Witmer Road Action Plan
4287 Witmer Road
Town of Niagara Falls, New York

August 2020

Prepared for:

NIAGARA ORLEANS REGIONAL LAND IMPROVEMENT CORPORATION
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List of Abbreviations and Acronyms

BCA	brownfield cleanup agreement
BCP	Brownfield Cleanup Program
COC	Certificate of Completion
cpm	counts per minute
CTC	Country Theatres Corporation
CY	cubic yards
E & E	Ecology and Environment Engineering and Geology, P.C., in association with Ecology and Environment, Inc., member of WSP
ESA	Environmental Site Assessment
IRM	Interim Remedial Measure
µR/hour	micro-Roentgens per hour
mg/kg	milligrams per kilogram
NFA	No Further Action
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
O&M	operation and maintenance
PCB	polychlorinated biphenyl
SCO	soil cleanup objective
SI	Site Investigation
Site Prep	Site Preparation Cost
SVOC	semi-volatile organic compound
TCLP	toxic characteristic leaching procedure
VOC	volatile organic compound
WMI	Waste Material Investigation
WRDI	Witmer Road Drive-In Site

1 Introduction

Ecology and Environment Engineering and Geology, P.C., in association with Ecology and Environment, Inc., member of WSP (hereafter collectively referred to as E & E) is under contract with Niagara Orleans Regional Land Improvement Corporation to provide an Action Plan for the Witmer Road Drive-In Site (WRDI) at 4287 Witmer Road, Niagara Falls, New York (Site No. 9-32-118) located in the town of Niagara, New York.

The purpose of this Action Plan is to:

- Document surficial radiation on-site;
- Summarize the results of the Phase I/II Environmental Site Assessments (ESAs) completed in 1989/1991, Waste Materials Investigation completed in 1994, Site Investigation report completed in 2005, and Site Characterization Report completed in 2008;
- Describe alternatives for cleanup in the Action Plan, providing information on the Brownfield Cleanup Program (BCP) options for remediation reimbursement; and
- Provide cost estimates for remedial alternatives.

1.1 Site Background

Site geology and hydrology were documented thoroughly in the Phase I and Phase II ESAs. The site history, site features, and previous investigations are described in the following sections.

1.1.1 Site Description

The WRDI is a 1.72-acre parcel located at 4287 Witmer Road in the town of Niagara, Niagara County, New York (see Figure 1-1). The site is currently owned by SJB Services, Inc., identified as Empire Soils in the tax database for Niagara County, and consists of a vacant single-story, slab-on-grade, brick building and associated parking lot surrounded by a vacant field of dense vegetation. The site is bounded by Witmer Road to the north, Gill Creek to the east, and an industrial park to the south and west. The site is located in the commercial area of Witmer Road, but residential properties are approximately 300 feet to the east, on the other side of Gill Creek. The property across Witmer Road to the north is Reservoir State Park, beyond which is a water reservoir used by the New York Power Authority for hydroelectric power generation. A 20-foot easement for a sanitary sewer exists parallel to Witmer Road along the northern boundary of the

site, while a 20-foot public utility easement exists along the western boundary of the site.

1.1.2 Geology

The majority of the site topography is relatively flat to gently sloping toward the north/northeast portion of the site, while the eastern boundary of the site drops abruptly (approximately 10 feet) to the elevation of Gill Creek, which runs along the eastern boundary. The flat and gently sloping grade was man-made with fill materials. Previous reports indicate that the original land surface was 3 to 12 feet lower than the current grade, and that a small tributary to Gill Creek previously cut across the property but was filled during the 1940s or 1950s (Empire 1991).

The native geology at WRDI consists of lacustrine deposits underlain by bedrock. A soil survey conducted by the U.S. Department of Agriculture Soil Conservation in 1972, identified two major native soil types in the area that encompasses the WRDI. The Wayland silt loam is located along banks of Gill Creek. The Odessa silty clay loam is a reddish-brown or brown-black lacustrine deposit, ubiquitous across the WRDI. The thickness ranges from 4 feet to 10 feet and exhibits slopes of 0% to 6%. The predominantly clay and silt composition of the Odessa silty clay loam results in low permeability (Empire 1989).

The bedrock unit at the WRDI is Lockport Dolomite, which is dark grey to brown, massive to thin-bedded dolomite. The thickness ranges from 20 feet to 140 feet thick and dips south on a regional scale with, approximately, a 30-foot per mile slope (Empire 1989). Based on soil boring refusal, bedrock is located 16.5 to 18 feet below ground surface (Empire 1991). The depth to bedrock in the WRDI is approximately 16 feet to 18 feet below ground surface (Empire 1991).

1.1.3 Hydrology

Previous investigations have identified two separate aquifer systems an unconfined aquifer in the man-made fill materials and a fractured bedrock aquifer in the fractured zones of the Lockport Dolomite. The Odessa silty clay unit acts as a low permeability confining layer between the fill materials and the bedrock. The flat/gently sloping topography of the site results in surface water either ponding in localized areas or flowing east-northeast directly into Gill Creek. Variability of standing water levels across the site may be a result of the looseness of the fill material and proximity to Gill Creek (Empire 1991).

The closest surface waterbodies to the WRDI are the New York State Power Reservoir, the upgradient water source for Gill Creek located approximately 0.5 miles north of the site, and the Niagara River, located approximately 1.5 miles west of the site. Gill Creek is a direct tributary of the Niagara River.

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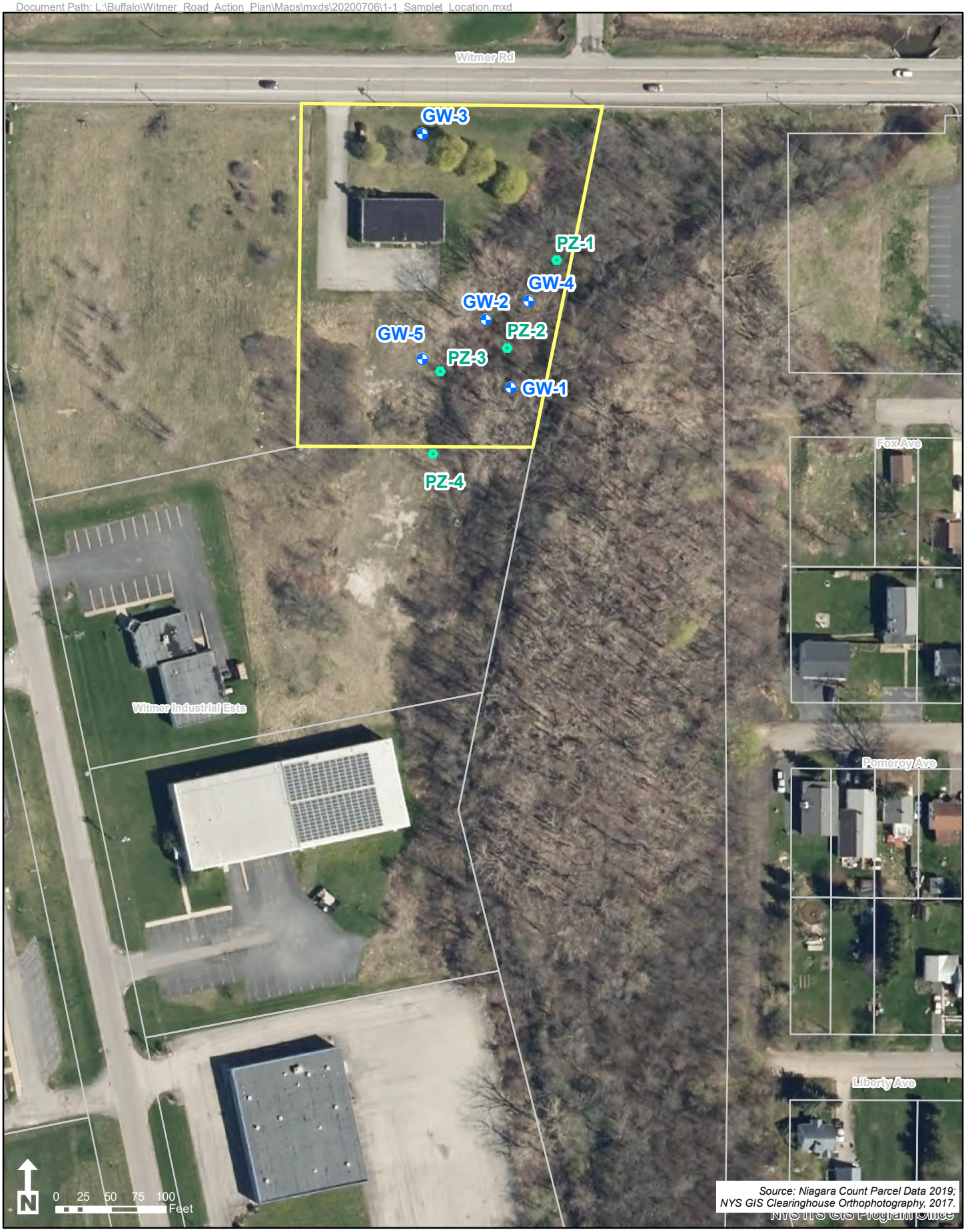

Witmer Road Drive-In (4287 Witmer Rd.) Site

Existing Groundwater Monitoring Well Location

Piezometer

Tax Parcel

Figure 1-1
Project Area
Witmer Road Drive-In Site
Town of Niagara, New York

1.1.4 Site History/Previous Site Investigations

According to the Phase I ESA conducted by Empire Soils Investigations, Inc., in 1989, the site was considered farmland until 1953 when the property was sold to the Country Theatres Corporation (CTC) by Mr. John Rommel's estate. Ms. Rolling, the Town of Niagara Historian at the time, speculated that approximately 6 feet of unknown fill existed on the site at the time of the sale. From approximately 1953 to 1986, a drive-in theater operated on the site, although a 1951 aerial photograph of the site shows the outline of the future drive-in. During its time of operation, three companies owned the drive-in including CTC (1953 to 1954), Falls Drive-In, Inc. (1954 to 1973), and Cataract Theater Corporation (1973 to 1986), which merged with Falls Drive-In, Inc. in 1973. Empire contacted the former drive-in theater manager, Mr. Vernor, who did not remember any fill activities and believed they occurred when Mr. Rommel owned the property.

In 1986, the property was sold to a variety of investors existing as the Witmer Industrial Estate co-partnership, who transferred ownership of the property to ASTECO, Inc., an industrial hygiene testing firm, in 1987. A single story office/ laboratory building and associated parking lot were constructed on the site in 1987. Sometime between 1987 and 1989, Empire's Industrial Hygiene Division occupied the building. The site was bought by Maxim Technologies in 1999, which was acquired by SJB Services, Inc., in September 2000. The site is listed as a property of Empire Soils Investigations, Inc., which is a subsidiary of SJB Services, Inc.

Five previous investigation reports on the site, described below, were used to obtain background information and sampling results. Limited information from three of these reports, the Phase I and II ESAs, and the Site Characterization Report, was available to E & E.

- A Phase I ESA was completed at the site in August 1989 by Empire Soils Investigations, Inc. (Empire 1989). The ESA was initiated after a suspicious material was noticed in one of four geotechnical borings that were installed on-site for a proposed building expansion. The ESA fieldwork consisted of a soil gas survey, test pit excavations, and soil boring installations. Fill materials were observed on the eastern area of the site along the Gill Creek banks as well as on the adjacent site to the south. Fill materials observed during the ESA included broken glass, bricks, metal, concrete, porcelain pieces, one crushed 55-gallon drum, and a lime-like material. The properties to the south and west of the site were once part of the subject property, and the ESA suggested that varying amounts of fill material are present on these adjacent sites. The analytical results from this ESA are discussed in Section 2 of this report.
- A Phase II ESA of the site was completed in April 1991 by Empire Soils Investigations, Inc. (Empire 1991). The objectives of the ESA were to characterize the groundwater quality within the fill material, develop a greater understanding of site hydrogeology, and determine whether the fill materials

have hazardous waste characteristics. The 1989 ESA sample results are also presented in this report in addition to the results from the collection of eight soil samples and the installation and sampling of five monitoring wells. This investigation found a 7,500-square-foot layer of dark red phenolic resin material 0.1 to 0.6 feet thick that is covered by several feet of dirt fill material and is located approximately 25 feet from the southeast corner of the building. In addition to the phenolics, ethylbenzene, toluene, and xylene were also detected in this resin material. Groundwater flow was toward the creek, with monitoring wells GW-1 and GW-2 containing the highest concentrations of contaminants including ethylbenzene, toluene, and xylene. The analytical results from this ESA are discussed in Section 2 of this report.

- A Waste Material Investigation (WMI) was conducted by Huntington/Empire in 1993 (Huntington/Empire 1994). The investigation included re-sampling the five existing monitoring wells as well as test pit/trench investigations to further delineate the extent of waste fill material on-site. This report identified four different types of waste fill at the site including an estimated 75 cubic yards (CY) of resin material; 2,420 CY of the lime-like material; 600 CY of the black material; and 50 CY of a black foundry sand at the site. This investigation concluded that the resin, lime-like material, and black material at the surface and in the subsurface appear to be the source of the groundwater contamination. The report also states that the contamination appears to be confined to the subject property and does not significantly affect the water quality or sediment of Gill Creek. The analytical results from the WMI report are discussed in Section 2 of this report.
- A site investigation (SI) was conducted by Empire Soils Investigations, Inc., in October and November 2005 (Empire 2005). The investigation included re-development and sampling of the five existing monitoring wells, collection of two surface water samples from Gill Creek, and collection of six direct-push soil borings to further delineate the extent of lime-like fill material on-site. The three lime-like material soil samples submitted for analysis exceed the 1994 New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum recommended soil cleanup objective (SCO) for chromium but were determined to be non-hazardous based on TCLP analysis. In general, the groundwater sample results were consistent with historical results. The upgradient surface water sample detected only a trace amount of barium, while the downgradient sample detected barium and selenium and exceeded NYSDEC groundwater standards for phenol. The analytical results from this SI report are also discussed in Section 2 of this report.
- Ecology and Environment Engineering, P.C. performed a site characterization in April and July of 2007. The site characterization activities included an initial site reconnaissance, borehole drilling, and temporary piezometer installation, qualitatively logging subsurface soil, surface water/sediment and groundwater sampling, and surveying. Three of the four waste fill materials previously identified at the site (resin, black foundry sands, and black fill

materials) appear to only be present on the actual site itself, while the fourth waste fill material (lime-like material) extends off-site approximately 300 feet to the south and has an estimated volume of 5,500 to 6,000 CY. Groundwater sampled near the resin material contained significant concentrations of volatile organic compounds (VOCs; [ethylbenzene, toluene, xylene]) and semi-volatile organic compounds (SVOCs; [phenol]) while groundwater sampled near the lime-like material contained significant concentrations of metals (primarily chromium). However only two of the nine groundwater sample locations, and no surface water and sediment sample locations, contained chromium at levels exceeding screening criteria, suggesting the impact of the lime-like material on the environment is minimal. Some metals were detected in sediments in Gill Creek at concentrations above NYSDEC sediment criteria (arsenic, chromium, copper, lead, mercury, and zinc). It is unclear if the source of contamination originated from metal contaminated sediments on-site or the numerous anthropogenic debris present in the creek. Results of this investigation, which correspond with previous site investigations, indicated the 75 CY of resin fill material southeast of the on-site building to be the primary source of VOC, SVOC, and metals contamination. Chromium contamination appears to be related to the lime-like material. Since the site is vacant, the primary source of exposure is direct contact with the contaminated waste materials. If the building was reoccupied or the site redeveloped, vapor intrusion into the buildings is another possible exposure pathway, warranting a new site investigation.

An additional Phase I ESA was completed in 2010 by TVGA Consultants for the Niagara County Department of Economic Development. The only new information that this document presented was a clarification of the property ownership and further information regarding the site building (TVGA 2010).

The information presented in these documents provided sufficient information to characterize the contamination on-site and develop cleanup alternatives.

2 Site Characterization

The majority of the information presented in this section is from the 2008 Site Characterization report prepared by Ecology and Environment Engineering, P.C. The report summarized the analytical results of the Phase I/II ESAs as well as the results of sampling completed during that study. Sample locations are shown on Figure 2-1.

Given that the building on-site was constructed in 1986, it is unlikely that building materials will contain lead paint or asbestos. Demolishing the building should only result in the creation of construction waste, and no additional contaminated material.

2.1 Analytical Results

Analytical results are presented in Tables 2-1 through 2-4. The results are discussed by media in the following subsections.

2.1.1 Soil

Soil samples were collected during the Phase I and Phase II ESAs, the WMI, and the SI. These samples were analyzed for metals, VOCs, SVOCs, and pesticides, as well as one polychlorinated biphenyl (PCB) mixture (PCB-1248). These samples and the associated analyte concentrations are presented in Table 2-1. Additional samples were collected during the Phase II ESA, WMI, and SI for TCLP concentrations of a selection of metals, 2-butanone, cresol, and lindane. Some of these samples were also tested for ignitability, corrosivity, and reactivity, to evaluate whether or not the soil could be considered hazardous. These samples and the associated analyte concentrations are presented in Table 2-2.

Analyte concentrations were compared to SCO values promulgated in 6 New York Codes, Rules and Regulations (NYCRR) Part 375-6.8(b) for restricted land uses. The residential SCO values are associated with residential development and the only restriction on land use is the exclusion of raising livestock or producing animal products for human consumption. The commercial SCO values are associated with passive recreational use, with limited potential for soil exposure, and commercial activities including buying, selling, or trading of goods or services.

Ten VOCs were detected in the previous investigation soil samples listed in Table 2-1, four of which were detected at levels exceeding the SCOs. Toluene was detected in two soil samples (TP-2 and Resin) exceeding both the residential and commercial cleanup objectives; total xylene was detected in two samples (TP-2

and Resin) exceeding both the residential and commercial objectives and one sample (TP-1) only exceeding the residential objective; ethylbenzene was detected in one soil sample (Resin) exceeding both the residential and commercial cleanup objectives; and 1,4-dichlorobenzene was detected in one soil sample (Resin) only exceeding the residential cleanup objective. The three test pit soil samples from the 1989 ESA investigation (TP-1, TP-2, and TP-3) are of the resin-like material.

Nineteen SVOCs were detected in the previous investigation soil samples listed in Table 2-1, 10 of which were detected at levels exceeding the Subpart 375-6 SCOs. Phenol and o-Cresol were both detected in one soil sample (Resin) exceeding both the residential and commercial cleanup objectives; p-Cresol was detected in the same sample only exceeding the residential cleanup objective. Benzo(a)-anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene were detected in one sample (black material) exceeding the residential cleanup objectives; benzo(a)pyrene was detected in the same sample exceeding the commercial cleanup objective.

Five pesticides and one PCB were detected in the previous investigation soil samples listed in Table 2-1. Alpha-BHC was detected in one sample (Resin) exceeding the residential cleanup objective.

Twenty-one metals were detected in the previous investigation soil samples listed in Table 2-1, six of which exceeded SCOs. Arsenic was detected in four soil samples (TP-1, TP-2, TP-3, and Black Material) exceeding both the residential and commercial cleanup objectives; barium was detected in three samples (TP-1, TP-2, and TP-3) exceeding the residential and commercial cleanup objectives; cadmium was detected in two soil samples (Black Material and Black Foundry Sand) only exceeding the residential cleanup objective; chromium was detected in two samples (Lime and SB-2) exceeding the residential and commercial cleanup objectives and in the remaining samples exceeding only the residential cleanup objective; copper was detected in three samples (TP-1, Resin, and Black Material) exceeding the residential and commercial cleanup objectives; and lead was detected in one sample (TP-1) exceeding the residential and commercial cleanup objectives. As stated above, the three test pit soil samples from the 1989 ESA investigation (TP-1, TP-2, and TP-3) are of the resin-like material.

For the leachate samples listed in Table 2-2, only one VOC (2-butanone), one SVOC (Cresol), one pesticide (lindane/gamma-BHC), and eight metals were detected. Only lead was detected in one sample (B-38) at a concentration exceeding the 40 Code of Federal Regulations Part 261 regulatory limit.

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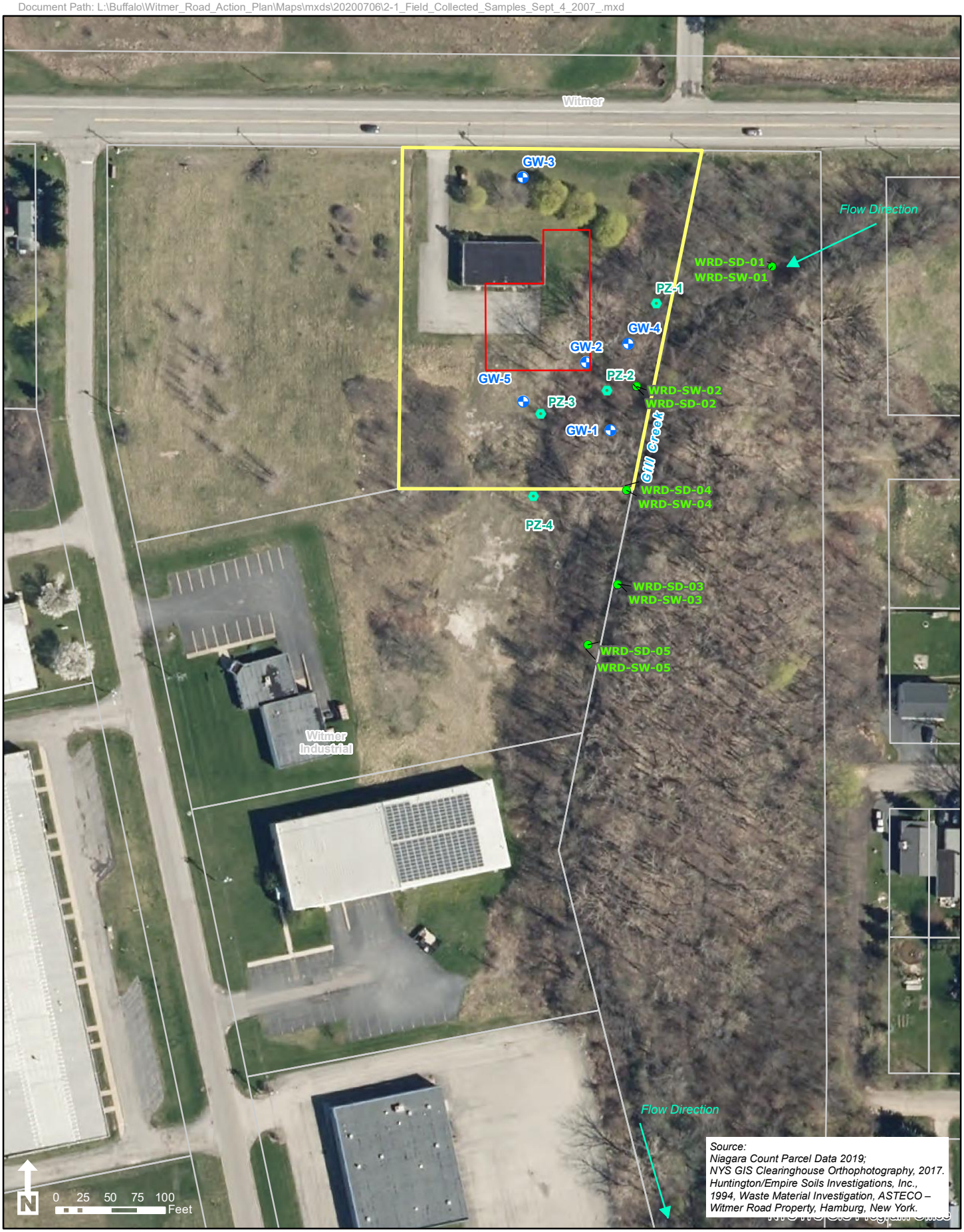

Witmer Road Drive-In (4287 Witmer Rd.) Site

Area of Phase 1 ESA Test Pit Sampling

Surface Water and Sediment Sample Locations (Sep-07)

Tax Parcel

Existing Groundwater Monitoring Well Location

Piezometer (Apr-07)

Figure 2-1
Sample Location Map
Witmer Road Drive-In Site
Town of Niagara, New York

Table 2-1
Summary of Historic Positive Analytical Results in Subsurface Soil Compared to Part 375 Restricted Use Soil Cleanup Objectives
Witmer Road Drive-In Site, Niagara Falls, New York

			Report:	Phase I ESA - 1989			Waste Material Investigation - 1993				Site Investigation - 2005		
Analyte	Residential SCO[1]	Commercial SCO[2]	Sample ID: Material:	TP-1 NA	TP-2 NA	TP-3 NA	Resin	Lime	Black Material	Black Foundry Sand	SB-1 Lime	SB-2 Lime	SB-5 Lime
Volatiles (mg/kg)													
2-Butanone	NA	NA		N/D	N/D	N/D	N/D	N/D	0.031	N/D	--	--	--
4-Methyl-2-Pentanone	NA	NA		N/D	N/D	N/D	N/D	N/D	N/D	N/D	--	--	--
1,2-Dichlorobenzene	100	500		0.4	0.4	N/D	30	N/D	N/D	N/D	--	--	--
1,2,4-Tricholorobenzene	NA	NA		1.2	1.0	N/D	48	N/D	N/D	N/D	--	--	--
1,3-Dichlorobenzene	17	280		--	--	--	N/D	N/D	0.011	N/D	--	--	--
1,4-Dichlorobenzene	9.8	130		N/D	N/D	N/D	**26**	N/D	N/D	N/D	--	--	--
Acetone	100	500		N/D	N/D	N/D	N/D	0.016	0.12	N/D	--	--	--
Ethylbenzene	30	390		N/D	N/D	1.3	**730**	N/D	N/D	N/D	--	--	--
Toluene	100	500		N/D	**1,400**	2.5	**170**	N/D	N/D	N/D	--	--	--
Trichloroethene	10	200		N/D	N/D	0.95	N/D	N/D	N/D	N/D	--	--	--
Xylene (Total)	100	500		**120**	**7,200**	8.9	**7,600**	N/D	N/D	N/D	--	--	--
Semivolatiles (mg/kg)													
Anthracene	100	500		2.4	8.7	0.3	N/D	N/D	1.1	N/D	--	--	--
Benzo(a)anthracene	1	5.6		N/D	N/D	N/D	N/D	N/D	**2.3**	N/D	--	--	--
Benzo(a)pyrene	1	1		N/D	N/D	N/D	N/D	N/D	**2.0**	N/D	--	--	--
Benzo(b)fluoranthene	1	5.6		N/D	N/D	N/D	N/D	N/D	**1.8**	N/D	--	--	--
Benzo(g,h,i)perylene	100	500		N/D	N/D	N/D	N/D	N/D	1.1	N/D	--	--	--
Benzo(k)fluoranthene	1	56		N/D	N/D	N/D	N/D	N/D	**2.2**	N/D	--	--	--
2,4-Dimethylphenol	NA	NA		2.4	8.7	0.3	250	N/D	N/D	N/D	--	--	--
Carbazole	NA	NA		--	--	--	N/D	N/D	0.37	N/D	--	--	--
Chrysene	1	56		N/D	N/D	N/D	N/D	N/D	**2.3**	N/D	--	--	--
Di-n-butylphthalate	NA	NA		0.5	0.6	N/D	N/D	N/D	N/D	N/D	--	--	--
Fluoranthene	100	500		0.3	N/D	N/D	N/D	N/D	4.8	N/D	--	--	--
Fluorene	100	500		N/D	N/D	N/D	N/D	N/D	0.44	N/D	--	--	--
Indeno(1,2,3-cd)pyrene	0.5	5.6		N/D	N/D	N/D	N/D	N/D	**0.84**	N/D	--	--	--
Naphthalene	100	500		1.2	2.0	N/D	71	N/D	N/D	N/D	--	--	--
o-Cresol (2-Methylphenol)	100	500		N/D	N/D	N/D	**1,500**	N/D	N/D	N/D	--	--	--
p-Cresol (4-Methylphenol)	34	500		N/D	N/D	N/D	**120**	N/D	N/D	N/D	--	--	--
Phenanthrene	100	500		N/D	N/D	N/D	N/D	N/D	4.1	N/D	--	--	--
Phenol	100	500		65.0	19.2	18.0	**5,800**	N/D	N/D	N/D	--	--	--
Pyrene	100	500		0.6	N/D	N/D	N/D	N/D	5.6	N/D	--	--	--
Pesticides/PCBs (mg/kg)													
Aldrin	0.019	0.68		N/D	0.017	N/D	N/D	N/D	N/D	N/D	--	--	--
alpha-BHC	0.097	3.4		0.023	0.018	0.087	**0.2**	N/D	0.04	N/D	--	--	--
beta-BHC	0.072	3		N/D	N/D	0.047	N/D	N/D	0.04	N/D	--	--	--
delta-BHC	100	500		N/D	N/D	0.022	N/D	N/D	0.03	N/D	--	--	--
gamma-BHC (Lindane)	NA	NA		N/D	N/D	0.013	0.07	N/D	N/D	N/D	--	--	--
PCB-1248	1	1		N/D	N/D	0.68	N/D	N/D	0.63	N/D	--	--	--

Table 2-1
Summary of Historic Positive Analytical Results in Subsurface Soil Compared to Part 375 Restricted Use Soil Cleanup Objectives
Witmer Road Drive-In Site, Niagara Falls, New York

			Report:	Phase I ESA - 1989			Waste Material Investigation - 1993				Site Investigation - 2005		
			Sample ID:	TP-1	TP-2	TP-3				Black Foundry	SB-1	SB-2	SB-5
Analyte	Residential SCO[1]	Commercial SCO[2]	Material:	NA	NA	NA	Resin	Lime	Black Material	Sand	Lime	Lime	Lime
Metals (mg/kg)													
Aluminum	NA	NA		13,900	24,100	19,600	N/D	N/D	N/D	N/D	--	--	--
Antimony	NA	NA		N/D	N/D	N/D	N/D	N/D	69.6	N/D	--	--	--
Arsenic	16	16		**76.3**	**79.4**	**65.2**	5.43	N/D	**22.9**	N/D	--	--	--
Barium	350	400		**754**	**963**	**490**	N/D	N/D	N/D	N/D	--	--	--
Beryllium	14	590		N/D	N/D	N/D	2.51	2.81	2.48	1.29	--	--	--
Cadmium	2.5	9.3		N/D	N/D	N/D	N/D	N/D	**4.63**	**1.22**	--	--	--
Calcium	NA	NA		43,000	22,400	36,800	N/D	N/D	N/D	N/D	--	--	--
Chromium	36	1,500		**65.7**	**45.7**	**31.9**	**128**	**2,590**	**49.5**	**25.1**	**1,380**	**2,210**	**853**
Cobalt	NA	NA		N/D	23.4	17.3	N/D	N/D	N/D	N/D	--	--	--
Copper	270	270		**271**	119	132	**434**	14.5	**714**	N/D	--	--	--
Iron	NA	NA		57,400	40,500	37,400	N/D	N/D	N/D	N/D	--	--	--
Lead	400	1,000		**1,080**	309	239	17.5	8.51	319	17.9	--	--	--
Magnesium	NA	NA		16,100	11,600	12,800	N/D	N/D	N/D	N/D	--	--	--
Manganese	2,000	10,000		739	601	878	N/D	N/D	N/D	N/D	--	--	--
Mercury	0.81	2.8		--	--	--	0.289	0.171	0.528	0.188	--	--	--
Nickel	140	310		42.5	65.1	46.4	23.1	13.5	38.8	N/D	--	--	--
Potassium	NA	NA		N/D	N/D	N/D	N/D	N/D	N/D	N/D	--	--	--
Selenium	36	1,500		N/D	N/D	N/D	N/D	N/D	4.19	N/D	--	--	--
Silver	36	1,500		N/D	N/D	N/D	N/D	N/D	N/D	N/D	--	--	--
Sodium	NA	NA		1370	1130	1120	N/D	N/D	N/D	N/D	--	--	--
Thallium	NA	NA		142	149	N/D	N/D	N/D	N/D	N/D	--	--	--
Vanadium	NA	NA		34.3	45.7	37.4	N/D	N/D	N/D	N/D	--	--	--
Zinc	2,200	10,000		1,070	405	431	408	31.5	1,660	21.9	--	--	--

Table 2-1
Summary of Historic Positive Analytical Results in Subsurface Soil Compared to Part 375 Restricted Use Soil Cleanup Objectives
Witmer Road Drive-In Site, Niagara Falls, New York

[1] New York State Department of Environmental Conservation, Subpart 375-6, Table 375-6.8(b): Protection of Public Health - Residential

[2] New York State Department of Environmental Conservation, Subpart 375-6, Table 375-6.8(b): Protection of Public Health - Commercial

Notes:

1. The bolded cells exceed the residential use screening value, while the bolded and shaded cells exceed the commercial use screening value.
2. The three test pit samples collected from during the 1989 ESA (TP-1, TP-2, and TP-3) were of a dark red to black resin-like material.

Key:

-- = parameter was not tested
ESA = Environmental Site Assessment
mg/kg = milligram per kilogram
NA = not available
N/D = not detected above test method limits
SCO = soil cleanup objective

Table 2-2
Summary of Historic TCLP Analytical Results in Subsurface Soil
Witmer Road Drive-In Site, Niagara Falls, New York

Analyte	Regulatory Limits[1]	Report:	Phase I Environmental Site Assessment - 1989											
		Sample ID:	B-38	B-39(S-3)	B-39(S-4)	Resin Sample	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8
		Material:												
Ignitablility ˚F	<140˚F		**145**	**>160**	**>160**	--	--	--	--	--	--	--	--	--
Corrosivity	pH <2 or >12.5		7.4	7.8	8.2	--	--	--	--	--	--	--	--	--
Releasable Cyanide	250 mg/kg		N/D	N/D	N/D	--	--	--	--	--	--	--	--	--
Releasable Sulfide	500 mg/kg		N/D	N/D	N/D	--	--	--	--	--	--	--	--	--
Volatiles (mg/L)														
2-Butanone	200		--	--	--	--	--	--	--	--	--	--	--	--
Semivolatiles (mg/L)														
Cresol (total)	200		--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (mg/L)														
Lindane (gamma-BHC)	0.4		0.00005	0.00013	N/D	--	--	--	--	--	--	--	--	--
Metals (mg/L)														
Arsenic	5		N/D	0.038	0.048	N/D	--	--	--	--	--	--	--	--
Barium	100		0.69	3.1	1.4	0.86	--	--	--	--	--	--	--	--
Cadmium	1		0.02	N/D	N/D	0.017	--	--	--	--	--	--	--	--
Chromium	5		0.02	N/D	N/D	0.019	--	--	--	--	--	--	--	--
Lead	5		**8.1**	0.38	0.08	0.179	0.657	0.417	1.270	0.634	1.720	0.294	N/D	N/D
Mercury	0.2		N/D	N/D	N/D	N/D	--	--	--	--	--	--	--	--
Selenium	1		N/D	N/D	N/D	N/D	--	--	--	--	--	--	--	--
Silver	5		0.03	N/D	N/D	N/D	--	--	--	--	--	--	--	--

Table 2-2
Summary of Historic TCLP Analytical Results in Subsurface Soil
Witmer Road Drive-In Site, Niagara Falls, New York

		Phase II Environmental Site Assessment - 1991								
Analyte	Regulatory Limits[1]	SB-3-5-21	SB-4-5-21	SB-5-5-21	SB-7-5-21	SB-8-5-21	Resin - 5-22	SB-1-5-22	SB-6-5-22	SB-2-5-22
Ignitablility ˚F	<140˚F	--	--	--	--	--	--	--	--	--
Corrosivity	pH <2 or >12.5	--	--	--	--	--	--	--	--	--
Releasable Cyanide	250 mg/kg	--	--	--	--	--	--	--	--	--
Releasable Sulfide	500 mg/kg	--	--	--	--	--	--	--	--	--
Volatiles (mg/L)										
2-Butanone	200	--	--	--	--	--	--	--	--	--
Semivolatiles (mg/L)										
Cresol (total)	200	--	--	--	--	--	--	--	--	--
Pesticides (mg/L)										
Lindane (gamma-BHC)	0.4	--	--	--	--	--	--	--	--	--
Metals (mg/L)										
Arsenic	5	--	--	--	--	--	N/D	--	--	--
Barium	100	--	--	--	--	--	0.86	--	--	--
Cadmium	1	--	--	--	--	--	0.0173	--	--	--
Chromium	5	--	--	--	--	--	N/D	--	--	--
Lead	5	1.27	0.634	1.72	N/D	N/D	0.179	0.657	0.294	0.42
Mercury	0.2	--	--	--	--	--	N/D	--	--	--
Selenium	1	--	--	--	--	--	N/D	--	--	--
Silver	5	--	--	--	--	--	N/D	--	--	--

Table 2-2
Summary of Historic TCLP Analytical Results in Subsurface Soil
Witmer Road Drive-In Site, Niagara Falls, New York

		Waste Material Investigation - 1993						Site Investigation - 2005		
Analyte	Regulatory Limits[1]	Resin-2	Lime-2	Lime-3	Black (Comp)	Fill-2	Creek-Sed	SB-1 Lime	SB-2 Lime	SB-5 Lime
Ignitablility ˚F	<140˚F	**>160**	--	--	**>160**	**>160**	--	--	--	--
Corrosivity	pH <2 or >12.5	8.16	8.34	12.26	7.89	8.25	--	--	--	--
Releasable Cyanide	250 mg/kg	N/D	N/D	N/D	N/D	N/D	--	--	--	--
Releasable Sulfide	500 mg/kg	N/D	N/D	N/D	N/D	N/D	--	--	--	--
Volatiles (mg/L)										
2-Butanone	200	0.43	N/D	N/D	N/D	N/D	N/D	--	--	--
Semivolatiles (mg/L)										
Cresol (total)	200	0.25	N/D	N/D	32	N/D	N/D	--	--	--
Pesticides (mg/L)										
Lindane (gamma-BHC)	0.4	--	--	--	--	--	--	--	--	--
Metals (mg/L)										
Arsenic	5	N/D	N/D	N/D	N/D	N/D	N/D	--	--	--
Barium	100	N/D	N/D	0.22	0.22	0.1	N/D	--	--	--
Cadmium	1	N/D	N/D	N/D	N/D	N/D	N/D	--	--	--
Chromium	5	N/D	N/D	1.0	N/D	N/D	N/D	2.04	0.11	1.12
Lead	5	N/D	N/D	N/D	0.05	N/D	N/D	--	--	--
Mercury	0.2	N/D	N/D	N/D	N/D	N/D	N/D	--	--	--
Selenium	1	N/D	N/D	0.01	N/D	N/D	N/D	--	--	--
Silver	5	N/D	N/D	N/D	N/D	N/D	N/D	--	--	--

Table 2-2
Summary of Historic TCLP Analytical Results in Subsurface Soil
Witmer Road Drive-In Site, Niagara Falls, New York

[1] 40 Code of Federal Regulations Part 261. Contaminant concentrations listed in Table 1 of Part 261.24.

Notes:

1. Shaded and bolded cells exceed the regulatory limits.

Key:

-- = parameter was not tested
mg/kg = milligram per kilogram
mg/L = milligram per liter
N/D = not detected above test method limits

2.1.2 Sediment

Table 2-3 presents the results of the sediment samples collected during the site characterization effort in 2007. Analyte concentrations were compared to screening criteria listed in the NYSDEC guidance *Screening and Assessment of Contaminated Sediment* for Class B freshwater.

Twenty-six different SVOCs were detected in the sediment samples collected at the site, none of which exceeded the screening criteria. The greatest number of chemicals detected were detected in sample SD-03 (22), followed by SD-05 with 19, 14 in SD-04, 10 in SD-02, and only six in SD-01. The increase in the number and concentration of SVOC chemicals downstream of the site suggests the WRDI is the probable source of this low-level contamination.

Twenty-one different metals were detected in the sediment samples, four of which exceeded the screening criteria. Twenty of the 21 metals were detected in all five samples. Silver was detected in only sediment sample SD-04, which was also an exceedance of the screening criteria. Concentrations of arsenic, cadmium, and lead exceeded the screening criteria in sample SD-03 and the concentration of lead in sample SD-02 exceeded the screening criteria. In general, the metal concentrations detected adjacent to the site (SD-02 and SD-04) or downstream of the site (SD-03 and SD-05) were higher than the concentrations in samples collected upgradient of the site (SD-01), suggesting the site contributes metals contamination to the creek.

Total organic carbon concentrations ranged from 13,000 milligrams per kilogram (mg/kg) upgradient of the site (SD-01) to 37,000 mg/kg (SD-04) near the southern border of the site.

2.1.3 Surface Water

Table 2-4 presents the results of surface water samples collected during the WMI in 1993, the SI in 2005 and the site characterization effort in 2007. Analyte concentrations were compared to water quality standards promulgated in 6 NYCRR 703.5, Table 1, for water classes A, A-S, AA, and AA-S.

Bis(2-ethylhexyl)phthalate and phenol were the only SVOCs detected in the surface water samples collected at the WRDI. They were both detected in concentrations that exceed the water quality standards.

As shown on Table 2-4, 15 metals were detected in one or more of the 10 surface water samples and two compounds (iron and selenium) were detected at concentrations exceeding NYSDEC water quality standards. In general, the highest concentrations of metals and the most frequent exceedances were detected near the southern border of the WRDI (SW-04) or immediately downstream of the site (SW-03), suggesting the site is the probable source of this low-level contamination.

Table 2-3
Summary of Positive Analytical Results for Sediment Samples
Witmer Road Drive-In Site, Niagara Falls, New York

Analyte	Screening Criteria[1]	Sample ID: Date:	SD-01 9/5/2007	SD-02 9/5/2007	SD-03 9/5/2007	SD-04 9/5/2007	SD-05 9/5/2007
Semivolatiles (mg/kg)							
2,4-Dimethylphenol	NA		0.42 U	0.50 U	0.98	0.50 U	0.52 U
2-Methylnaphthalene	NA		0.42 U	0.50 U	0.10 J	0.50 U	0.25 J
Acenaphthene	NA		0.42 U	0.50 U	0.51 U	0.065 J	0.092 J
Acenaphthylene	NA		0.42 U	0.50 U	0.056 J	0.50 U	0.52 U
Acetophenone	NA		0.42 U	0.50 U	0.18 J	0.50 U	0.52 U
Anthracene	NA		0.42 U	0.50 U	0.13 J	0.14 J	0.21 J
Benzo(a)anthracene	NA		0.085 J	0.13 J	0.32 J	0.44 J	0.66
Benzo(a)pyrene	NA		0.084 J	0.13 J	0.29 J	0.41 J	0.62
Benzo(b)fluoranthene	NA		0.12 J	0.20 J	0.40 J	0.49 J	0.84
Benzo(g,h,i)perylene	NA		0.42 U	0.50 U	0.21 J	0.24 J	0.43 J
Benzo(k)fluoranthene	NA		0.42 U	0.076 J	0.17 J	0.22 J	0.31 J
Bis(2-ethylhexyl)phthalate	360		0.42 U	0.50 U	0.17 J	0.097 J	0.12 J
Carbazole	NA		0.42 U	0.50 U	0.51 U	0.50 U	0.11 J
Chrysene	NA		0.089 J	0.16 J	0.34 J	0.45 J	0.70
Dibenzofuran	NA		0.42 U	0.50 U	0.061 J	0.50 U	0.089 J
Di-n-butylphthalate	NA		0.42 U	0.086 J	0.41 J	0.50 U	0.52 U
Fluoranthene	NA		0.15 J	0.26 J	0.71	0.93 J	1.4
Fluorene	NA		0.42 U	0.50 U	0.51 U	0.50 U	0.073 J
Hexachlorocyclopentadiene	8.1		0.42 U	0.50 UJ	0.51 U	0.50 U	0.52 U
Indeno(1,2,3-cd)pyrene	NA		0.42 U	0.50 U	0.17 J	0.21 J	0.35 J
Naphthalene	NA		0.42 U	0.50 U	0.61	0.50 U	0.18 J
o-Cresol (2-Methylphenol)	NA		0.42 U	0.50 U	1.6	0.50 U	0.52 U
p-Cresol (4-Methylphenol)	NA		0.42 U	0.50 U	0.35 J	0.50 U	0.52 U
Phenanthrene	NA		0.057 J	0.12 J	0.41 J	0.48 J	0.87
Phenol	NA		0.42 U	0.12 J	3.1	0.075 J	0.081 J
Pyrene	NA		0.12 J	0.19 J	0.52	0.76	1.1

Table 2-3
Summary of Positive Analytical Results for Sediment Samples
Witmer Road Drive-In Site, Niagara Falls, New York

Analyte	Screening Criteria[1]	Sample ID: Date:	SD-01 9/5/2007	SD-02 9/5/2007	SD-03 9/5/2007	SD-04 9/5/2007	SD-05 9/5/2007
Metals (mg/kg)							
Aluminum	NA		9220	10300	6070	7540	7280
Arsenic	33		8.8	18.4	**54.6**	7.1	11.1
Barium	NA		72.6 J	104 J	213 J	61.8 J	87.3 J
Beryllium	NA		0.42 J	0.49 J	0.33 J	0.38 J	0.37 J
Cadmium	5		1.0	2.3	**6.0**	1.6	1.6
Calcium	NA		4280	24200	30700	88200	26900
Chromium	110		13.3 J	23.6 J	35.2 J	18.4 J	59.7 J
Cobalt	NA		7.6 J	10.5 J	13.4 J	6.6 J	8.0 J
Copper	150		9.1 J	39.2 J	72.1 J	20.4 J	31.7 J
Iron	NA		11700 J	25300 J	73900 J	13500 J	13700 J
Lead	130		9.5	**188**	**399**	91.1 J	63.6
Magnesium	NA		4080 J	12300 J	11200 J	38000 J	11100 J
Manganese	NA		219 J	404 J	666 J	639 J	301 J
Nickel	49		13.1 J	19.3 J	19.7 J	14.5 J	19.4 J
Potassium	NA		863	1290	792	1320	1010
Silver	2.2		1.6 U	1.8 U	1.9 U	**11.5**	2.3 U
Sodium	NA		30.1 J	87.5 J	59.1 J	72.4 J	50.4 J
Thallium	NA		0.91 J	1.5	4.8	0.27 J	0.61 J
Vanadium	NA		16.7 J	21.7 J	16.7 J	15.5 J	16.2 J
Zinc	460		130	254 J	430	242	327
Mercury	1		0.046 J	0.51 J	0.19 J	0.087 J	0.19 J
Total Organic Carbon (mg/kg)							
Organic Carbon, Total	NA		13000	21000 J	30000 J	37000 J	35000 J

[1] New York State Department of Environmental Conservation, *Screening and Assessment of Contaminated Sediment* , Table 5 - Freshwater Sediment Guidance Values, Class B. June 2014.

Notes:

1. Shaded and bolded cells exceed the screening criteria.

Key:

J = estimated value

mg/kg = milligrams per kilogram

NA = not available

U = not detected at the reported value

Table 2-4
Summary of Positive Analytical Results for Surface Water Samples Witmer Rd. Drive-In
Witmer Road Drive-In Site, Niagara Falls, New York

Analyte	Screening Criteria[1]	Report:	Waste Material Investigation - 1993			Site Investigation - 2005		Site Characterization - 2008				
		Sample ID:	Creek -Up	Creek-GW-4	Creek-Down	Gill Creek Upgradient	Gill Creek Downgradient	SW-01	SW-02	SW-03	SW-04	SW-05
		Date:	5/19/1993	5/19/1993	5/19/1993	11/08/05	11/08/05	9/5/2007	9/5/2007	9/5/2007	9/5/2007	9/5/2007
Semivolatiles (µg/L)												
Bis(2-ethylhexyl)phthalate	5		--	--	--	--	--	**11 J**	10 U	10 U	10 U	10 U
Phenol	1		N/D	N/D	N/D	N/D	**15**	--	--	--	--	--
Metals (µg/L)												
Aluminum	NA		--	--	--	--	--	117 J	123 J	121 J	344	106 J
Antimony	3		--	--	--	--	--	20 U	20 U	20 U	20 U	20 U
Arsenic	25		--	--	--	--	--	20 U	20 U	20 U	20 U	20 U
Barium	1000		N/D	N/D	N/D	0.032	0.033	29.3 J	29.2 J	29.0 J	32.3 J	29.5 J
Calcium	NA		--	--	--	--	--	38700	38200	38100	38700	38800
Chromium	50		0.014	0.011	N/D	N/D	N/D	20 U	20 U	0.59 J	0.69 J	0.76 J
Cobalt	NA		--	--	--	--	--	1.4 J	1.4 J	1.4 J	1.4 J	1.4 J
Copper	200		--	--	--	--	--	2.9 J	2.7 J	2.6 J	3.0 J	2.7 J
Iron	300		--	--	--	--	--	277	296	290	**661**	272
Lead	50		--	--	--	--	--	10 U	10 U	10 U	10 U	10 U
Magnesium	35000		--	--	--	--	--	12400	12300	12200	12400	12500
Manganese	300		--	--	--	--	--	11.7 J	12.1 J	12.7 J	24.9 J	12.2 J
Nickel	100		--	--	--	--	--	1.7 J	1.6 J	1.5 J	2.3 J	1.9 J
Potassium	NA		--	--	--	--	--	1690	1740	1710	1740	1760
Selenium	10		N/D	N/D	N/D	N/D	0.006	5.7 J	5.6 J	**12.1 J**	7.9 J	10.0 J
Silver	50		--	--	--	--	--	3.1 J	3.2 J	3.0 J	2.9 J	3.2 J
Sodium	NA		--	--	--	--	--	14200	14200	14000	14100	14300
Vanadium	NA		--	--	--	--	--	50 U	50 U	50 U	50 U	50 U
Zinc	NA		0.068	0.06	0.052	N/D	N/D	26.4 J	33.1 J	25.9 J	47.9 J	50 U

[1] 6 New York Code of Rules and Regulations 703.5 Table 1, Water Classes A, A-S, AA, AA-S.

Notes:

1. Shaded and bolded cells exceed the screening criteria.

Key:

-- = parameter was not tested
J = Estimated value.
NA = not available
N/D = not detected above test method limits
U = Not detected at the reported value.
µg/L = micrograms per liter

Source: Ecology and Environment Engineering, P.C., 2007

2.1.4 Groundwater

Table 2-5 presents the results of groundwater samples collected during the Phase II ESA, the WMI in 1993, the SI in 2005, and the site characterization effort in 2007. Analyte concentrations were compared to water quality standards promulgated in 6 NYCRR Part 703.5, Table 1, for water class GA.

Eleven VOCs were detected in one or more of the nine groundwater wells, with exceedances of screening criteria for all nine compounds with available screening criteria. These exceedances were primarily in GW-1 and GW-2 in the sampling events between 1990 and 2005, though there were exceedances of screening criteria for methylene chloride and total xylenes in GW-3 and an exceedance of the screening criteria for total xylenes in GW-5. During the 2007 effort, the only exceedances of screening criteria were detected in PZ-02 and include ethylbenzene, toluene, total xylenes, and methylene chloride.

Twenty-three SVOCs were detected in one or more of the nine groundwater wells. Four of the compounds were detected at concentrations exceeding NYSDEC Class GA groundwater standards. GW-3, GW-5, PZ-01, and PZ-04 exceeded the groundwater standard for bis(2-ethylhexyl)phthalate in 2005 and 2007. However, bis(2-ethylhexyl)phthalate is a common contaminant associated with laboratory gloves and plastic containers. Concentrations of 2,4-dimethylphenol exceeded the groundwater standards in GW-1, GW-2, PZ-01, PZ-02, and PZ-03 (duplicate sample). Benzo(a)pyrene was detected above screening criteria in PZ-04, and phenol was detected above screening criteria in GW-1, GW-2, GW-3, and PZ-02. Many of the SVOCs detected do not have established screening criteria.

A limited selection of metals was sampled from GW-1 through GW-5. Concentrations of antimony, beryllium, and mercury that exceeded screening criteria in GW-2. Concentrations of lead exceeded screening criteria during the 1990 sampling of GW-3 and GW-4. GW-5 had concentrations of beryllium, cadmium, and chromium exceeding screening criteria during the 1993 sampling.

The first round of groundwater sampling in 2007 involved unfiltered samples, while the second round involved filtered samples. Twenty-two metals (including mercury) were detected in one or more of the four groundwater samples and 14 compounds were detected at concentrations exceeding NYSDEC Class GA groundwater standards. The compounds without exceedances were beryllium and silver, while the other six compounds did not exceed standards because aluminum, calcium, cobalt, potassium, vanadium, and zinc do not have established criteria. Five metals (arsenic, chromium, iron, lead, and manganese) exceeded the standard at all four locations. All but arsenic were detected at levels more than 10 times the groundwater standard at multiple locations. In general, the highest levels of metals and the most frequent screening criteria exceedances were detected at

piezometers PZ-01 and PZ-02, both of which are located next to the eastern border of the site, approximately 20 feet from Gill Creek.

2.2 Nature and Extent of Contamination

In the 1993 WMI report, it was estimated that 75 CY of resin material, 2,420 CY of the lime-like material, 600 CY of the black material, and 50 CY of the black foundry sand existed at the WRDI. While the resin, black foundry sands, and black material appear to only be present on the site, the lime-like material extends off-site approximately 300 feet to the south, with an additional 3,000-3,500 CY of potentially contaminated material off-site (see Figure 2-2). Based on the comparison of subsurface soil analytical data to the 6 NYCRR Part 375 standards for restricted land use, residential and commercial, the resin-like and lime-like material appear to be the source of the majority of soil contamination. The majority of VOC and SVOC contamination appears to be associated with the resin-like material, while the chromium contamination appears to be associated with the lime-like material.

The other two types of fill material identified and sampled during the 1993 investigation at the site, the black foundry sand and black material, do not appear to be significant contamination sources. The black material has some SVOC and metals contamination, and the black foundry sand only exceeds residential standards for cadmium and chromium.

Surface water and sediment samples indicate contamination adjacent to or downgradient of the site, suggesting that site contamination has a minor impact on Gill Creek. Of the surface water contaminants, only one exceedance each of screening criteria for bis(2-ethylhexyl)phthalate, phenol, iron, and selenium was detected. Five total exceedances of screening criteria were detected adjacent to and downstream of the site for arsenic, cadmium, lead, and silver, in sediment samples. The few screening criteria exceedances indicate that the contribution of contamination to the creek is minor.

The number of VOC and SVOC analytes and magnitude of the concentrations detected during the 2007 groundwater sampling were significantly less than the results from the previous rounds of groundwater samples collected from monitoring wells GW-1 through GW-5, suggesting some natural degradation may occur at the WRDI. The highest VOC and SVOC concentrations in groundwater were detected in the sample from PZ-02, which is located downgradient of the resin area of identified VOC contamination from the Phase II ESA report (Empire 1989). Historically, monitoring wells GW-01 and GW-02 have contained the majority of the VOCs and SVOCs contamination, with ethylbenzene and xylene being the primary VOCs exceeding standards, and phenol and 2,4-dimethylphenol being the primary SVOCs exceeding standards. Based on soil results discussed above and the extent of contamination areas shown in Figure 2-2, it appears that the resin material is the probable source for the VOC and SVOC contamination in the groundwater.

2.3 Potential Human Health Exposure Pathway Evaluation

A human health exposure pathway evaluation was completed as part of the 2008 site characterization report. This section summarizes the conclusions of that report.

In order for contamination to present a human health risk, both of these conditions must be true: (1) there must be a complete exposure pathway from the contamination to human receptors; and (2) the magnitude of the human receptors' exposure to contamination must be sufficient to potentially cause an adverse health effect. A visitor/trespasser to the site and future site workers were the two receptors evaluated. The pathways evaluated were:

- Surface water via ingestion and dermal contact;
- Sediment via ingestion and dermal contact;
- Groundwater via ingestion and indoor vapor intrusion; and
- Soils via ingestion, dermal contact, and inhalation of particulates.

Surface water and sediment do not have complete risk pathways on-site as there are no viable industrial or recreational (e.g., swimming or fishing) uses associated with the WRDI. In addition, a brief exposure to the surface water or sediments on-site would not result in a significant risk to the receptor. Therefore, the surface water and sediment exposure pathways are not considered complete.

Groundwater is not used as a source of potable water in this area, so there is no exposure pathway directly associated with withdrawal of groundwater. In addition, the building on-site is not located directly above the contaminated groundwater sources, so indoor vapor intrusion is unlikely. If a structure is built on-site in the future, additional investigation may be necessary to prevent vapor intrusion to any subsurface structures associated with the future building.

Contaminant concentrations in soil were compared to SCOs for restricted land use associated with residential land use and commercial land use. If a contaminant concentration does not exceed the corresponding SCO, it is unlikely that the contaminant would cause adverse health effects to a worker or visitor population as a result of exposure.

Results of this exercise indicate that the resin material exceeds SCOs for various VOCs, SVOCs, and metals. Under current site conditions, the resin material is only present in the subsurface and is covered by several feet of uncontaminated fill material. Thus, direct contact with resin material by site workers (if the site is reoccupied) and site visitors is not a complete exposure pathway and is not of concern for this site. However, subsurface soil may be exposed during excavation and future construction activities. Thus, constructions worker and future site workers may be exposed to resin subsurface contamination brought to the surface

Table 2-5
Summary of Positive Organic Results for Groundwater Samples
Witmer Witmer Road Drive-In Site, Niagara Falls, New York

Analyte	Screening Criteria[1]	Sample ID: Date:	GW-1 05/90	GW-1 02/93	GW-1 08/93	GW-2 05/90	GW-2 02/93	GW-2 08/93	GW-2 11/08/05	GW-3 05/90	GW-3 02/93	GW-3 08/93	GW-3 11/08/05	GW-4 05/90	GW-4 02/93	GW-4 08/93	GW-5 05/90	GW-5 02/93	GW-5 08/93	GW-5 11/08/05
Volatiles (µg/L)																				
1,2-Dichlorobenzene	3		--	N/D	N/D	--	**850**	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	--	--
1,3-Dichlorobenzene	3		--	N/D	N/D	--	**37**	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	--	--
1,4-Dichlorobenzene	3		--	N/D	**12**	--	**66**	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	--	--
1,2,4-Trichlorobenzene	5		--	N/D	N/D	--	**30**	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	--	--
2-Butanone	50		N/D	N/D	N/D	N/D	**540**	**1,000**	--	N/D	N/D	--	--	N/D	N/D	--	N/D	N/D	--	--
4-Methyl-2-Pentanone	NA		N/D	N/D	N/D	N/D	1,100	1,800	1,100	N/D	N/D	--	--	N/D	N/D	--	N/D	N/D	--	--
Acetone	NA		N/D	N/D	180	N/D	850	1,900	700	N/D	N/D	--	--	N/D	N/D	--	N/D	N/D	--	25
Ethylbenzene	5		**710**	N/D	**380**	**5,500**	**4,500**	**6,300**	**2,800**	N/D	N/D	--	--	N/D	N/D	--	N/D	N/D	--	--
Methylene chloride	5		--	--	--	--	--	--	--	--	--	--	**6.1**	--	--	--	--	--	--	--
Toluene	5		**10**	N/D	N/D	N/D	**610**	**1,000**	**360**	N/D	N/D	--	--	N/D	N/D	--	N/D	N/D	--	--
Xylene (Total)	5		**5500**	**27**	**1,400**	**40,000**	**28,000**	**37,000**	--	**12.0**	N/D	--	--	N/D	N/D	--	**18**	N/D	--	--
Semivolatiles (µg/L)																				
2-Chlorophenol	NA		--	N/D	N/D	--	240	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	--	--
2,4-Dimethylphenol	1		N/D	**520**	**92**	**6,000**	**8,000**	**10,000**	--	N/D	N/D	--	--	N/D	N/D	--	N/D	N/D	--	--
2-Methylphenol	NA		2,100	99	2,200	21,000	25,000	33,000	7,200	N/D	N/D	--	--	N/D	N/D	--	N/D	N/D	--	--
4-Methylphenol	NA		N/D	N/D	170	2,200	3,500	4,500	--	N/D	N/D	--	--	N/D	N/D	--	N/D	N/D	--	--
Acenaphthene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetophenone	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	N/D		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	NA		--	N/D	N/D	--	12,000	3,300	--	--	N/D	--	--	--	N/D	--	--	N/D	--	--
Bis(2-ethylhexyl)phthalate	5		--	--	--	--	--	--	--	--	--	--	**14**	--	--	--	--	--	--	**28**
Carbazole	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	NA		--	11	N/D	--	25	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	--	--
Phenanthrene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenol	1		**9,400**	**170**	**5,700**	**86,000**	**150,000**	**190,000**	**28,000**	**22.0**	N/D	--	**13**	N/D	N/D	--	N/D	N/D	--	--
Pyrene	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Source: Ecology and Environment Engineering, P.C., 2007

Table 2-5
Summary of Positive Organic Results for Groundwater Samples
Witmer Witmer Road Drive-In Site, Niagara Falls, New York

Analyte	Screening Criteria[1]	PZ-01	PZ-02		PZ-03		PZ-03D*	PZ-04	
		4/19/2007	4/19/2007	9/5/2007	4/19/2007	9/5/2007	4/19/2007	4/19/2007	9/5/2007
Volatiles (µg/L)									
1,2-Dichlorobenzene	3	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	3	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	3	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	5	--	--	--	--	--	--	--	--
2-Butanone	50	16	500 U	--	5.0 U	--	5.0 U	5.0 U	--
4-Methyl-2-Pentanone	NA	--	--	--	--	--	--	--	--
Acetone	NA	--	--	--	--	--	--	--	--
Ethylbenzene	5	1.0 U	**970 J**	--	1.0 U	--	1.0 U	1.0 U	--
Methylene chloride	5	1.0 U	**180 J**	--	1.0 U	--	1.0 U	1.0 U	--
Toluene	5	1.0 U	**410**	--	1.0 U	--	1.0 U	1.0 U	--
Xylene (Total)	5	1.0 U	**10000 J**	--	1.0 U	--	1.0 U	1.0 U	--
Semivolatiles (µg/L)									
2-Chlorophenol	NA	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	1	**10 R**	**690 R**	--	10 UJ	--	**10 R**	10 UJ	--
2-Methylphenol	NA	10 U	2300	--	10 UJ	--	10 U	10 UJ	--
4-Methylphenol	NA	10 U	230	--	10 UJ	--	10 U	10 UJ	--
Acenaphthene	NA	10 U	100 U	--	10 UJ	--	10 U	1.2 J	--
Acetophenone	NA	10 U	100	--	10 UJ	--	10 U	10 UJ	--
Anthracene	NA	10 U	100 U	--	10 UJ	--	10 U	1.6 J	--
Benzo(a)anthracene	NA	10 U	100 U	--	10 UJ	--	10 U	5.3 J	--
Benzo(a)pyrene	N/D	10 U	100 U	--	10 UJ	--	10 U	**3.7 J**	--
Benzo(b)fluoranthene	NA	10 U	100 U	--	10 UJ	--	10 U	4.4 J	--
Benzo(g,h,i)perylene	NA	10 U	100 U	--	10 UJ	--	10 U	2.6 J	--
Benzo(k)fluoranthene	NA	10 U	100 U	--	10 UJ	--	10 U	1.8 J	--
Benzoic Acid	NA	--	--	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	5	**24**	100 U	--	1.4 J	--	1.3	**11 J**	--
Carbazole	NA	10 U	100 U	--	10 UJ	--	10 U	1.2 J	--
Chrysene	NA	10 U	100 U	--	10 UJ	--	10 U	5.2 J	--
Fluoranthene	NA	10 U	100 U	--	10 UJ	--	10 U	11 J	--
Indeno(1,2,3-cd)pyrene	NA	10 U	100 U	--	10 UJ	--	10 U	1.9 J	--
N-Nitrosodi-n-propylamine	NA	--	--	--	--	--	--	--	--
Naphthalene	NA	10 U	43	--	10 UJ	--	10 U	10 UJ	--
Phenanthrene	NA	10 U	100 U	--	10 UJ	--	10 U	7.1 J	--
Phenol	1	10 U	**5400**	--	10 UJ	--	10 U	10 UJ	--
Pyrene	NA	10 U	100 U	--	10 UJ	--	10 U	9.4 J	--

Source: Ecology and Environment Engineering, P.C., 2007

Table 2-5
Summary of Positive Organic Results for Groundwater Samples
Witmer Witmer Road Drive-In Site, Niagara Falls, New York

Analyte	Screening Criteria[1]	Sample ID: Date:	GW-1 05/90	GW-1 02/93	GW-1 08/93	GW-2 05/90	GW-2 02/93	GW-2 08/93	GW-2 11/08/05	GW-3 05/90	GW-3 02/93	GW-3 08/93	GW-3 11/08/05	GW-4 05/90	GW-4 02/93	GW-4 08/93	GW-5 05/90	GW-5 02/93	GW-5 08/93	GW-5 11/08/05
Metals (µg/L)																				
Aluminum	NA		--	N/D	N/D	--	N/D	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	N/D	--
Antimony	3		--	N/D	N/D	--	**27.5**	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	N/D	--
Arsenic	25		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	1000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	11		--	N/D	N/D	--	N/D	**7.22**	--	--	N/D	--	--	--	N/D	--	--	N/D	**6.96**	--
Cadmium	5		--	N/D	N/D	--	N/D	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	**9.18**	--
Calcium	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	50		--	N/D	N/D	--	N/D	12.8	0.006	--	N/D	--	<0.005	--	N/D	--	--	**1,930**	**1,750**	1.16
Cobalt	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	200		--	19.3	N/D	--	N/D	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	N/D	--
Iron	300		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	25		N/D	7.60	8.90	N/D	N/D	7.10	0.006	**239**	N/D	--	<0.005	**43.7**	N/D	--	9.70	N/D	8.70	<0.005
Magnesium	35000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	300		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	100		--	N/D	N/D	--	N/D	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	N/D	--
Potassium	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	10		--	N/D	N/D	--	N/D	N/D	--	--	N/D	--	--	--	N/D	--	--	N/D	N/D	--
Silver	50		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	20000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	NA		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	NA		--	209	84.6	--	22.1	22.7	--	--	N/D	--	--	--	86.2	--	--	N/D	N/D	--
Mercury	0.7		--	N	N	N/D	N/D	**7.10**	--	--	N/D	--	--	--	N/D	--	--	N/D	N/D	--

[1] 6 New York Code of Rules and Regulations 703.5 Table 1, Water Class GA.

Notes:

1. Shaded and bolded cells exceed the screening criteria.
2. PZ03D is the field duplicate of PZ-03.

Key:

-- = parameter was not tested
J = Estimated value.
NA = not available
N/D = not detected above test method limits
R = matrix spike recovery was less than or equal to 30%
U = Not detected at the reported value
µg/L = micrograms per liter

Source: Ecology and Environment Engineering, P.C., 2007

Table 2-5
Summary of Positive Organic Results for Groundwater Samples
Witmer Witmer Road Drive-In Site, Niagara Falls, New York

Analyte	Screening Criteria[1]	PZ-01	PZ-02		PZ-03		PZ-03D*	PZ-04	
		4/19/2007	4/19/2007	9/5/2007	4/19/2007	9/5/2007	4/19/2007	4/19/2007	9/5/2007
Metals (µg/L)									
Aluminum	NA	90800	39200	283	12600	2090	16400	24900	155 J
Antimony	3	20 U	20 U	**8.0 J**	**30.7**	**4.6 J**	**29.9**	**70.5**	20 U
Arsenic	25	**40.4**	**37.0**	20 U	**30.6**	20 U	**42.1**	**51.9**	12.5 J
Barium	1000	**1710**	**1130**	142 J	218 J	46.0 J	348 J	363	216
Beryllium	11	4.4 J	2.4 J	5.0 U	0.69 J	5.0 U	1.2 J	5.0 U	5.0 U
Cadmium	5	2.9 J	**8.5**	5.0 U	0.22 J	5.0 U	0.56 J	0.62 J	5.0 U
Calcium	NA	518000	307000	247000	317000	129000	414000	700000	522000
Chromium	50	**155**	**124**	20 U	**978**	3.4 J	**1000**	**2410**	**965**
Cobalt	NA	42.6 J	26.2 J	9.3 J	8.2 J	4.8 J	12.6 J	6.3 J	16.0 J
Copper	200	**211**	**1160**	16.2 J	38.9	16.1 J	50.3	64.1	23.3 J
Iron	300	**134000**	**99600**	**2950**	**13500**	**550**	**15200**	**11300**	**2140**
Lead	25	**432**	**1910**	16.5	23.6 J	10 U	**46.8 J**	**163**	**37.1**
Magnesium	35000	**150000**	**56800**	**50000**	8200 J	20.9 J	12900 J	**123000**	223 J
Manganese	300	**6090**	**3460**	**2180 J**	**565 J**	50 U	**999 J**	**716**	3.6 J
Nickel	100	**130**	**143**	12.3 J	14.1 J	17.2 J	18.1 J	13.6 J	17.8 J
Potassium	NA	17500	15200	5270	4780	6540	5550	4110	3410
Selenium	10	30 U	**40.2**	30 U	30 U	5.6 J	30 U	30 U	30 U
Silver	50	30 U	30 U	20.6 J	30 U	10.2 J	30 U	30 U	42.5
Sodium	20000	**30200**	18200	**29400**	**35300**	**36000**	**38400**	12500	10800
Vanadium	NA	142	77.2	50 U	22.8 J	7.1 J	25.2 J	49.3 J	50 U
Zinc	NA	1540	3530	25.9 J	97.4	50 U	129	241	50 U
Mercury	0.7	**0.77**	**3.9**	0.20 U	0.31	0.20 U	0.42	0.47	0.20 U

[1] 6 New York Code of Rules and Regulations 703.5 Table 1, Wat

Notes:

1. Shaded and bolded cells exceed the screening criteria.
2. PZ03D is the field duplicate of PZ-03.

Key:

-- = parameter was not tested
J = Estimated value.
NA = not available
N/D = not detected above test method limits
R = matrix spike recovery was less than or equal to 30%
U = Not detected at the reported value
µg/L = micrograms per liter

Source: Ecology and Environment Engineering, P.C., 2007

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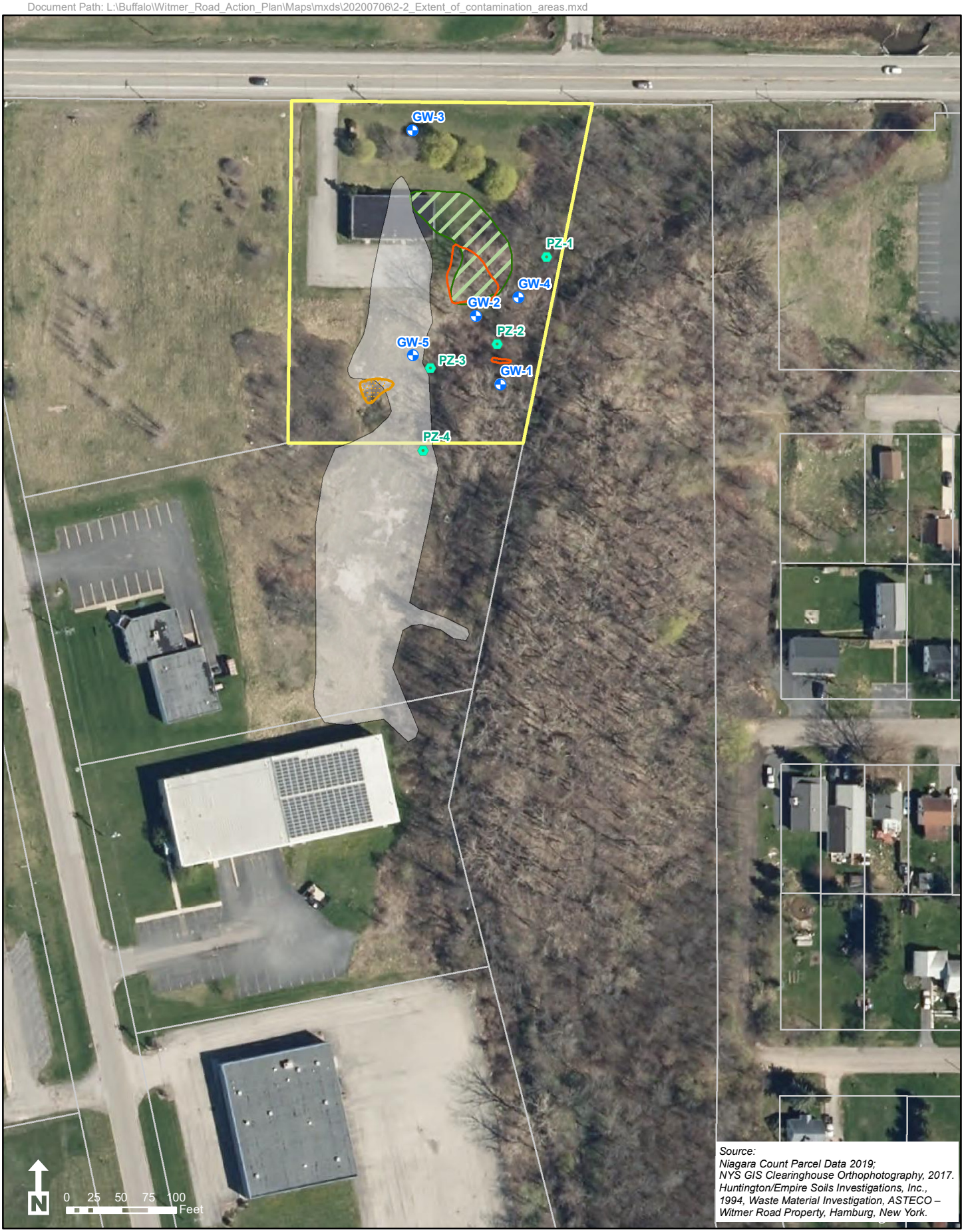

Existing Groundwater Monitoring Well Location
Piezometer (Apr-07)
Black Foundry Sand Limits
Resin Limits
Lime-Like Material Limits
Black Material Limits
Witmer Road Drive-In (4287 Witmer Rd.) Site
Tax Parcel

Figure 2-2
Extent of Contamination Areas
Witmer Road Drive-In Site
Town of Niagara, New York

during grading and construction activities. In the event of construction at the site, additional evaluation is needed to ensure health is not impacted.

Chromium appears to be the main contaminant of concern for the lime-like material on-site. Since this material is at the surface at various on-site locations, it could cause potential long-term health problems if it is inhaled or ingested over a long period of time. However, site visitors would only be exposed briefly, presenting little risk. If the site is redeveloped or becomes an active property in the future, the potential exposure to surface soil and subsurface soil by construction and site workers may need to be further investigated.

If subsurface soil is disturbed on-site, there may also be exposure to groundwater. Groundwater level measurements from April 2007 are shown in Figure 2-3. It is recommended that water levels are measured before any future redevelopment of the property.

2.4 Radiation Survey

A surficial radiation survey of the areas of the property without shrubs or trees was conducted on June 12, 2020. Before any site measurements were made, background measurements were collected at Reservoir State Park, northwest of the site. Three background measurements were collected, with an average of 7,000 counts per minute (cpm) of ionizing radiation and a dose rate of 8 micro-Roentgens per hour (μR/hour). Ionizing radiation measurements were collected using a Ludlum Model 2221 ratemeter connected to a Ludlum Model 44-10 2-inch diameter sodium iodide detector. Dosage rates were measured using a Ludlum Model 19 ratemeter.

Figure 2-4 shows the results of the radiation survey in terms of measurements at or below two times background measurements, measurements between two and three times background measurements, and measurements above three times background measurements. The highest dosage rates detected were 24 μR/hour, though the areas where ionizing radiation was greater than 21,000 cpm were only surveyed along the boundaries. Based on the location of these areas, radiation is likely to only be a concern where the lime and resin areas overlap with the building and the area immediately to the east of the building, and a small portion of the black foundry sand area.

2.5 Conclusions

Several wastes present at the site may have potential impacts on human health. Part 375 SCOs include levels established for the protection of public health as well as for the protection of the environment. The resin fill material has been reported to contain VOCs (toluene, xylene, ethylbenzene), SVOCs (phenol, o-Cresol, and benzo(a)pyrene), and metals (arsenic, copper, lead) in concentrations above Part 375 SCOs for residential and commercial property. The lime-like material contains chromium in concentrations above Part 375 SCOs for residential

and commercial property. Due to the presence of VOCs in the resin material, there is the potential for soil vapor intrusion into future site buildings if constructed.

Groundwater sampled near the resin material contained significant concentrations of VOCs (ethylbenzene, toluene, xylene) and SVOCs (phenol, benzo(a)pyrene) while groundwater sampled near the lime-like material contained significant concentrations of metals (primarily chromium). However, widespread groundwater impacts have not been detected at the WRDI.

Surface water and sediment in Gill Creek do not appear to have been significantly affected by site contamination. While some metals were detected in sediment above NYSDEC sediment criteria (arsenic, cadmium, lead) are also present in site wastes, the section of Gill Creek that is adjacent to the site contains numerous pieces of debris that may also have contributed to the sediment concentrations detected.

In general, the 75 CY of resin fill material observed southeast of the on-site building appears to be the primary waste fill material impacting the environment. Based on the previously collected soil sample results, the resin material appears to be the main source of VOC, SVOC, and metals contamination at the site except for the chromium contamination, which appears to be related to the lime-like material. While the chromium-contaminated lime-like material has a much greater volume than the resin and extends off-site, only two of the nine groundwater sample locations, and no surface water and sediment sample locations contain chromium at levels exceeding screening criteria. This suggests that the lime-like material only has a minimal impact on the environment.

Potential human health exposure pathways are generally limited to direct contact with, or incidental ingestion of contaminated waste materials. However, these exposures are considered infrequent since the site is currently vacant. If the site was to be re-developed or the existing building re-occupied, then potential human health exposure pathways would have to be re-evaluated. These pathways would include direct contact with wastes, as well as potential vapor intrusion to future site structures.

If the site is redeveloped or becomes active in the future, the resin material and to a lesser extent the lime-like fill present at the site could pose a risk to site workers. Both the resin and lime-like materials should be removed before they pose a potential health risk to future site occupants. A vapor intrusion study may also be necessary to evaluate the possibility of organic chemical vapors entering into structures at the site if the resin material is not removed from the site. In addition, a radiation surveying firm would need to be present during the removal of any potential radiation contaminated soils to screen soils before disposal.

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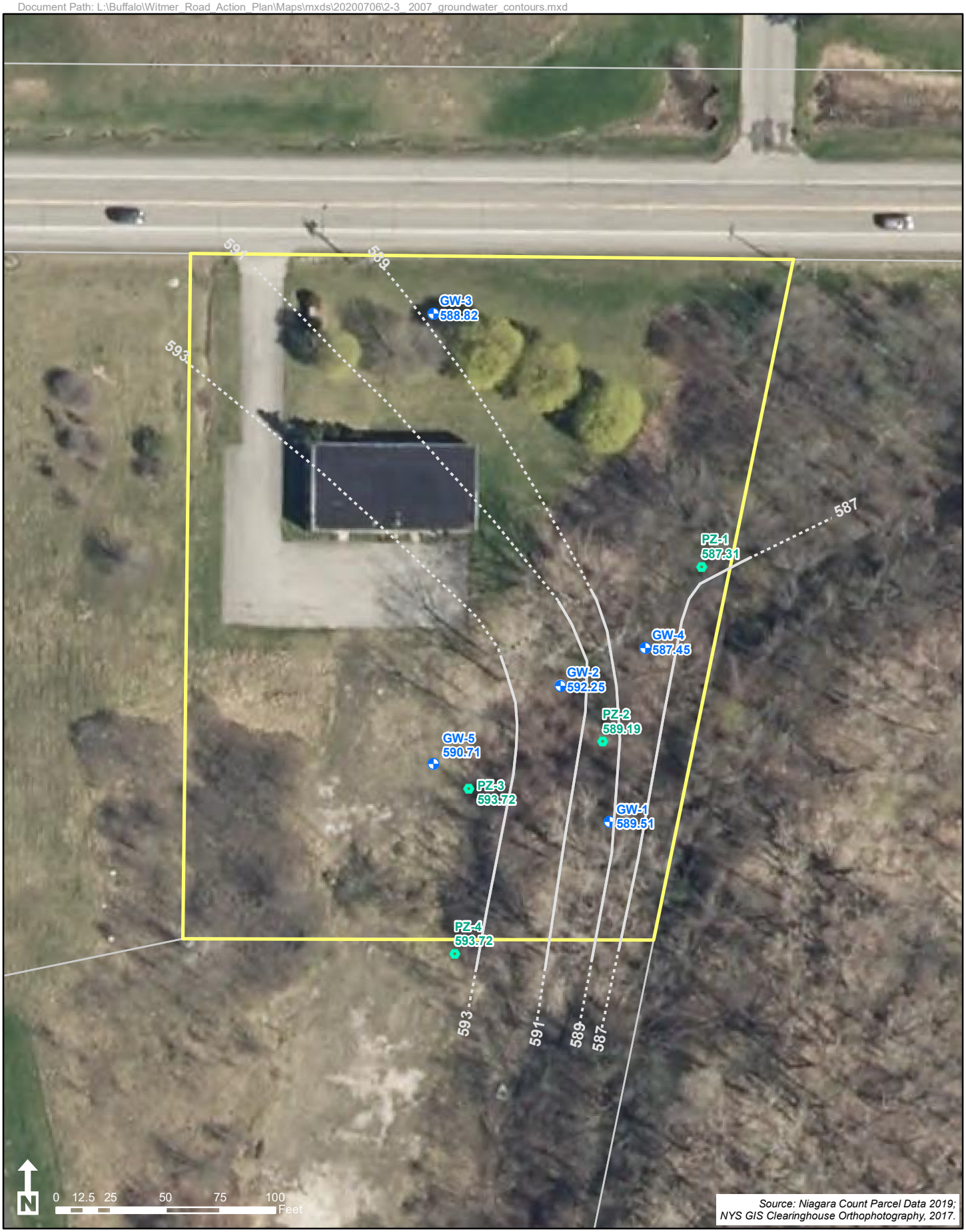

Note: Groundwater levels measured April 19, 2007.

Witmer Road Drive-In (4287 Witmer Rd.) Site

Groundwater Elevation Contour (dashed where inferred)

Tax Parcel

Existing Groundwater Monitoring Well Location

Piezometer

Figure 2-3
April 2007 Groundwater Elevation Contour Map
Witmer Road Drive-In Site
Town of Niagara, New York

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Existing Groundwater Monitoring Well Location
Piezometer (Apr-07)
Radiation measured to be greater than 21,000 counts per minute (cpm)
Radiation measured to be between 14,000 and 21,000 cpm
Radiation measured to be less than 14,000 cpm
Black Foundry Sand Limits
Resin Limits
Lime-Like Material Limits
Black Material Limits
Witmer Road Drive-In Site (4287 Witmer Rd.)
Tax Parcel

Figure 2-4
2020 Radiation Survey
Witmer Road Drive-In Site
Town of Niagara, New York

3 Development and Analysis of Alternatives

Four alternatives were developed to address the contamination present at the WRDI. The first alternative assumes no future development of the property and no action performed on the property other than building demolition. The remaining three alternatives follow remedial tracks 2 and 4 as presented in 6 NYCRR Part 375-3.8:

- **Track 2** - restricted use with generic SCOs based on the intended use of the property-residential, restricted residential (single family houses not allowed), commercial, or industrial; and
- **Track 4** - restricted use with site-specific SCOs, where the shallow exposed soils must meet the generic SCOs used for track 2 above.

To evaluate the remediation alternatives, the following criteria were considered:

Overall Protection of Human Health and the Environment

This criterion provides an overall assessment of protection of human health and the environment and is based on a composite of factors assessed under the evaluation criteria, especially short-term effectiveness, long-term effectiveness and performance, and compliance with cleanup goals.

Short-Term Impacts

This criterion addresses the impacts of the alternative during the construction and implementation phase. Factors to be evaluated include protection of the community and workers during the remedial actions.

Long-Term Effectiveness and Permanence

This criterion addresses the long-term protection of human health and the environment after completion of the remedial action. It assesses the effectiveness of the remedial action to manage the risk posed by the residual contamination remaining after treatment and the long-term reliability of the remedial action.

Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of services and materials required during implementation. Technical feasibility refers to the ability to construct and operate a remedial action for the specific conditions at the site and the availability

of the necessary equipment and technical specialists as well as construction and operation and maintenance (O&M) difficulties, reliability, ease of undertaking additional remedial action (if required), and the ability to monitor effectiveness. Administrative feasibility refers to compliance with applicable rules, regulations, and statutes and the ability to obtain permits or approvals from government agencies or offices.

Cost

This criterion evaluates the estimated capital costs and long-term O&M costs. The estimates included herein (unless otherwise noted) assume engineering and administrative costs would equal 15% of the capital costs and contingency costs would equal 30% of the capital costs. A present-worth analysis was only completed for the alternatives that require long-term O&M.

Land Use

This criterion is an evaluation of the current, intended, and reasonably anticipated future use of the site and its surroundings as it relates to an alternative or remedy when unrestricted levels would not be achieved. Additionally, this evaluation must consider various land use factors, including, but not limited to, current and historical development patterns, consistency of proposed use, applicable zoning laws and maps, brownfield opportunity areas, proximity to other properties, environmental justice concerns, federal or state land-use designations, population growth patterns, accessibility to infrastructure, proximity to cultural resources and natural resources, proximity to floodplains, geography and geology, potential vulnerability of groundwater to contamination, and current institutional controls.

3.1 Alternative 1: No Further Action

This alternative would include demolition of the on-site building. After demolition, no action would be taken. The No Action alternative involves taking no further action to remedy site conditions. The National Contingency Plan at 40 Code of Federal Regulations §300.430(e) (6) provides that the No Action alternative be considered at every site as a baseline for comparison with other alternatives. This alternative does not include remedial action, institutional or engineering controls, or long-term monitoring.

Overall Protection of Human Health and the Environment

This alternative is not protective of human health and the environment, because the site soils would remain in their present condition. Contamination in the soil would remain at the site and continue to persist in the environment. Uncontrolled trespassing and excavations in contaminated soils could lead to exposure and, therefore, risk to human health.

Short-Term Impacts and Effectiveness

There is no suspected lead or asbestos in the building on-site, so short-term impacts would only be associated with demolition (e.g., noise). The site is not in a

residential area and, therefore, the short-term impact of demolition would be minimal.

Long-Term Effectiveness and Permanence

This alternative does not involve the removal of contaminated soil or a decrease in the volume of contamination, so the risks associated with the existing contamination would remain the same. Therefore, this alternative is not effective in the long term.

Implementability

This alternative is easy to implement and would only involve obtaining permits associated with building demolition.

Cost

The estimated cost for the demolition of the site building is $34,280. Details of the capital cost estimate are provided in Table 3-1.

Land Use

This alternative would not change the current zoning of the site. A deed restriction would be required for the site.

3.2 Alternative 2: Track 2 Residential Remediation

This alternative includes demolition of the on-site building and excavation and off-site disposal of site soils that exceed the 6 NYCRR Part 375-6.8(b) Residential SCOs. To achieve this, a total volume of 3,456 CY of soil will be excavated and disposed of off-site, including 75 CY of resin, 2,420 CY of lime material, 600 CY of black material, 50 CY of black foundry sands, and 311 CY of potentially radiologically contaminated soils. These areas are shown on Figure 2-2.

A radiation survey technician will be on site during excavation to scan the soils for radiation and to collect samples for radiation analysis. Confirmation samples will be collected in all excavated areas to confirm that SCOs have been met. Areas where sample concentrations exceed SCOs will be excavated an additional foot with additional confirmation samples collected after excavation, until SCOs are met. The excavated areas will be backfilled with common fill that meets Part 375 Residential SCOs up to 6 inches below the surrounding grade. The remaining 6 inches will be backfilled with topsoil that meets Part 375 Residential SCOs and seeded.

Since this alternative removes all contamination for future zoning, no cover system or long-term monitoring will be required.

Table 3-1
Alternative 1 Cost Estimate

	Item Description	Quantity	Units	Unit Price Cost	Item Cost	Total
					Total Capital Cost of Remediation	$ 34,280.12
Site Preparation						**$ 3,391.43**
	Mobilization and Demobilization	1	LS	$ 528.75	$ 528.75	
	Performance Bonds and Insurance, Assume 1.5% of total bid	1	LS	$ 362.68	$ 362.68	
	Work Plan	1	LS	$ 2,500.00	$ 2,500.00	
Site Services						**$ 1,827.89**
	Site Trailer, Assume 1 trailer for project duration	0.5	Mo	$ 262.01	$ 131.01	
	Power, Assume 1 trailer for project duration	0.5	Mo	$ 200.00	$ 100.00	
	Water, Assume 1 trailer for project duration	0.5	Mo	$ 250.00	$ 125.00	
	Internet, Assume 2 trailers for project duration	0.5	Mo	$ 75.00	$ 37.50	
	Lights and HVAC, Assume 1 trailer for project duration	0.5	Mo	$ 174.35	$ 87.18	
	Portable toilets, Assume 2 toilets for project duration	0.5	Mo	$ 376.90	$ 188.45	
	Office Equipment, Assume 1 trailer for project duration	0.5	Mo	$ 224.02	$ 112.01	
	Office Supplies, Assume 1 trailer for project duration	0.5	Mo	$ 93.50	$ 46.75	
	Noise Monitoring reporting w/corrective actions, 0.5 hr/day, $100/day, for project dur	10	Days	$ 50.00	$ 500.00	
	Maintain Record Drawings and shop drawings	1	LS	$ 500.00	$ 500.00	
Building Demolition						**$ 21,150.00**
	Building demolition, 20 mile haul for waste	45,000	CF	$ 0.47	$ 21,150.00	
10% Legal, administrative, engineering fees, construction management						**$ 2,636.93**
20% Contingencies						**$ 5,273.86**

Notes

Size of Building (3,000 SF footprint, height + foundation depth of 15 feet) 45000 CF

Overall Protection of Human Health and the Environment

Excavation of the soils that exceed Part 375 residential SCOs addresses the source of the site contamination, which is the most significant threat to public health and the environment. This alternative is the most protective of human health and the environment as it removes the largest volume of contaminated soils from the site.

Short-Term Impacts and Effectiveness

The excavation and removal of contaminated soils would provide short-term protection to occasional visitors to the site and eliminate the need to further control future use and activities on the site. During construction, a potential short-term impact includes the generation of fugitive dust during excavation and subsequent truck loading. This alternative may cause some community disturbance due to noise from truck traffic and equipment. Worker exposure to contaminants can be controlled using personal protective equipment and dust suppression.

Long-Term Effectiveness and Permanence

This alternative would be effective in providing long-term protection of human health and the environment because the contaminated soils would be removed to an off-site disposal facility.

Implementability

This alternative would require short-term direct contact with the contaminated soils during construction. The remedy would also require disposal at an appropriate disposal facility and related transportation, which would require additional site sampling.

Cost

The estimated cost for the implementation of the Track 2 Residential Remediation is $1,251,438.96. Details of the capital cost estimate are provided in Table 3-2.

Land Use

This alternative would improve the zoning of the site from commercial to residential.

3.3 Alternative 3: Track 2 Commercial Remediation

This alternative includes demolition of the on-site building, excavation and off-site disposal of site soils that exceed the Part 375 commercial SCOs, a deed restriction limiting site development to commercial or industrial use only, and a site management plan governing future monitoring and use of the site. A total volume of 3,106 CY of soil will be excavated and disposed of off-site, including 75 CY of resin, 2,420 CY of lime material, 300 CY of black material, and 311 CY of potentially radiologically-contaminated soils. These areas are shown in Figure 2-2.

Table 3-2
Alternative 2 Cost Estimate

	Item Description	Quantity	Units	Unit Price Cost	Item Cost	Total
					Total Capital Cost of Remediation	$ 1,251,438.96
Site Preparation						**$ 66,075.00**
	Mobilization and Demobilization	1	LS	$ 22,414.26	$ 22,414.26	
	Decon Station - Asphalt Area to be Used for Staging					
	40 mil VLDPE liner for decontamination pad, add 25% for overlap	1,500	SF	$ 1.85	$ 2,775.00	
	#2 Stone, material cost (12 inches) for decontamination pad (additional 15% for swell)	102	Tons	$ 21.16	$ 2,163.02	
	Placement Cost, Dozer 80 HP, 300' Haul from stockpile, sand and gravel	51	LCY	$ 3.37	$ 172.24	
	Submersible Sump Pump, automatic, cast-iron, 1/2 HP	1	Each	$ 503.13	$ 503.13	
	Frac Tank, 10,000 Gal Tank rental	2	month	$ 1,744.05	$ 3,488.10	
	Off-site Discharge at local WWTP, Assume 5 frac tanks of water will be disposed off-site total	50	kGal	$ 5.00	$ 250.00	
	Transportation of decon pad stone	102	Tons	$ 20.00	$ 2,044.44	
	Disposal of decon pad stone	102	Tons	$ 18.00	$ 1,840.00	
	Performance Bonds and Insurance, Assume 1.5% of total bid	1	LS	$ 13,988.06	$ 13,988.06	
	Work Plan	1	LS	$ 10,000.00	$ 10,000.00	
	Compost or Mulch Filter Sock, 9" diameter	176	LF	$ 6.69	$ 1,177.44	
	Orange Safety Fence	1,410	LF	$ 3.73	$ 5,259.30	
Surveying						**$ 4,622.15**
	Pre-Construction Survey	0.5	Acre	$ 4,929.03	$ 2,311.08	
	Post-Construction Survey	0.5	Acre	$ 4,929.03	$ 2,311.08	
Site Services						**$ 39,929.30**
	Site Trailer, Assume 1 trailer for project duration	2	Mo	$ 262.01	$ 524.02	
	Power, Assume 1 trailer for project duration	2	Mo	$ 200.00	$ 400.00	
	Water, Assume 1 trailer for project duration	2	Mo	$ 250.00	$ 500.00	
	Internet, Assume 2 trailers for project duration	2	Mo	$ 75.00	$ 150.00	
	Lights and HVAC, Assume 1 trailer for project duration	2	Mo	$ 174.35	$ 348.70	
	Portable toilets, Assume 2 toilets for project duration	2	Mo	$ 376.90	$ 753.80	
	Office Equipment, Assume 1 trailer for project duration	2	Mo	$ 224.02	$ 448.04	
	Office Supplies, Assume 1 trailer for project duration	2	Mo	$ 93.50	$ 187.00	
	Compost or Mulch Filter Sock, maintenance: 10% replacement	18	LF	$ 6.69	$ 117.74	
	SWPPP Inspections (one per week), assume one additional day/month for rain events, 1 person/2 hour day, $100/hr	10	Days	$ 200.00	$ 2,000.00	
	Noise, Odor and Vapor Monitoring reporting w/corrective actions, 1 hr/day, $100/day, for project duration	40	Days	$ 100.00	$ 4,000.00	
	Operation of the Decontamination Station, 2 laborers, 4 hours/day, $100/hour, during excavation activities	30	Days	$ 800.00	$ 24,000.00	
	Maintain E&SC controls	1	LS	$ 2,500.00	$ 2,500.00	
	Sweeping of roads	1	LS	$ 1,500.00	$ 1,500.00	
	Maintain Record Drawings and shop drawings	1	LS	$ 2,500.00	$ 2,500.00	
Health and Safety						**$ 28,400.00**
	H & S Technician, 8 hours/day, $50/hour	40	Days	$ 400.00	$ 16,000.00	
	Health and Safety Equipment	40	Days	$ 160.00	$ 6,400.00	
	Drums for PPE disposal	15	Each	$ 100.00	$ 1,500.00	
	Disposal Cost for the Drum at WM	15	Each	$ 300.00	$ 4,500.00	

Table 3-2
Alternative 2 Cost Estimate

	Item Description	Quantity	Units	Unit Price Cost	Item Cost	Total
					Total Capital Cost of Remediation	$ 1,251,438.96
CAMP						**$ 8,760.00**
	CAMP, equipment rental during construction activities (not including mob/demob days)	30	Days	$ 150.00	$ 4,500.00	
	CAMP, labor to set-up, tear-down, and record data	30	Days	$ 142.00	$ 4,260.00	
Building Demolition						**$ 21,150.00**
	Building demolition, 20 mile haul for waste	45,000	CF	$ 0.47	$ 21,150.00	
Clearing and Grubbing						**$ 3,588.04**
	Brush removal, including stumps	0.6	Acre	$ 6,053.95	$ 3,588.04	
	Cut & chip light trees, to 6" diameter	0.6	Acre	$ 4,559.10	$ 2,702.07	
Excavation						**$ 10,103.60**
	Sandy clay & loam excavation	2,470	CY	$ 2.84	$ 7,014.80	
	Common earth excavation	990	CY	$ 3.12	$ 3,088.80	
Radiation Surveying						**$ 16,120.00**
	Health and Safety Plan	1	LS	$ 1,000.00	$ 1,000.00	
	Radiation Technician (assume 8 hr/day for duration of excavation, 1 month)	160	Hour	$ 74.00	$ 11,840.00	
	Radiation Samples (assume 10 samples)	10	Each	$ 328.00	$ 3,280.00	
Handling, Transport, and Off-Site Disposal						**$ 571,251.59**
	Non-Hazardous transportation of soil	4,450	Tons	$ 20.70	$ 92,115.00	
	Non-Hazardous disposal of soil	4,450	Tons	$ 18.00	$ 80,100.00	
	Non-Hazardous transportation of radioactive soil	490	Tons	$ 350.00	$ 171,500.00	
	Non-Hazardous disposal of radioactive soil	190	Miles	$ 220.77	$ 41,946.72	
	Hazardous transportation of soil	200	Miles	$ 108.13	$ 21,626.67	
	Hazardous disposal of soil (assume 5% of non-radioactive volume)	240	Tons	$ 665.48	$ 159,715.20	
	Waste Profiling, TCLP for Metals, SVOCs, VOCs, PCBs, 1 sample every 500 tons	9	Each	$ 372.00	$ 3,348.00	
	Labor for Collecting Samples, 1 hr/sample, $100/hour	9	Each	$ 100.00	$ 900.00	
Confirmation Sampling						**$ 44,440.50**
	Bottom of excavation sampling, DER 10, 1 sample per 900 square feet, includes 15% contingency and 20% QA/QC	40	Each	$ 444.41	$ 17,776.20	
	Sidewall sampling, DER 10, 1 sample per 30 linear feet, includes 15% contingency and 20% QA/QC	60	Each	$ 444.41	$ 26,664.30	
Common Fill						**$ 117,813.49**
	Common Fill, Material Cost & Spreading by Dozer	2,978	CY	$ 32.58	$ 97,020.22	
	Common Fill Source Testing	20	Each	$ 686.52	$ 13,730.40	
	Grading, Finishing	1,440	SY	$ 0.24	$ 345.60	
	Compaction, Vibrating Roller, 24" wide, 12" lifts, 3 passes	2,978	ECY	$ 1.81	$ 5,390.01	
	Compaction Testing, every 5000 SF	5	Each	$ 257.05	$ 1,327.25	
Topsoil						**$ 30,391.68**
	Topsoil (0-6 inches), Material Cost & Spreading by Dozer	478	CY	$ 47.87	$ 22,886.29	
	Topsoil Source Testing	6	Each	$ 686.52	$ 4,119.12	
	Hydroseeding	2,869	SY	$ 1.06	$ 3,040.67	
	Grading, Finishing	1,440	SY	$ 0.24	$ 345.60	
10% Legal, administrative, engineering fees, construction management						**$ 96,264.54**
20% Contingencies						**$ 192,529.07**

Table 3-2
Alternative 2 Cost Estimate

Item Description	Quantity	Units	Unit Price Cost	Item Cost	Total
				Total Capital Cost of Remediation	$ 1,251,438.96
Notes					
Size of Decon Area	1200	SF	assuming 20'x60' for decon pad		
40 mil VLDPE Liner, for decon pad, 25% for overlap	1500	SF			
Size of Building (3,000 SF footprint, height + foundation depth of 15 feet)	45000	CF			
Clay/sandy loam volume (lime like material & black foundry sands)	2,470.00	CY			
Common earth volume (radiation material, black fill material and resin)	986.00	CY			
Work Area (building and excavations)	0.47	acres			
Common Fill volume	2,977.91	CY			
Topsoil Volume	478.09	CY			
Excavated Soil Surface Area	25817	SF			
Silt Sock	176	LF	Assumed perimeter of decon pad, 10% contingency		
Construction fence	1410	LF	Assumed perimeter of work area & decon area		
Perimeter of work area	1250	LF			
Assume 1 work season	2	Mo			
Assume 1 month equals	4	weeks			
Assume five work days per week	5	Days			
Assume Mob/Demob is 1 week each	2	weeks			
Soil density assumed to be	1.37	Ton/CY			
Stone density assumed to be	2.00	Ton/CY			
Swell factor for common fill assumed to be	15%				
Common Fill source sampling - VOCs	13	Each	Based on DER-10 Table 5.4(e)10		
Common Fill source sampling - Composite	5	Each	Based on DER-10 Table 5.4(e)10		
Topsoil source sampling - VOCs	4	Each	Based on DER-10 Table 5.4(e)10		
Topsoil source sampling - Composite	2	Each	Based on DER-10 Table 5.4(e)10		

A radiation survey technician will be on site during excavation to scan the soils for radiation and to collect samples for radiation analysis. Confirmation samples will be collected in all excavated areas to confirm that SCOs have been met. Areas where sample concentrations exceed SCOs will be excavated an additional foot with additional confirmation samples collected after excavation, until SCOs are met. The excavated areas will be backfilled with common fill that meets Part 375 Commercial SCOs up to 6 inches below the surrounding grade. The remaining 6 inches will be backfilled with topsoil that meets Part 375 Commercial SCOs and seeded.

Since contamination remains on-site that requires site use restrictions for this alternative, a deed restriction will be implemented on the site limiting development to commercial or industrial use. A site management plan will be written for the property to be followed by the current and future property owners. The site management plan will include information about the site remediation and remaining contamination, as well as restrictions on future use of the site, an environmental easement, and the requirement to install a sub-slab depressurization system if a new building is constructed on-site.

Overall Protection of Human Health and the Environment

Excavation of the soils that exceed Part 375 commercial SCOs addresses the source of the site contamination, which is the most significant threat to public health and the environment. This alternative is protective of human health and the environment as it removes the majority of contaminated soils from the site.

Short-Term Impacts and Effectiveness

The excavation and removal of contaminated soils would provide short-term protection to occasional visitors to the site and eliminate the need to further control future use and activities on-site. During construction, a potential short-term impact includes the generation of fugitive dust during excavation and subsequent truck loading. This alternative may cause some community disturbance due to noise from truck traffic and equipment. Worker exposure to contaminants can be controlled using personal protective equipment and dust suppression.

Long-Term Effectiveness and Permanence

This alternative would be effective in providing long-term protection of human health and the environment because the majority of contaminated soils would be removed to an off-site disposal facility.

Implementability

This alternative would require short-term direct contact with the contaminated soils during construction. The remedy would also require disposal at an appropriate disposal facility and related transportation, which would require additional site sampling.

Table 3-3
Alternative 3 Cost Estimate

	Item Description	Quantity	Units	Unit Price Cost	Item Cost	Total
					Total Capital Cost of Remediation	$ 1,333,845.67
Site Preparation						**$ 63,719.32**
	Mobilization and Demobilization	1	LS	$ 20,955.63	$ 20,955.63	
	Decon Station - Asphalt Area to be Used for Staging					
	40 mil VLDPE liner for decontamination pad, add 25% for overlap	1,500	SF	$ 1.85	$ 2,775.00	
	#2 Stone, material cost (12 inches) for decontamination pad (additional 15% for swell)	102	Tons	$ 21.16	$ 2,163.02	
	Placement Cost, Dozer 80 HP, 300' Haul from stockpile, sand and gravel	51	LCY	$ 3.37	$ 172.24	
	Submersible Sump Pump, automatic, cast-iron, 1/2 HP	1	Each	$ 503.13	$ 503.13	
	Frac Tank, 10,000 Gal Tank rental	2	month	$ 1,744.05	$ 3,488.10	
	Off-site Discharge at local WWTP, Assume 5 frac tanks of water will be disposed off-site total	50	kGal	$ 5.00	$ 250.00	
	Transportation of decon pad stone	102	Tons	$ 20.00	$ 2,044.44	
	Disposal of decon pad stone	102	Tons	$ 18.00	$ 1,840.00	
	Performance Bonds and Insurance, Assume 1.5% of total bid	1	LS	$ 13,091.01	$ 13,091.01	
	Work Plan	1	LS	$ 10,000.00	$ 10,000.00	
	Compost or Mulch Filter Sock, 9" diameter	176	LF	$ 6.69	$ 1,177.44	
	Orange Safety Fence	1,410	LF	$ 3.73	$ 5,259.30	
Surveying						**$ 4,622.15**
	Pre-Construction Survey	0.5	Acre	$ 4,929.03	$ 2,311.08	
	Post-Construction Survey	0.5	Acre	$ 4,929.03	$ 2,311.08	
Site Services						**$ 39,929.30**
	Site Trailer, Assume 1 trailer for project duration	2	Mo	$ 262.01	$ 524.02	
	Power, Assume 1 trailer for project duration	2	Mo	$ 200.00	$ 400.00	
	Water, Assume 1 trailer for project duration	2	Mo	$ 250.00	$ 500.00	
	Internet, Assume 2 trailers for project duration	2	Mo	$ 75.00	$ 150.00	
	Lights and HVAC, Assume 1 trailer for project duration	2	Mo	$ 174.35	$ 348.70	
	Portable toilets, Assume 2 toilets for project duration	2	Mo	$ 376.90	$ 753.80	
	Office Equipment, Assume 1 trailer for project duration	2	Mo	$ 224.02	$ 448.04	
	Office Supplies, Assume 1 trailer for project duration	2	Mo	$ 93.50	$ 187.00	
	Compost or Mulch Filter Sock, maintenance: 10% replacement	18	LF	$ 6.69	$ 117.74	
	SWPPP Inspections (one per week), assume one additional day/month for rain events, 1 person/2 hour day, $100/hr	10	Days	$ 200.00	$ 2,000.00	
	Noise, Odor and Vapor Monitoring reporting w/corrective actions, 1 hr/day, $100/day, for project duration	40	Days	$ 100.00	$ 4,000.00	
	Operation of the Decontamination Station, 2 laborers, 4 hours/day, $100/hour, during excavation activities	30	Days	$ 800.00	$ 24,000.00	
	Maintain E&SC controls	1	LS	$ 2,500.00	$ 2,500.00	
	Sweeping of roads	1	LS	$ 1,500.00	$ 1,500.00	
	Maintain Record Drawings and shop drawings	1	LS	$ 2,500.00	$ 2,500.00	
Health and Safety						**$ 28,400.00**
	H & S Technician, 8 hours/day, $50/hour	40	Days	$ 400.00	$ 16,000.00	
	Health and Safety Equipment	40	Days	$ 160.00	$ 6,400.00	
	Drums for PPE disposal	15	Each	$ 100.00	$ 1,500.00	
	Disposal Cost for the Drum at WM	15	Each	$ 300.00	$ 4,500.00	

Table 3-3
Alternative 3 Cost Estimate

	Item Description	Quantity	Units	Unit Price Cost	Item Cost	Total
					Total Capital Cost of Remediation	$ 1,333,845.67
CAMP						**$ 8,760.00**
	CAMP, equipment rental during construction activies (not including mob/demob days)	30	Days	$ 150.00	$ 4,500.00	
	CAMP, labor to set-up, tear-down, and record data	30	Days	$ 142.00	$ 4,260.00	
Building Demolition						**$ 21,150.00**
	Building demolition, 20 mile haul for waste	45,000	CF	$ 0.47	$ 21,150.00	
Clearing and Grubbing						**$ 3,202.09**
	Brush removal, including stumps	0.5	Acre	$ 6,053.95	$ 3,202.09	
	Cut & chip light trees, to 6" diameter	0.5	Acre	$ 4,559.10	$ 2,411.42	
Excavation						**$ 9,025.60**
	Sandy clay & loam excavation	2,420	CY	$ 2.84	$ 6,872.80	
	Common earth excavation	690	CY	$ 3.12	$ 2,152.80	
Radiation Surveying						**$ 16,120.00**
	Health and Safety Plan	1	LS	$ 1,000.00	$ 1,000.00	
	Radiation Technician (assume 8 hr/day for duration of excavation, 1 month)	160	Hour	$ 74.00	$ 11,840.00	
	Radiation Samples (assume 10 samples)	10	Each	$ 328.00	$ 3,280.00	
Handling, Transport, and Off-Site Disposal						**$ 527,987.86**
	Non-Hazardous transportation of soil	3,930	Tons	$ 20.70	$ 81,351.00	
	Non-Hazardous disposal of soil	3,930	Tons	$ 18.00	$ 70,740.00	
	Non-Hazardous transportation of radioactive soil	490	Tons	$ 350.00	$ 171,500.00	
	Non-Hazardous disposal of radioactive soil	190	Miles	$ 220.77	$ 41,946.72	
	Hazardous transportation of soil	200	Miles	$ 94.62	$ 18,923.33	
	Hazardous disposal of soil (assume 5% of non-radioactive volume)	210	Tons	$ 665.48	$ 139,750.80	
	Waste Profiling, TCLP for Metals, SVOCs, VOCs, PCBs, 1 sample every 500 tons	8	Each	$ 372.00	$ 2,976.00	
	Labor for Collecting Samples, 1 hr/sample, $100/hour	8	Each	$ 100.00	$ 800.00	
Confirmation Sampling						**$ 44,440.50**
	Bottom of excavation sampling, DER 10, 1 sample per 900 square feet, includes 15% contingency and 20% QA/QC	40	Each	$ 444.41	$ 17,776.20	
	Sidewall sampling, DER 10, 1 sample per 30 linear feet, includes 15% contingency and 20% QA/QC	60	Each	$ 444.41	$ 26,664.30	
Common Fill						**$ 107,537.16**
	Common Fill, Material Cost & Spreading by Dozer	2,679	CY	$ 32.58	$ 87,292.68	
	Common Fill Source Testing	20	Each	$ 686.52	$ 13,730.40	
	Grading, Finishing	2,000	SY	$ 0.24	$ 480.00	
	Compaction, Vibrating Roller, 24" wide, 6" lifts, 3 passes (change to 12" lifts)	2,679	ECY	$ 1.81	$ 4,849.59	
	Compaction Testing, every 5000 SF	5	Each	$ 257.05	$ 1,184.49	
Topsoil						**$ 27,050.73**
	Topsoil (0-6 inches), Material Cost & Spreading by Dozer	427	CY	$ 47.87	$ 20,424.53	
	Topsoil Source Testing	5	Each	$ 686.52	$ 3,432.60	
	Hydroseeding	2,560	SY	$ 1.06	$ 2,713.60	
	Grading, Finishing	2,000	SY	$ 0.24	$ 480.00	

Table 3-3
Alternative 3 Cost Estimate

Item Description	Quantity	Units	Unit Price Cost	Item Cost	Total
				Total Capital Cost of Remediation	$ 1,333,845.67
Operation & Maintenance 30-year Present Worth					**$ 124,090.41**
Site Management Plan and Yearly Maintenance	30	Year	$ 10,000.00	$124,090.41	
10% Legal, administrative, engineering fees, construction management					**$ 102,603.51**
20% Contingencies					**$ 205,207.03**

Notes

Size of Decon Area	1200	SF	assuming 20'x60' for decon pad
40 mil VLDPE Liner, for decon pad, 25% for overlap	1500	SF	
Size of Building (3,000 SF footprint, height + foundation depth of 15 feet)	45000	CF	
Clay/sandy loam volume (lime like material)	2,420.00	CY	
Common earth volume (radiation material, 50% of black fill material and resin)	686.00	CY	
Work Area (building and excavations)	0.47	acres	
Common Fill volume	2,679.33	CY	
Topsoil Volume	426.67	CY	
Excavated Soil Surface Area	23040	SF	
Silt Sock	176	LF	Assumed perimeter of decon pad, 10% contingency
Construction fence	1410	LF	Assumed perimeter of work area & decon area
Perimeter of work area	1250	LF	
Assume 1 work season	2	Mo	
Assume 1 month equals	4	weeks	
Assume five work days per week	5	Days	
Assume Mob/Demob is 1 week each	2	weeks	
Soil density assumed to be	1.37	Ton/CY	
Stone density assumed to be	2.00	Ton/CY	
Swell factor for common fill assumed to be	15%		
Common Fill source sampling - VOCs	13	Each	Based on DER-10 Table 5.4(e)10
Common Fill source sampling - Composite	5	Each	Based on DER-10 Table 5.4(e)10
Topsoil source sampling - VOCs	4	Each	Based on DER-10 Table 5.4(e)10
Topsoil source sampling - Composite	1	Each	Based on DER-10 Table 5.4(e)10

Cost

The estimated cost for the implementation of the Track 2 Commercial Remediation is $1,333,845.67. Details of the capital cost estimate are provided in Table 3-3.

Land Use

This alternative would not change the current zoning of the site. A deed restriction would be required for the site.

3.4 Alternative 4: Track 4 Site Cover

This alternative includes demolition of the on-site building, a minimum 1-foot clean soil cover over contaminated soils, a deed restriction limiting site development to commercial or industrial use only, and a site management plan governing future monitoring and use of the site. The resin, lime-like, black material, and black foundry sand areas shown on Figure 2-2 and the building footprint and highest radiation area north of the building shown in Figure 2-4 would be covered with a minimum of 1 foot of topsoil meeting Part 375 Residential SCOs and seeded.

Since contamination remains on-site that requires site use restrictions for this alternative, a deed restriction will be implemented on the site. A site management plan will be written for the property to be followed by the current and future property owners. The site management plan will include information about the site remediation and remaining contamination, as well as restrictions on future use of the site, an environmental easement, the requirement to install a sub-slab depressurization system if a new building is constructed on-site, and maintenance requirements for the soil cover.

Overall Protection of Human Health and the Environment

Though the source of site contamination (i.e., contaminated soils) would remain on-site for this alternative, the soil cover would provide a barrier between site contamination and site visitors or workers. Therefore, though this alternative is not protective of the environment, it is protective of human health.

Short-Term Impacts and Effectiveness

Minimal site impacts associated with demolition and truck traffic noise are expected with the implementation of this alternative. The site is not in a residential area and, therefore, the short-term impact of building demolition and delivery of site cover soils would be minimal.

Long-Term Effectiveness and Permanence

This alternative is moderately protective in the long-term, provided that the soil cover is maintained over time. The source of contamination remains on-site, so this alternative is not a long-term effective solution for the WRDI.

Implementability

This alternative is easy to implement and would only involve obtaining permits associated with building demolition and obtaining a source of clean soil for the site cover.

Cost

The estimated cost for the implementation of the Track 2 Commercial Remediation is $291,505.89. Details of the estimate are provided in Table 3-4.

Land Use

This alternative would not change the current zoning of the WRDI. A deed restriction would be required for the site.

3.5 Recommended Alternative

The recommended remedial alternative for the site is Alternative 2: Track 2 Residential Remediation. Though this alternative involves the highest capital cost, there are minimal to no costs associated with long-term maintenance of the site. Costs are summarized for all four alternatives in Table 3-5, including maintenance costs, legal fees, and contingencies.

Alternative 2 also provides the maximum protection for human health and the environment and opens the site to non-commercial development.

Table 3-4
Alternative 4 Cost Estimate

	Item Description	Quantity	Units	Unit Price Cost	Item Cost	Total
					Total Capital Cost of Remediation	$ 291,505.89
Site Preparation						**$ 8,885.05**
	Mobilization and Demobilization	1	LS	$ 2,281.50	$ 2,281.50	
	Performance Bonds and Insurance, Assume 1.5% of total bid	1	LS	$ 1,603.56	$ 1,603.56	
	Work Plan	1	LS	$ 5,000.00	$ 5,000.00	
	Compost or Mulch Filter Sock, 9" diameter	1,250	LF	$ 6.69	$ 8,362.50	
Surveying						**$ 4,622.15**
	Pre-Construction Survey	0.5	Acre	$ 4,929.03	$ 2,311.08	
	Post-Construction Survey	0.5	Acre	$ 4,929.03	$ 2,311.08	
Site Services						**$ 6,905.78**
	Site Trailer, Assume 1 trailer for project duration	1	Mo	$ 262.01	$ 262.01	
	Power, Assume 1 trailer for project duration	1	Mo	$ 200.00	$ 200.00	
	Water, Assume 1 trailer for project duration	1	Mo	$ 250.00	$ 250.00	
	Internet, Assume 2 trailers for project duration	1	Mo	$ 75.00	$ 75.00	
	Lights and HVAC, Assume 1 trailer for project duration	1	Mo	$ 174.35	$ 174.35	
	Portable toilets, Assume 2 toilets for project duration	1	Mo	$ 376.90	$ 376.90	
	Office Equipment, Assume 1 trailer for project duration	1	Mo	$ 224.02	$ 224.02	
	Office Supplies, Assume 1 trailer for project duration	1	Mo	$ 93.50	$ 93.50	
	Compost or Mulch Filter Sock, maintenance: 10% replacement	125	LF	$ 6.69	$ 836.25	
	SWPPP Inspections (one per week), assume one additional day/month for rain events, 1 person/2 hour day, $100/hr	5	Days	$ 200.00	$ 1,000.00	
	Noise Monitoring reporting w/corrective actions, 0.5 hr/day, $100/day, for project duration	20	Days	$ 50.00	$ 1,000.00	
	Maintain E&SC controls	1	LS	$ 1,250.00	$ 1,250.00	
	Sweeping of roads	1	LS	$ 750.00	$ 750.00	
	Maintain Record Drawings and shop drawings	1	LS	$ 1,250.00	$ 1,250.00	
Building Demolition						**$ 21,150.00**
	Building demolition, 20 mile haul for waste	45,000	CF	$ 0.47	$ 21,150.00	
Clearing and Grubbing						**$ 3,588.04**
	Brush removal, including stumps	0.6	Acre	$ 6,053.95	$ 3,588.04	
	Cut & chip light trees, to 6" diameter	0.6	Acre	$ 4,559.10	$ 2,702.07	
Topsoil						**$ 54,993.87**
	Topsoil (12 inches), Material Cost & Spreading by Dozer	956	CY	$ 47.87	$ 45,772.58	
	Topsoil Source Testing	8	Each	$ 686.52	$ 5,492.16	
	Hydroseeding	2,869	SY	$ 1.06	$ 3,040.67	
	Grading, Finishing	2,869	SY	$ 0.24	$ 688.45	
Operation & Maintenance 30-year Present Worth						**$ 124,090.41**
	Site Management Plan and Yearly Maintenance	30	Year	$ 10,000.00	$124,090.41	
10% Legal, administrative, engineering fees, construction management						**$ 22,423.53**
20% Contingencies						**$ 44,847.06**

Notes

Size of Building (3,000 SF footprint, height + foundation depth of 15 feet)	45000	CF	
Work Area (building and excavations)	0.47	acres	
Topsoil Volume	644.70	CY	
Contaminated Soil Surface Area	25817	SF	
Perimeter of work area	1250	LF	
Assume 1 work season	1	Mo	
Assume 1 month equals	4	weeks	
Assume five work days per week	5	Days	
Assume Mob/Demob is 1 week total	1	weeks	
Topsoil source sampling - VOCs	6	Each	Based on DER-10 Table 5.4(e)10
Topsoil source sampling - Composite	2	Each	Based on DER-10 Table 5.4(e)10

Table 3-5
Alternative Cost Summary

	Costs			
Item Description	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**
Site Preparation	$ 3,391	$ 66,075	$ 63,719	$ 8,885
Surveying	--	$ 4,622	$ 4,622	$ 4,622
Site Services	$ 1,828	$ 39,929	$ 39,929	$ 6,906
Health and Safety	--	$ 28,400	$ 28,400	--
CAMP	--	$ 8,760	$ 8,760	--
Building Demolition	$ 21,150	$ 21,150	$ 21,150	$ 21,150
Clearing and Grubbing	--	$ 3,588	$ 3,202	$ 3,588
Excavation	--	$ 10,104	$ 9,026	--
Radiation Surveying	--	$ 16,120	$ 16,120	--
Handling, Transport, and Off-Site Disposal	--	$ 571,252	$ 527,988	--
Confirmation Sampling	--	$ 44,441	$ 44,441	--
Common Fill	--	$ 117,813	$ 107,537	--
Topsoil	--	$ 30,392	$ 27,051	$ 54,994
O&M Present Year Worth, 30 years	--	--	$ 124,090	$ 124,090
Construction Subtotal	**$ 26,369**	**$ 962,645**	**$ 1,026,035**	**$ 224,235**
10% Legal, administrative, engineering fees, construction management:	$ 2,637	$ 96,265	$ 102,604	$ 22,424
20% Contingencies:	$ 5,274	$ 192,529	$ 205,207	$ 44,847
Total	**$ 34,280**	**$ 1,251,439**	**$ 1,333,846**	**$ 291,506**
Eligible Remediation and Site Development Costs less Long-term O&M	**$ 34,280**	**$ 1,251,439**	**$ 1,209,755**	**$ 167,415**

4 Brownfield Cleanup Program and Associated Tax Credits

The purpose of this section is to provide a recommended course of action that a new property owner can follow in order to obtain a successful completion of a property redevelopment project through the New York State BCP. The purpose of this process would be to remediate the 4287 Witmer Road property while also taking advantage of the generous tax credits that are being offered by New York State for the clean-up and redevelopment of properties that exhibit contamination levels above established standards. Through regulation, the BCP's implementation is administrated by NYSDEC, and in consultation with the New York State Department of Health.

In the 17 years since this program was established in 2003, the New York State BCP has been the primary catalyst for the cleanup of over 792 contaminated sites statewide while also incentivizing redevelopment. It has also resulted in the awarding of over $2.3 billion in tax credits. While the process may seem complicated, it can provide significant returns on the capital investments made on the property. It is, therefore, important for the property owner to employ both an environmental consultant and environmental attorney who have experience in the program as well as a practical and workable knowledge of the regulatory process so they can provide an efficient use of resources in order to achieve the greatest return on investment (i.e., tax credit) at the successful completion of the program.

4.1 Program Description

The New York State BCP was enacted in 2003, was amended in 2008 and 2015 and replaced the NYSDEC's administrative voluntary cleanup program. In addition to providing liability releases, the BCP offers the most generous tax credits in the country. Applicants can claim three types of tax credits and these BCP tax credits are refundable to the extent that if the brownfield tax credits exceed the applicant's tax liability, the tax credit is treated as a tax overpayment and the state reimburses that over payment amount for that tax year. Only those entities named on the brownfield cleanup agreement (BCA) may claim the brownfield tax credits so it is important that the correct entities are named on the BCA. Additional information is listed on the New York State Department of Taxation and Finance website about Brownfield Redevelopment Credits (New York State Department of Taxation and Finance 2020).

4.2 Brownfield Redevelopment Tax Credits

Sites entering the BCP are eligible for various types of tax credits. Those tax credits include Site Preparation, On-Site Groundwater Remediation, and Tangible Property credits, as described below.

4.2.1 Site Preparation Credit

The first tax credit is known as the Site Preparation Cost (Site Prep). It includes all costs incurred to make the property ready for development. The Site Prep credit includes not only physical cleanup costs but also the costs of legal, engineering, investigation, sample analysis, abatement, demolition, excavation, soil disposal, sheeting, shoring, filling, grading, capping and dewatering, etc. The amount of the Site Prep tax credit that may be claimed depends on the level of cleanup and ranges from 28% to 50% of those costs. The Site Prep tax credit may be claimed in the tax year following the issuance of the Certificate of Completion (COC) that is issued by NYSDEC after successful completion of the program. The buildings on BCP sites do not have to be constructed or occupied to claim the Site Prep tax credit. Instead, only the remedy has to be completed and a COC issued to be able to claim the Site Prep tax credit. It is also important to note that the facility cannot be put into service prior to issuance of the COC. To do so would void significant tax credits.

It should be noted that the BCP was amended in 2015 so that the costs eligible for the Site Prep tax credit only include those expenses incurred to qualify the site for a COC. The critical documents for identifying those costs will be the Decision Document where NYSDEC approves the remedial action for the brownfield site and the Final Engineering Report that discusses the implementation of the remedy. For example, NYSDEC may exclude areas of soil excavation or portions of the foundation from the scope of the approved remedy in these documents. As a result, it is important for counsel and the environmental consultant to be familiar with these restrictions and the remedial process in order to review these documents to determine potential tax credit impacts on-site development.

4.2.2 On-Site Groundwater Remediation Tax Credit

The second tax credit is available for post-COC groundwater monitoring costs at the same percentage of the Site Prep tax credit. This credit may be claimed annually for the five-year period following the issuance of the COC. However, based on E & E's review of site information and remedial alternatives, this tax credit would not be applicable to this project.

4.2.3 Tangible Property Credit

The third (and most valuable) BCP tax credit is the qualified tangible property tax credit which ranges from 10% to 24% of the value of the improvements constructed on the brownfield site subject to a cap of $35M or three times the Site Prep costs (whichever is less for non-manufacturing redevelopment) or to a cap of $45M or six times the Site Prep costs (whichever is less for manufacturing redevelopment). BCP applicants have 10 years from the issuance of the COC to

put the building into service and claim the tangible property tax credit. Examples of applicable tax credit for a commercial development is provided in Appendix A. To claim these credits, the property owner must apply to and be accepted into the BCP, conduct the required investigations and remedial activities, and receive a COC from NYSDEC. The BCP tax credits can be applied to a property for a 10-year period or until 2026, whichever comes first.

4.3 Program Process

Sites entering the BCP are required to follow a prescriptive process to apply for and enter the program, investigate the site, develop remedial alternatives, remediate the site, and close out the site. These steps are outlined in the subsequent sections.

4.3.1 Pre-Application Meeting

It is highly recommended that the property owner, their environmental consultant, and attorney prepare for and attend a pre-application meeting with the regional NYSDEC staff prior to the submittal of the BCP Application. The purpose of this meeting is to provide NYSDEC with an overview of the contamination at the site, proposed remedial efforts, and process and timeline for this project, including the redevelopment of the property. It also allows NYSDEC to discuss any issues that may potentially delay NYSDEC's approval of the application.

Because there is already substantial analytical data available for this property, it is recommended that this project start the process (with NYSDEC's approval) at the remedial stage. This would involve the submission of an Interim Remedial Measure (IRM) Work Plan. Once NYSDEC approves this work plan, building demolition and site clean-up can occur and be completed in a timely basis. This approach also eliminates duplicative public notice waiting periods, which can also significantly delay redevelopment of the property involved in the BCP.

4.3.2 Submittal of the BCP Application

Once a path forward has been determined with NYSDEC, the applicant should complete and submit the BCP application real property for reuse and redevelopment. As noted above, the submission of this application may also be accompanied by additional documents such as a Remedial Investigation or IRM workplans. This application is subject to a 30-day public notice/review period or 45-day period, if an IRM workplan is submitted with the application.

4.3.3 Application Completeness Review

Within 30 days of receiving an application, NYSDEC will use best efforts to determine whether the application is complete or incomplete and notify the applicant accordingly. This determination is based on whether the application contains sufficient information to determine site eligibility in accordance with 6 NYCRR Part 375-3.3, although additional information may be requested during the eligibility review. Some key technical information that must be included in a complete application include:

- **Figures** showing sample locations and contaminants detected on each tax parcel that exceed the applicable SCOs, soil vapor intrusion guidelines and groundwater quality standards for the reasonably anticipated use of the site,
- **The Site Description and Environmental Assessment** in the format provided by NYSDEC, and
- **The tax map identifiers, site latitude and longitude, a site location map, and a site plan drawing required** by the application.

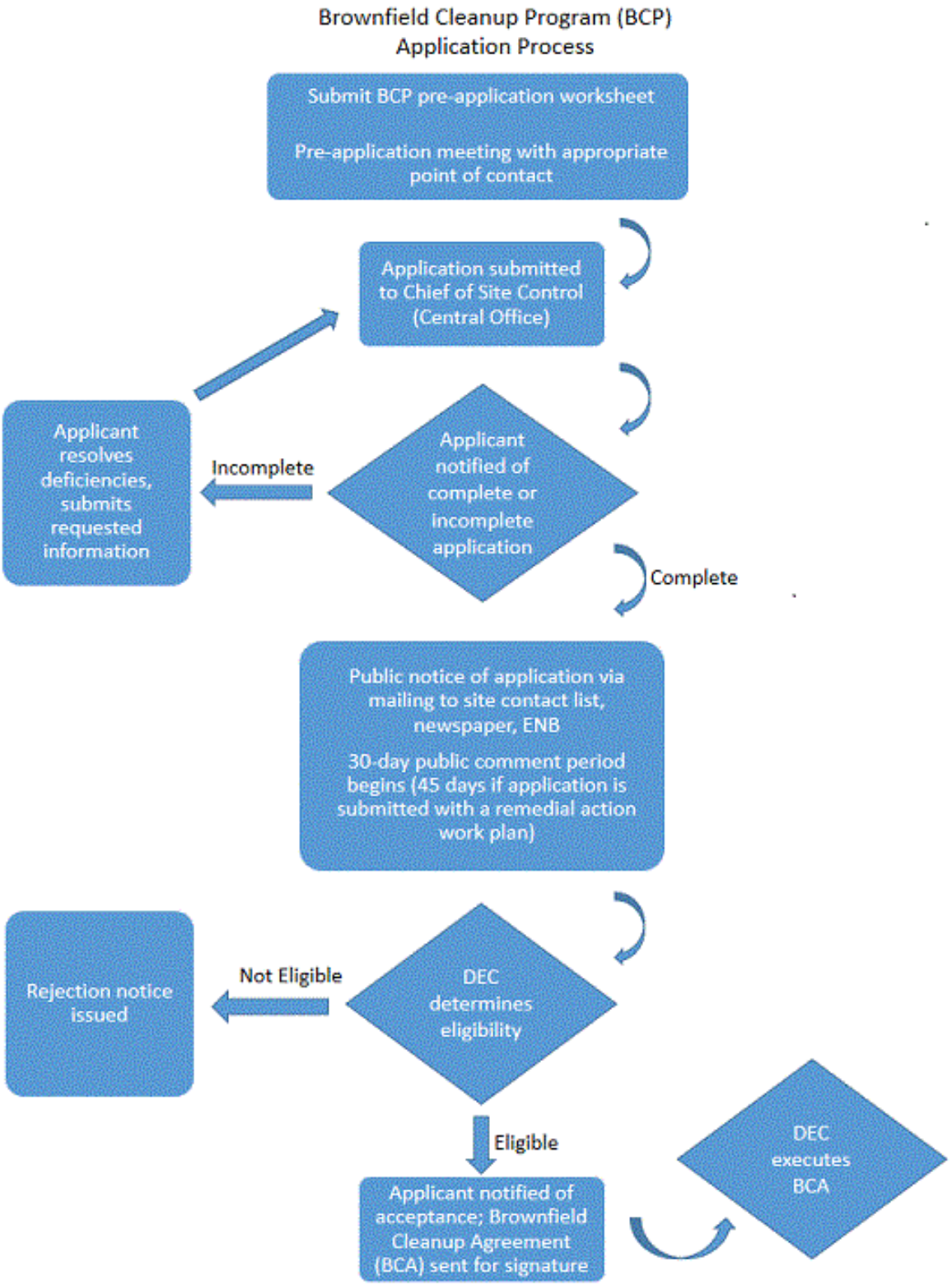
If the application is determined to be complete, NYSDEC will send a Letter of Complete Application that will include the following three items:

- **Public Notice:** This will be sent to all parties on the brownfield site contact list.
- **Application Approval/Disapproval:** Following the completion of the public notice period and NYSDEC's determination of a complete application, NYSDEC will either accept or reject the application and supplemental documents. If application instructions have been followed and communications with NYSDEC conducted, acceptance of the program should follow within five days of the closure of the public notice period.
- **Brownfield Cleanup Agreement:** NYSDEC's acceptance letter will also include a draft BCA. This agreement requires the applicant to make a commitment to undertake remedial activities under NYSDEC's oversight. The obligations of an Applicant under a BCA depend upon whether the Applicant is accepted into the BCP as either a Volunteer or a Participant.
  - A **Volunteer** is an applicant who is not liable for disposal of hazardous waste/substances or discharge of petroleum at the site.
  - A **Participant** is an applicant who was an owner or operator of the site at the time of disposal of waste/substances or discharge of petroleum at the site, or who otherwise failed to take reasonable care to stop continuing releases or prevent further releases.

In the case of the 4287 Witmer Road property, a new property owner would qualify as a Volunteer. Figure 4-1 shows the application submittal and approval process.

4.3.4 BCP Reporting Requirement

All environmental investigation and cleanup activity must be performed in accordance with Work Plan or design documents approved by NYSDEC. Reports documenting the completion of all work must be submitted to NYSDEC for approval in order to receive a COC. The documents are typically prepared by the Applicant's engineering consultant and require a certification by either a Qualified Environmental Professional or a Professional Engineer registered in New York State.



Source: NYSDEC 2020a

Figure 4-1 Brownfield Cleanup Program Application Process

4.3.5 Citizen Participation

To facilitate the remedial process and enable citizens to participate more fully in decisions that affect their health, the NYSDEC will require opportunities for citizen involvement and will encourage consultation with the public early in the process. A Citizen Participation Plan specific to this project will need to be developed and submitted to NYSDEC for approval. The plan will provide details on the citizen participation activities that will occur at several milestone points during a BCP project. Table 4-1 provides a list of those milestone points. As previously noted, some of these milestones can be combined in order to expedite the projects completions and obtaining the COC.

Table 4-1 BCP Process Milestones

When the Brownfield Cleanup Program Application is Deemed Complete
■ Develop public contact list and establish a document repository; ■ Develop a fact sheet; ■ Publish a notice of Applicant's request to participate in the Brownfield Cleanup Program in a local newspaper, the Environmental Notice Bulletin, and send fact sheet to public contact list; ■ Commence 30-day public comment period; and ■ Develop Citizen Participation Plan before beginning investigation.
Before NYSDEC Division of Environmental Remediation (DER) Finalizes Remedial Investigation Work Plan
■ Issue notice and fact sheet to contact list describing plan; and ■ Commence 30-day public comment period.
Before DER Approves Proposed Remedial Investigation Report
■ Send fact sheet to contact list describing the Remedial Investigation Report.
Before DER Finalizes Proposed Remedial Work Plan
■ Send fact sheet to contact list describing plan, and ■ Allow a 45-day public comment period.
Before Applicant Starts Construction
■ Send fact sheet to contact list announcing the start of construction.
Before DER Approves Final Engineering Report
■ Send fact sheet to contact list announcing the final engineering report.
Certificate of Completion (when institutional/engineering controls are used)
■ Send fact sheet to contact list describing such controls within 10 days of issuance of certificate.

4.3.6 Remedy Selection

The selection of remedy is based on the nature and extent of contamination on the site and the qualitative exposure assessment. A Volunteer in the BCP must evaluate and implement an effective remedy to address the contamination on-site as well as prevent further migration of contamination to off-site properties.

In the case of the 4287 Witmer Road property, it is recommended that an IRM work plan that addresses all of the known impacts on the site be submitted with the application package submittal and remedial actions completed at the site.

NYSDEC's definition of IRM is that "an IRM is a discrete set of planned actions for both emergency and non-emergency situations that can be conducted without the extensive investigation and evaluation of a Remedial Investigation/Feasibility Study" (NYSDEC 2020b). Given the extensive information available on contamination at the WRDI, an IRM is an appropriate remediation method for the site.

The IRM for the WRDI will be implemented upon acceptance into the BCP. This eliminates the need for the Remedial Alternatives Analysis Report process since the remedial investigation work has already been performed. In this case the analysis would identify that no further action (NFA) is required and that a Track 1 or Track 2 remedy may be acquired at the conclusion of the IRM process. The four remedy tracks are described below:

- **Track 1** - No restrictions on the use of the property.
- **Track 2** - Restricted use with generic SCOs based on the intended use of the property: residential, restricted residential (single family houses not allowed), commercial, or industrial.
- **Track 3 -** Restricted use with modified SCOs based on the same uses described in Track 2.
- **Track 4 –** Restricted use with site-specific SCOs, where the shallow exposed soils must meet the generic SCOs used for Track 2 above.

Once a remedy has been proposed and NYSDEC agrees that remedial goals will be met, a fact sheet will be issued notifying the public of the availability of the Remedial Work Plan (Remedial Alternatives Analysis or Remedial Action Work Plan), which presents the proposed remedy, for a 45-day public comment period. Based on the information presented above for implementing an IRM that addresses contamination at the WRDI, this Remedial Work Plan would present an NFA remedy.

NYSDEC will consider the public comments for final remedy selection, have the applicant revise the plan as necessary, and issue a final Decision Document, which describes the selected remedy. At the conclusion of this process, a COC can be issued for the project.

4.3.7 Certificate of Completion

NYSDEC issues a COC at the completion of a BCP project and upon a determination that the remedial action objectives for the BCP site as defined in the Decision Document have been achieved.

A COC allows the Applicant to receive a limitation of liability to the State of New York which applies to contamination identified by the remedial program. In addition, a COC makes the Applicant eligible to apply for the BCP tax credits. The tax credits for individual sites may vary depending on a number of factors that are further described below.

In order for NYSDEC to schedule the necessary reviews and approvals of the milestone documents, they require that the Applicant follow the schedule of document submission in Table 4-2. They will also require the applicant and their consultant/attorney to attend and participate in quarterly tracking meetings. Attendance at these meetings is mandatory so that NYSDEC can determine the status of the project and if the project is on track to receive a COC by the end of the calendar year. The applicate can be excused from these meetings if NYSDEC regional staff agrees that the project is meeting the milestone dates.

Table 4-2 Milestones for Receipt of a Certificate of Completion by End of Calendar Year

Action	Last Date for Action
Environment Easement (EE) Package, to include: ■ Draft Easement ■ Title Report submitted ■ Site Survey	May 1: If changes to EE from the template are requested, they must be submitted with a letter detailing the changes and reasons. June 1: If EE follows the template.
Draft Site Management Plan submitted	August 1
Construction completed SMP approval Submittal of electronic data in EQuIS format Environment Easement executed Draft Final Engineering Report submitted	October 1
Environmental Easement recorded and Notices provided	October 15
Final Engineering Report submitted in final form	November 15

4.4 BCP Tax Credits

As described above there are a number of factors that need to be considered early on in the BCP process in order to take the best advantage of the tax credits that are being offered under New York State's BCP. These factors include, but are not limited to:

- Chosen clean-up track;
- Investigation costs;
- Remediation costs;
- Redevelopment costs;
- Clean-up levels;
- Future redevelopment of the property (Residential, Commercial, Industrial); and
- Implementation schedule.

For the purpose of calculating an estimated BCP tax credit, the following assumptions were made:

- Building Square Footage: 3,000 square feet
- Site preparation/remediation:
  - Alternative 1: No Further Action : $34,280
  - Alternative 2: Track 2 Residential Remediation: $1,251,439
  - Alternative 3: Track 2 Commercial Remediation: $1,209,755
  - Alternative 4: Track 4 Site Cover: $167,415
- Building Construction: $1,200,000
- Furniture, Fixtures, and Equipment: $130,000
- Soft Costs: $20,000
- Total Capital Costs: $1,350,000

It should be noted that the above estimated site preparation and remediation costs are not the same as the costs noted in the alternatives analysis provided in Section 3, because they do not include long term O&M costs that would not be eligible for reimbursement over the 30-year requirement.

Table 4-3 provides a summary of estimated tax credits that could be received based on some of these factors. The basis for these tax credit estimates are provided in Appendix A.

Table 4-3 Summary of BCP Tax Credits

BCP Cleanup Level	Remedial Cost	Site Preparation Component Credit	Tangible Property Component Credit	Total Estimated BCP Credit
No Further Action	$34,280	**$0**	**$0**	**$0**
Track 2 Residential Remediation	$1,251,439	$560,576	$135,000	$695,576
Track 2 Commercial	$1,209,755	$448,719	$135,000	$583,719
Track 4 Site Cover	$167,415	$73,506	$135,000	$208,506

Key:
BCP = Brownfield Cleanup Program

5 References

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A Applicable Tax Credits for a Commercial Development

Summary of BCP Tax Credits

BCP Clean-Up Level	Remedial Cost	Site Preparation Component Credit	Tangible Property Component Credit	Total Estimated BCP Credit
No Further Action	**$34,280**	$0	$0	$0
Residential Track 2	**$1,251,439**	$560,576	$135,000	$695,576
Commercial Track 2	**$1,209,755**	$448,719	$135,000	$583,719
Commercial Track 4	**$167,415**	$73,506	$135,000	$208,506

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Example of Post July 1, 2015 Projects Tax Credit Calculations

Residential Soil Clean-up Objectives (SCOs) - Track 2

For the development project being considered, the tax credits available would vary based upon the Track of the Cleanup selected for the site. The following tables illustrate the tax credit percentages and the calculation of the credits.

Table 1: Applicable Tax Credits for the Project

Tax Credit Percentages	Track 1	Track 2	Track 4
Site Prep. & Remediation Component			
Remediation Tax Credit Percentage	*50%*	*40%*	*22%*
Tangible Property Component			
Baseline Credit	10%	10%	10%
Track 1 (5%)	0%	0%	0%
En Zone (5%)	0%	0%	0%
BOA (5%)	0%	0%	0%
Affordable Housing	0%	0%	0%
Manufacturing	0%	0%	0%
Tangible Tax Credit Percentage (24% Max)	10%	10%	10%

Assumptions
1- Three remediation scenarios evaluated:
Track 1 - Unrestricted Use/No Environmental Easement
Track 2 - Restricted Commercial Use/Environmental Easement
Track 4 - Restricted Commercial Use/Environmental Easement w/cover system
2- Article 22 tax payer status [eligible for tangible property tax credit of 10%]
3- Some remediation costs were modified for the Track 2 and 4 scenarios from the unrestricted scenario

· Cost of site investigation/reporting:	$150,000
· Cost of Site Preparation/Remediation (Includes: remediation, excavation, demolition, fencing, security etc.):	$1,251,439
· On-Site Groundwater Component:	$0
Total cost of Cleanup:	$1,401,439

Assumptions:
- Remediation did not include a On-site Groundwater Remediation Component
- Assume Commercial/Office facility project
- Assume Remediation consisted of a Track 2 clean-up to Commecial Cleanup Standards

Tax Credit Percentages	Track 1	Track 2	Track 4
Remediation Component			
Remediation Tax Credit Percentage	*50%*	*40%*	*22%*
Total Cost Remediation Component	$1,401,439	$1,401,439	$1,401,439
Site Prep. Remediation Component Credit:	$700,720	$560,576	$308,317

Assumptions:
- Use 10% for Corporations filing under Article 9-A
- Site is not located in a designated Environmental Zone (0%)
- Site is located in a designated Brownfield Opportunity Area (5%)

Tax Credit Percentages	All Tracks
Tangible Property Component:	
Tangible Property Tax Credit Percentage (Table 1)	***10%***
Total Cost Tangible Property Component	**$1,350,000**

Cost of Redevelopment

Tangible Property Component Credit:	$135,000

Tax Credit Cap on Tangible Property Component:

Assumptions: Track 2 Commercial Clean-up criteria was obtained.

For Commercial projects: Maximum Tangible Property Credit
The lessor value of either $35 million or three times (3x) the site preparation and on-site groundwater remediation costs applies vs. Calculated

Tangible Prop.Component Max. $1,401,439 X 3 $4,204,317
$135,000 does not exceeds the $35M or calculated max. value

	Tangible Credit	Remediation Credit	Total Credit
Total Cost of Applicable Tax Credits:	$135,000	$560,576	**$695,576**

Table 1: Applicable Clean-up/Use Track

Site Preparation Component and On-Site Groundwater Remediation Component: Percent of Site Preparation Costs and On-Site Groundwater Remediation Costs (Max 50%, no cap)

Cleanup of Soil to Soil Cleanup Objectives (SCOs) as follows:				
Use ?	**Unrestricted**	**Residential**	**Commercial**	**Industrial**
Track 1	50%	N/A	N/A	N/A
Tracks 2 and 3	N/A	40%	33%	27%
Track 4	N/A	28%	25%	22%

Table 2: Tangible Property Percentage

Tangible Property Component: Percent of Tangible Property (Redevelopment) Costs (Max 10-24% with cap)

Tangible Property Tax Credits	Accepted after July 1, 2015 and Completed by March 31, 2026
Baseline (Based on Tax Status)*	10%
Environmental Zone: At least 50% of the site is located in an EN-zone (high poverty and unemployment rates)	5%
Track 1 Cleanup: Unrestricted soil and groundwater cleanup	5%
Brownfield Opportunity Areas: Development conforms with the goals and priorities of the designated Brownfield Opportunity Area (BOA) in which the site is located	5%
Affordable Housing	5%
Manufacturing	5%
Maximum Percentage	24%
Cap Non-Manufacturing	$35M or 3X Site Prep
Cap Manufacturing	$45M or 6X Site Prep

Applicable tax reimbursement applies for 10 years from date of CoC issuance

Tax Credit Caps on Tangible Property Component (based on allowable land uses as outlined in the COC):

1. Non-manufacturing projects: $35 million or three times (3x) the site preparation and on-site groundwater remediation costs, whichever is less.
2. Manufacturing projects: $45 million or six times (6x) the site preparation and on-site groundwater remediation costs, whichever is less.

1. Sites will have until March 31, 2026 to receive a certificate of completion

2. The only remediation costs eligible for the Site Preparation Credit are those associated with investigation, remediation or are necessary to obtain a certificate of completion for the site. The costs associated with building demolition and for remediating asbestos, PCBs and lead in structures at the site also qualify for the Site Preparation Credit. The costs of foundations which exceed the equivalent of a site cover system do not qualify for the Site Preparation Credit.

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Example of Post July 1, 2015 Projects Tax Credit Calculations

Commercial Redevelopment - Track 2 Commercial SCOs

For the development project being considered, the tax credits available would vary based upon the Track of the Cleanup selected for the site. The following tables illustrate the tax credit percentages and the calculation of the credits.

Table 1: Applicable Tax Credits for the Project

Tax Credit Percentages	Track 1	Track 2	Track 4
Site Prep. & Remediation Component (Table 4)			
Remediation Tax Credit Percentage (Table 5)	*50%*	*27%*	*22%*
Tangible Property Component (Table 5)			
Baseline Credit	10%	10%	10%
Track 1 (5%)	0%	0%	0%
En Zone (5%)	0%	0%	0%
BOA (5%)	0%	0%	0%
Affordable Housing	0%	0%	0%
Manufacturing	0%	0%	0%
Tangible Tax Credit Percentage (24% Max)	10%	10%	10%

Assumptions
1- Three remediation scenarios evaluated:
Track 1 - Unrestricted Use/No Environmental Easement
Track 2 - Restricted Commercial Use/Environmental Easement
Track 4 - Restricted Commercial Use/Environmental Easement w/cover system
2- Article 22 tax payer status [eligible for tangible property tax credit of 10%]
3- Some remediation costs were modified for the Track 2 and 4 scenarios from the unrestricted scenario

· Cost of site investigation/reporting:	$150,000
· Cost of Site Preparation/Remediation (Includes: remediation, excavation, demolition, fencing, security etc.):	$1,209,755
· On-Site Groundwater Component:	$0
Total cost of Cleanup:	$1,359,755

Assumptions:
- Remediation did not include a On-site Groundwater Remediation Component
- Assume Commercial/Office facility project
- Assume Remediation consisted of a Track 2 clean-up to Commecial Cleanup Standards

Table 2: Site Prep Remediation Component Credit

Tax Credit Percentages	Track 1	Track 2	Track 4
Remediation Component			
Remediation Tax Credit Percentage (Table 4)	*50%*	*33%*	*22%*
Total Cost Remediation Component	$1,359,755	$1,359,755	$1,359,755
Site Prep. Remediation Component Credit:	$679,878	$448,719	$299,146

Assumptions:
- Use 10% for Corporations filing under Article 9-A
- Site is not located in a designated Environmental Zone (0%)
- Site is not located in a designated Brownfield Opportunity Area (5%)

Table 3: Tangible Property Component Credit:

Tax Credit Percentages	All Tracks
Tangible Property Component:	
Tangible Property Tax Credit Percentage (Table 1)	***10%***
Total Cost Tangible Property Component	**$1,350,000**

Tangible Property Component Credit:	$135,000

Tax Credit Cap on Tangible Property Component:

Assumptions: Track 2 Commercial Clean-up criteria was obtained.

For Commercial projects: Maximum Tangible Property Credit
The lessor value of either $35 million or three times (3x) the site preparation and on-site groundwater remediation costs applies vs. Calculated Tangible

Tangible Prop.Component Max.	$1,359,755	X 3	$4,079,265
	$135,000	does not exceeds the $35M or calculated max. value	

	Tangible Credit	Remediation Credit	Total Credit
Total Cost of Applicable Tax Credits:	$135,000	$448,719	**$583,719**

Table 4: Applicable Clean-up/Use Track

Site Preparation Component and On-Site Groundwater Remediation Component: Percent of Site Preparation Costs and On-Site Groundwater Remediation Costs (Max 50%, no cap)

Cleanup of Soil to Soil Cleanup Objectives (SCOs) as follows:				
Use ?	**Unrestricted**	**Residential**	**Commercial**	**Industrial**
Track 1	50%	N/A	N/A	N/A
Tracks 2 and 3	N/A	40%	33%	27%
Track 4	N/A	28%	25%	22%

Table 5: Tangible Property Percentage

Tangible Property Component: Percent of Tangible Property (Redevelopment) Costs (Max 10-24% with cap)

Tangible Property Tax Credits	**Accepted after July 1, 2015 and Completed by March 31, 2026**	**Applies to this Project (Y/N)**
Baseline (Based on Tax Status)*	10%	Y
Environmental Zone: At least 50% of the site is located in an EN-zone (high poverty and	5%	N
Track 1 Cleanup: Unrestricted soil and groundwater cleanup	5%	N
Brownfield Opportunity Areas: Development conforms with the goals and priorities of the designated Brownfield Opportunity Area (BOA) in which the site is	5%	N
Affordable Housing	5%	N
Manufacturing	5%	N
Maximum Percentage	24%	N
Cap Non-Manufacturing	$35M or 3X Site Prep	Y
Cap Manufacturing	$45M or 6X Site Prep	N

Applicable tax reimbursement applies for 10 years from date of CoC issuance

Tax Credit Caps on Tangible Property Component (based on allowable land uses as outlined in the COC):

1. Non-manufacturing projects: $35 million or three times (3x) the site preparation and on-site groundwater remediation costs, whichever is less.
2. Manufacturing projects: $45 million or six times (6x) the site preparation and on-site groundwater remediation costs, whichever is less.
3. Sites will have until March 31, 2026 to receive a certificate of completion
4. The only remediation costs eligible for the Site Preparation Credit are those associated with investigation, remediation or are necessary to obtain a certificate of completion for the site. The costs associated with building demolition and for remediating asbestos, PCBs and lead in structures at the site also qualify for the Site Preparation Credit. The costs of foundations which exceed the equivalent of a site cover system do not qualify for the Site Preparation Credit.

NYS Brownfield Clean-up Program
Example of Post July 1, 2015 Projects Tax Credit Calculations
Commerial Soil Clean-up Objectives (SCOs) - Track 4

For the development project being considered, the tax credits available would vary based upon the Track of the Cleanup selected for the site. The following tables illustrate the tax credit percentages and the calculation of the credits.

Table 1: Applicable Tax Credits for the Project

Tax Credit Percentages	Track 1	Track 2	Track 4
Site Prep. & Remediation Component			
Remediation Tax Credit Percentage	*50%*	*33%*	*25%*
Tangible Property Component			
Baseline Credit	10%	10%	10%
Track 1 (5%)	0%	0%	0%
En Zone (5%)	0%	0%	0%
BOA (5%)	0%	0%	0%
Affordable Housing	0%	0%	0%
Manufacturing	0%	0%	0%
Tangible Tax Credit Percentage (24% Max)	10%	10%	10%

Assumptions
1- Three remediation scenarios evaluated:
Track 1 - Unrestricted Use/No Environmental Easement
Track 2 - Restricted Commercial Use/Environmental Easement
Track 4 - Restricted Commercial Use/Environmental Easement w/cover system
2- Article 22 tax payer status [eligible for tangible property tax credit of 10%]
3- Some remediation costs were modified for the Track 2 and 4 scenarios from the unrestricted scenario

· Cost of site investigation/reporting:	$150,000
· Cost of Site Preparation/Remediation	$144,025
(Includes: remediation, excavation, demolition, fencing security etc.):	
· On-Site Groundwater Component:	$0
Total cost of Cleanup:	$294,025

Assumptions:
- Remediation did not include a On-site Groundwater Remediation Component
- Assume manufacturing facility project
- Assume Remediation consisted of a Track 2 clean-up to Commecial Cleanup Standards

Tax Credit Percentages	Track 1	Track 2	Track 4
Remediation Component			
Remediation Tax Credit Percentage	*50%*	*33%*	*25%*
Total Cost Remediation Component	$294,025	$294,025	$294,025
Site Prep. Remediation Component Credit:	$147,013	$97,028	$73,506

Assumptions:
- Use 10% for Corporations filing under Article 9-A
- Site is not located in a designated Environmental Zone (0%)
- Site is located in a designated Brownfield Opportunity Area (5%)

Tax Credit Percentages	All Tracks	
Tangible Property Component:		
Tangible Property Tax Credit Percentage (Table 2)	***10%***	
Total Cost Tangible Property Component	**$1,350,000**	Cost of Redevelopment

Tangible Property Component Credit:	$135,000

Tax Credit Cap on Tangible Property Component:

Assumptions: Track 4 Commercial Clean-up criteria was obtained.

For Commercial projects: Maximum Tangible Property Credit
The lessor value of either $35 million or three times (3x) the site preparation and on-site groundwater remediation costs

Tangible Prop.Component Max. $294,025 X 3 $882,075
$135,000 does not exceeds the $35M or calculated max. value

	Tangible Credit	Remediation Credit	Total Credit
Total Cost of Applicable Tax Credits:	$135,000	$73,506	**$208,506**

Table 1: Applicable Clean-up/Use Track

Site Preparation Component and On-Site Groundwater Remediation Component: Percent of Site Preparation Costs and On-Site Groundwater Remediation Costs (Max 50%, no cap)

Cleanup of Soil to Soil Cleanup Objectives (SCOs) as follows:				
Use ?	**Unrestricted**	**Residential**	**Commercial**	**Industrial**
Track 1	50%	N/A	N/A	N/A
Tracks 2 and 3	N/A	40%	33%	27%
Track 4	N/A	28%	25%	22%

Table 2: Tangible Property Percentage

Tangible Property Component: Percent of Tangible Property (Redevelopment) Costs (Max 10-24% with cap)

Tangible Property Tax Credits	Accepted after July 1, 2015 and Completed by March 31, 2026
Baseline (Based on Tax Status)*	10%
Environmental Zone: At least 50% of the site is located in an EN-zone (high poverty and unemployment rates)	5%
Track 1 Cleanup: Unrestricted soil and groundwater cleanup	5%
Brownfield Opportunity Areas: Development conforms with the goals and priorities of the designated Brownfield Opportunity Area (BOA) in which the site is located	5%
Affordable Housing	5%
Manufacturing	5%
Maximum Percentage	24%
Cap Non-Manufacturing	$35M or 3X Site Prep
Cap Manufacturing	$45M or 6X Site Prep

Applicable tax reimbursement applies for 10 years from date of CoC issuance

Tax Credit Caps on Tangible Property Component (based on allowable land uses as outlined in the COC):

1. Non-manufacturing projects: $35 million or three times (3x) the site preparation and on-site groundwater remediation costs, whichever is less.
2. Manufacturing projects: $45 million or six times (6x) the site preparation and on-site groundwater remediation costs, whichever is less.

1. Sites will have until March 31, 2026 to receive a certificate of completion
2. The only remediation costs eligible for the Site Preparation Credit are those associated with investigation, remediation or are necessary to obtain a certificate of completion for the site. The costs associated with building demolition and for remediating asbestos, PCBs and lead in structures at the site also qualify for the Site Preparation Credit. The costs of foundations which exceed the equivalent of a site cover system do not qualify for the Site Preparation Credit.