	0.32	0.34	0.32	0.11
Arsenic (As)	12	0.1	mg/kg	13.6	7.71	8.73	11.7	7.88	2.65
Barium (Ba)	2,000	0.5	mg/kg	180	208	240	208	244	64.5
Beryllium (Be)	8	0.1	mg/kg	1.00	1.29	0.88	1.38	1.27	0.29
Boron (B)	120 ^b	5	mg/kg	18.5	23.2	22.6	26.1	28.3	13.5
Boron, hot water soluble	NG	0.1	mg/kg	0.79	0.68	0.58	0.63	0.64	0.2
Cadmium (Cd)	22	0.02	mg/kg	0.341	0.226	0.204	0.231	0.281	0.102
Chromium (Cr)	87	0.5	mg/kg	44.3	56.2	49.8	58.4	56.9	18.4
Chromium, hexavalent [Cr VI]	1.4	0.1	mg/kg	0.11	0.22	0.14	0.23	<0.10	<0.10
Cobalt (Co)	300	0.1	mg/kg	11.5	12.8	13.6	15.4	15.5	4.46
Copper (Cu)	91	0.5	mg/kg	33.4	33.3	32.7	34.7	29.4	10.7
Lead (Pb)	600	0.5	mg/kg	15.3	13.4	11.1	14.4	14.1	4.4
Mercury	50	0.005	mg/kg	0.0337	0.0328	0.029	0.0332	0.0273	0.0105
Molybdenum (Mo)	40	0.1	mg/kg	0.38	0.17	0.97	0.25	0.19	0.27
Nickel (Ni)	89	0.5	mg/kg	32.5	41.4	41.8	46.8	43.5	12.7
Selenium (Se)	2.9	0.2	mg/kg	0.39	<0.20	0.35	0.25	<0.20	<0.20
Silver (Ag)	40	0.1	mg/kg	0.1	0.13	0.1	0.13	0.12	<0.10
Thallium (Tl)	1	0.05	mg/kg	0.301	0.354	0.302	0.378	0.348	0.122
Uranium (U)	300	0.05	mg/kg	1.74	0.851	1.38	1.05	0.836	0.673
Vanadium (V)	130	0.2	mg/kg	81.5	102	80.8	118	102	26.3
Zinc (Zn)	410	2	mg/kg	83.9	98.4	82.0	102	99.2	23.0

^a Canadian Council of Ministers of the Environment (CCME 2010) Soil Quality Guidelines for the Protection of Environmental and Human Health (Accessed July 23, 2024), Industrial Land Use.

^b Ontario Ministry of Environment (MOE), Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, November 30, 2023.

SQG - soil quality guideline.

mbgs - metres below ground surface.

mg/kg - milligram per kilogram.

NG - No Guideline.

RDL -Reportable Detection Limit

< - Denotes concentration less than indicated detection limit.

BOLD -Reportable Detection Limit (RDL) exceeds the regulatory standard

Yellow -exceeds Applied Soil Quality Guideline

Table 2: Soil Analytical Results - Polycyclic Aromatic Hydrocarbons

Sample ID:	SQG ^a	RDL	Units	TH24-01-01	TH24-01-02	TH24-01-05	TH24-02-01	TH24-02-02	TH24-02-04
Date Sampled (dd-mmm-yyyy)				11-Jul-24	11-Jul-24	11-Jul-24	10-Jul-24	10-Jul-24	10-Jul-24
Depth (mbgs)				0.30 - 0.45	0.75 - 0.90	3.55 - 3.70	0.20 - 0.35	0.70 - 0.90	2.20 - 2.40
Acenaphthene	96 ^b	0.005	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	0.17 ^b	0.005	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acridine	NG	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	32	0.004	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Benz(a)anthracene	10	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	72	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j)fluoranthene	NG	0.01	mg/kg	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	NG	0.015	mg/kg	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	NG	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	10	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	9.6 ^b	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	10	0.005	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	180	0.01	mg/kg	0.012	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	69 ^b	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	10	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1+2-	NG	0.015	mg/kg	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Methylnaphthalene, 1-	85 ^b	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 2-	85 ^b	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	22	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	50	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	100	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Quinoline	NG	0.01	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
B(a)P total potency equivalents [B(a)P TPE]	NG	0.02	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
IACR (CCME)	NG	0.15	N/A	<0.150	<0.150	<0.150	<0.150	<0.150	<0.150

^a Canadian Council of Ministers of the Environment (CCME 2010) Soil Quality Guidelines for the Protection of Environmental and Human Health (Acessed July 23, 2024), Industrial Land Use.

^b Ontario Ministry of Environment (MOE), Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, July 1, 2011.

SQG - soil quality guideline.

mbgs - metres below ground surface.

mg/kg - milligram per kilogram.

NG - No Guideline.

RDL -Reportable Detection Limit

< - Denotes concentration less than indicated detection limit.

BOLD Reportable Detection Limit (RDL) exceeds the regulatory standard

Yellow Exceeds Applied Soil Quality Guideline

Table 3: Soil Analytical Results - Petroleum Hydrocarbons

Sample ID:	SQG ^a Surface Soil (<1.5 m)	SQG ^a Subsoil (>1.5 m)	RDL	Units	TH24-01-01	TH24-01-02	TH24-01-05	TH24-02-01	TH24-02-02	TH24-02-04
Date Sampled (dd-mmm-yyyy)					11-Jul-24	11-Jul-24	11-Jul-24	10-Jul-24	10-Jul-24	10-Jul-24
Depth (mbgs)					0.30 - 0.45	0.75 - 0.90	3.55 - 3.70	0.20 - 0.35	0.70 - 0.90	2.20 - 2.40
Benzene	0.28	0.29	0.005	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Toluene	330	660	0.05	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ethylbenzene	430	860	0.015	mg/kg	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Xylenes, total	230	460	0.05	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
F1 (C6-C10) - BTEX ^b	320	800	5	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
F2 (C10-C16) ^b	260	1,000	25	mg/kg	<25	<25	27	29	<25	26
F3 (C16-C34) ^b	2,500	5,000	50	mg/kg	<50	<50	<50	<50	<50	<50
F4 (C34-C50) ^b	6,600	10,000	50	mg/kg	<50	<50	<50	<50	<50	<50

^a Canadian Council of Ministers of the Environment (CCME 2010) Soil Quality Guidelines for the Protection of Environmental and Human Health (Acessed July 23, 2024), Industrial Land Use, Fine Grained Soils.

^b Canada Wide Standard for Petroleum Hydrocarbons (PHC) in Soil, Canadian Council of Ministers of the Environment (CCME 2008), Fine Grained Soils.

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