

Opinion of Probable Cost for Remediation

**NYSDEC Spill #1103833
121-123 Reynolds Street
Rochester, New York**

April 2016

This opinion of probable (OPC) cost is based on existing limited site data and includes budgetary cost estimates for various remedial activities at 121-123 Reynolds Street, Rochester, New York (Site) to address New York State Department of Environmental Conservation (NYSDEC) Spill #1103833 and historic urban fill material encountered at the Site. Specifically, this OPC includes the costs associated with a limited fill material excavation and off-site disposal, a petroleum source zone excavation (including overburden soil and up to two feet of bedrock) and off-site disposal, a petroleum plume zone excavation (including overburden soil and up to two feet of bedrock) and off-site disposal, treatment of the saturated zone within, the petroleum source zone and petroleum plume zone using a bioremediation product, installation of a sub-slab depressurization system in one new construction residential structure with a footprint of approximately 1,500 square-feet, post-remediation groundwater monitoring, and project management activities. Figure 1 and Figure 2 depict the excavation areas and the presumed new construction residential structure in relation to GIS-interpolated peak photoionization detector (PID) readings and total VOCs detected in analytical laboratory soil samples, respectively.

Site Conditions:

- The Site is vacant grass covered urban land, and vehicle access is limited by wooden bollards along the two sides of the Site bounded by Tremont Street and Reynolds Street.
- Groundwater in the overburden/shallow bedrock flows south.
- The depth to groundwater varies seasonally, but is generally encountered between 8 and 10 feet below the ground surface.
- Bedrock is generally encountered between 8 feet and 10 feet below the ground surface.
- Source area petroleum-impacted soil and groundwater is generally present in proximity to the former underground storage tank (UST) locations and presumed pump dispenser locations.
- Metal, semi-volatile organic compound (SVOC) and ash impacted fill was generally encountered on a portion of the 121 Reynolds Street parcel.
- A dissolved plume is generally present in the downgradient direction (i.e., south) from the former UST locations and is predominantly located on the Site, however it likely extends off-site to the south and east at select locations along these boundaries.

Remedial Components

Task 1 Site Preparation Tasks

- A Remedial Action Work Plan will be prepared to cover remedial components presented herein. [Note: This OPC assumes a United States Environmental Protection Agency (USEPA) Quality Assurance Plan (QAPP) is not required.]

- A remedial design investigation (RDI) will be performed to further define the extent of petroleum-impacted overburden soil requiring remediation.
- A 6-foot high temporary chain-link fence with one locked 20-foot gate and one locked 6-foot man gate will be installed around the perimeter of the Site to prevent public access to the Site during remediation.
- Bedrock interface monitoring wells MW-1, MW-2 and MW-3 will be decommissioned in accordance with NYSDEC regulations.

Task 2 Metal, SVOC and ash impacted Fill Removal and Disposal at Landfill

- Fill impacted with metals (lead) and SVOCs is generally present on the 121 Reynolds Street portion of the Site and is estimated to be 81 feet by 38 feet in area (3,078 square feet) and 4 feet deep. As such, it is estimated that approximately 456 cubic yards (CY), or approximately 684 tons, of fill material requiring excavation and off-site disposal as a non-hazardous waste are present on the Site. This OPC assumes fill material on the 123 Reynolds Street portion of the Site does not require removal.
- The fill material will be direct-loaded (no staging) and disposed off-site as a non-hazardous waste.
- Post-excavation sampling will be completed in accordance with DER-10. Soil samples will be tested for CP-51 SVOCs and Lead.
- It is assumed that the associated field work can be completed in five days or less.
- It is assumed that backfilling of the fill removal area will be conducted subsequent to completion of the petroleum-contaminated soil removal and off-site disposal tasks described herein, which will reduce material handling and oversight costs. As such, it is presumed that Task 2 and Task 3 will be completed simultaneously and as one excavation where there is overlap.

Task 3 Petroleum-Contaminated Soil Removal from Source Area and Disposal at Landfill

- Source area petroleum-impacted soil and groundwater is generally present in proximity to the former underground storage tank (UST) locations and is estimated to be 36 feet by 38 feet in area (1,368 square feet) and 3.0 feet thick located approximately 6.5 feet to 9.5 feet below the ground surface, based on a site specific geographical information system (GIS) model using analytical laboratory test data and refined by field observations and PID measurements. In general, it was assumed that modeled concentrations of total VOCs exceeding 5 parts per million (ppm) in soil samples tested by the analytical laboratory would be excavated and disposed off-site, and that remedial activities would be confined by the property boundaries of the Site. As such, it is estimated that approximately 152 CY, or approximately 228 tons, of material requiring excavation and off-site disposal as a non-hazardous waste are present in the source area on the Site. The petroleum source area soils are covered by an approximate 4 foot thick layer of fill beginning

at the ground surface. This OPC assumes that this fill material will be removed and disposed off-site prior to completing the petroleum source area soil removal, refer to Task 2. [Note: If the sequence of fill and petroleum source area soil removals are modified from that presumed herein, the associated volumes and costs described herein will be less accurate.] Subsequent to fill removal, it is estimated that an approximate 2.5 foot thick layer (i.e., approximately 127 CY or 191 tons), of clean soil will be excavated, staged on-site and ultimately used as excavation backfill. The approximate 228 tons of petroleum-impacted soil will then be removed to the top of bedrock.

- Up to two feet of bedrock within the soil removal footprint (i.e., 1,368 square feet) will be broken up with a hydraulic breaker or similar, excavated and disposed off-site as a non-hazardous waste. As such, it is estimated that approximately 101 CY (or 202 tons) of material requiring excavation and off-site disposal as a non-hazardous waste are present on the Site.
- Contaminated soil and rock will be direct-loaded (no staging of soil) and disposed off-site as a non-hazardous waste.
- The portion of the excavation where bedrock is removed will be backfilled with #2 stone compacted to 95%.
- An approximate 21,000 gallon frac tank will be staged on-site. The source area excavation will be dewatered and any removed water will be transferred to the Frac tank. This OPC assumes the water will be tested, not require pretreatment, and will be discharged to a public combined or sanitary sewer under a sewer use permit.
- Post-excavation sampling will be completed in accordance with DER-10. Soil samples will be tested for CP-51 VOCs.
- In-situ remediation hardware, for possible future delivery of bioremediation amendments or other in-situ remediation amendments will be installed within the bottom of the excavation for potential additional treatment of residual contamination, if warranted.
- Up to 441 pounds of aerobic bioremediation amendment (e.g., ORC-Advanced or similar) will be placed into the source area excavation and/or the in-situ remediation hardware.
- The excavation resulting from this task and the fill removal task will be backfilled with clean site soils and clean imported soils.
- It is assumed that the associated fieldwork can be completed in five days or less.

Task 4 Petroleum-Contaminated Soil Removal from Plume Area and Disposal at Landfill

- Plume area petroleum-impacted saturated soil and groundwater is estimated to be 40 feet by 36 feet in area (1,440 square feet) and 2.0 feet thick located approximately 7.5 feet to 9.5 feet below the ground surface, based on a site specific GIS model using analytical laboratory test data and refined by field observations

and PID measurements collected in the field. In general, it was assumed that modeled concentrations of total VOCs exceeding 5 ppm in soil samples tested by the analytical laboratory would be excavated and disposed off-site, and that remedial activities would be confined by the property boundaries of the Site. As such, it is estimated that 107 CY, or 160 tons, of petroleum-impacted soil requires removal. The petroleum plume area soils are covered by an approximate 7.5 feet thick layer of clean soil/fill beginning at the ground surface. This OPC assumes that this clean soil/fill material will be removed and re-used as excavation backfill material. As such, it is estimated that approximately 400 CY, or approximately 600 tons, of clean soil/fill material requiring excavation and on-site staging are present in the downgradient plume area on the Site. Subsequent to clean soil/fill removal the approximate 107 CY, or approximately 160 tons, of petroleum-impacted soil in the plume area will be excavated, direct loaded and disposed off-site as a non-hazardous waste.

- Up to two feet of bedrock within the soil removal footprint (i.e., 1,440 square feet) will be broken up with a hydraulic breaker or similar, excavated and disposed off-site as a non-hazardous waste. As such, it is estimated that approximately 107 CY (or 213 tons) of bedrock will be excavated and disposed off-site as a non-hazardous waste.
- The portion of the excavation where bedrock is removed will be backfilled with #2 stone compacted to 95%.
- In-situ remediation hardware for possible future delivery of bioremediation amendments, or other in-situ amendments, will be installed within the bottom of the excavation for potential additional treatment of residual contamination, if warranted.
- Up to 720 pounds of aerobic bioremediation amendment (e.g., ORC-Advanced or similar) will be placed into the plume area excavation and/or the in-situ remediation hardware.
- Contaminated soil and rock will be direct-loaded (no staging of soil) and disposed off-site as a non-hazardous waste.
- The plume area excavation will be dewatered, and any removed water will be placed in the Frac tank for characterization and disposal along with any water from Task 3.
- Post-excavation sampling will be completed in accordance with DER-10. Soil samples will be tested for CP-51 VOCs.
- The excavation resulting from this task and the fill removal task will be backfilled with staged clean site soils and clean imported soils.
- It is assumed that the associated fieldwork can be completed in five days or less.

Task 5 Site Restoration Tasks

- Three new 2-inch diameter bedrock interface groundwater monitoring wells will be installed subsequent to source removal work to replace the three wells removed to complete the excavation work described herein.
- The 6-foot high chain-link fence with one 20-foot gate and one 6-foot man gate installed around the perimeter of the Site will be removed, and the wood bollards along the two sides of the Site bounded by Tremont Street and Reynolds Street will be re-installed.

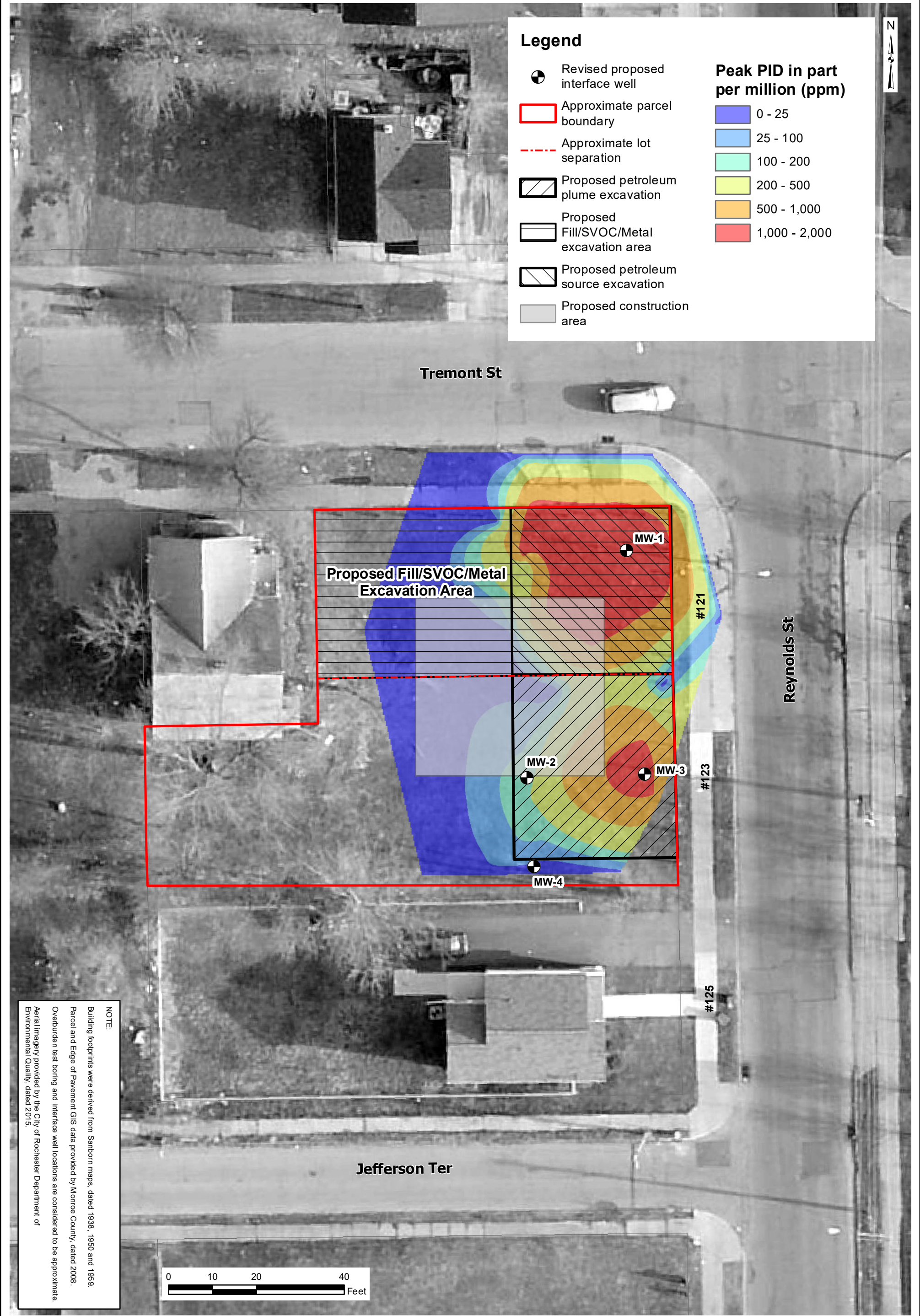
Task 6 Post-Remediation Tasks

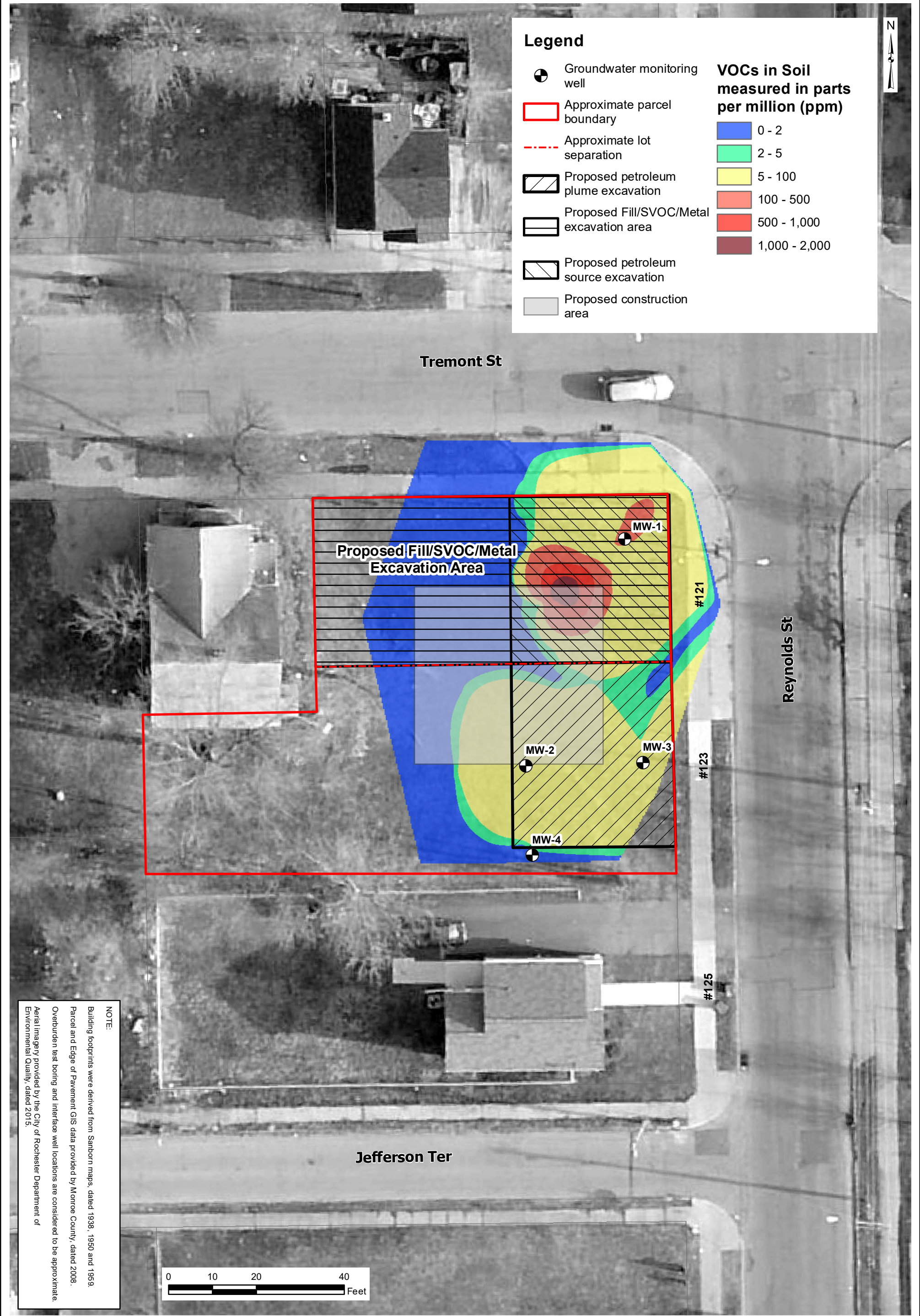
- Quarterly groundwater monitoring will be conducted using the four on-site wells for the first year after remediation, and semi-annual (twice per year) groundwater monitoring will be conducted at these wells for the second year after remediation. Groundwater samples will be tested for CP-51 volatile organic compounds (VOCs).
- In accordance with New York State Department of Health (NYSDOH) guidance, a sub-slab depressurization system will be installed in any new residential construction to address the potential for soil vapor intrusion.
- A Site Management Plan will be prepared in accordance with NYSDEC Region 8 Spills Unit criteria (i.e., not the DER-10 version) to address residual constituents that may be present at the Site subsequent to the remediation.

Task 7 Reporting

- A remedial action summary report will be completed to document the remedial actions implemented, and to summarize the analytical laboratory testing associated with the implemented remedial actions.

An opinion of probable cost to complete Task 1 through Task 7 is summarized on the attached tables. As shown, it is estimated that total project costs including a 20% contingency will be \$249,830.80





Opinion of Probable Cost

	Total
Task 1: Site Preparation Tasks	\$19,425.00
Task 2: Fill Excavation, Transportation, Disposal, Backfilling and Laboratory Testing	\$56,638.22
Task 3: Source Area Excavation (Soil and 2ft into Bedrock), Transportation, Disposal, Backfilling and Laboratory Testing	\$60,884.40
Task 4: Plume Excavation	\$58,897.69
Task 5: Site Restoration Tasks	\$8,250.00
Task 6: Post-Remediation Tasks	\$15,523.60
Task 7: Reporting	\$7,500.00
	Sub-total \$227,118.91
	Contingency 10% \$22,711.89
	Total \$249,830.80

Opinion of Probable Cost

	Unit Rate	Units	Qty	Total
Task 1: Site Preparation				
Remedial Action Work Plan Development	\$5,000.00 lump		1	\$5,000.00
Remedial Design Investigation	\$7,500.00 Lump		1	\$7,500.00
Project Coordination (regulatory and subcontractor)	\$105.00 hr.		20	\$2,100.00
Furnish, Install and Remove Fencing around the Site	\$7.50 per ft.		350	\$2,625.00
20 ft. Gate and a 4 ft. Gate	\$700.00 lump		1	\$700.00
Monitoring Well MW-1, MW-2 and MW-3 Decommissioning	\$500.00 each		3	\$1,500.00
	Sub-total			\$19,425.00
	Contingency 10%			\$1,942.50
	Total			\$21,367.50
Task 5: Site Restoration Tasks				
Monitoring Well Installation	\$2,750.00 each		3	\$8,250.00
	Sub-total			\$8,250.00
	Contingency 10%			\$825.00
	Total			\$9,075.00
Task 6: Post-Remediation Tasks				
Site Management Plan	\$2,500.00 lump		1	\$2,500.00
Sub-Slab Depressurization System - New Construction	\$1.00 /ft2		1500	\$1,500.00
Groundwater Monitoring Events and Summary Reports	\$1,400.00 event		6	\$8,400.00
CP-51 VOC Analysis	\$67.65 sample		24	\$1,623.60
Petition NYSDEC for Spill Closure	\$1,500.00 Lump		1	\$1,500.00
	Sub-total			\$15,523.60
	Contingency 10%			\$1,552.36
	Total			\$17,075.96
Task 7: Reporting				
Remedial Action Summary Report (CCR)	\$7,500.00 lump		1	\$7,500.00
	Sub-total			\$7,500.00
	Contingency 10%			\$750.00
	Total			\$8,250.00

Opinion of Probable Cost

		Unit Rate	Units	Qty	Total
Task 2: Fill Material Excavation , Transportation, Disposal and Backfilling					
Subcontractor Services					
	Mobilization/Demobilization	\$1,412.50	lump	1	\$1,412.50
	Soil Excavation/loading/backfilling	\$2,825.00	day	3	\$8,475.00
	Supply Clean Fill	\$14.69	ton	684	\$10,047.96
	Transport & Dispose Fill	\$42.94	ton	684	\$29,370.96
	Excavation Oversight	\$1,330.00	day	4	\$5,320.00
Labor					
	Waste Profile Analysis	\$1,200.00	Lump	1	\$1,200.00
	Confirmatory Soil Samples	\$67.65	sample	12	\$811.80
Sub-total					\$56,638.22
Contingency 10%					\$5,663.82
Total					\$62,302.04

Opinion of Probable Cost

	Unit Rate	Units	Qty	Total
Task 3: Petroleum Source Area and Unsaturated Zone Excavation , Transportation, Disposal and Backfilling				
Subcontractor Services				
Mobilization/Demobilization	\$1,412.50	lump	1	\$1,412.50
Soil Excavation Equipment Charge (included in Excavation/Backfilling Rates)	\$2,825.00	day	1	\$2,825.00
Transport and Dispose Soil, Supply Clean Fill	\$62.15	ton	228	\$14,170.20
Rock Excavation, transportation, disposal and backfill	\$101.00	ton	202	\$20,402.00
Soil Excavation, Staging, and Backfill - Backfill Soils	\$14.69	ton	190	\$2,791.10
Frac Tank (21,000 Gallon)	\$5,000.00	lump	1	\$5,000.00
Excavation and Backfilling Oversight	\$1,330.00	day	5	\$6,650.00
Hardware for Supplemental Remediation (O ₂ , chem Ox, etc.)	\$1,000.00	lump	1	\$1,000.00
ORC-Advanced	441	lbs	10.11	\$4,460.05
Traffic Control	\$500.00	Lump	1	\$500.00
Laboratory Analysis				
Waste Profile Analysis	\$1,200.00	Lump	1	\$1,200.00
Confirmatory Soil Samples	\$67.65	sample	7	\$473.55
Sub-total				\$60,884.40
Contingency 10%				\$6,088.44
Total				\$66,972.84

Opinion of Probable Cost

	Unit Rate	Units	Qty	Total
Task 4: Petroleum Plume Area and Unsaturated Zone Excavation , Transportation, Disposal and Backfilling				
Subcontractor Services				
Soil/bedrock Excavation and Direct Loading Rate	\$3,390.00 day		5	\$16,950.00
Transport and Dispose Soils	\$45.20 ton		373	\$16,874.67
Backfill Supply	\$17.52 ton		320	\$5,604.80
Excavation and Backfilling Oversight	\$1,330.00 day		7	\$9,310.00
Hardware for Supplemental Remediation (O ₂ , chem Ox, etc.)	\$1,000.00 lump		1	\$1,000.00
ORC-Advanced	720 lbs		10.11	\$7,281.72
Laboratory Analysis				
Waste Profile Analysis	\$1,200.00 Lump		1	\$1,200.00
Confirmatory Soil Samples	\$67.65 sample		10	\$676.50
Sub-total				\$58,897.69
Contingency 10%				\$5,889.77
Total				\$64,787.46

Opinion of Probable Cost

Assumptions/Notes

- Environmental samples (i.e., soil, groundwater, sediment, etc.) would be tested for one or more of the following parameters: CP-51 VOCs, CP-51 SVOCs and/or RCRA Metals.
- Additional source areas requiring removal/remediation are not identified during site remediation.
- One Work Plan and one Remedial Action Report would be prepared and submitted that would summarize the source zone soil excavation, fill material excavation, plume excavation and reporting tasks.
- Soil and rock to be disposed would be directly loaded (i.e., staging and subsequent disposal would not be required).
- A conversion factor of 1.5 tons/CY for overburden soil was used in applicable calculations.
- A conversion factor of 2.0 tons/CY for bedrock was used in applicable calculations.
- A conversion factor of 1.5 tons/CY for backfill was used in applicable calculations. As such, mass of disposed soil calculations that account for both overburden soil and bedrock will be greater than the required backfill mass calculations.
- Remediation is only required to address petroleum contamination associated with NYSDEC Spill # 1103833 and historic fill.
- Soil Excavation, loading and backfilling rates include labor and equipment.