Superfund Program

Proposed Plan – May 12, 2023
Amcast Industrial Corporation Superfund Site – Operable Unit 1
Cedarburg, Ozaukee County, Wisconsin

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A. INTRODUCTION

The United States Environmental Protection Agency (EPA) is issuing this Proposed Plan to present EPA's Preferred Alternative for Operable Unit 1 (OU1) at the Amcast Industrial Corporation Superfund Site (Amcast Site or Site) in Cedarburg, Ozaukee County, Wisconsin. OU1 addresses contaminated soils and sediments. OU2 addresses Sitewide groundwater contamination. This Proposed Plan will also present EPA's interim remedy for OU2 at the Site; EPA is continuing to study long-term groundwater clean-up options at the Site under OU2 and will issue an OU2 Proposed Plan to present EPA's Preferred Alternative for remediating the Sitewide groundwater in the future. This Proposed Plan includes specific remedial actions for eight sub-areas, including two contamination source areas at former Amcast facilities.

This Proposed Plan is being issued by EPA, the lead agency for Site activities, in consultation with the Wisconsin Department of Natural Resources (WDNR), the support agency. EPA, in consultation with WDNR, will select a remedy for the Site after reviewing and considering all information submitted during the 30-day public comment period. The public comment period runs from May 12 through June 12, 2023. If requested timely by the public, the public comment period may extend an additional 30 days to July 12th, 2023.

EPA encourages the public to review and comment on all of the alternatives presented in this Proposed Plan. EPA also encourages community members to attend a public meeting at the Cedarburg Community Gym, on May 31st. The public meeting begins at 6 PM. EPA will accept oral comments during the public meeting and written comments at any time during the public comment period. A transcript of the meeting will be kept and will be available to the public.

EPA's final decision on the remedy will be announced in local newspaper notices and presented in an EPA document called a Record of Decision (ROD). The ROD will include a Responsiveness Summary that summarizes EPA's responses to public comments on this Proposed Plan. Based on new information and/or public comments received during the public comment period, EPA may modify the Preferred Alternative or select a different alternative, so it is important for the public to review and comment on all the alternatives presented in this Proposed Plan.

EPA's Preferred Alternative for OU1 and interim remedy for OU2 at the Amcast Site, listed by sub-area, is:

- *Amcast North*: Excavation, Offsite Disposal, Backfill and Site Restoration
- *Residential Yards*: Soil Excavation, Offsite Disposal, Backfill, and Site Restoration
- *Amcast South*: Excavation, Offsite Disposal, Backfill, and Site Restoration
- *Quarry Pond*: Sediment Dredging, Bank Soil Excavation, Offsite Disposal, and Site Restoration
- *Wilshire Pond*: Sediment and Bank Soil Excavation, Offsite Disposal, Backfill, and Site Restoration
- *North storm sewers*: Abandon Amcast North Building Storm Sewers, Remove Non-Building Storm Sewer Piping, Excavation of Pipes and Backfill, Offsite Disposal, Backfill, and Site Restoration
- *South storm sewers*: Remove Storm Sewer Piping, Excavation, Offsite Disposal, Backfill, and Site Restoration
- *Groundwater (Interim Remedy)*: Institutional Controls and Groundwater Monitoring

More details about the Preferred Alternatives are provided later in this Proposed Plan. The estimated cost to implement the Preferred Alternatives is $39,478,000.

EPA is issuing this Proposed Plan to fulfill its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C § 9617, and 40 C.F.R. § 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan highlights key information that can be found in greater detail in the Final Remedial Investigation (RI) and Feasibility Study (FS) reports and other documents contained in the Administrative Record file for this Site. EPA and WDNR encourage the public to review these documents to gain a comprehensive understanding of the Site and Superfund activities that have been conducted at the Site. Site documents can be found on EPA's website for the Site (www.epa.gov/superfund/amcast-industrial) or at the following locations:

Cedarburg Public Library
W63 N583 Hanover Ave.
Cedarburg, Wisconsin
262-375-7640
Mon-Thu: 9:30 a.m. to 8 p.m.
Friday: 9:30 a.m. to 5 p.m.
Saturday: 9:30 a.m. to 4 p.m.

EPA Region 5 Records Center
77 W. Jackson Boulevard (SRC-7J)
Chicago, Illinois
312-886-0900
Mon-Fri: 8 a.m. to 4 p.m.
Call for appointment

The remedial alternatives evaluated for each sub-area of the Amcast Site are detailed in the FS Report. For each sub-area, a "No Action" Alternative was considered but ultimately not selected as it would not result in meeting the cleanup objectives. A brief summary of the remedial alternatives evaluated for each sub-area and the preferred alternative is identified in this Proposed Plan.

B. SITE BACKGROUND

1. Site Description

The Amcast Site is located in the City of Cedarburg, Ozaukee County, Wisconsin. The Site is located on the south side of Cedarburg at N39 W5789 Hamilton Road, with portions of the property located on the north and south sides of Hamilton Road and west of Cedar Creek (Figure 1). The Amcast Site includes the Amcast North and South properties, the residential properties adjacent to Amcast North, Wilshire Pond (a stormwater retention basin), Quarry Pond at Zeunert Park, groundwater, and storm sewers. The RI identified Site contaminants in soils, sediments, groundwater, and surface waters.

2. Site History

a. Amcast North

A detailed history of operations at the facility prior to 2001 is not available. While the exact ownership dates are unknown, historical photography shows a portion of the manufacturing facility having been constructed in 1963. The aluminum die-casting process occurring at Amcast North in 2001 included receipt of aluminum ingots followed by temporary storage, prior to its introduction into one of several heating furnaces. After melting, the aluminum was transferred into a holding furnace that metered aluminum into individual dies. Once the die casting was complete, the material was cooled by air and/or water and transferred into an oven to be tempered. The part was then heat-treated, inspected, and shipped offsite for distribution to customers. Dies were reused by entering a blast booth that used plastic media to remove old coating from the die. The die was then heated and re-coated.

Three aboveground storage tanks (ASTs) were reportedly present on the Amcast North property during a 2001 Site inspection conducted by Sigma Environmental. A propane AST was located adjacent to the railroad on the northwestern portion of Amcast North, and an AST containing liquid nitrogen was located near the partial basement. A 10,000-gallon AST was also reported at the southwestern portion of the northern facility that was used to collect and process oily wastes. Wastewater was pumped from the facility and stored in the AST for disposal. Some of the drains and sumps in the manufacturing plant were also reportedly routed to this AST. No ASTs were present at Amcast North during 2011 field activities. Two bermed areas were also noted in the basement for storage of drummed liquid products. Glycol and water tanks associated with the aluminum casting process were stored in one bermed area, while petroleum and other liquid products were stored in a separate bermed area. The following chemicals were reportedly stored in secondary containment on the property in 2001: glycol- and petroleum-based hydraulic fluids, petroleum-based die inspection fluid, oil- and vegetable-based cutting fluids, Stoddard Solvent, mineral spirits, and naphtha.

b. Amcast South

The Amcast South property is the location of the former Meta-Mold Aluminum Company, an aluminum die-cast facility that began operating as early as 1937. Dayton Malleable Iron, Inc. acquired shares of the Meta-Mold Aluminum Company in 1955, which, in turn, became a division of Dayton Malleable in 1973. In 1993, Dayton Malleable changed its name to Amcast Industrial Corporation. Amcast Industrial Corporation was a former manufacturer of aluminum castings, primarily for the automotive industry.

The original foundry facility was located east of the present-day office building on the Amcast South property and was demolished sometime between 1975 and 1980. There were ASTs located south-southeast of the former Quonset hut on Amcast South. The ASTs were reportedly used for the storage and distribution of fuel oil for heating the aluminum casting facilities on the Amcast South and North properties and were removed from the Site between April 1980 and April 1985. A 14,000-gallon underground storage tank (UST) was also present on Amcast South, in an unspecified location, and reportedly abandoned in place by filling with an inert material (sand/gravel/slurry).

An area on the southern half of the property was depressed in elevation by at least 5 to 10 feet from the surrounding land, based on a 1959 topographic map. During the 1970s, the low-lying area, herein referred to as the former disposal area, received material from foundry casting operations and the City of Cedarburg. The fill materials encountered during previous investigations included silt and sand with variable amounts of gravel and other debris such as brick, metal, wood, concrete, slag, asphalt, a "white powdery substance," and visible staining and odors. Interviews with former facility personnel report fill materials included debris from previous Site structures, general office and/or factory refuse (such as paper and wood), scrap metals, and possibly spent oils such as hydraulic fluids. While the "white powdery substance" was not conclusively identified, a sample was analyzed for the presence of asbestos, and no asbestos was identified in the sample. Spent hydraulic fluids were also reportedly applied to the former gravel parking lot for dust control; the parking lot is now paved with asphalt.

c. Future Reuse

The Amcast North and South properties were purchased by a developer in late 2018. Demolition of Amcast North manufacturing buildings and the Amcast South Quonset hut were completed in December of 2020. The developer plans to redevelop the Site for residential and commercial use.

d. History of Polychlorinated Biphenyl Use and Detections

Previous reports from 1990 summarizing WDNR records indicated that specific products used onsite included Pydraul 312, Pydraul 312A, Pydraul 312C, and Amitron cutting fluid. A letter from Monsanto Company to Amcast Industrial Corporation's former legal counsel, dated July 13, 1990, indicates sales of 23,000 pounds of polychlorinated biphenyl (PCB)-containing Pydraul 312 to the facility between 1966 and 1971. Pydraul 312 contained PCB Aroclor 1242 in a concentration of 47 to 48 percent. No sale of the material was documented after 1971. PCB-based cutting fluids were historically used onsite, and some of the material was reportedly used to oil the roads on the property to reduce dust. The summary of WDNR's project files regarding the PCB detections and the elimination of PCBs from the facility reported that in 1974, WDNR notified Amcast (Dayton Malleable, Inc.) that Aroclor 1248 was found in a storm sewer manhole (location not specified) on the Amcast Site. WDNR requested that Amcast (Dayton Malleable) discontinue use of PCB-containing oils and determine the path of hydraulic fluid to the storm sewer. Correspondence files indicated that efforts to remove PCB-containing oils from the machine system were completed by 1976, installation of an oil/water separator and floor drain modifications were completed by 1978, discharges to the storm sewer were eliminated by 1980, cooling water from the oil/water separator had been rerouted to discharge to the sanitary sewer by 1986, and effluent was within permitted limits per a 1986 compliance report. A more detailed summary of WDNR project files reviewed by Foth & Van Dyke is presented in the Preliminary Site Characterization Summary (Foth & Van Dyke 2004). Despite efforts to eliminate the presence and use of PCBs onsite, sample results from previous investigations indicate significant levels of PCBs in storm sewers on the Amcast North and South properties. Two releases to surface waters and/or the storm sewer were reported to WDNR in 1998.

e. Distribution of Pollutants Beyond Amcast North and South

Figure 2 depicts the conceptual site model (CSM) for the Amcast Site. In general, contaminants at the Amcast Site, primarily PCBs from oils used at the former die-casting facilities, were released to the offsite environment via inlets to storm sewers and by overland flow during rain events. PCB contamination has affected soil and sediment that has accumulated in the storm sewers and in Wilshire and Quarry Ponds. Figure 3 shows the storm sewer system associated with the Amcast Site. Storm sewers from the Amcast North property are connected to the Wilshire Pond stormwater retention basin, which drains to Cedar Creek, located east of the Site. Storm sewers from the Amcast South property connect to Quarry Pond at Zeunert Park and to Wilshire Pond. The storm sewers transported contaminated sediment from the former manufacturing areas to the Quarry and Wilshire Ponds. The storm sewer inlets on the manufacturing areas have been closed so that contamination cannot continue to enter the sewers. However, the storm sewers currently contain contaminated sediments that will continue to spread to Quarry and Wilshire Ponds if they are not remediated.

Pollutants from the manufacturing areas of Amcast North have been found in residential yards adjacent to Amcast North. This is believed to be attributed to overland flow during rain events. A former disposal area on Amcast South also received contaminated materials (PCBs, volatile organic compounds [VOCs], and polycyclic aromatic hydrocarbons [PAHs]) that have affected surrounding subsurface soil and groundwater.

3. Remedial Investigation

An RI was initiated at the Site by Amcast Corporation in 2003. Amcast went bankrupt after conducting some of the investigation work, and EPA took over the RI in 2009. The RI was finalized in 2015. The RI conclusions and site characterization information is summarized below. For more detail about Site investigations, see the 2015 Final RI Report.

The nature and extent of contamination at Amcast North is described in the RI Report and is summarized below:

- The highest PCB concentrations are generally limited to the top 5 feet of soil on the grounds surrounding the location of the former building.
- PCB concentrations in soil beneath the building are generally below the 0.22 mg/kg site-specific non-industrial residual contaminant level (RCL), consistent with Wisconsin regulations for non-industrial direct soil contact (Wisconsin Administrative Code [WAC] Chapter NR 720.12).
- Arsenic concentrations in surface and subsurface soil range from 0.61 to 5.3 mg/kg, which is lower than natural background concentrations according to the United States Geological Survey (USGS) and WDNR[1].
- The highest concentrations of total PAHs are generally limited to the top 6 feet of soil.
- None of the individual VOC compounds were detected above their respective EPA Regional Screening Levels (RSLs) in surface or subsurface soil.

As indicated in the CSM, some PCB-laden soils were transported overland from the Amcast North manufacturing site to nearby residential yards from windblown dust or rain events. Several residential yards that were sampled during the RI contained soils that exceed the 0.22 mg/kg site-specific non-industrial RCL for total PCBs.

Contaminants were transported by the Cedarburg storm sewer system to Wilshire Pond, which is part of the City of Cedarburg's stormwater management system, designed to settle soils and sediments before stormwater is discharged to Cedar Creek. Sediments in Wilshire Pond were sampled during the RI, and the following is a summary of the contamination that was found:

- Total PCB concentrations ranged from 1.3 mg/kg to 520 mg/kg in the 17 sediment samples collected.
- PCBs were not detected in surface water samples.
- Only aluminum and manganese exceeded WDNR Enforcement Standards (ES) for surface water.
- Total PCB concentrations in fish and tadpole tissues ranged from 3.83 to 30 mg/kg.

The nature and extent of contamination at Amcast South is described in the RI Report and is summarized below:

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[1] Although the arsenic concentrations in site soils exceed the RSL concentration, the detected concentrations fall within the range of baseline values (less than 1.1 mg/kg to 8.0 mg/kg) established by the USGS for glacially deposited soil within the Lake Michigan Lobe (Stensvold 2012). WDNR has also concluded that the USGS data set is of sufficient scope and quality to establish a statewide soil background threshold value for arsenic that can be categorically accepted as "not exceeding background." The WDNR background threshold value for arsenic is 8 parts per million (ppm; equivalent to 8 mg/kg) (WDNR 2013).

- The highest concentrations of PCBs in soil at Amcast South generally occur within the limits of the former disposal area. Concentrations increase with depth, with maximum concentrations between 11 and 21 feet.
- The distribution of PAHs in surface soil (between 0 and 2 feet below ground surface [bgs]) and subsurface soil (deeper than 2 feet bgs) roughly correlates with PCB distribution, except that the highest PAH concentrations are found in surface soils.
- VOCs were not detected in soil samples.
- Arsenic concentrations in surface and subsurface soil (1.2 mg/kg to 8.2 mg/kg) are not related to site contaminants and are likely naturally occuring according to USGS and WDNR (see footnote on previous page).
- Lead concentrations in soil at one location (FVSS-06: 1200 mg/kg from 1 to 3 feet, 430 mg/kg from 5 to 7 feet) exceeded the residential RSL of 400 mg/kg; FVSS-06 is located outside of the former disposal area boundary, on the eastern boundary of Amcast South and west of the railroad tracks.

Contaminants traveled from Amcast South to the Quarry Pond in Zeunert Park via the storm sewer system. A brief description of the contamination found in the Quarry Pond and Zeunert Park is presented below:

- Total PCB concentrations range from 1.3 mg/kg to 11,000 mg/kg in 31 sediment samples, with the highest concentrations located in the portion of the pond where the storm sewer discharges stormwater that originates at Amcast South.
- PCB contamination on the banks of Quarry Pond and in Zeunert Park soil is coincident with park areas that are more prone to flooding (areas of relatively low ground surface elevations), suggesting that pond sediment is the likely source of the on-land PCB contamination, and that sediment was deposited during events of high water in the Quarry Pond.
- The highest total PCB concentration in surface soil was detected in the northern portion of the park (2.0 mg/kg) and is thought to be due to sediment deposition from the pond.
- PCBs were not detected in Quarry Pond surface water samples.
- Pentachlorophenol (PCP), an organochlorine compound used as a pesticide and a disinfectant, was detected in 5 of 8 surface water samples at concentrations above the WDNR ES. However, based on the limited detections of PCP in site soil and groundwater, the concentrations of PCP detected in Quarry Pond surface water do not appear to be related to the former Amcast operations.
- PCBs were detected in tissues of 13 of 24 aquatic organisms (including fish, frogs, and tadpoles) collected in the pond, ranging in concentration from 2.5 to 25 mg/kg.

The storm sewers that conveyed contaminants from Amcast North and Amcast South to the other sub-areas described above are being treated as source areas that could re-contaminate downgradient areas in the future, and are proposed to be remediated as part of this remedial action. A summary of the results of the RI pertaining to the storm sewers is presented below:

- Total PCB sample concentrations in storm sewer sediment collected upslope from Wilshire Pond range in concentration from 0.65 mg/kg to 19 mg/kg, with the highest concentration detected immediately adjacent to the Amcast North building.
- Storm sewer sediment samples collected from sewers that connect Amcast South and Quarry Pond have total PCB concentrations ranging from 1.35 mg/kg to 23,000 mg/kg. The highest concentrations were detected from sewer sediment samples in onsite Amcast South, with concentrations decreasing in the downslope directions within the sewers.
- Storm sewers located in Zeunert Park have total PCB sediment sample concentrations ranging from 2.0 mg/kg to 250 mg/kg.

Groundwater near the Site source areas was sampled during the RI. A summary of the groundwater results is presented below:

- Monitoring well AMS-MW01, immediately east of the former disposal area on Amcast South, was the only Site well where PCBs (Aroclor 1260) were detected at 1.5 micrograms per liter (µg/L), above the WDNR ES of 0.03 µg/L during the most recent (2011) monitoring event.
- PCBs were detected in another well during the 2003/2004 sampling events on Amcast North (FVMW-27) and 3 additional Amcast South wells (FVMW-21, GMMW-3, and GMMW-7), all of which are shallow wells screened in the upper clay/silt, and all of which had no PCB detections in 2011.
- Bromodichloromethane at well GMMW-1 (1.1 µg/L) was the only VOC detected above its EPA Maximum Contaminant Level (MCL)/WDNR ES (0.6 µg/L) in 2011. GMMW-1 is located at the farthest northern corner of Amcast South, upgradient of former operations at Amcast South and cross-gradient of former operations at Amcast North. Bromodichloromethane is not thought to be related to former Amcast operations and no surrounding facilities have been identified that are a likely source.
- There were no semi-volatile organic compounds (SVOCs), including PAHs, detected above their individual MCL/ES in 2011 groundwater data.
- Arsenic and manganese were the only metals exceeding an MCL/ES (10 µg/L and 300 µg/L, respectively) in the 2011 data. The exceedances occurred at the following locations and concentrations:

  Amcast South: AMS-MW01 manganese: 1,120 µg/L; GMMW-3 arsenic: 16.6 µg/L; GMMW-4 arsenic: 13.3 µg/L, manganese 485 µg/L;
  Zeunert Park: FVMW-23 manganese: 722 µg/L; FVMW-24 manganese: 754 µg/L.

  The arsenic concentrations in groundwater are likely a result of the naturally elevated (background) concentrations in soil established by the USGS for glacially deposited soil within the Lake Michigan Lobe (Stensvold 2012) and the WDNR soil background threshold value for arsenic (WDNR 2013). As such, arsenic was not evaluated further in this Proposed Plan.
- Lead was not detected in the 2011 data, but was detected in several wells exceeding the MCL/ES (15 µg/L for both) in 2003 and 2004 monitoring events.

4. Community Involvement

EPA conducted community interviews in 2011 and 2022 to better understand the community and its needs regarding the Site. These interviews were conducted with residents and local officials. EPA completed a Community Involvement Plan for the Site in April 2012 and revised the plan in December 2022.

C. SITE CHARACTERISTICS

1. Physical Characteristics, Demography, and Land Use

The Amcast Site is located along the southeastern portion of the City of Cedarburg, located in southeastern Wisconsin approximately 4.5 miles west of the western shore of Lake Michigan and 20 miles north of the City of Milwaukee. Cedarburg consists of a 4.3-square-mile area and has a population of 11,412 people according to 2010 U.S. Census Bureau data with a 4.6 percent increase in population since 2000.

Land use for the Amcast North and South properties and surrounding area consists of multiple zoning districts. The Amcast North property is zoned residential and is bounded on the northeast, southeast, and northwest by existing residences. A Canadian National Railroad line runs along the east side of Amcast South and along the west side of Amcast North and Zeunert Park/Quarry Pond. Farther east is an “I-1” zone (Institutional and Public Service District) that includes the Wilshire Pond and a municipal water treatment plant, and east of that parcel is Cedar Creek. Along the Creek’s western boundary, between the Amcast Site and Cedar Creek, zoning is I1, B2 (Community Business), or C1 (Conservancy District).

The Amcast South property is located in a “mixed-use infill district” that is “intended to provide for a mixture of limited business and higher-density residential uses that are located adjacent to or within a primary residential area in a manner that is consistent with the City of Cedarburg Comprehensive Plan” (City of Cedarburg 2012). The South property is bounded on the west by existing residences, on the south by the City of Cedarburg’s Department of Public Works offices and garages (I-1), and on the east by the railroad and a small manufacturer zoned as a “M-1” (Limited Manufacturing District). East of Amcast South across the railroad tracks is Zeunert Park and Quarry Pond, which are zoned as a park and recreation district (P-1). The P-1 area is surrounded by both residential-zoned and industrial-zoned parcels.

The land use in Zeunert Park around Quarry Pond consists of park parcels on the north (baseball diamond), northeast, and southwest sides; private residences around the southeast; and a fenced private property around the northwest side. The southwest portion of the park includes a ballpark and play structures, and the northeast part of the park is green space. The park is located within city limits in a residential neighborhood. Quarry Pond basin is located within Zeunert Park with no restrictions to access.

There is no known current use of groundwater near the Site for drinking water; drinking water is supplied by the City of Cedarburg from wells located elsewhere within the city.

2. Land Surface Topography

The land surface elevations range from a high of approximately 770 feet above mean sea level (amsl) near the northwestern portion of Amcast South to a low at the edge of Quarry Pond (approximately 730 feet amsl) based on the 1994 USGS Cedarburg topographic quadrangle. The Amcast South property elevation decreases to approximately 760 feet amsl along its southern boundary. The elevation range across Amcast North is approximately 760 to 750 feet amsl, and the downward slope continues across the residential area to the south and east, to a general elevation of approximately 730 feet amsl. The ground surface elevation near Wilshire Pond is at the approximate elevation of 740 feet amsl. Farther south and east, the base elevation of Cedar Creek (not its water elevation) is approximately 700 to 710 feet amsl.

3. Geology

Regional geology in Ozaukee County consists of unconsolidated deposits ranging from 0 to 600 feet thick overlying eastward dipping, Silurian-aged dolomite bedrock (Niagara formation) that is approximately 500 feet thick in the Cedarburg area (Wisconsin Geological and Natural History Survey [WGNHS] 2005). The surface elevation of Niagara dolomite in Ozaukee County ranges from approximately 600 to 900 feet, and outcrops locally at the ground surface. Underlying the dolomite in the Cedarburg area is approximately 150 feet of Maquoketa Group Shale that acts as a confining layer to deeper bedrock units.

The unconsolidated deposits consist of glacial sediments, alluvium (east of the Amcast Site along Cedar Creek), and surface marsh deposits (WGNHS 1997; 2005). Glacial material deposited in Ozaukee County includes diamicton (unsorted or poorly sorted sediment with a wide range of grain size and a fine-grained matrix deposited directly beneath glacial ice or on ice margins by mudflows and landslides that collapse off of glacial ice slopes), and landforms from interglacial and glacial periods, including end moraines, ground moraines, outwash plains, and ice-walled lake plains (WGNHS 1997). Gravel outwash or lake deposits are found between end moraine diamicton deposits.

The subsurface materials immediately beneath the Site include a compact and uniform glacial clayey silt with some sand lenses and other discontinuities, as shown in Figure 4 and Figure 5. In addition, in the Amcast South disposal area fill materials extend to depths of about 21 feet and contain soil material (silt, sand, and gravel), brick, metal filings, wood, concrete, and asphalt. A thin layer of organic-rich clayey silt up to 5 feet thick is also encountered beneath the fill or clay/silt layer(s) in some locations. Beneath the uppermost clayey silt or fill materials (and the organic layer, where present) is a fine-grained diamicton consisting of clayey silts and silty clays with some sand and/or gravel lenses. A sand unit reportedly composed of glacial outwash deposits is present beneath the diamicton and noted to be 15 feet thick at one location on Amcast North, where it is bounded below by a silt layer of unknown thickness. Below the unconsolidated units lies dolomite bedrock that outcrops on the northwestern shoreline of Quarry Pond (Figure 5). The RI report contains additional details on the Site geology.

4. Hydrogeology

There are three major aquifer systems within Ozaukee County in descending elevation: the unconsolidated materials that are capable of yielding water under pumping stress, the Niagara dolomite aquifer, and the sandstone aquifer (WGNHS 1980). The Maquoketa shale aquifer serves as an aquitard beneath the unconfined Niagara aquifer and the confined, deeper sandstone aquifer (WGNHS 1980). The deeper confined aquifer historically has a horizontal flow towards Lake Michigan to the east, but localized variations are possible due to pumping of high-capacity wells. Where the unconsolidated aquifer exists, it consists of the sand and gravel deposits such as outwash, alluvium, and glacial lake deposits and features within diamicton deposits that yield enough water to a residential or other relatively low-use well. Groundwater flow directions within unconsolidated deposits are expected to be toward local rivers and streams (e.g., Cedar Creek) that likely act as groundwater discharge areas.

Groundwater is encountered at the Amcast Site at depths ranging between 8 and 34 feet bgs, depending on the ground surface elevation. Monitoring wells that are screened in the shallow clay/silt are considered to be within a perched groundwater zone that is not able to yield sufficient water for residential or other use (logarithmic-average hydraulic conductivity of 4.31×10^{-4} centimeters per second). The potential direction of groundwater flow within the shallow clay/silt unit roughly coincides with the topography of the land surface, sloping toward the southeast and Quarry Pond at a relatively slow rate. Monitoring wells screened in the deeper, sandy outwash material (hydraulic conductivity of 2.08×10^{-2} centimeters per second) are considered to be part of a shallow unconsolidated groundwater aquifer with an apparent eastern flow direction at a relatively higher estimated flow rate.

5. Surface Water Hydrology and Ecology

Surface water drains in the general direction that follows northwest to southeast topography. Quarry Pond (a former rock quarry) is situated southeast of Amcast South in Zeunert Park, with a surface water elevation of approximately 730 feet. In addition to overland flow, the pond receives storm sewer discharge from adjacent commercial areas, including the City of Cedarburg Department of Public Works and the Amcast South property. Sediment thickness in the pond ranges from 1 to 5 feet thick. A 2011 biological survey noted green sunfish and black bullhead as the dominant fish species in Quarry Pond.

Wilshire Pond is a stormwater retention basin, not known to be used for recreation. The stormwater retention basin receives stormwater from the neighborhood to the north and west of its location including Amcast North and surrounding areas. A stormwater discharge pipe extends in a northeast direction out of Wilshire Pond, continuing toward Cedar Creek. Sediment thickness in Wilshire Pond ranges from between 0.5 and 2.9 feet. Based on the small size of the pond, its shallow water depth, periodic dry periods, and its irregular flooding regime, the pond does not appear to support much of a fish population. However, snails, other invertebrates, and thick emergent vegetation are present. Small numbers of green sunfish and golden shiner were noted during a 2011 biological survey, along with frogs/tadpoles of unknown species.

Cedar Creek flows north to south approximately 1,000 feet east of the Site and receives stormwater from Wilshire Pond in addition to the typical surface runoff from zones immediately adjacent to the Creek.

6. Nature and Extent of Contamination

The RI determined that the primary source of the contaminants was from the Amcast North and Amcast South facilities and that transport of the contaminants occurred through the stormwater sewers, Quarry and Willshire Pond sediments, and through overland flow to adjacent residential yards. The following sections detail information gathered during the RI regarding the nature and extent of the contamination at each area of the Site. Table 1 shows the summary of maximum concentrations of the contaminants detected in the soils and sediments at each area of the Site. Table 2 shows the summary of maximum concentrations of the contaminants detected in groundwater at the Site.

a. Surface-Weighted Average Concentration of PCBs in Sediment

A surface-weighted average concentration (SWAC) is a method of spatially calculating the mean (average) concentration of a constituent in the sediment surface. Samples are collected throughout the area of concern, representative sub-areas are generated for each sample location, and a sub-area-weighted average concentration is calculated to produce the SWAC for the entire surface. SWACs were calculated for sediments in both Quarry Pond and Wilshire Pond in order to evaluate the impacts to sediments, instead of comparing individual samples to applicable criteria as done for soil samples at the Amcast Site. SWACs account for the natural variability of impacts in sediment and provide an estimated average exposure to organisms who live within Quarry Pond and Wilshire Pond.

b. Amcast North Soils

Surface soil samples were collected from 11 exterior locations at Amcast North. PCBs concentrations ranged from 0.052 mg/kg to 33 mg/kg, with 8 samples detected above the WDNR site-specific non-industrial RCL (Figure 6). The highest concentrations were observed on the north side and on the southwest corner of the building property.

In 2007, ENSR Corporation (ENSR) collected surface soil samples (within the upper 2 feet of soil) from 14 soil borings advanced through the Amcast North building’s floor (Figure 6). Of the 14 surface soil samples, PCBs were detected above the WDNR site-specific non-industrial RCL of 0.22 mg/kg in one sample (0.64 mg/kg).

Twelve surface soil samples were collected for PAH analysis at Amcast North and the residential area. At least one individual PAH compound was detected at each location, with total PAH concentrations ranging from 0.026 mg/kg to 5.0 mg/kg. Two of the samples collected near the northwestern boundary of the former manufacturing building had individual PAH concentrations below their respective WDNR non-industrial RCLs. The remaining ten locations had concentrations of at least one individual PAH above their respective RCL. The highest total PAH concentration observed in the surface soil was 5.0 mg/kg at sample location AMN-SO09 in the southwest corner of the Site (see Figure 6 for sample locations). Thirteen subsurface soil samples were collected at Amcast North; concentrations of total PAHs range from non-detect to 62.8 mg/kg, with concentrations above respective site-specific non-industrial RCLs clustered at the southeast and northeast corners of the Amcast North area. The highest detected concentration of total PAHs (62.8 mg/kg) was located along the southeast boundary at FVSS-31 and was collected from a depth of between 2 and 4 feet. With the exception of FVSS-25, samples collected at depths greater than 6 feet either did not have detectable concentrations of PAH compounds or the detected concentrations were below their respective RSLs. Review of the surface and subsurface soil data from the Amcast North property indicates that the highest concentrations of total PAHs are generally limited to the top 5 to 6 feet of soil.

c. Residential Area Soils

Thirty-three surface soil samples were collected from the residential yards adjacent to the Amcast North property. Total PCB concentrations ranged from non-detect to 79 mg/kg (Figure 6). Total PCBs were detected above the WDNR site-specific non-industrial RCL of 0.22 mg/kg in 24 samples at 18 properties. The highest concentrations were detected in samples located near the fence along the northeastern edge of the former Amcast facility. Although PCB concentrations on properties adjacent the former Amcast facility were typically above the RCL, more distant samples show a somewhat random distribution across the residential yards. The concentrations in samples collected along Wilshire Drive, with one exception, are either non-detect or below the RCL.

d. Amcast South Soils

Fifteen surface soil samples were collected from the Amcast South facility, with total PCB concentrations ranging from non-detect to 11 mg/kg (Figure 7). Nine locations exceed the WDNR site-specific non-industrial RCL for total PCBs of 0.22 mg/kg.

Subsurface soil samples (more than 2 feet bgs) were collected from various depth intervals at 49 locations (Figure 8). Total PCB concentrations ranged from non-detect to 15,000 mg/kg. 17 subsurface soil samples had concentrations reported above the RCL. Twenty-one of the 49 sample locations did not have detectable levels of PCBs at the depth intervals sampled. The majority of the non-detect samples were outside of the former disposal area and/or along its perimeter. Eleven subsurface soil samples contained total PCB concentrations below the RCL. The samples were located both within and outside of the former disposal area’s boundary, at depths ranging between 2 and 23 feet bgs.

The highest total PCB concentration of 15,000 mg/kg was in the 12-to-14-foot depth interval, along the eastern edge of the former disposal area. Staining and a “fuel-like” odor were noted on the boring log for that interval. The remaining samples with the elevated concentrations of PCBs were also collected from borings along the eastern portion of the former disposal area at depths of between 11 and 21 feet.

Sixteen surface soil samples were collected and analyzed for PAHs from the Amcast South property. Total PAH concentrations ranged from non-detect to 50.8 mg/kg. Fifteen of the samples, located in the former disposal area and near the south end of the former Quonset building, had at least one PAH in each sample present at concentrations above their respective WDNR non-industrial RCLs. The highest total PAH concentrations were reported in samples collected from within the former disposal area.

In the subsurface soil, greater than 2 ft depth, total PAH concentrations ranged from non-detect to 2.92 mg/kg. At least one individual PAH was detected at a concentration above its respective WDNR non-industrial RCL within the former disposal area and at FVMW-21 (located directly adjacent to the railroad tracks) and FVSS-01 (located west of the former disposal area). The highest detection of total PAHs in subsurface soil was at a depth of between 8 and 10 feet (FVSB-13).

Descriptions of the items/debris observed in the former disposal area during drilling activities were consistent across various historical reports. The highest concentrations of PCBs were generally identified within the boundaries of the former disposal area, with some elevated surface soil concentrations adjacent to the former Quonset building and west of the former disposal area. The spatial distribution of PAHs in surface and subsurface soils roughly correlates with the distribution of PCBs. One main difference is that PCB concentrations tend to increase in depth, with maximum concentrations observed between 11 and 21 feet bgs, whereas the highest concentrations of PAHs are found in surface soil.

VOCs were not detected in soils.

Thirty-nine surface or subsurface soil samples have been collected and analyzed for metals from the Amcast South property. Arsenic was the metal most frequently detected at concentrations above its RSL (0.39 mg/kg). Although the arsenic concentrations exceed the RSL concentration, the detected concentrations fall within the range of baseline values (up to 8.0 mg/kg) for glacially deposited soil within the Lake Michigan Lobe (Stensvold 2012), with the exception of AMS-SO04. Arsenic was present in AMS-SO04 at 8.2 mg/kg within the 8- to 10-ft interval, only slightly exceeding the WDNR range of background soil concentrations, and is not considered to be indicative of historical activities at the Amcast South facility.

There are two samples across two individually sampled depth intervals with concentrations of lead detected above the residential RSL (400 mg/kg) at one historical sample location (FVSS-06 from November 2003); 1,200 mg/kg in the 1-3 ft interval, and 430 mg/kg in the 5-7 ft interval. FSS-06 is located outside of the former disposal area boundaries, just west of the railroad tracks, and does not contain PCB or PAH concentrations exceeding criteria. It is not clear if the elevated lead concentrations are due to former activities associated with the Amcast South facility.

e. Zeunert Park/Quarry Pond Sediments and Soils

East of the Amcast South property across the railroad tracks are Zeunert Park and Quarry Pond, which are zoned as a park and recreation district. Samples collected from within Quarry Pond were analyzed for PCBs and total organic carbon (TOC). Samples collected from Quarry Pond bank sediment and in Zeunert Park were analyzed for PCBs, TOC, and percent solids. Additional information for the surface water and fish tissue sampling is presented in the Field Sampling Summary, Aquatic Biological Investigation, Quarry and Wilshire Ponds Technical Memorandum (CH2M HILL 2012 – see Administrative Record).

Thirty-one sediment samples were collected from within the Quarry Pond, with total PCB concentrations ranging from 1.3 mg/kg to 11,000 mg/kg (Figure 9). The highest detected concentrations of PCBs are in the northern portion of the pond near the outflow of the storm sewer pipe originating from the Amcast South property. Concentrations decrease with distance from the outfall. The SWAC calculated for PCB impacts in Quarry Pond was 17.6 mg/kg.

Evaluation of the PCBs concentrations versus sample depth indicate that the highest concentrations of PCBs were in samples from the intermediate depths. The data suggest that the rate and distribution of deposition have decreased over time as evidenced by the presence of less contaminated shallow sediments on the north side in contrast to the absence of cleaner shallow deposits on the south side (Figure 9).

A limited investigation was conducted during the 2011 RI to define the extent of contamination on the banks with increasing distance from the pond. The area is prone to flooding during periods of higher water. Samples collected from locations adjacent to the north-northeast portion of the pond had PCB concentrations ranging from 0.830 mg/kg to 9.0 mg/kg, which is above the 1 mg/kg Toxic Substances Control Act (TSCA) self-implementing requirements of 40 CFR § 761.61(a) for high occupancy areas. Areas that are in continuous or semi-continuous use, such as residences or schools, are generally classified as “high occupancy areas.” Other risk criteria evaluated in the RI/FS for non-residential soils were less stringent than TSCA high-occupancy criteria and would require additional institutional controls (*i.e.*, property use restrictions) where less stringent risk criteria were used.

The sediment core samples collected adjacent to the transect lines either did not contain detectable levels of PCBs or the PCBs were detected at concentrations below TSCA criteria.

f. Wilshire Pond Sediments

Seventeen sediment samples were collected from Wilshire Pond, with total PCB concentrations ranging from 1.3 mg/kg to 520 mg/kg (Figure 10). Each of the 17 samples contained total PCB concentrations above the TSCA high occupancy criteria of 1 mg/kg, with the highest concentrations occurring in Basin A near the stormwater inlet to the pond. The SWAC calculated for PCB impacts in Wilshire Pond was 8.3 mg/kg. This SWAC was calculated by averaging PCB results within each of the six individual basins within Wilshire Pond.

g. Storm Sewers

During several sampling events, sediment samples were collected from storm sewers and catch basins on the Amcast North and South properties, or storm sewers and catch basins believed to be connected to the Amcast sewer lines. Dye testing, lamping, and visual inspections have been performed, and current and historic as-built drawings and geographic information system files for the sewer system maintained by the City of Cedarburg were consulted to determine flow direction and connectivity of the sewer system to Site features.

The stormwater from Amcast North is directed into one of two storm sewer mains that trend northwest-southeast along Wilshire Drive or through the residential yards. The storm sewers convey stormwater to Wilshire Pond, which discharges to Cedar Creek. The storm sewers and catch basins within the Amcast North building are also connected to the sewer line that runs along the former drainage ditch. Total PCB sample concentrations from storm sewer sediments range in concentration from 0.065 mg/kg to 19 mg/kg. The hot spot sample at CB-9 (19 mg/kg) is located on the northeast side of the building and is connected to the building storm sewers.

Amcast South stormwater is conveyed by Site storm sewers which coalesce at the south end of the Amcast South property. Stormwater is then routed under the railroad embankment and discharged to the Quarry Pond. Total PCB sample concentrations from storm sewer sediments range in concentration from 0.135 mg/kg to 23,000 mg/kg. The hot spot sample at FVSS-05A is located in the northern portion of the Amcast South property near the location of the former Quonset building. The north and south sides of the former Quonset building on the Amcast South property contain relatively higher total PCB concentrations in sewer sediment than the area farther away from the building.

Total PCB concentrations from storm sewer sediment samples taken from locations in Zeunert Park range from 2.0 mg/kg to 250 mg/kg, all exceeding the TSCA high-occupancy use criteria of 1 mg/kg.

h. Groundwater

Groundwater monitoring wells associated with the former Amcast Site were sampled and analyzed for metals (Figure 11), PCBs (Figure 12), SVOCs, and VOCs (Figure 13). The results were compared to EPA MCLs, and WDNR ESs defined under Wisconsin Administrative Code

Chapters NR 140 and NR 160 for protection of groundwater and drinking water; in the event there exists both an MCL and ES for a compound, the more stringent of the two is used for comparison. The three wells sampled at Amcast North have historically had concentrations of one or more compounds that exceed the MCL/ES, including chromium, lead, arsenic, bis(2-ethylhexyl)phthalate, and total PCBs. In 2011, the only exceedances of MCL/ES at Amcast North were for chromium at well AMN-MW01 and arsenic at well FVMW-27.

At the Amcast South property, historical and recent samples from 6 of the 10 wells contained concentrations that exceeded the MCL/ES for at least one metal, VOC, SVOC, and/or PCB. Groundwater concentrations for lead, arsenic, and manganese exceed the MCLs/ESs at four of the six wells. Only arsenic in well GMMW-3 and lead in GMMW-4 are consistently detected (through multiple sample dates) at concentrations that exceed their respective standards. Bis(2-ethylhexyl)phthalate exceedances are common amongst the Amcast South wells. Other SVOC/PAH constituents that have historically been detected above the MCL/ES include benzo(a)pyrene, benzo(b)fluoranthene, and chrysene, which were detected at GMMW-4 located in the former disposal area.

PCBs have been historically detected in samples from shallow monitoring wells FVMW-21 and GMMW-3 on the Amcast South property (Figure 12), which are screened in shallow clay and silt. During the 2011 monitoring event, PCBs were also detected at a concentration of 1.5 µg/L in AMS-MW01, which is screened in the deeper sands (Figure 12). The concentration was above the PCB ES of 0.03 µg/L. PCBs were not detected in the other wells in 2011. FVMW-21 was not sampled in 2011 because it was damaged.

There are two monitoring wells at Zeunert Park, near the eastern edge of Quarry Pond, that are screened across or near the water table in the shallow clay and silt zone. FVMW-23 is situated directly adjacent to the northern end of Quarry Pond and had only one exceedance of the MCL/ES for manganese in 2011. Manganese concentrations did not exceed the MCL/ES at this well in any of the previous dates sampled (2003 and 2004).

MCL/ES exceedances for PCBs have been detected historically in monitoring well FVMW-24 which is situated further south in the park and immediately adjacent to the eastern edge of the pond. Review of more recent sampling results found the only exceedances detected in FVMW-24 were for arsenic (29.4 µg/L) and manganese (754 µg/L).

i. Wilshire Pond Surface Water

Five surface water samples were collected from Wilshire Pond and analyzed for metals, PCBs, SVOCs, VOCs, and total suspended solids. Metals and SVOCs were detected in Wilshire Pond surface water. PCBs were not detected above detection limits (1.0 µg/L) in surface water.
Fish and aquatic organism tissue samples were collected in 2011 from the Wilshire Pond to support the ecological risk assessment. Fish species diversity was limited to green sunfish (*Lepomis cyanellus*) and golden shiner (*Notemigonus crysoleucas*). To obtain enough biomass

for tissue analysis other aquatic organisms (for example, tadpoles) were also collected. Two suspended feeder samples were retained for analysis of PCBs and percent lipids, which included one whole-body sample (green sunfish) and one whole-body composite sample (one green sunfish and one golden shiner). PCBs were detected in both samples at concentrations of 17 and 29 mg/kg, respectively. Six composite samples of tadpoles of unknown species were also retained for analysis of PCBs and percent lipids. PCBs were detected in each sample, with concentrations ranging from 3.83 to 30 mg/kg. A detailed evaluation of the biological investigation is presented in the human health and ecological risk assessments and summarized in Section E of this Proposed Plan.

j. Quarry Pond Surface Water

Surface water samples were collected from Quarry Pond and analyzed for metals, PCBs, SVOCs, VOCs, and total suspended solids. PCBs were not detected above the detection limit of 1.0 µg/L in any of the surface water samples from the Quarry Pond.

Fish tissue samples were collected from Quarry Pond to support the human health and ecological risk assessments. The fish community structure and species diversity observed in Quarry Pond was limited to green sunfish (*Lepomis cyanellus*) and black bullhead (*Ameiurus melas*) as the dominant species. Water column predators were not present; therefore, the omnivorous green sunfish, a suspended feeder, was substituted for a water column predator. Ten black bullheads and six green sunfish were retained for fillet tissue analysis of PCBs and percent lipids to support a human health risk assessment. PCBs were detected in 3 of the 6 column feeder samples, with detected concentrations ranging from 2.7 to 4.3 mg/kg. PCBs were detected in 8 of the 10 bottom feeder samples, with detected concentrations ranging from 2.5 to 25 mg/kg.

Whole-body fish tissue samples of an appropriate size range for piscivorous wildlife (4 to 12 centimeters) were collected to support an ecological risk assessment. Five composite samples of a suspended feeder (green sunfish) and three samples of single individuals of bottom feeders (black bullhead) were retained for analysis of PCBs and percent lipids. PCBs were detected in 1 of the 5 suspended feeder samples at a concentration of 6.3 mg/kg. PCBs were detected in 1 of the 3 bottom feeder samples at a concentration of 5.2 mg/kg.

A detailed evaluation of the results from the biological investigation are also presented in the Human Health Risk Assessment (HHRA) and the Ecological Risk Assessment (ERA) and summarized in Section E of this Proposed Plan.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The Site has been divided into two Operable Units (OUs). OU1 consists of soil and sediment contamination due to historic activities associated with the former Amcast Industrial Corporation. OU2 consists of Sitewide groundwater contamination due to historic activities associated with the former Amcast Industrial Corporation. This Proposed Plan describes the Preferred Alternative for contaminated soil and sediment cleanup at OU1 and also includes specific interim remedial actions for Sitewide groundwater (OU2). EPA is continuing to study long-term groundwater clean-up options at the Site under OU2 and will issue an OU2 Proposed Plan to present EPA's Preferred Alternative for remediating the Sitewide groundwater in the future.

This Proposed Plan describes the Preferred Alternative for the specific remedial actions for each of eight sub-areas: Amcast North and South source areas, the Residential Area, the Storm Sewers, Quarry Pond sediments, Zeunert Park soils, Wilshire Pond sediments, and interim groundwater. This remedy will be implemented at the source areas while monitoring will be implemented to examine the effectiveness of source removal on groundwater and surface water quality. No principal threat waste has been identified at this Site.

E. SUMMARY OF SITE RISKS

EPA uses an evaluation of human health and ecological risks posed by the Site to determine whether a remedial action is warranted at the Site. EPA conducted a Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment (ERA) as part of the RI/FS to determine the current and future effects of contaminants on human health and the environment if no remedial action were to occur.

1. Human Health Risk

A Superfund human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate the baseline risk at a Superfund site, EPA undertakes a four-step process:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk

In Step 1, EPA looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies help EPA determine which contaminants are most likely to pose the greatest threat to human health and define contaminants of potential concern (COPCs).

In Step 2, EPA considers the different ways that people might be exposed to the COPCs identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, EPA calculates a "reasonable maximum exposure" scenario which portrays the highest level of human exposure that could reasonably be expected to occur.

In Step 3, EPA uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. EPA considers two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a Superfund site is generally expressed as an upper bound probability – for example, a "1 in 10,000 chance" – and is described in terms of an excess lifetime cancer risk (ELCR). For example, for every 10,000 people that could be exposed, one extra cancer case may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected from all other causes. For noncancer health effects, EPA calculates a "hazard index" (HI). The key concept here is that a "threshold level" (measured usually as an HI of less than 1) exists below which non-cancer health effects are not predicted.

In Step 4, EPA determines whether site risks are great enough to cause health problems for people at or near the Superfund site. The results of the three previous steps are then combined, evaluated, and summarized, and contaminants of concern (COCs) are identified as needing to be addressed in the remedy.

The RI sample results from the Site were evaluated in the HHRA to identify COPCs as contaminants present above their respective screening levels. A COPC was carried through the risk assessment and identified as a contaminant of concern (COC) if it posed an ELCR greater than EPA's acceptable risk range of 1×10^{-4} (1 in 10,000 chance) to 1×10^{-6} (1 in 1,000,000 chance) for cancer risks or exceeded an HI of 1 for non-cancer risks and was above background.

The HHRA focused on health effects for both children and adults, in several different exposure scenarios, that could result from current and future direct contact with 1) contaminated soils, through ingestion, dermal contact, and inhalation of particulates, and 2) contaminated groundwater, through ingestion, dermal contact, and inhalation of volatile contaminants via household use and via vapor intrusion (VI) of soil vapor into buildings.

The HHRA also considered exposures to onsite industrial/commercial workers and onsite construction and utility workers. These workers could be exposed via all the above exposure routes. In addition, on-site construction and utility workers could also be exposed via dermal contact with groundwater seeping into trenches.

The soil data were divided into groupings based on their geographic locations (Amcast North, Amcast South, Zeunert Park, Quarry Pond banks, Residential Yards, and Wilshire Pond banks) and then subdivided into specific exposure depths. Table 3 summarizes the final COC list for the Site and broken down by sub-area and media.

a. Amcast North and South

Concentrations of COPCs in surface soils (0-2 ft bgs) were evaluated for current exposure by onsite trespassers, and the risk ranges were within acceptable levels. However, Amcast North and South properties are zoned for mixed commercial and residential use, and a developer with a grant from the City of Cedarburg is working to develop the Site for future residential use. Therefore, the Site was evaluated for future use as a residential site. Human health risk levels for

Amcast North and South surface soils were found to be above the acceptable levels, with an HI >1 for adults and children and an ELCR of 1 x 10^{-3} for children.

b. Residential Yards

COPCs in surface soils (0-2 ft bgs) were evaluated for current residential exposure. For current residents, risk in surface soils at several residential properties were within EPA's acceptable risk range for ELCR between 1×10^{-4} and 1×10^{-6}. Additionally, the HI for the residential yards is equal to or less than 1 for non-cancer endpoints. One residential property had human health risk levels above the acceptable levels (ELCR of $1\times10^{-3)}$. The contamination at this property was found between 15 and 18 inches bgs; there currently is not a known direct contact risk at this property.

c. Zeunert Park/Quarry Pond

The Zeunert Park/Quarry Pond portion of the Site is assumed to have recreational (and not residential or industrial) use. Zeunert Park surface soils were evaluated for dermal contact and ingestion pathways, and the human health risk did not exceed acceptable risk levels. Noncancer hazards did not exceed 1. Total risks to adults and children from surface soils were 1×10^{-6}.

Quarry Pond surface water was evaluated for ingestion and dermal contact risks. While risks exceeded EPA's 1×10^{-6} departure point (at which no action may be needed) for cancer related risk, the risk was still within EPA's acceptable risk range. The noncancer HI did not exceed 1. There are advisories posted around Quarry Pond warning the public to avoid contact with the water.

Quarry Pond sediment was evaluated for dermal contact and ingestion pathways, and the human health noncancer hazards exceeded 1. Total risks to adults and children from sediment were 4×10^{-4} . Access is restricted to the Pond and there are advisories posted warning the public to avoid contact with the sediment.

Quarry Pond fish filets were evaluated for ingestion risks, and the risk levels exceed acceptable ranges. After detecting PCBs in fish collected from Quarry Pond in 1991, WDNR released a "do not eat" fish consumption advisory. "No Fishing" signs were present around Quarry Pond as observed during a November 2022 site tour.

d. Wilshire Pond

A human health recreational use was also assumed for Wilshire Pond. Acceptable risk ranges were exceeded for some COPCs in Wilshire Pond sediments and bank soils. Noncancer hazards were greater than 1 for adults and children due to PCB concentrations. Wilshire Pond surface water exceed cancer risks, with an ELCR of 2×10^{-4}.

e. Groundwater

Groundwater samples were collected beneath the Amcast North and Amcast South areas. Contaminant concentrations were compared in the HHRA against WDNR Preventive Action Limits (PALs) presented in Wisconsin Administrative Code Chapter NR 140, in addition to the EPA RSLs for the selection of COCs. VI samples were not collected as part of the RI. Screening levels for the groundwater-to-indoor air pathway (vapor intrusion) were calculated using the USEPA Vapor Intrusion Screening Level (VISL) Calculator tool (USEPA 2013c).

The risk of potable use of groundwater was quantified, however groundwater is not currently used as potable water and it is unlikely that groundwater would be used as potable water in the future. The site is currently served by the public water supply, and it is anticipated that the site will continue to be served by public water in the future. However, given that per the NCP the EPA expects that groundwater be returned to beneficial use, future potable use of groundwater was evaluated during the HHRA.

Groundwater is encountered at the Amcast Site at depths ranging between 8 and 34 feet bgs, depending on the ground surface elevation. Monitoring wells that are screened in the shallow clay/silt are considered to be within a perched groundwater zone that is not able to yield sufficient water for residential or other use (logarithmic-average hydraulic conductivity of 4.31×10^{-4} centimeters per second).

Groundwater data was also evaluated for future exposure scenarios at Amcast North and South for the potential for vapor intrusion. The human health risks exceed acceptable ranges for adults and children, with HI>1 and ELCR at 3×10^{-1} at both Amcast North and South. This elevated risk is based on a scenario of exposure via the vapor intrusion pathway of a future Site resident.

2. Ecological Risk

The objective of the ERA was to evaluate whether Site-related contaminants, present on the Site and in surrounding areas connected to the Site through complete transport pathways, represent a potential unacceptable risk to exposed ecological receptors. The assessment was performed in accordance with the *Ecological risk assessment guidance for Superfund: process for designing and conducting ecological risk assessments* (USEPA 1997).

Conservative assumptions were generally used in the exposure and effects assessments, so uncertainties related to the limitations of the available data (requiring that certain assumptions and extrapolations be made), along with uptake and food web exposure model assumptions, are more likely to result in an overestimation rather than an underestimation of the likelihood and magnitude of risks to ecological receptors. ERA COPCs were identified for each of the terrestrial and aquatic areas evaluated in the ERA (Amcast North, Amcast South, Residential Area, Zeunert Park, Quarry Pond, and Wilshire Pond). PCBs are the ERA COCs identified in aquatic habitats associated with the Site (Quarry Pond basin sediment, fish tissue, and aquatic food webs; Wilshire Pond basin and bank sediment, fish tissue, and aquatic food webs). The fish tissue and aquatic food web exposures in Wilshire Pond constitute the highest potential ecological risks of those evaluated in the ERA. PCBs are also the primary ERA COCs in terrestrial habitats on and adjacent to the Site.

COCs were identified for all terrestrial and aquatic areas evaluated in the ERA, as summarized below.

a. Amcast North

Manganese and PCBs were identified as surface soil COPCs for direct exposures of lower trophic level receptors. The results of the terrestrial food web evaluation identified PCBs as COPCs. These potential risks were driven largely by short-tailed shrew exposures. Given the relatively poor habitat quality present in this area, the identified potential risks were likely of low ecological significance.

b. Residential Area

PCBs were identified as COPCs in surface soil for direct exposures of lower trophic level receptors. However, potential risks to these receptors were relatively low. Based on a soil ecological screening value (ESV) for terrestrial plants of 8,000 µg/kg (including an uncertainty factor of 5), the maximum hazard quotient (HQ) in this area was 1.6. Given the relatively low habitat quality present in this area, it is likely that exposures and potential risks are low. The results of the terrestrial food web evaluation identified PCBs as COCs. Potential risks were driven largely by short-tailed shrew exposures.

c. Amcast South

Copper, manganese, Aroclor-1248, Aroclor-1254, total PCBs, and high molecular weight PAHs were identified as surface soil COPCs for direct exposures of lower trophic level receptors. Copper exceeded soil ESVs in just one site surface soil sample but at a relatively high ratio (14.4), suggesting that there are relatively high, but spatially isolated, areas of copper contamination in this area of the Site. Similarly, high molecular weight PAHs exceed ESVs in just 2 of 15 surface soil samples (but at maximum ratios exceeding 5), although mean HQs are less than one. Thus, PAH contamination at ecologically relevant levels is likely to be spatially limited. The results of the terrestrial food web evaluation identified PCBs as final COPCs. Potential risks were driven largely by short-tailed shrew exposures. However, mean HQs for this receptor were exceeded only for the maximum acceptable toxicant concentration (MATC) (HQs = 1.50) and for the lowest observed adverse effect level (LOAEL). Thus, potential risks were marginal for these two chemicals.

d. Zeunert Park

No chemicals were identified as surface soil COPCs for direct exposures of lower trophic level receptors, and risks were considered acceptable for this pathway. The results of the terrestrial food web evaluation identified PCBs as COPCs. Potential risks were driven by short-tailed shrew exposures. However, mean HQs for this receptor did not exceed 1.0. Thus, potential risks were marginal for these two chemicals.

e. Quarry Pond

There were no COPCs identified for Quarry Pond surface water. PCBs were identified as COPCs in pond basin surface sediment. However, bank surface sediment samples did not exceed acceptable risk levels. Thus, potential risks related to bank soils were relatively low and are not likely to be ecologically significant. No COPCs were identified for bank surface sediments.

The concentrations of PCBs in pond basin surface sediment samples exceed risk levels, and the elevated concentrations extended into the subsurface sediments where most samples also exceed the site-specific ESV of 1.9 mg/kg. Thus, risks related to pond surface sediments for PCBs (the COCs for this media) were relatively high and are likely to be ecologically significant.

PCBs were identified as COPCs in Quarry Pond fish tissue. However, HQs based on mean concentrations did not exceed 1.0 so potential risks on a population level were marginal. The limited food supply in the pond (based on the limited littoral zone and minimal benthic invertebrate community) and the seasonally low bottom dissolved oxygen concentrations in the deeper portions of the pond may have been more limiting factors for fish populations than PCB contamination.

Similarly, PCBs were identified as COPCs for food web exposures in Quarry Pond. However, only the tree swallow has a LOAEL-based mean HQ exceeding 1.0. Based on the qualitative benthic invertebrate sampling, there appears to be a limited food base for this receptor, which eats emergent flying insects. Thus, risks from food web exposures in Quarry Pond were marginal. Potential risks for species utilizing the pond banks (such as Canada geese) did not exceed acceptable risk thresholds. Thus, fish and aquatic food web pathway risks from PCB exposures were marginal and may not be ecologically significant given the relatively poor habitat conditions that currently exist.

f. Wilshire Pond

While there is some uncertainty due to the lack of dissolved metals data and the potential turbidity of some samples, potential risks from surface water exposures were relatively low and no COPCs were identified for this media.

PCBs were identified as COPCs in surface sediment. The concentrations of these chemicals in combined pond and bank samples exceeded risk values. The elevated concentrations extended into the subsurface sediments of the basins where the majority of samples also exceeded risk-based values. Thus, potential risks related to pond and bank surface sediment samples were relatively high and likely to be ecologically significant.

PCBs were identified as COPCs in fish tissue and for food web exposures. Exceedances were of high enough magnitude to warrant the retention of these chemicals as COCs for these pathways, which constitute the highest potential ecological risks of those evaluated.

3. Basis for Action

It is EPA's current judgement that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in this Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

F. REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are goals specific to media or OUs for protecting human health and the environment. They are based on unacceptable risks, anticipated current and future land use, objectives and expectations of the action, and statutory requirements. RAOs were developed for the Site based on the COC levels and exposure pathways estimated to pose an unacceptable risk to human health and the environment, as determined during the RI.

1. Human Health and Ecological Risk based RAOs

Unacceptable risks or hazards were identified in surface soil (0 to 2 feet), total soil (0 to 10 feet), groundwater, sediment, and fish. No RAOs are proposed for Zeunert Park soils as they currently pose no unacceptable human health or ecological risks. The corresponding RAOs have been developed to address these risks under this proposed action:

- Soil
    - Reduce or eliminate human exposure through dermal contact, ingestion, and inhalation of COCs in soil to levels protective of current and reasonably anticipated future land uses at the Site.
- Groundwater (Interim RAOs)
    - Prevent human exposure via dermal contact with, and ingestion of, contaminated groundwater at the Site.
    - Reduce or eliminate human exposure from vapor intrusion of COCs for hypothetical future residents and/or future industrial workers at the Site.
- Quarry Pond and Wilshire Pond Sediment
    - Reduce or eliminate human exposure through dermal contact and ingestion to COCs for recreational users.
- Quarry Pond Fish
    - Reduce fish tissue COC concentrations to acceptable levels for recreational anglers.

The ecological RAOs for surface soil (0 to 2 feet), surface sediment, fish/frog tissue, and wildlife are as follows:

- Surface soil

    - Reduce or eliminate direct contact, direct ingestion, and/or food web exposures to COC concentrations that are above acceptable levels at the Site.
- Pond Basin and Bank Sediment
    - Reduce or eliminate direct contact, direct ingestion, and/or food web exposures to COC concentrations that are above acceptable levels at the Site.
- Wildlife
    - Reduce the potential for bioaccumulation of PCBs into fish/frog tissues above acceptable levels at the Site.
    - Minimize the potential for adverse effects resulting from the ingestion of water and aquatic prey taken from surface waters containing PCBs.

2. Preliminary Remediation Goals

To meet the RAOs, preliminary remediation goals (PRGs) were developed to define the extent of contaminated media (soil, sediment, and groundwater) requiring remedial action. PRGs are risk-based or Applicable or Relevant and Appropriate Requirement (ARAR)-based chemical-specific concentration levels used in developing and evaluating potential cleanup alternatives for a site. PRGs are considered "preliminary" until final cleanup levels are established in a ROD.

EPA developed the PRGs for the Site based both on protective risk-based concentrations associated with current and reasonably anticipated future land uses and a review of potential federal and state ARARs. The potential ARARs for the Site are provided in Table 4.

PRGs establish media-specific concentrations of COCs that, once achieved, will be protective of human health and the environment. The proposed remedial action with the proposed PRGs will address hazards associated with exposure to contaminated soils, sediments, and fish. The soil and sediment PRGs are presented by sub-area and media in Table 5.

Potential exposures to sediment and water in the stormwater sewers would be very infrequent and are considered negligible, and as such were not evaluated in the HHRA. However, PRGs are proposed for storm sewer sediments because of the potential for PCB contamination associated with sewer sediment or backfill to continue to act as source material for water travelling toward Wilshire and/or Quarry Ponds, either within the pipes or along the backfill. These PRGs are also consistent with PCB cleanup limits under TSCA.

There are no unacceptable risks for surface water and therefore no PRGs. Surface water sampling during the RI was conducted without considering Wisconsin's (and EPA's) water-quality criteria for the protection of wildlife, which includes a numeric standard for total PCBs at 0.12 ng/L. PCBs in previously collected surface water samples were non-detect, with a limit of detection of 1 μg/L. Additional sampling will be conducted after remediation is complete to monitor surface water quality as it applies to these protective criteria.

a. Summary of PRGs

The table below summarizes the various PRGs that are proposed for the Amcast Site. The ability to meet the various risk-based fish tissue PRGs for sediments will be evaluated during the five-year review process following the remedial action. These reviews will consider factors identified during long-term monitoring that may limit overall fish tissue and sediment recovery.

EPA has selected a PRG for PCB concentrations in site soils of 0.22 mg/kg, which is consistent with the cleanup level identified by Wisconsin regulations for non-industrial direct soil contact (NR 720.12). EPA is using a PRG for PCB concentrations in pond bank soils and storm sewer sediments of 1 mg/kg, which is consistent with the cleanup level for high-occupancy use under TSCA.

EPA is using a PRG of 400 mg/kg for lead in soil at residential properties, based on current EPA policy and EPA's current residential RSL. EPA's current national lead policy, in effect since 1994, specifies the use of a target blood lead level of 10 micrograms per deciliter (µg/dL) in the Integrated Exposure Uptake Biokinetic (IEUBK) model to develop lead-in-soil cleanup levels for residential properties. This is also the basis for EPA's current residential RSL of 400 mg/kg, which was developed using Version 1 of the IEUBK model. EPA is currently reviewing its existing policy on human health risks from lead contamination in soil. If EPA revises its national lead policy after the Record of Decision is signed and the revised policy results in a lower cleanup level for residential properties, then EPA will determine whether the selected residential lead-in-soil cleanup level for this Site needs to be modified to comply with the revised national guidance and ensure the remedy is protective.

Recommended PRGs for Amcast Site OU1		
Media/Biota	**PRGs for Total PCBs**	**Other PRGs**
Fish Tissue	0.025 mg/kg (achieved via a long-term SWAC of 0.25 mg/kg in sediment)	N/A
Sediment (Quarry Pond)	Long-term SWAC of 0.25 mg/kg	N/A
Sediment (Wilshire Pond, Storm Sewers)	1 mg/kg	N/A
Non-Residential Soils (pond banks)	1 mg/kg	N/A
Residential Soils (including Amcast North and South)	0.22 mg/kg	PAHs: varies by PAH, 0.115 – 115 mg/kg Copper: 80 mg/kg Lead: 400 mg/kg Manganese: 450 mg/kg

G. SUMMARY OF REMEDIAL ALTERNATIVES

Remedial alternatives for the Site are presented below. For each sub-area a "no action" alternative was evaluated. The Superfund regulations require that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. This alternative was rejected in each case because it would not achieve the RAOs for the Site. After the FS was completed, EPA further evaluated several of the soil and sediment alternatives to be consistent with 1×10^{-6} risk levels in a Technical Memorandum dated March 13, 2023. EPA also updated the estimated costs for all the remedial alternatives in the Technical Memorandum. All of the proposed remedial alternatives and their associated cost estimates are presented below. Estimated costs include both capital (*i.e.*, costs to construct a remedial alternative) and operation and maintenance costs (*i.e.*, post-construction costs), where applicable. Alternatives are numbered to correspond with the numbers in the March 13, 2023, Technical Memorandum and are further explained in the FS report and Technical Memorandum.

Remedial alternatives were developed using site-specific PRGs at 1×10^{-6} risk levels, derived during the 2015 RI Report and corresponding HHRA. Since that time, EPA has updated guidance for toxicological inputs to determine the PRGs associated for some PAHs and risk levels have changed. As such, new PRGs to be consistent with WDNR guidance and EPA risk methodology are reflected in the above table. These new PRGs will be part of the Residential Yards, Amcast North, and Amcast South selected remedy. The impact to the costs of the arrayed remedial alternatives in this proposed plan due to revised PRGs for some PAHs is not significant and expected to be within the Feasibility Study cost range of +50 to -30% of the eventual selected remedy.

1. Amcast North

The remedial alternatives for the Amcast North soil source areas are shown in Figure 14 and described below.

a. AMN-1: No Action

Estimated Capital cost: *$0*

Estimated Annual Operation and Maintenance (O&M) cost: *$0*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost: *$0*

Alternative AMN-1 consists of taking no action. The no-action alternative would leave affected soil in place at the Site. There are no capital or O&M costs associated with Alternative AMN-1. However, Superfund regulations require five-year site reviews as long as hazardous substances remain at the site at concentrations that do not allow unlimited use and unrestricted exposure (UU/UE).

b. AMN-2: Excavation, Offsite Disposal, Backfill and Site Restoration

Estimated Capital cost: $*2,986,482*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *4 months*

Estimated Time to Achieve RAOs: *4 months*

Estimated Total Present Worth Cost: *$2,986,482*

Alternative AMN-2 consists of excavating the soil with COCs exceeding human health and ecological PRGs, followed by offsite disposal at a Resource Conservation and Recovery Act (RCRA) Subtitle D landfill for soils containing less than 50 mg/kg PCBs or TSCA-permitted and Offsite Rule (OSR)-approved facility for soils containing greater than 50 mg/kg PCBs. Sampling will be conducted during the design phase to better define the extent of soils requiring disposal at a TSCA facility. Soil verification samples would be required to document that soil with concentrations exceeding the PRGs has been removed. The excavation would then be filled with clean soil and restored to existing conditions. The alternative was originally developed with the assumption that the Amcast North building would remain intact. The building was demolished by a third party and so any design developed for remediation based on this alternative would be modified based on current Site conditions. Approximately 4,981 cubic yards (yd^3) of non-TSCA and 56 yd^3 of TSCA soil would be removed (to be confirmed with sampling during design). There are no O&M costs associated with Alternative AMN-2 as no contamination will be left behind that would require long-term maintenance.

c. AMN-3: Excavation, Backfill, Isolation Cover, and Site Restoration

Estimated Capital cost: *$1,442,786*

Estimated Annual O&M cost: *$773,323*

Estimated Construction Timeframe: *3 months*

Estimated Time to Achieve RAOs: *3 months*

Estimated Total Present Worth cost: *$ 2,216,109*

AMN-3 consists of excavating PCB soils greater than 10 mg/kg (the TSCA high-occupancy limit for capped PCB-impacted soil) and constructing an isolation cover over the soil with COCs exceeding human health-related and ecological-related PRGs for residential use. The building was demolished by a third party outside of EPA's control and so any design developed for remediation based on this alternative will be modified based on current Site conditions. Excavated soils would be disposed of at a RCRA or TSCA-permitted and Off-Site Rule (OSR - 40 CFR 300.440)-approved facility. Sampling will be conducted during the design phase to better define to extent of soils requiring disposal at a TSCA facility. Soil verification samples would be taken to document that soil with concentrations exceeding the PRGs has been removed.

The unique components of AMN-3 are as follows:

- Excavating contaminated soils with PCB concentrations greater than 10 mg/kg to a depth of 3 feet below grade, as depicted in Figure 14;
- Constructing a low-permeability isolation cover over the soil with COCs exceeding human health and ecological PRGs; and
- Removing approximately 56 yd^3 of TSCA soil.

Annual inspections and maintenance of the isolation cover would be required into perpetuity after construction is complete; a cost estimate for 30 years of maintenance was generated. Institutional controls in the form of deed restrictions to define areas of remaining contamination and associated restrictions would be required for this alternative.

2. Residential Yards

The remedial alternatives for the Amcast North soil source areas are shown in Figure 14 and described below.

a. RY-1—No Action

Estimated Capital cost: *$0*

Estimated Annual O&M cost: $0

Estimated Construction Timeframe*: N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost: *$*0

Alternative RY-1 consists of taking no action. The no-action alternative leaves affected soil in place at the Site. There are no capital or O&M costs associated with Alternative RY-1. However, five-year site reviews would be required as long as hazardous substances remain at the site at concentrations that do not allow UU/UE.

b. RY-2—Soil Excavation, Offsite Disposal, Backfill, and Site Restoration (Total PCB PRG of 1 mg/kg)

Estimated Capital cost: *$3,137,495*

Estimated Annual O&M cost: $0

Estimated Construction Timeframe*: 4 months*

Estimated Time to Achieve RAOs: *4 months*

Estimated Total Present Worth cost: *$ 3,137,495*

Alternative RY-2 consists of excavating soil with COC concentrations exceeding human health and ecological risk levels, and offsite disposal at RCRA or TSCA-permitted and OSR-approved facility. Specifically, this alternative was evaluated in the Feasibility Study as excavating PCB soils greater than 1 mg/kg based on TSCA high occupancy requirements. Sampling will be conducted during the design phase to better define to extent of soils requiring disposal at a TSCA facility. Soil verification samples will be required to verify that soil with concentrations exceeding the PRGs has been removed. The excavation will then be filled with clean soil and restored to its existing condition. Approximately 3,015 yd^3 of non-TSCA and 267 yd^3 of TSCA soil will be removed.

c. RY-3—Soil Excavation, Offsite Disposal, Backfill, and Site Restoration (Total PCB PRG of 0.22 mg/kg)

Estimated Capital cost: *$3,793,290*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe*: 4 months*

Estimated Time to Achieve RAOs: *4 months*

Estimated Total Present Worth cost: *$ 3,793,290*

Alternative RY-3 consists of excavating soil with COC concentrations exceeding human health and ecological PRGs, and offsite disposal at RCRA or TSCA-permitted and OSR-approved facility. Sampling will be conducted during the design phase to better define to extent of soils requiring disposal at a TSCA facility. Specifically, this alternative was evaluated in the March 13, 2023, Technical Memorandum as excavating PCB soils greater than 0.22 mg/kg consistent with WAC NR 720.12 Direct Contact soil criteria. Soil verification samples will be required to verify that soil with concentrations exceeding the PRGs has been removed. The excavation would be backfilled with clean soil and restored to its existing condition. Approximately 4,782 yd^3 of non-TSCA and 267 yd^3 of TSCA soil would be removed. There are no O&M costs associated with Alternative RY-3 as no contamination will be left behind that would require long-term maintenance.

3. Amcast South Alternatives (Soil)

The remedial alternatives for the Amcast South soil source areas are shown in Figure 15 and described below.

a. AMS-1—No Action

Estimated Capital cost: *$0*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost*: $*0

Alternative AMS-1 consists of taking no action. The no-action alternative leaves affected soil in place at the Site. There are no capital or O&M costs associated with Alternative AMS-1. However, five-year site reviews would be required as long as hazardous substances remain at the site at concentrations that do not allow UU/UE.

a. AMS-2—Excavation, Offsite Disposal, Backfill, and Site Restoration (Total PCB PRG of 1 mg/kg)

Estimated Capital cost: *$8,822,056*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe*: 4 months*

Estimated Time to Achieve RAOs: *4 months*

Estimated Total Present Worth cost: *$ 8,822,056*

AMS-2 consists of excavating the soil with COCs exceeding human health and ecological risk levels, followed by offsite disposal at a RCRA- and/or TSCA-permitted and OSR-approved facility. Sampling will be conducted during the design phase to better define to extent of soils requiring disposal at a TSCA facility. Specifically, this alternative was evaluated in the Feasibility Study as excavating PCB soils greater than 1 mg/kg based on TSCA high-occupancy requirements. Verification samples would be required to document that soil concentrations exceeding the TSCA threshold have been removed. The excavation would then be backfilled with clean soil and restored to its existing condition. The alternative is based on the assumption that soils with concentrations exceeding human health and/or the ecological risk levels would be excavated to various depths up to 21 feet below grade, as shown in Figure 15. Approximately 11,979 yd^3 of non-TSCA and 1,385 yd^3 of TSCA soil would be removed.

b. AMS-3—Excavation, Backfill, Isolation Cover and Site Restoration

Estimated Capital cost: *$ 4,460,672*

Estimated Annual O&M cost: *$ 1,076,204*

Estimated Construction Timeframe: *3 months*

Estimated Time to Achieve RAOs: *3 months*

Estimated Total Present Worth cost: *$ 5,536,876*

AMS-3 consists of excavating PCB soils greater than 10 mg/kg (the TSCA high-occupancy limit for capped PCB-impacted soil), constructing an isolation cover over the remaining soil with COC concentrations exceeding the human health and ecological PRGs and stabilization of offsite contamination. Excavated soils would be disposed of at a RCRA or TSCA-permitted and OSR-approved facility. Sampling will be conducted during the design phase to better define the extent of soils requiring disposal at a TSCA facility. Soil verification samples would be taken to document that soil with concentrations exceeding risk levels has been removed.

The unique components of AMS-3 are as follows:

- Constructing a low-permeability isolation cover over the soil with COCs exceeding human health and ecological risk levels; and
- Removing approximately 1,385 yd^3 of TSCA soil.

Annual inspections of the isolation cover would be required into perpetuity and a maintenance cost for 30 years after construction is complete was generated. Institutional controls in the form of deed restrictions to define areas of remaining contamination and associated restrictions would be required for this alternative.

c. AMS-4—Excavation, Offsite Disposal, Backfill, and Site Restoration (Total PCB PRG of 0.22 mg/kg)

Estimated Capital cost: *$7,933,312*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *4 months*

Estimated Time to Achieve RAOs: *4 months*

Estimated Total Present Worth cost*: $ 7,933,312*

AMS-4 consists of excavating the soil with COCs exceeding human health and ecological PRGs followed by offsite disposal at a RCRA- and/or TSCA-permitted and OSR-approved facility. Specifically, this alternative was evaluated in the March 13, 2023, Technical Memorandum as excavating PCB soils greater than 0.22 mg/kg consistent with WAC NR 720.12. Verification samples would be required to document that soil concentrations exceeding the PRGs have been removed. The excavation would then be filled with clean soil and restored to its existing condition. The alternative is based on the assumption that soils with concentrations exceeding human health PRGs and/or the ecological PRGs would be excavated to various depths up to 21 feet below grade, as shown in Figure 15. The status of the building demolition may affect the cost estimate and the estimate of cubic yards of soil that would be excavated and taken offsite for disposal. Approximately 12,129 yd^3 of non-TSCA and 1,385 yd^3 of TSCA soil would be removed. There are no O&M costs associated with Alternative AMS-4 as no contamination will be left behind that would require long-term maintenance.

4. Quarry Pond Alternatives (Sediment)

The remedial alternatives for the Quarry Pond sediment are shown in Figure 16 and described below.

a. QP-1—No Action

Estimated Capital cost: *$0*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost: *$*0

Alternative QP-1 consists of taking no action. The no-action alternative would leave affected sediment in place at the Site. There are no capital or O&M costs associated with Alternative QP-1. However, five-year site reviews would be required as long as hazardous substances remain at the site at concentrations that do not allow UU/UE.

a. QP-2—Sediment Dredging, Bank Soil Excavation, Offsite Disposal, and Site Restoration

Estimated Capital cost: *$8,398,937*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost: *$ 8,398,937*

Alternative QP-2 consists of dredging the sediment and excavating bank soil with COC concentrations exceeding 1.9 mg/kg (the ecological PRG), followed by offsite disposal of materials at RCRA- and/or TSCA-permitted and OSR-approved facility. Verification samples would be required to document that sediment concentrations exceeding the PRGs have been removed. The pond bank soil would then be backfilled with clean soil and restored.

An estimated 656 yd^3 of bank soil and 14,907 yd^3 of Quarry Pond sediment would be removed under this alternative.

b. QP-3 - Construct Permeable Reactive Barrier, Excavate Bank Soil, Offsite Disposal, and Site Restoration

Estimated Capital cost: *$5,905,381*

Estimated Annual O&M cost: *$ 2,366,415*

Estimated Construction Timeframe: *2 months*

Estimated Time to Achieve RAOs*: 2 months*

Estimated Total Present Worth cost: *$ 8,271,796*

QP-3 consists of constructing a permeable reactive barrier (PRB) to isolate sediment with PCB concentrations exceeding human health and ecological PRGs (Table 5), excavating bank soils, and offsite disposal at a TSCA-permitted and OSR-approved facility. Soil verification samples would be required to document that soil with concentrations exceeding the PRGs has been removed from the bank, and periodic fish tissue verification sampling would be required to monitor long-term reduction of PCB bioaccumulation in fish. The pond bank areas would then be backfilled with clean soil and restored. An estimated 656 yd^3 of bank soil would be removed under this alternative.

The unique components of QP-3 are as follows:

- Constructing a PRB to isolate the contaminated sediments with concentrations exceeding human health PRGs and ecological PRGs;
- Performing monitoring and maintenance of the PRB and fish tissue sampling every 5 years for a period of 30 years; and
- Implementing institutional controls (e.g., deed notations and signage) to define areas of remaining concern and the associated restrictions that would limit exposure.

c. QP-4 - Sediment Dredging to 1 mg/kg PCBs, Bank Soil Excavation, Offsite Disposal, Residual Management Layer and Site Restoration

Estimated Capital cost: *$12,140,519*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *4 months*

Estimated Time to Achieve RAOs: *4 months*

Estimated Total Present Worth cost: *$ 12,140,519*

QP-4 consists of dredging the sediment with PCB concentrations above a 1 mg/kg action level to achieve a post-construction PCB SWAC of 0.5 mg/kg and a long-term PCB SWAC goal of 0.25 mg/kg, and excavating bank soils above the PRG for PCBs of 1 mg/kg. The 0.25 mg/kg sediment SWAC goal is the sediment PRG, and its attainment is intended to hasten the recovery of fish tissues to PRGs. Dredging will be followed by offsite disposal of materials at RCRA- and/or TSCA-permitted and OSR-approved facility. Verification samples would be required to document that sediment with concentrations exceeding the post-construction SWAC of 0.5 mg/kg has been removed, and periodic fish tissue verification sampling would be required to monitor long-term reduction of PCB bioaccumulation in fish. The pond bank soil would then be backfilled with clean soil and restored after verification sampling. A residual management layer consisting of 3-6" of clean sand may also be applied if necessary to reduce post-dredging residual PCB concentrations. An estimated 656 yd^3 of bank soil and 19,573 yd^3 of Quarry Pond sediment would be removed under this alternative.

5. Wilshire Pond Alternatives (Sediment/Bank Soil)

The alternatives developed for the Wilshire Pond address sediment and bank soil contamination and are described in the following paragraphs (see Figure 17).

a. WP-1—No Action

Estimated Capital cost: *$0*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost: *$*0

Alternative WP-1 consists of taking no action. The no-action alternative would leave affected soil in place at the Site. There are no capital or O&M costs associated with Alternative WP-1. However, five-year site reviews would be required as long as hazardous substances remain at the site at concentrations that do not allow UU/UE.

b. WP-2—Sediment and Bank Soil Excavation, Offsite Disposal, Backfill, and Site Restoration

Estimated Capital cost: *$1,772,880*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *2 months*

Estimated Time to Achieve RAOs: *2 months*

Estimated Total Present Worth cost: *$ 1,772,880*

Alternative WP-2 consists of excavating the sediment and/or bank soil with PCB concentrations exceeding PRGs (as shown in Table 5) from each sub-basin composing Wilshire Pond, followed by offsite disposal at a RCRA and/or TSCA-permitted and OSR-approved facility. This alternative assumes that the berms are not contaminated and, therefore, does not include removal and replacement of the berms separating each basin. Verification samples would be required to document that soil with concentrations exceeding the PRGs has been removed. The slopes of the basins would then be restored to stable conditions. Approximately 1,348 yd^3 of non-TSCA sediment and soil and 89 yd^3 of TSCA sediment would be removed under this alternative. There are no O&M costs associated with Alternative WP-2 as no contamination will be left behind that would require long-term maintenance.

c. WP-3—Sediment and Bank Soil Excavation, Structural Excavation, Offsite Disposal, Backfill, and Site Restoration

Estimated Capital cost: *$2,058,198*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *2 months*

Estimated Time to Achieve RAOs: *2 months*

Estimated Total Present Worth cost: *$ 2,058,198*

Alternative WP-3 consists of the same components as Alternative WP-2, except that the berms separating the basins are assumed to be contaminated. Under this alternative, the berms separating the sub-basins would be removed and replaced. The stormwater retention basin would also be restored in consultation with the City of Cedarburg. Approximately 1,859 yd^3 of non-TSCA sediment and soil and 89 yd^3 of TSCA sediment would be removed under this alternative. There are no O&M costs associated with Alternative WP-3 as no contamination will be left behind that would require long-term maintenance.

6. Amcast North Storm Sewers Alternatives

The Amcast North sewers are composed of the subsurface pipes and associated components (e.g., catch basins) that originate inside the building and extend to Wilshire Pond. North area storm sewer remedial actions would be completed prior to any remedy for Wilshire Pond. Figure 18 depicts the major components of the alternatives for the Amcast North storm sewers.

a. SSN-1—No Action

Estimated Capital cost: *$0*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost: *$0*

Alternative SSN-1 consists of taking no action. The no-action alternative would leave affected soil and sediment in place at the Site. There are no capital or O&M costs associated with Alternative SSN-1. However, five-year site reviews would be required as long as hazardous substances remain at the site at concentrations that do not allow UU/UE.

b. SSN-2—Abandon Amcast North Building Storm Sewers, Excavation and Backfill, Pressure Wash Non-Building Storm Sewers, Offsite Disposal, and Site Restoration

Estimated Capital cost: *$3,007,513*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *2 months*

Estimated Time to Achieve RAOs: *2 months*

Estimated Total Present Worth cost: *$ 3,007,513*

Alternative SSN-2 consists of abandoning the Amcast North building storm sewers at the perimeter and plugging the pipe ends with concrete after pressure washing storm sewers to the extent possible. Soils and sediments, with COC concentrations exceeding human health PRGs and/or ecological PRGs for soil (Table 5), would be excavated in the area outside of the building, excavating the sewer trench fill footprint to access the sewer piping for abandonment. Further, alternative SSN-2 consists of removing sediment and associated water in storm sewers connecting Cedar Creek to Wilshire Pond, and storm sewers from outside of the Amcast North property building footprint and downgradient until the storm sewers discharge into Wilshire Pond, by pressure washing. After pressure washing the pipes, the interior of the pipes would be sealed with epoxy to prevent potential recontamination of the pipes from outside material. All removed soil and sediment would be sent for offsite disposal at a TSCA-permitted and OSR-approved facility. The alternative assumes that the contaminant concentrations in the excavated soil and sewer backfill at the building perimeter would not be RCRA-regulated hazardous waste or exceed the TSCA disposal threshold of 50 mg/kg. Verification samples would be required to determine if soils with concentrations exceeding the PRGs have been removed. The excavation would then be backfilled with clean soil and restored to its existing condition. There are no O&M costs associated with Alternative SSN-2 as no contamination will be left behind that would require long-term maintenance.

c. SSN-3—Abandon Amcast North Building Storm Sewers, Remove Non-Building Storm Sewer Piping, Excavation and Backfill, Pressure Wash Non-Building Storm Sewers, Offsite Disposal, and Site Restoration

Estimated Capital cost: *$ 3,122,871*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *2 months*

Estimated Time to Achieve RAOs: *2 months*

Estimated Total Present Worth cost: *$3,122,871*

Alternative SSN-3 consists of abandoning the Amcast North building storm sewers at the perimeter and removing the estimated 20 feet of non-building storm sewer piping emanating from the Amcast North building after pressure washing storm sewers to the extent possible. Soils and sediments, with COC concentrations exceeding human health PRGs and/or ecological PRGs for soil (Table 5), would be excavated in the area outside of the building excavating the sewer trench fill footprint to access the sewer piping for abandonment. Further, alternative SSN-3 consists of removing sediment and associated water in storm sewers from outside of the Amcast North property building footprint, downgradient until the storm sewers discharge into Wilshire Pond, and the sewers connecting Wilshire Pond to Cedar Creek by pressure washing. After pressure washing the pipes, the interior of the pipes would be sealed with epoxy to prevent potential recontamination of the pipes from outside material. All removed soil and sediment would be sent for offsite disposal at a TSCA-permitted and OSR-approved facility. The alternative assumes that the contaminant concentrations in the excavated soil and sewer backfill at the building perimeter would not be RCRA-regulated hazardous waste or exceed the TSCA disposal threshold of 50 mg/kg. Verification samples would be required to determine if soils with concentrations exceeding the PRGs have been removed. The excavation would then be backfilled with clean soil and restored to its existing condition. There are no O&M costs associated with Alternative SSN-3 as no contamination will be left behind that would require long-term maintenance.

7. Amcast South Storm Sewer Alternatives

Figure 19 depicts the major components of the alternatives for the Amcast South storm sewers, and the alternatives are described below.

a. SSS-1—No Action

Estimated Capital cost: *$0*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost: *$*0

Alternative SSS-1 consists of taking no action. The no-action alternative would leave affected soil and sediment in place at the Site. There are no capital or O&M costs associated with Alternative SSS-1. However, five-year site reviews would be required as long as hazardous substances remain at the site at concentrations that do not allow UU/UE.

b. SSS-2—Pressure Wash Storm Sewers, Excavation, Offsite Disposal, Backfill, and Site Restoration

Estimated Capital cost: *$2,463,136*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *2 months*

Estimated Time to Achieve RAOs: *2 months*

Estimated Total Present Worth cost: *$ 2,463,136*

Alternative SSS-2 consists of pressure washing non-building storm sewers on the Amcast South property and downgradient from the Amcast South Property until the storm sewers discharge into Quarry or Wilshire Pond, removing sediment and associated water, excavating the soil surrounding impacted sewers with COC concentrations exceeding human health PRGs and/or ecological PRGs (Table 5), followed by offsite disposal at a RCRA and/or TSCA-permitted and OSR-approved facility. After pressure washing the storm sewers, the interior of the pipes would be sealed with epoxy to prevent potential recontamination from outside material. The alternative assumes the Amcast South building remains intact, and no work is conducted inside the building. The alternative assumes that any excavated soil surrounding the storm sewers would not be RCRA-regulated hazardous waste or exceed the TSCA disposal threshold of 50 mg/kg. Soil verification samples would be required to determine if soil with concentrations exceeding the PRGs has been removed. The excavation would then be backfilled with clean soil and restored to its existing condition. There are no O&M costs associated with Alternative SSS-2 as no contamination will be left behind that would require long-term maintenance.

c. SSS-3—Abandon Amcast South Storm Sewers, Excavation, Offsite Disposal, Backfill, and Site Restoration

Estimated Capital cost: *$2,218,400*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *2 months*

Estimated Time to Achieve RAOs: *2 months*

Estimated Total Present Worth cost: *$ 2,218,400*

Alternative SSS-3 consists of abandoning the Amcast South storm sewer system on the property by pumping a flowable concrete grout into the sewers and installing plugs at the extents of pipe abandonment. Alternative SSS-3 also consists of removing sediment and associated water in storm sewers downgradient of the Amcast South until the storm sewers discharge into Quarry or Wilshire Pond by pressure washing, excavating the soil surrounding impacted sewers with COC concentrations exceeding human health PRGs and ecological PRGs (Table 5), followed by offsite disposal at RCRA and/or TSCA-permitted and OSR-approved facility. After pressure washing the storm sewers, the interior of the pipes would be sealed with epoxy to prevent potential recontamination from outside material. The alternative assumes the Amcast South building remains intact, and no work is conducted inside the building. The alternative assumes that the excavated soil surrounding the storm sewers would not be RCRA-regulated hazardous waste or exceed the TSCA disposal threshold of 50 mg/kg. Soil verification samples would be required to determine if soil concentrations exceeding the PRGs has been removed. The excavation would then be backfilled with clean soil and restored to its existing condition. There are no O&M costs associated with Alternative SSS-3 as no contamination will be left behind that would require long-term maintenance.

d. SSS-4—Remove Storm Sewer Piping, Excavation, Offsite Disposal, Backfill, and Site Restoration

Estimated Capital cost: *$4,303,000*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *2 months*

Estimated Time to Achieve RAOs: *2 months*

Estimated Total Present Worth cost: *$ 4,303,000*

Alternative SSS-4 consists of excavating and removing the onsite storm sewer piping outside of the building footprint. Alternative SSS-4 also consists of removing sediment and associated water in storm sewers downgradient of the Amcast South until the storm sewers discharge into Quarry or Wilshire Pond by pressure washing, excavating the soil surrounding impacted sewers with COC concentrations exceeding human health PRGs and ecological PRGs (Table 5), followed by offsite disposal at RCRA and/or TSCA-permitted and OSR approved facility. After pressure washing the storm sewers, the interior of the pipes would be sealed with epoxy to prevent potential recontamination from outside material. The alternative assumes the Amcast South building remains intact. The alternative assumes that the excavated soil surrounding the storm sewers would not be RCRA-regulated hazardous waste or exceed the TSCA disposal threshold of 50 mg/kg. Soil verification samples would be required to determine if soil concentrations exceeding the PRGs has been removed. The excavation would then be backfilled with clean soil and restored to its existing condition. There are no O&M costs associated with

Alternative SSS-4 as no contamination will be left behind that would require long-term maintenance.

8. Interim Groundwater Remedial Alternatives

Figure 20 shows, and the paragraphs below describe, the interim remedial alternatives developed to address Site groundwater.

a. GW-1— No Action

Estimated Capital cost: *$0*

Estimated Annual O&M cost: *$0*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *N/A*

Estimated Total Present Worth cost: *$*0

Alternative GW-1 consists of taking no action. The no-action alternative would leave impacted groundwater in place at the Site. There are no capital or O&M costs associated with Alternative GW-1. However, five-year site reviews would be required as long as hazardous substances remain at the site at concentrations that do not allow UU/UE.

b. GW-2— Institutional Controls and Groundwater Monitoring

Estimated Capital cost: *$ 636,551*

Estimated Annual O&M cost: *$ 2,503,150*

Estimated Construction Timeframe: *N/A*

Estimated Time to Achieve RAOs: *30 years*

Estimated Total Present Worth cost: *$ 3,139,701*

This alternative involves monitoring groundwater COCs with concentrations exceeding EPA MCLs and WDNR ESs and implementing institutional controls (ICs) to restrict groundwater use and require vapor mitigation engineering controls, if necessary. The risk at the Site related to groundwater is to a future resident on the Amcast North and Amcast South parcels Site via the inhalation pathway from VI. Monitoring would be conducted after contaminated soils are removed from Amcast North and South to monitor the effectiveness of the remedy at reducing VI. ICs to require vapor mitigation engineering controls would be implemented, if necessary. The ICs would prevent inhalation exposures to COCs for future residents and industrial workers. Although it is unlikely that Site groundwater will be used as a drinking water source in the future, there is currently no deed restriction in place or local regulations preventing use of Site groundwater. The groundwater use restriction ICs are anticipated to include deed restrictions and/or use of a local groundwater management zone for the site area and downgradient. There are no potable water wells in the area (drinking water is supplied by the City of Cedarburg from wells located elsewhere in the city), and the aquifer in which most of the elevated concentrations of Site contaminants were found is not anticipated to yield sufficient water for that use. However, adding groundwater use restrictions will layer additional protections to potential groundwater exposures. EPA anticipates selecting a final groundwater remedy after further Site evaluation as part of OU2.

9. Surface Water

Site surface waters were not evaluated for a specific remedy because specific COCs were not identified for Site surface waters. Total PCBs were not detected above the method detection limit of 1.0 µg/L in Site surface waters, which is above the applicable water quality standards set by WDNR and EPA. The remedial design will include surface water monitoring with more sensitive analytical methods to further evaluate PCB concentrations in site surface waters.

H. EVALUATION OF REMEDIAL ALTERNATIVES

Evaluation Criteria

Section 121(b)(l) of CERCLA presents several factors that EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives. The purpose of this evaluation is to promote consistent identification of the relative advantages and disadvantages of each alternative, thereby guiding selection of remedies offering the most effective and efficient means of achieving site cleanup goals. While all nine criteria are important, they are weighed differently in the decision-making process depending on whether they evaluate protection of human health and the environment or compliance with federal and state ARARs (threshold criteria), consider technical or economic merits (primary balancing criteria), or involve the evaluation of non-EPA reviewers that may influence an EPA decision (modifying criteria). These nine criteria are described below, followed by a discussion of how each alternative meets or does not meet each criterion.

These threshold criteria must be met for a remedial alternative to be eligible for selection:

(1) **Overall Protection of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

(2) **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the Site, or whether a waiver is justified.

The primary balancing criteria, technical criteria used as the basis for the detailed analysis are:

(3) **Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time once cleanup levels have been met. This criterion also incorporates an evaluation of climate resilience.
(4) **Reduction of Toxicity, Mobility, or Volume Through Treatment** addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of hazardous substances as a principal element.
(5) **Short-term Effectiveness** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation until cleanup levels are achieved.
(6) **Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services, and coordination with other governmental entities.
(7) **Cost** includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth costs are the total costs of an alternative over time in terms of today's dollar value and incorporates a 7% discount factor. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

The modifying criteria (State and community acceptance) are assessed formally after the public comment period:

(8) **State/Support Agency Acceptance** considers whether the State agrees with the EPA's analysis and recommendation, as described in the RI/FS and Proposed Plan. For each alternative the State/Support Agency acceptance of the preferred alternative will be evaluated after receiving comments on the Proposed Plan from the state support agency.
(9) **Community Acceptance** considers whether the local community agrees with EPA's analysis and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance. Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the ROD for the Site.

Comparative Analysis of Alternatives

In this section, the remedial alternatives are compared to each other in terms of how well they meet the specified evaluation criteria. Threshold and primary balancing criteria are presented and evaluated for each remedial alternative. The two modifying criteria, State and community acceptance, are briefly addressed below and will be further evaluated after this Proposed Plan undergoes public comment, then addressed in the ROD. The FS Report contains a detailed discussion of the comparative analysis of alternatives, where the alternatives for each area of the Site are compared against each other in terms of how they fare against the nine evaluation criteria.

1. Overall Protection of Human Health and the Environment

EPA is required to select remedies that will protect human health and the environment. Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls. For each separate area of the Site, all of the retained alternatives – with the exception of each area's "No Action" alternative – would protect human health and the environment. Because the "No Action" alternative for each area would not protect human health and the environment, all of the "No Action" alternatives were eliminated from consideration and will not be discussed further in this Proposed Plan.

Amcast North Alternatives (Soil)
Alternative AMN-2 would provide the greatest degree of protection since this alternative would remove and dispose of contaminated media. Alternative AMN-3, which leaves contaminated material in place but beneath an isolation cover only reduces overall risk but would provide adequate protection from exposure. Additionally, perpetual cap maintenance would be required to ensure total protectiveness and any breach in the cap would potentially expose individuals to unacceptable levels of contamination.

Residential Yards Alternatives (Soil)
Alternatives RY-2 and RY-3 both provide a degree of protection as they both involve removing contaminated media above the corresponding cleanup levels. However, RY-3 would provide the greatest degree of protection since this alternative would remove and dispose of contaminated media down to a lower cleanup level.

Amcast South Alternatives (Soil)
Alternative AMS-4 would provide the greatest degree of protection since this alternative would remove and dispose of contaminated media, providing the highest level of protection based on the lowest clean up value. Alternative AMS-3, which leaves contaminated material in place but beneath an isolation cover reduces overall risk and properly maintained, would provide adequate protection from exposure. Additionally, perpetual cap maintenance would be required to ensure long-term protectiveness. Any breach in the cap would potentially expose individuals to unacceptable levels of contamination. AMS-2 would provide less protection than AMS-4 given its higher cleanup level.

Quarry Pond Alternatives (Sediment)
Alternative QP-4 would provide the greatest degree of protection since this alternative would remove and dispose of contaminated media. Alternative QP-3, which leaves contaminated material in place covered with a reactive barrier reduces overall risk and properly maintained, would provide adequate protection from exposure. However, perpetual maintenance of the barrier would be required to ensure long-term protectiveness. Any breach in the barrier would potentially expose individuals to unacceptable levels of contamination. Alternative QP-2 would

provide adequate protection for ecological receptors within the pond, but would require controls (e.g., signage) in perpetuity to mitigate human exposures above human health-based risk levels in sediments and fish tissues.

Wilshire Pond Alternatives (Sediment/Bank Soil)
Alternatives WP-2 and WP-3 would provide equivalent degrees of protection as they both propose to remove contaminated material. WP-3 accounts for removal of more contaminated material, if encountered, but the overall protection achieved by both alternatives is similar. However, WP-3 will only be triggered if the berms are found to be contaminated in the pre-design investigation.

Amcast North Storm Sewer Alternatives
All of the remaining alternatives presented achieve protection of human health and the environment. However, Alternative SSN-3 would provide the greatest degree of protection since this alternative removes and disposes sections of sewer pipes and contaminated sediment versus sealing and leaving contaminated sewer piping in-place as proposed in SSN-2.

Amcast South Storm Sewer Alternatives
Alternative SSS-4 would provide the greatest degree of protection since this alternative removes and disposes of the contaminated sediment and the pipes. Alternative SSS-3 abandons the storm sewers preventing exposure or transport of contaminated sediment and would be the next most protective alternative. Alternative SSS-2 would achieve protection of human health and the environment and would remove contaminated sediment from storm sewers.

Groundwater Alternatives (Interim)
Alternative GW-2 is the only remaining alternative and is protective, as institutional controls will restrict water use. This interim action will require a subsequent final cleanup decision.

2. Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and NCP § 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for invoking waiver.

The key federal and state requirements identified as potential ARARs include the following:

- TSCA (40 CFR § 761.61[c]) to establish cleanup levels for removing PCB-contaminated remediation waste and managing such waste;
- Wisconsin's water quality standards [WAC NR 102.04(1)(a) and (d) and WAC NR 105.06], as well as federal 40 CFR Part 132, are applicable to Wilshire and Quarry Ponds; WAC NR 140 is applicable to groundwater quality;
- WAC NR 207 Wisconsin Pollutant Discharge Elimination System regulations may be applicable or relevant and appropriate to groundwater treatment, sediment dewatering, or pond water removal;
- TSCA 40 CFR § 761.61(c) risk-based disposal approval for PCB remediation waste and soil and 40 CFR § 761.65(c) for PCB waste storage are the main federal action-specific regulations that are applicable to remedial actions at the Amcast Site.
- Although not an ARAR by definition, 40 CFR § 300.440 (the CERCLA Offsite Rule) is a regulation that requires compliance if waste is disposed offsite.

Other ARARs originating at the state level that may be/are applicable or relevant depending on alternatives chosen include:

- WAC NR 415 (fugitive dust emission standards);
- WAC NR 216 Subchapter III (WAC NR 216.46 and 216.47) for stormwater management;
- WAC NR 662 (management requirements for hazardous waste, if encountered);
- WAC NR 718 (storage, transportation, treatment, and disposal standards for excavated soil and other solid wastes);
- WAC NR 292.12 for maintenance of a sediment cap; and
- WAC NR 350-353 (wetland compensatory mitigation projects) if such a project is required for Wilshire or Quarry Ponds.

In addition to ARARs, under 40 CFR § 300.400(g)(3) EPA may, as appropriate, identify other advisories, criteria, or guidance "to be considered" (TBC) when evaluating remedial alternatives.

<u>Amcast North Alternatives (Soil)</u>

All remaining alternatives for this sub-area will comply with Federal and State ARARs and TBCs.

Residential Yards Alternatives (Soil)
Alternatives RY-2 and RY-3 will comply with Federal and State ARARs and TBCs.

Amcast South Alternatives (Soil)
Alternatives AMS-2, AMS-3 and AMS-4 will comply with ARARs and TBCs.

Quarry Pond Alternatives (Sediment)
Alternatives QP-2, QP-3 and QP-4 will comply with ARARs and TBCs.

Wilshire Pond Alternatives (Sediment/Bank Soil)
All remaining alternatives will comply with ARARs and TBCs.

Amcast North Storm Sewer Alternatives
All remaining alternatives will comply with ARARs and TBCs.

Amcast South Storm Sewer Alternatives
All remaining alternatives will comply with ARARs and TBCs.

Groundwater Alternatives (Interim)
Alternative GW-2 is an interim remedy and thus is not required to comply with all ARARs. The final OU2 Groundwater remedy will be required to comply with all ARARs or invoke an ARARs waiver. A further detailed analysis is not needed for the Groundwater Alternatives because there is only one alternative that meets the threshold criteria; therefore, GW-2 is the preferred alternative.

3. Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refer to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Residential Yards Alternatives (Soil)
Alternative RY-3 is more protective than RY-2 as it addresses soils to a lower PRG.

Amcast North Alternatives (Soil)
Alternative AMN-2 would result in the lowest residual risk after implementation. Alternative AMN-2 would not require maintenance and is more effective in assuring protection against potential exposures. The installation of an isolation cover for subsurface soils in Alternative AMN-3 will reduce exposure to residual contamination in surface soil but will not reduce residual risk at depth. Alternative AMN-3 requires long-term maintenance and inspection to monitor the integrity and thickness of the isolation cover. There is the potential for the cover to

be removed or disturbed depending on future site usage and activities. Thus, the adequacy and reliability of controls to prevent disturbance of the cover depend on maintenance and inspection and may be less effective in assuring protection against potential exposures in the long term. Additionally, this area is vulnerable to increased risk from tornadoes, severe thunderstorms, and flooding. As such, Alternative AMN-2 is more effective in the long term with no isolation cover that could be impacted by increased incidence of severe weather.

Amcast South Alternatives (Soil)
Alternative AMS-4 would result in the lowest residual risk after implementation than AMS-2, which addresses soils to a higher PRG, and AMS-3 which involves containment. Alternative AMS-4 would not require maintenance and is more effective in assuring protection against potential exposures. The installation of an isolation cover for subsurface soils in Alternative AMS-3 will reduce exposure to residual contamination in surface soil but will not reduce residual risk at depth. Alternative AMS-3 requires long-term maintenance and inspection to monitor the integrity and thickness of the isolation cover. There is the potential for the cover to be removed or disturbed depending on future site usage and activities. Thus, the adequacy and reliability of controls to prevent disturbance of the cover depend on maintenance and inspection and may be less effective in assuring protection against potential exposures. Additionally, this area is vulnerable to increased risk from tornadoes, severe thunderstorms, and flooding. As such, Alternative AMS-4 is more effective in the long term with no isolation cover that could be impacted by increased incidence of severe weather.

Quarry Pond Alternatives (Sediment)
Alternative QP-4 would result in the lowest residual risk after implementation for the Quarry Pond and less residual risk than QP-2 which addresses soils to a higher PRG, and QP-3 which relies on containment. Alternative QP-4 would not require maintenance and is more effective in assuring protection against potential exposures. The installation of a reactive barrier in Quarry Pond Alternative QP-3 will reduce exposure to residual contamination in surface sediment by absorbing the contaminants but will not reduce residual risk at depth. There is limited potential for the reactive barrier in Alternative QP-3 to be removed or disturbed by humans or the environment because the depth of water is up to 20 feet and other potential disturbances from tributary inlets/outlets or large wave action that could produce scouring velocities at depth are not present. In addition, placement of a 6-inch protective layer of 0.5-inch aggregate further minimizes the potential for disturbances. However, pond water levels are linked to groundwater levels and precipitation. Thus, there may be an increased risk of cover disturbance during low groundwater level times. The adequacy and reliability of controls to prevent disturbance of the cover depends on long-term maintenance and monitoring to verify performance and thickness and, as such, are required.

Wilshire Pond Alternatives (Sediment/Bank Soil)
Alternatives WP-2 and WP-3 will result in low residual risk as a result of the excavation and offsite disposal of contaminated sediment and soil. Alternatives WP-2 and WP-3 would not

require long-term maintenance and are effective in assuring protection against potential exposures.

Amcast North Storm Sewer Alternatives
In both Alternatives SSN-2 and SSN-3, contaminated sediment within storm sewer pipes would be removed from the Site, resulting in a very low residual risk from sewer sediment. The least amount of residual risk would occur as a result of excavation, removal, and offsite disposal of storm sewer pipes in Alternative SSN-3 as opposed to abandoning or pressure washing these pipes and leaving them in place in Alternative SSN-2. Both alternatives would not require long-term maintenance or controls and would protect human health and the environment once the remedial action is complete.

Amcast South Storm Sewer Alternatives
For all the remaining alternatives presented for this sub-area, contaminated sediment within storm sewer pipes would be removed from the site, resulting in a very low residual risk. The least amount of residual risk would occur as a result of excavation, removal, and offsite disposal of storm sewer pipes in Alternative SSS-4 as opposed to pressure washing or abandoning the pipes, then leaving them in place as proposed in Alternatives SSS-2 and SSS-3, respectively. Alternatives SSS-3 and SSS-4 would not require long-term maintenance or controls and protect human health and the environment once the remedial action is complete. Alternative SSS-2 may require periodic maintenance since the onsite storm sewers would remain in place.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. There are seven components that compose evaluation of the reduction of toxicity, mobility, and volume. These components are evaluated below for the Amcast North alternatives.

Residential Yards Alternatives (Soil)
There is no treatment associated with Alternative RY-2 and RY-3.

Amcast North Alternatives (Soil)
There are no treatment processes associated with the implementation of Alternatives AMN-2 and AMN-3 as no material is being treated, and therefore there are no reductions in toxicity or volume (through treatment) for either of the alternatives. However, both alternatives reduce mobility of contaminated material. AMN-2 achieves mobility reduction by removing material from the Site and containing at a disposal facility and AMN-3 achieves reduction by isolating material below a cover. Alternative AMN-2 is irreversible as contaminated material is being removed from the Site and would not be allowed to be brought back as fill. Likewise, for Alternative AMN-3, contaminated material would be removed from the Site and would not be allowed back onsite. However, Alternative AMN-3 is slightly more reversible than Alternative AMN-2 as the cover is removable. The amount of contaminated material after implementation of

Alternative AMN-2 would be minimal. Contaminated material would remain onsite after the implementation of Alternative AMN-3 under an isolation cover. Treatment would not be performed in any of the alternatives for this sub-area.

Amcast South Alternatives (Soil)
No treatment processes are proposed in Alternatives AMS-4, AMS-2 and AMS-3, thus there are no reductions in toxicity or volume (through treatment) for each of the alternatives. However, all alternatives reduce mobility of contaminated material. AMS-4 and AMS-2 reduce mobility by removing material from the site and containing it at a disposal facility while AMS-3 reduces mobility by isolating it below a cover. Alternative AMS-2 and AMS-4 are irreversible as contaminated material is being removed from the site and would not be allowed to be brought back as fill. Likewise, for Alternative AMS-3, contaminated material would be removed from the Site and would not be allowed back on-Site. However, Alternative AMS-3 is slightly more reversible than Alternatives AMS-2 and AMS-4 as the cover is removable. The amount of contaminated material left after implementation of Alternatives AMS-2 and AMS-4 would be minimal. Contaminated material would remain on-Site after the implementation of Alternative AMS-3 under an isolation cover.

Quarry Pond Alternatives (Sediment)
In Alternative QP-3, PCB-contaminated sediment would be covered with a PRB composed of 1 percent granular activated carbon (GAC) mixed with 99 percent sand, and an organophilic clay layer. This is expected to reduce toxicity and mobility by absorbing PCBs into the GAC. There would be no treatment processes associated with the implementation of Alternatives QP-2 and QP-4 and therefore no hazardous materials would be destroyed, and there are no reductions in toxicity or volume through treatment.

Alternative QP-3 is slightly reversible as the PRB can be removed. However, due to the nature of the PRB, PCBs would be absorbed into the GAC and would be removed along with the barrier. Alternatives QP-2 and QP-4 are irreversible as contaminated material would be removed from the Site and would not be allowed to be brought back as fill.

The amount of contaminated material left after implementation of Alternatives QP-2 and QP-4 would be minimal. Contaminated material would remain on-Site after the implementation of Alternative QP-3 under a PRB. Treatment is not performed in Alternative QP-2 or QP-4.

Wilshire Pond Alternatives (Sediment/Bank Soil)
There are no treatment processes associated with the implementation of Alternatives WP-2 and WP-3 and therefore no hazardous materials would be destroyed and there would be no reductions in toxicity or volume through treatment. Alternatives WP-2 and WP-3 are irreversible as all contaminated material, above the PRG, would be excavated, disposed of offsite and would not be allowed to be brought back as fill.

Amcast North Storm Sewer Alternatives

There are no treatment processes with Alternatives SSN-2 and SSN-3, as no material would be treated, and no hazardous materials would be destroyed. Furthermore, the alternatives would not reduce the toxicity or the volume of contamination. Both alternatives would reduce mobility of contaminated material by removing it from the Site and containing at a disposal facility and are irreversible.

Amcast South Storm Sewer Alternatives
There are no treatment processes with Alternatives SSS-2, SSS-3, and SSS-4 as no material would be treated and no hazardous materials would be destroyed. Furthermore, the alternatives would not reduce the toxicity or the volume of contamination. All of the remaining alternatives would reduce mobility of contaminated material by removing it from the Site and containing it at a disposal facility and are irreversible.

5. Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Amcast North Alternatives (Soil)
Alternative AMN-3 may result in less potential for exposure to the community by air or direct contact because this alternative removes the least amount of material. Further, exposure to the community from dust during installation of a cover depends on whether the underlying material is dry or wet at the time of installation. Alternative AMN-2 has more material being removed and disposed and therefore more potential for exposure to the community by air or direct contact. However, dust emissions from both alternatives can be controlled using standard engineering controls, and trucks can be covered and decontaminated before leaving the Site. Soil will be disturbed, removed, and handled in both alternatives using properly designed equipment, but direct contact exposure to workers is possible during construction of both alternatives. The higher volume of material removed and managed in Alternative AMN-2 could pose an elevated worker risk. With properly executed Health and Safety Plans, the risks to workers for both of the remaining alternatives are minimal. Short-term environmental impacts are present in both alternatives as damage will occur during excavation. More excavation is anticipated with Alternative AMN-2 than AMN-3, and with these more potential impacts are projected. Both alternatives are anticipated to achieve RAOs after implementation of the remedial action and restoration of the habitat.

Amcast South Alternatives (Soil)
Alternative AMS-3 may result in less potential for exposure to the community by air or direct contact because this alternative removes the least amount of material. Further, exposure to the community from dust during installation of a cover depends on whether the underlying material is dry or wet at the time of installation. Alternatives AMS-2, and to a greater degree, AMS-4 has more material being removed and disposed than AMS-3 and therefore more potential for

exposure to the community by air or direct contact. However, dust emissions from both alternatives can be controlled using standard engineering controls, and trucks can be covered and decontaminated before leaving the Site. Soil will be disturbed, removed, and handled in both alternatives using properly designed equipment, but direct contact to workers is possible during construction of both alternatives. The higher volume of material removed and managed in Alternatives AMS-2 and AMS-4 could pose an elevated worker risk. With properly executed Health and Safety Plans, the risks to workers for all of the remaining alternatives are minimal. Short-term environmental impacts are present in both alternatives as damage will occur during excavation. More excavation is anticipated with Alternatives AMS-2 and AMS-4 and with these more potential impacts are projected. Both alternatives are anticipated to achieve RAOs after implementation of the remedial action and restoration of the habitat.

Quarry Pond Alternatives (Sediment)
All of the remaining Quarry Pond Alternatives may result in a potential for exposure to the community and workers from dust emissions or direct contact to the material removed. Exposure to the community and workers from dust during the installation of the reactive barrier should be considerably less in Alternative QP-3, as the cover will be placed under water. Alternatives QP-2 and QP-4 may result in a potential for exposure to the community and worker by air or direct contact as material is being removed and disposed of. However, dust emissions can be controlled using standard engineering controls, and trucks can be covered and decontaminated before leaving the Site. With properly executed Health and Safety Plans, the risks to workers for all of the remaining alternatives are minimal.

Short-term environmental impacts include the disturbance and resuspension of sediment contamination into the water column during removal and/or submerged capping operations in Alternatives QP-3, QP-2, and QP-4. The resuspension of sediments during these activities may result in a short-term release of PCBs into the water column. Habitat damage due to excavation, as well as some materials used for the reactive cover, may occur during construction and would be present in all the alternatives.

Alternatives QP-4 and QP-2 would achieve RAOs after implementation of the remedial action and restoration of the habitat, though a period is required to reduce the PCB concentrations in fish tissue after contamination has been removed. Alternative QP-3 would require additional time in comparison as the reactive barrier needs time to react with and lower the PCB concentrations in sediment. All alternatives would require a similar period to reduce the PCB concentrations in fish tissue as QP-3.

Wilshire Pond Alternatives (Sediment/Bank Soil)
Both of the remaining Wilshire Pond Alternatives may result in a potential for exposure to the community and workers from dust emissions or direct contact to the material removed. However, dust emissions can be controlled using standard engineering controls, and trucks can be covered and decontaminated before leaving the Site. Since Alternative WP-3 has a higher volume of material removed and managed, the chance for worker risk is greater, and the amount of

protection provided to the worker is lower than Alternative WP-2. With properly executed Health and Safety Plans, the risks to workers for both of the remaining alternatives are minimal.

Short-term environmental impacts include the disturbance and resuspension of sediment contamination into the water column and habitat damage during excavation of sediments and soils. Since more excavation is occurring in Alternative WP-3, the potential impacts are greater. Alternatives WP-2 and WP-3 would achieve RAOs after implementation of the remedial action and restoration of the habitat, though a period is required to reduce the PCB concentrations in fish tissue.

Amcast North Storm Sewer Alternatives

Alternative SSN-3 may result in a potential for exposure to the community by air or direct contact as pipes are being pressure washed or abandoned. Alternative SSN-2 may result in a greater potential for exposure to the community by air or direct contact during excavation of pipes. However, dust emissions can be controlled using standard engineering controls, and trucks can be covered and decontaminated before leaving the Site. Alternative SSN-3 would pose the least amount of potential exposure to a worker since pipe removal and disposal would occur with construction equipment. With properly executed Health and Safety Plans, the risks to workers for both of the remaining alternatives are minimal. Short-term environmental impacts are present in both alternatives since some damage will occur during excavation. Storm sewers onsite drain directly to Wilshire Pond, and pressure washing these storm sewers may wash contaminated sediment into this location, therefore the potential for additional environmental impacts is present in both the alternatives. Alternatives SSN-2 and SSN-3 would achieve RAOs after implementation of the remedial action.

Amcast South Storm Sewer Alternatives

Alternatives SSS-2 and SSS-3 may result in a potential for exposure to the community by air or direct contact as more pipes are being pressure washed and/or abandoned. Alternative SSS-4 may result in a greater potential for exposure to the community by air or direct contact during excavation of pipes. However, dust emissions can be controlled using standard engineering controls, and trucks can be covered and decontaminated before leaving the Site. Alternative SSS-4 would pose the least amount of potential exposure to a worker since pipe removal and disposal would occur with construction equipment. Alternative SSS-2 would have a higher potential exposure to workers because pressure washing, and coating pipes carries more risk to workers. With properly executed Health and Safety Plans, the risks to workers for all of the remaining alternatives are minimal. Short-term environmental impacts are present in all alternatives since some damage will occur during excavation. Storm sewers onsite drain directly to Quarry Pond and Wilshire Ponds, and pressure washing these storm sewers may wash contaminated sediment into these locations, therefore the greatest potential for additional environmental impacts is present in Alternatives SSS-2 and SSS-3. All alternatives would achieve RAOs after implementation of the remedial action.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Amcast North Alternatives (Soil)
Both of the remaining alternatives are relatively straightforward, have a proven record of performance, and have no anticipated implementation impediments. Standard construction equipment can be used for both alternatives and materials required are readily available. Additional remedial actions would be easy to implement under either alternative should they be necessary. However, additional remedial actions following Alternative AMN-3 would need to take into consideration the isolation cover. There are no impediments for monitoring effectiveness of Alternative AMN-2. Since the isolation cover in Alternative AMN-3 will be covered by fill, monitoring may be challenging. Both alternatives use known technologies with proven effectiveness so any administrative approvals would be obtained easily. For both alternatives, there are no impediments for offsite storage and disposal services because it is anticipated that local disposal facilities will have enough capacity for soil volumes being removed.

Amcast South Alternatives (Soil)
All of the remaining alternatives are relatively straightforward, have a proven record of performance, and have no anticipated implementation impediments. Standard construction equipment can be used for the alternatives and materials required are readily available. Additional remedial actions would be easy to implement under either alternative should they be necessary. However, additional remedial actions following Alternative AMS-3 would need to take into consideration the isolation cover. There are no impediments for monitoring effectiveness of Alternative AMS-2 and 4. Since the isolation cover in Alternative AMN-3 will be covered by fill, monitoring may be challenging. All alternatives use known technologies with proven effectiveness so any administrative approvals would be obtained easily. For all alternatives, there are no impediments for offsite storage and disposal services because it is anticipated that local disposal facilities will have enough capacity for soil volumes being removed.

Quarry Pond Alternatives (Sediment)
Excavation, dewatering, offsite disposal, and restoration, called for in Alternatives QP-2 and 4 is relatively straightforward, has a proven record of performance, and has no anticipated implementation impediments. Consistent thickness of a reactive cover in Alternative QP-3 can be difficult to achieve in some Site conditions. Standard construction equipment can be used for all alternatives and materials required are readily available. The only impediments for monitoring effectiveness for Alternative QP-4 will be the depth of water within the pond post completion. Long-term monitoring would not be anticipated with Alternatives QP-2 and 4 once fish tissue goals are met. For Alternative QP-3, not only will the depth of water impede

monitoring effectiveness, but it may be difficult to measure consistent thicknesses of the PRB, especially in deeper water. Long-term monitoring and inspection would be required for Alternative QP-3 to document reliability and the reactive cover may require replacement as material is exhausted or may require replacement if material is shifted out of place because of erosion or differential settlement. Additional remedial actions would be easy to implement under all the alternatives. However, additional remedial activities will need to take into account the PRB in Alternative QP-3. Alternatives QP-2 and 4 use known technologies with proven effectiveness so any administrative approvals would be obtained easily as well as coordination with other agencies. Alternative QP-3 also uses known technologies with proven effectiveness so administrative approvals would be obtained easily. For all alternatives, there are no impediments for offsite storage and disposal services because it is anticipated that local disposal facilities will have enough capacity for soil volumes being removed.

Wilshire Pond Alternatives (Sediment/Bank Soil)
Excavation, dewatering, offsite disposal, and restoration, called for in Alternatives WP-2 and WP-3 are relatively straightforward, have a proven record of performance, and have no anticipated implementation impediments. Standard construction equipment can be used for all alternatives and materials required are readily available. The only impediments for monitoring effectiveness for Alternatives WP-2 and WP-3 will be the depth of water within the pond post completion. Additional remedial actions would be easy to implement under all the alternatives. Long-term monitoring would not be anticipated with alternatives WP-2 and WP-3 once fish tissue goals are met. Alternatives WP-2 and WP-3 use known technologies with proven effectiveness so administrative approvals would be obtained easily as well as coordination with other agencies. For both alternatives, there are no impediments for offsite storage and disposal services because it is anticipated that local disposal facilities will have enough capacity for soil volumes being removed.

Amcast North Storm Sewer Alternatives
Both the remaining alternatives are relatively straightforward, have a proven record of performance, and have no anticipated implementation impediments. Standard construction equipment can be used for both alternatives and materials required are readily available. Additional remedial actions would be easy to implement under both alternatives, should they be necessary. Pressure washing, which is conducted in both alternatives, is generally reliable but will require monitoring and inspections to verify that all contaminated sediment has been removed. The only impediment for monitoring the effectiveness of each of the alternatives is the in-pipe video equipment and the quality of the video feed provided when preforming the pressure washing. Additional remedial actions would be easy to implement under both alternatives should they be necessary. There are no impediments for coordination with other agencies. The alternatives use known technologies with proven effectiveness so administrative approvals would be obtained easily. For both alternatives, there are no impediments for offsite storage and disposal services because it is anticipated that local disposal facilities will have enough capacity for soil volumes being removed.

Amcast South Storm Sewer Alternatives

All the remaining alternatives are relatively straightforward, have a proven record of performance, and have no anticipated implementation impediments. Standard construction equipment can be used for all Alternatives and materials required are readily available. Additional remedial actions would be easy to implement under all alternatives, should they be necessary. Pressure washing, which is conducted in all alternatives, is generally reliable but will require monitoring and inspections to verify that all contaminated sediment has been removed. The only impediment for monitoring the effectiveness of each of the alternatives is the in-pipe video equipment and the quality of the video feed provided when preforming the pressure washing. Additional remedial actions would be easy to implement under all alternatives should they be necessary. There are no impediments for coordination with other agencies. The alternatives use known technologies with proven effectiveness so administrative approvals would be obtained easily. For all alternatives, there are no impediments for offsite storage and disposal services because it is anticipated that local disposal facilities will have enough capacity for soil volumes being removed.

7. Cost

An overview of the cost analysis and the detailed breakdowns for each of the alternatives are presented in the March 13, 2023, Technical Memorandum for the Site. EPA uses the total present worth costs for purposes of comparing the costs of the various alternatives. The estimated present worth costs for the remaining alternatives are listed below by area in ascending order.

Amcast North Alternatives (Soil)

AMN-3	$2,136,622
AMN-2	$2,986,482

Residential Yards Alternatives (Soil)

RY-2	$3,137,495
RY-3	$3,793,290

Amcast South Alternatives (Soil)

AMS-3	$5,347,040
AMS-4	$7,933,312
AMS-2	$8,822,056

Quarry Pond Alternatives (Sediment)

QP-3	$8,271,796
QP-2	$8,398,937
QP-4	$12,140,519

Wilshire Pond Alternatives (Sediment/Bank Soil)

WP-2	$1,772,880
WP-3	$2,058,198

Amcast North Storm Sewer Alternatives

SSN-2	$3,007,513
SSN-3	$3,122,871

Amcast South Storm Sewer Alternatives

SSS-3	$2,218,400
SSS-2	$2,463,136
SSS-4	$4,303,000

Groundwater Alternatives (Interim)

GW-2	$3,139,701

I. EPA's PREFERRED ALTERNATIVE

EPA'S Preferred Alternative for the Amcast Site, listed by sub-area, is:

- Amcast North – AMN-2: Excavation, Offsite Disposal, Backfill and Site Restoration
- Residential Yards – RY-3: Soil Excavation, Offsite Disposal, Backfill, and Site Restoration
- Amcast South – AMS-4: Excavation, Offsite Disposal, Backfill, and Site Restoration
- Quarry Pond sediment and bank soils – QP-4: Sediment Dredging, Bank Soil Excavation, Offsite Disposal, and Site Restoration
- Wilshire Pond sediment and bank soils – WP-2/3: Sediment and Bank Soil Excavation, Offsite Disposal, Backfill, and Site Restoration
- Storm sewers north - SSN-3: Abandon Amcast North Building Storm Sewers, Remove Non-Building Storm Sewer Piping, Excavation of Pipes and Backfill, Offsite Disposal, Backfill, and Site Restoration
- Storm sewers south - SSS-4: Remove Storm Sewer Piping, Excavation, Offsite Disposal, Backfill, and Site Restoration
- Groundwater (Interim) - GW-2: Institutional Controls and Groundwater Monitoring

The Preferred Alternative was selected over other alternatives because it is expected to achieve substantial risk and mass reduction through the actions described above by sub-area. The total cost for all components of the Preferred Alternative is $39,478,000.

Based on the information available at this time, EPA believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the alternatives evaluated with respect to balancing and modifying criteria. EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA § 121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element.

The Preferred Alternative provides long-term and permanent protection against exposure to Site-related contaminants by the combination actions, described in sections above. EPA has not identified any principal threat wastes at the Site.

The Preferred Alternative can change in response to comments from WDNR, public comment, or new information.

J. COMMUNITY PARTICIPATION

EPA, in consultation with WDNR, will evaluate public reaction to the Preferred Alternative during the public comment period on this Proposed Plan before selecting a remedy for the Site. Based on new information or public comments, EPA may modify its Preferred Alternative or choose other alternatives. EPA encourages the public to review and comment on all of the cleanup alternatives.

To assure that the community's concerns are being addressed, a public comment period lasting thirty (30) calendar days will open on May 12th, 2023, and close on June 12th, 2023. If requested timely by the public, the public comment period may be extended up to 30 days. During this time the public is encouraged to submit comments to EPA on the Proposed Plan. Comments can be submitted using any of the following options:

- By website, directly at: www.epa.gov/superfund/amcast-industrial
- By email to Philip Gurley at gurley.philip@epa.gov
- By mail to: Philip Gurley
U.S. EPA Region 5
External Communications Office
77 W. Jackson Blvd. (RE-19J)
Chicago, IL 60604-3590
- During a hybrid public meeting on May 31st, 2023, described further below.

EPA has posted to its website for the Site (www.epa.gov/superfund/amcast-industrial) a summary of the investigative findings for the Site, a factsheet summarizing the Proposed Plan, and this Proposed Plan. In addition, EPA will be hosting a public meeting at the Cedarburg Community Gym on May 31st, 2023, from 6 to 8 PM CDT. EPA plans to have a court reporter formally document questions and comments during the public meeting and provide a virtual attendance option for those who would like to attend remotely.

An Administrative Record has been created for the Site and will be completed upon issuance of the Record of Decision. Site documents, including Administrative Record documents, can be found on EPA's website for the Site or at the following locations:

- Cedarburg Public Library
  W63N589 Hanover Ave, Cedarburg, WI

- Cedarburg City Hall
  W63N645 Washington Ave

- EPA Region 5, 7th Floor Records Center
  77 W. Jackson Blvd, Chicago, IL

EPA will respond in writing to all significant comments in a Responsiveness Summary, which will be part of the ROD. EPA will announce the selected cleanup alternative in local newspaper advertisements and will place a copy of the ROD on EPA's website and in the local information repositories.

In addition, questions about the Proposed Plan and requests for information can be sent via email to Zachary Sasnow (sasnow.zachary@epa.gov) or Philip Gurley (gurley.philip@epa.gov).

K. REFERENCES

Stensvold, K.A. 2012. *Distribution and Variation of Arsenic in Wisconsin Surface Soils, With Data on Other Trace Elements. USGS Scientific Investigations Report* 2011–5202. Prepared in cooperation with the U.S. Department of Agriculture, Natural Resources Conservation Service, Wisconsin Department of Natural Resources, and Wisconsin Department of Health Services.

Wisconsin Department of Natural Resources (WDNR). 2013. *RR Report: DNR's Remediation & Redevelopment Program Determines Statewide Soil-Arsenic Background Threshold Value.* February 19.

L. LIST OF FIGURES

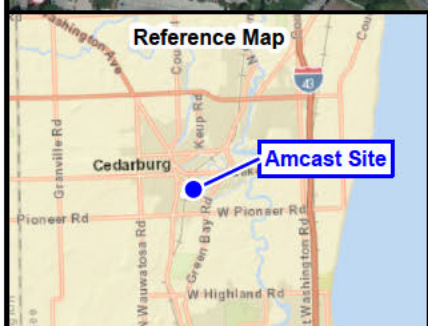
M. LIST OF TABLES

N. LIST OF ACRONYMS

µg/L:	microgram per liter
ARAR:	Applicable or Relevant and Appropriate Requirement
AST:	Aboveground Storage Tank
bgs:	Below Ground Surface
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act
CFR:	Code of Federal Regulations
COC:	Contaminant of Concern
COPC:	Contaminant of Potential Concern
CSM:	Conceptual Site Model
ELCR:	Excess Lifetime Cancer Risk
ENSR:	ENSR Corporation
EPA:	United States Environmental Protection Agency
ERA:	Ecological Risk Assessment
ES:	Enforcement Standard
ESV:	Ecological Screening Value
FS:	Feasibility Study
GAC:	Granular Activated Carbon
HHRA:	Human Health Risk Assessment
HI:	Hazard Index
HQ:	Hazard Quotient
ICs:	Institutional Controls
IEUBK:	Integrated Exposure Uptake Bio-Kinetic Model
LOAEL:	Lowest Observed Adverse Effect Level
MATC:	Maximum Acceptable Toxicant Concentration
µg/dL:	micrograms per deciliter
mg/kg:	milligram per kilogram
NCP:	National Oil and Hazardous Substances Pollution Contingency Plan
O&M:	Operations and Maintenance

OSR:	Off-Site Rule
OU:	Operable Unit
PAH:	Polycyclic Aromatic Hydrocarbons
PAL:	Preventative Action Limit
PCB:	Polychlorinated Biphenyl
PCP:	Pentachlorophenol
PRB:	Permeable Reactive Barrier
PRG:	Preliminary Remediation Goals
RAO:	Remedial Action Objectives
RCL:	Residual Contaminant Level
RCRA:	Resource Conservation and Recovery Act
RI:	Remedial Investigation
ROD:	Record of Decision
RSL:	Regional Screening Level
SWAC:	Surface-Weighted Average Concentration
TBC:	To Be Considered
TOC:	Total Organic Carbon
TSCA:	Toxic Substances Control Act
USGS:	United States Geological Survey
UST:	Underground Storage Tank
UU/UE:	Unlimited Use/Unrestricted Exposure
VI:	Vapor Intrusion
VISL:	Vapor Intrusion Screening Levels
VOC:	Volatile Organic Compound
WAC:	Wisconsin Administrative Code
WDNR:	Wisconsin Department of Natural Resources
WGNHS:	Wisconsin Geological and Natural History Survey

FIGURES AND TABLES



Legend

Approximate Study Area

Approximate Location of Former Disposal Area Based on Boring Logs and Historical Report Maps

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 1
Site Location Map

TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig1-SiteLocationMap.mxd

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EPA Contract No.: 68HE0519D0005

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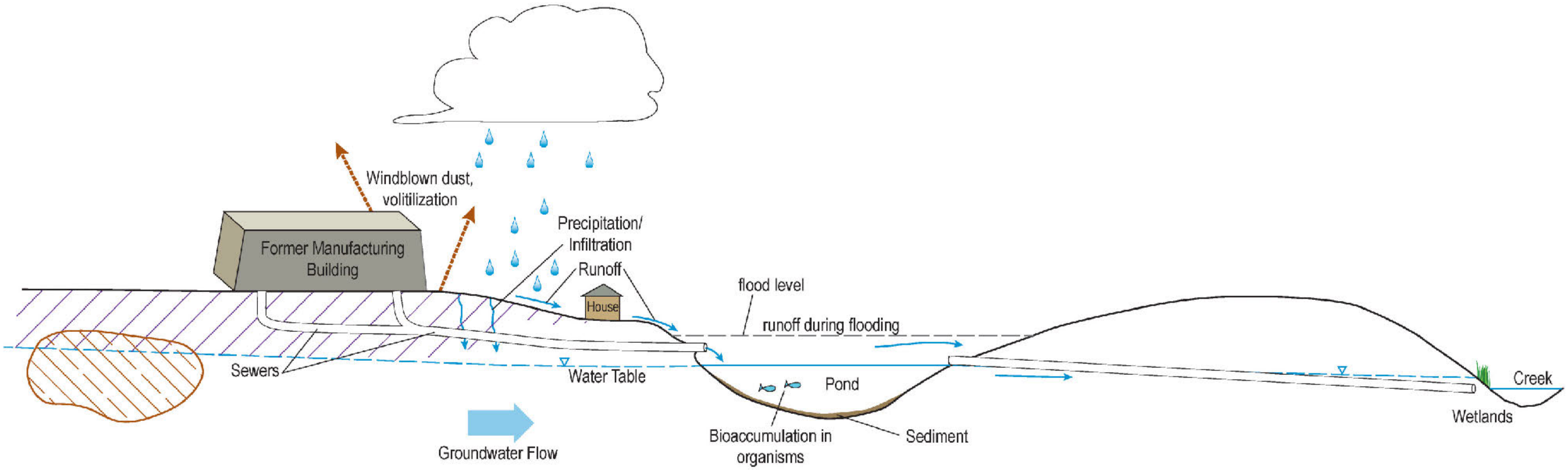
Units: Foot US



Not to scale

Contaminated soil

Contaminated Disposal Area

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 2
Conceptual Design - Release/ Transport Mechanisms

TETRA TECH

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File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig2-ConceptualDesign.mxd

Date Saved: 12/2/2022

EPA Contract No.: 68HE0519D0005

TO/TOLIN: 68HE0521F0114

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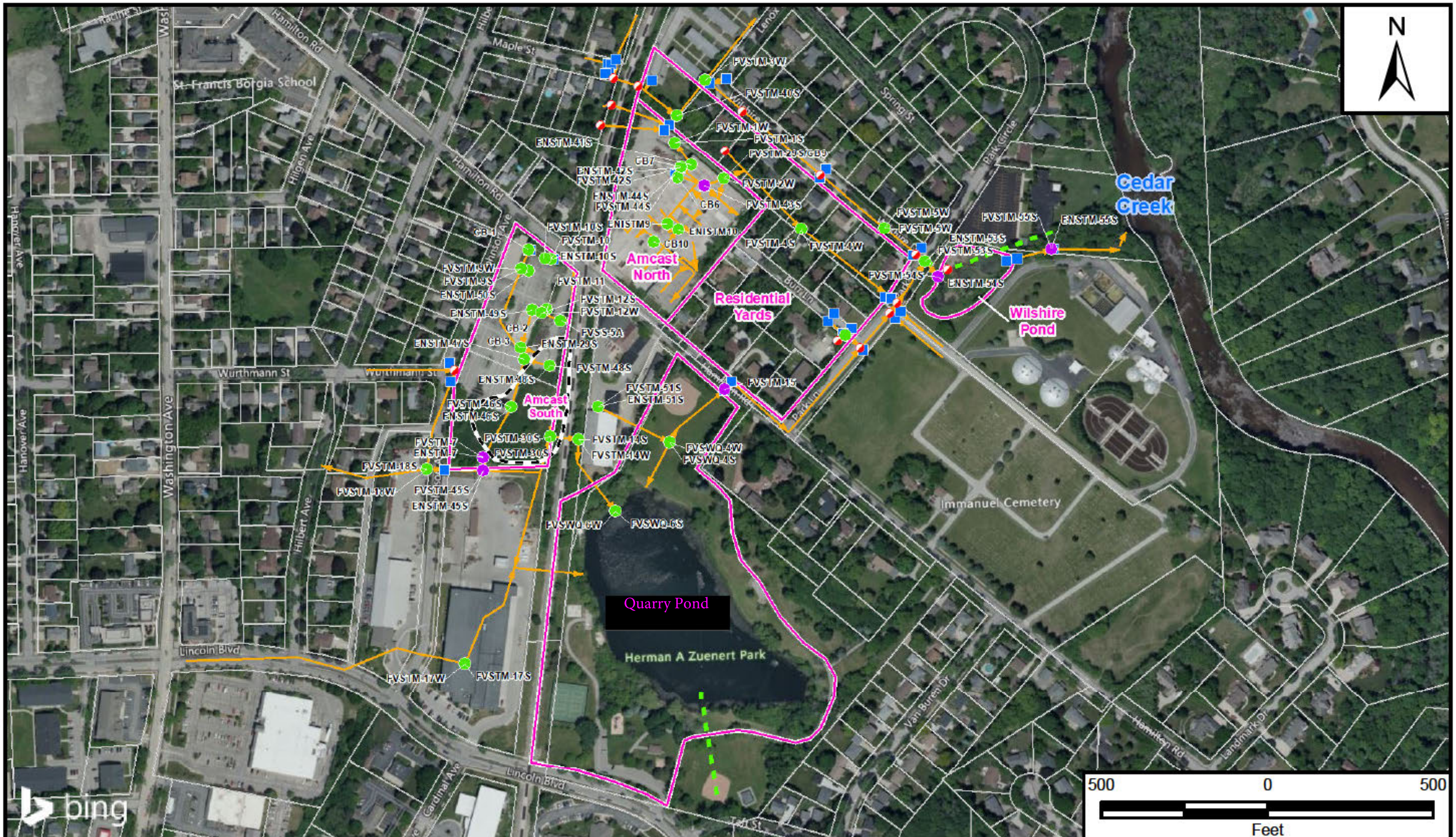

Legend

- Not Sampled
- Sample Collected
- Storm Sewer Access
- Catch Basin
- Approximate Study Area
- Approximate Location of Former Disposal Area Based on Boring Logs and Historical Report Maps
- Storm Sewer Line
- Former Storm Sewer Line
- Parcel

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 3
Storm Sewer Location Map

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File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig3-StormSewerLocations.mxd

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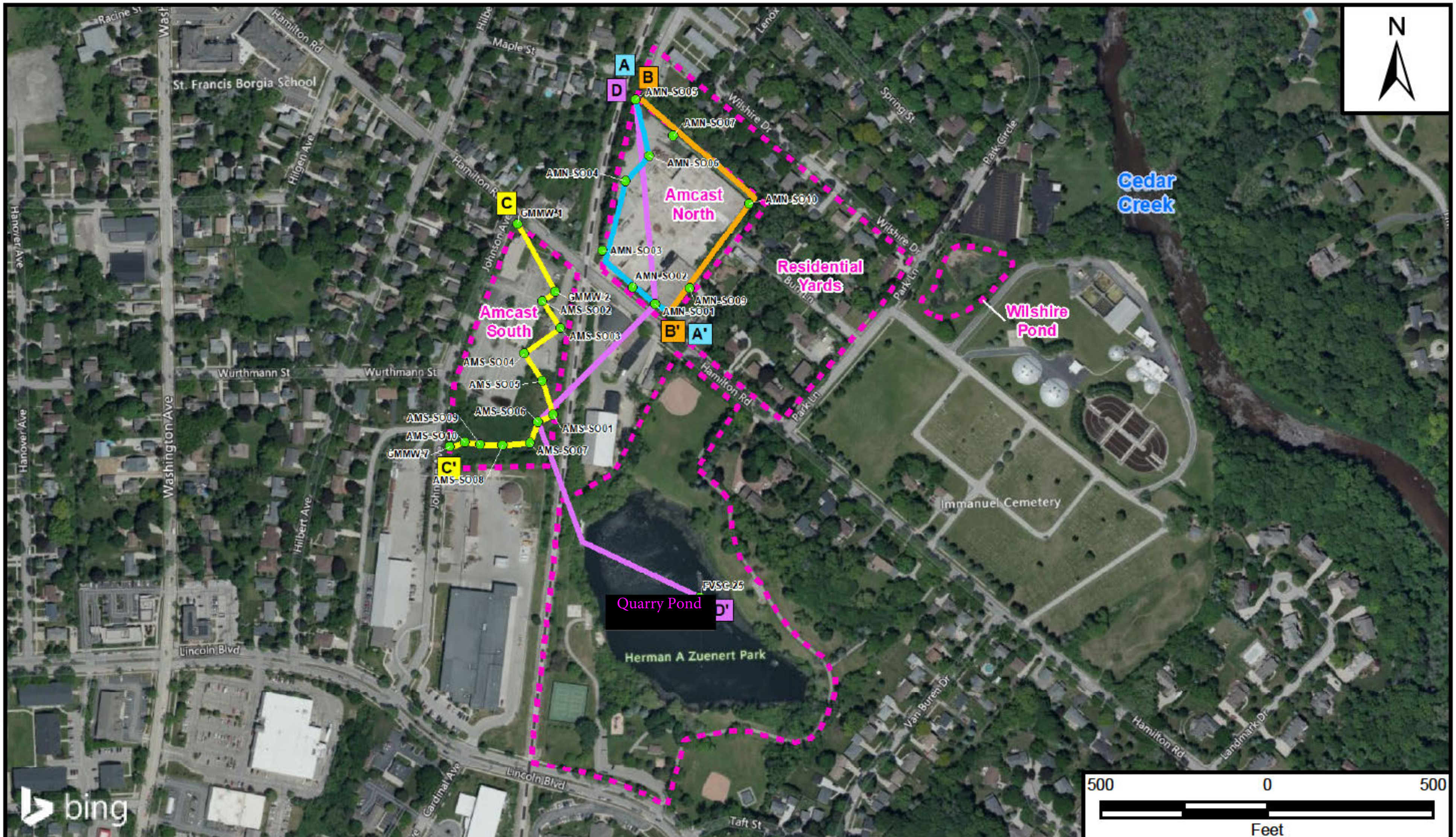

Legend

- Sample Locations
- Cross Section A-
- Cross Section B-B'
- Cross Section C-C'
- Cross Section D-D'
- Approximate Study

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 4

Cross Section Location Map

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File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig4-CrossSectionLocations.mxd

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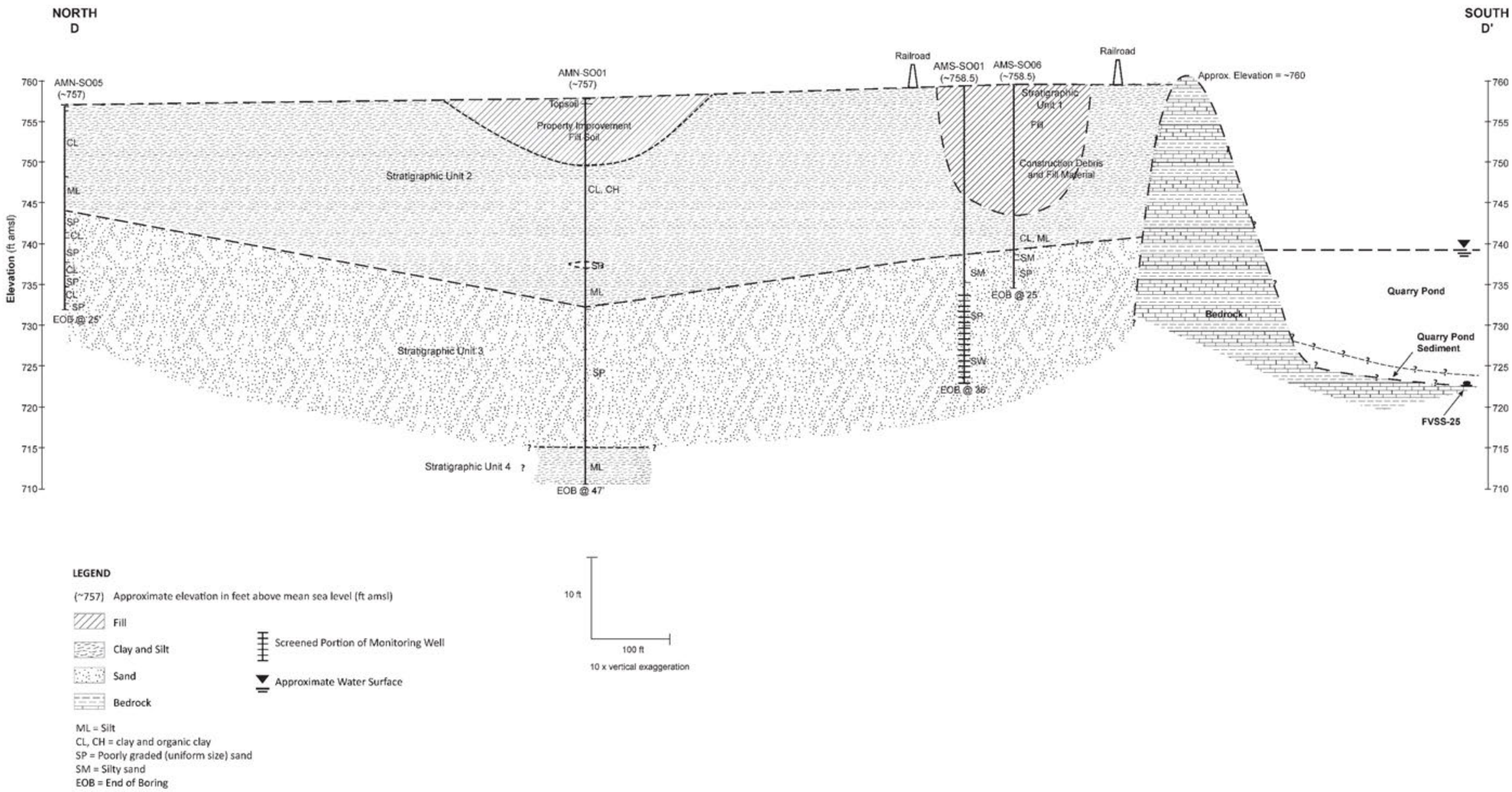

Note: Approximate land and water surface elevations from Foth & Van Dyke, 2003 (Figures 3 and 7) and Foth & Van Dyke, 2004 (Figures 6 and 7)

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 5
Cross Section D-D'

TETRA TECH

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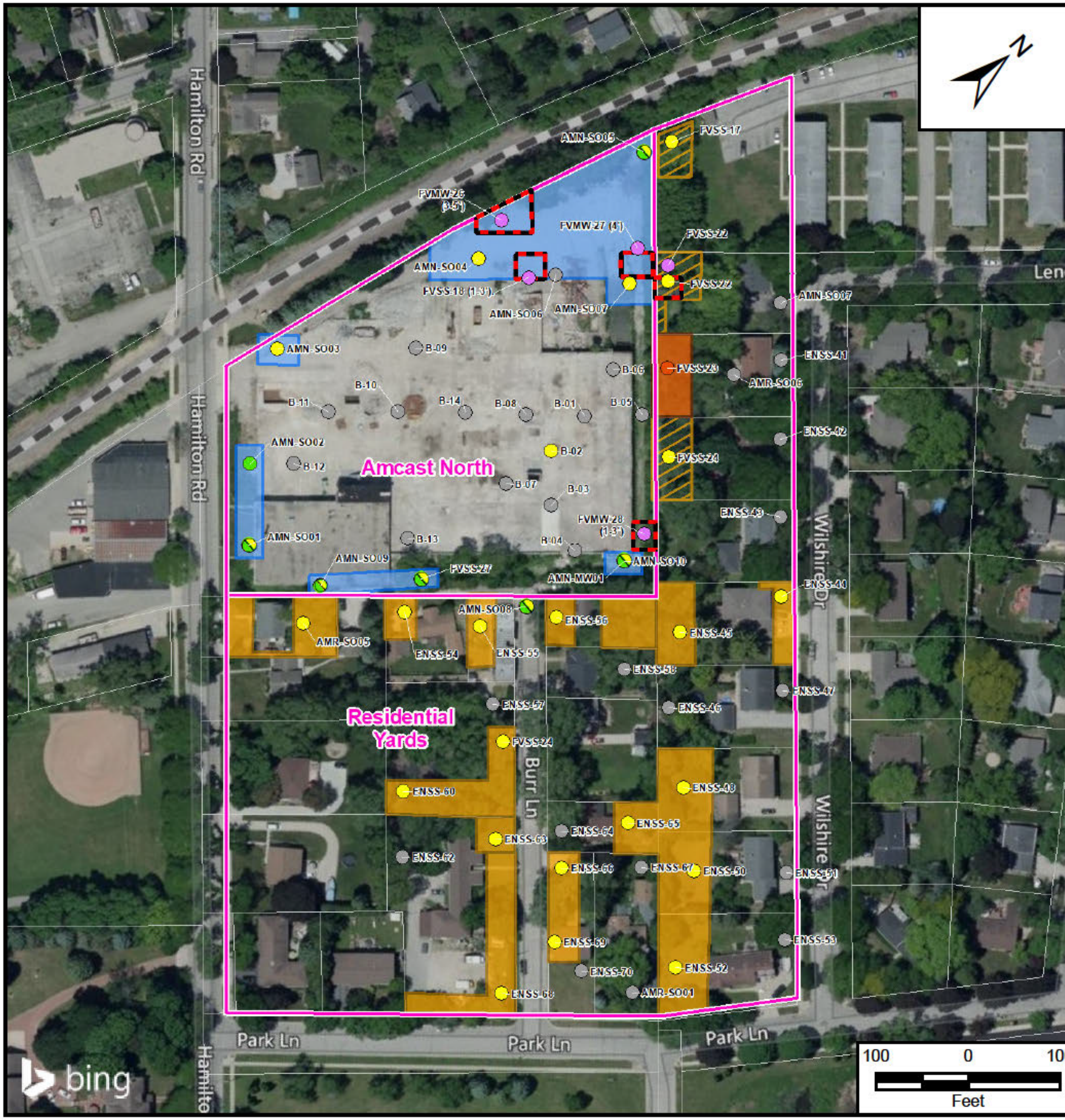

Legend

- Total PCB concentra ions exceed TSCA high-occupancy threshold of 10 mg/kg
- Exceeds Human Health Residential PCB PRG and Ecological PCB PRG (0.22 mg/kg Total PCBs)
- Total PCB Concentrations Exceed TSCA Threshold of 50 mg/kg
- Exceeds Human Health Residential or Soil to Groundwater PAH PRGs
- Sample Location without concentrations exceeding PRGs

[redacted]

- Approximate Study

Notes:
FVMW - October 2003 (Foth & VanDyke)
FVSS - November 2003 (Foth & VanDyke)
ENSS - April 2005 (ENSR)
B - April 2007 (ENSR)
AMR, AMN - September 2011 (USEPA/CH2MHILL)
bgs = below ground surface
mg/kg = milligrams per kilogram
PAH = polyaromatic hydrocarbon
PCB = polychlorinated biphenyl
PRG = preliminary remediation goal for soil as outlined in the Remedial Alternatives Study Report text
ND = Non-Detect

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 6
Amcast North Property Residential Yards Surface Soil PRG Exceedances

100 0 100
Feet

TETRA TECH

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File Path: G:\G9031-START V\Wisconsin\Amcast\mxd\2023-03\Fig6-SurfaceSoilPRGExceedances-North.mxd

Date Saved: 3/3/2023 EPA Contract No.: 68HE0519D0005 TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
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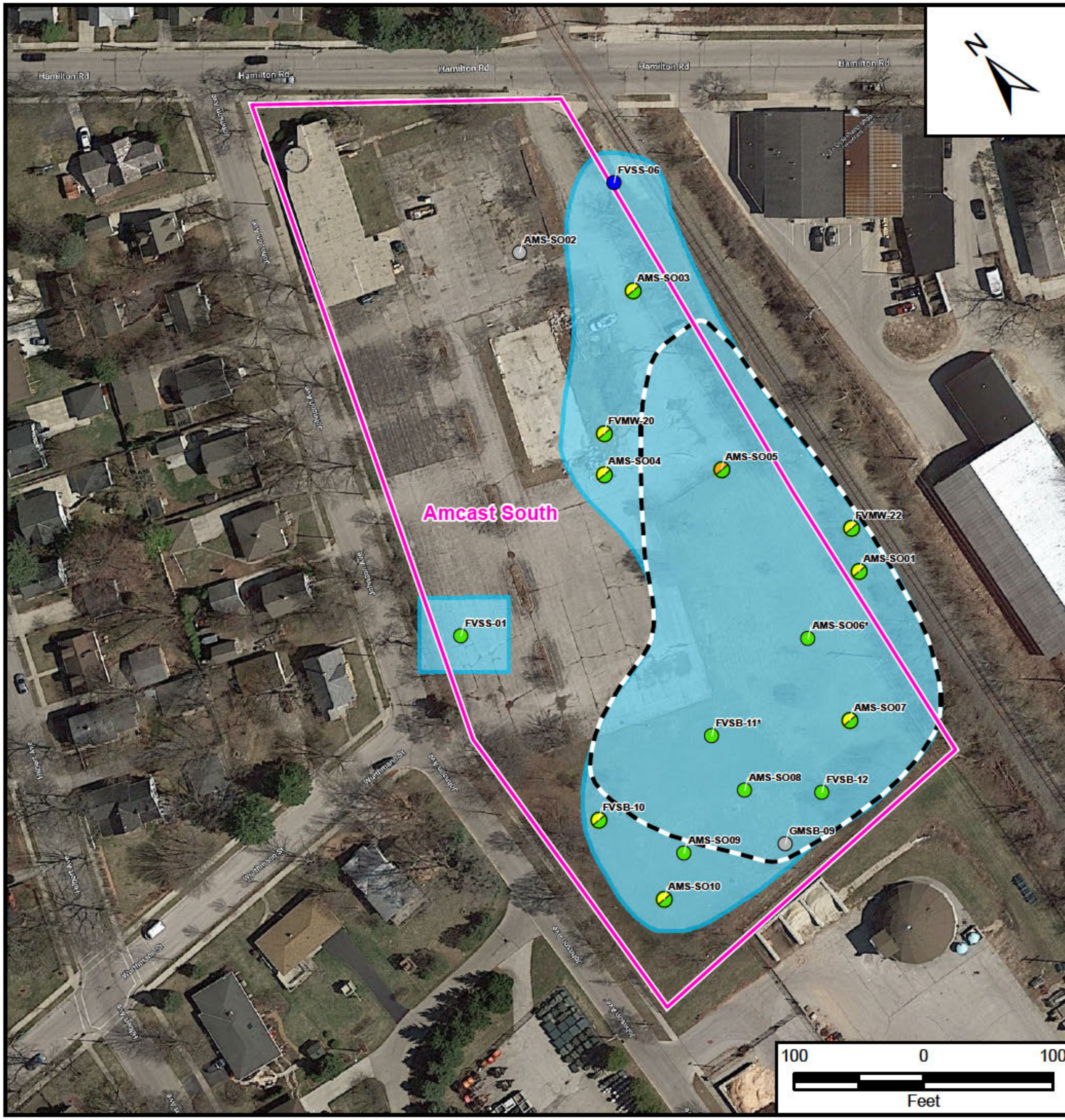

Legend

- Area of assumed exceedance of Human Health Industrial and/or Ecological PRG requiring remedial action for direct contact
- Approximate Study
- Approximate Location of Former Disposal
- Exceeds Human Health Residential PCB PRG and Ecological PCB PRG (0.22 mg/kg Total PCBs)
- Exceeds Human Health Industrial PCB PRG (7.3 mg/kg Total PCBs)
- Exceeds Human Health Residential or Soil to Groundwater PAH PRGs
- Exceeds Human Health Residential or Soil to Groundwater Lead PRGs
- Sample Location without concentrations exceeding PRGs
- * Exceeds Human Health Industrial and Ecological

Notes:

SB - April 1992 (Fox Environmental)
GMSB, GMMW - November 1993 (Geraghty & Miller)
FVMW - October 2003 (Foth & VanDyke)
FVSB - October, November 2003 (Foth & VanDyke)
FVSS - November 2003 (Foth & VanDyke)
AMS - September 2011 (USEPA/CH2MHILL)
mg/kg = milligrams per kilogram
PAH = polyaromatic hydrocarbon
PCB = polychlorinated biphenyl
PRG = preliminary remediation goal for soil as outlined in he Remedial Alternatives Study Report text

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 7
Amcast South Property
Surface Soil PRG Exceedances

TETRA TECH

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File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig7-SurfaceSoilPRGExceedances-South.mxd

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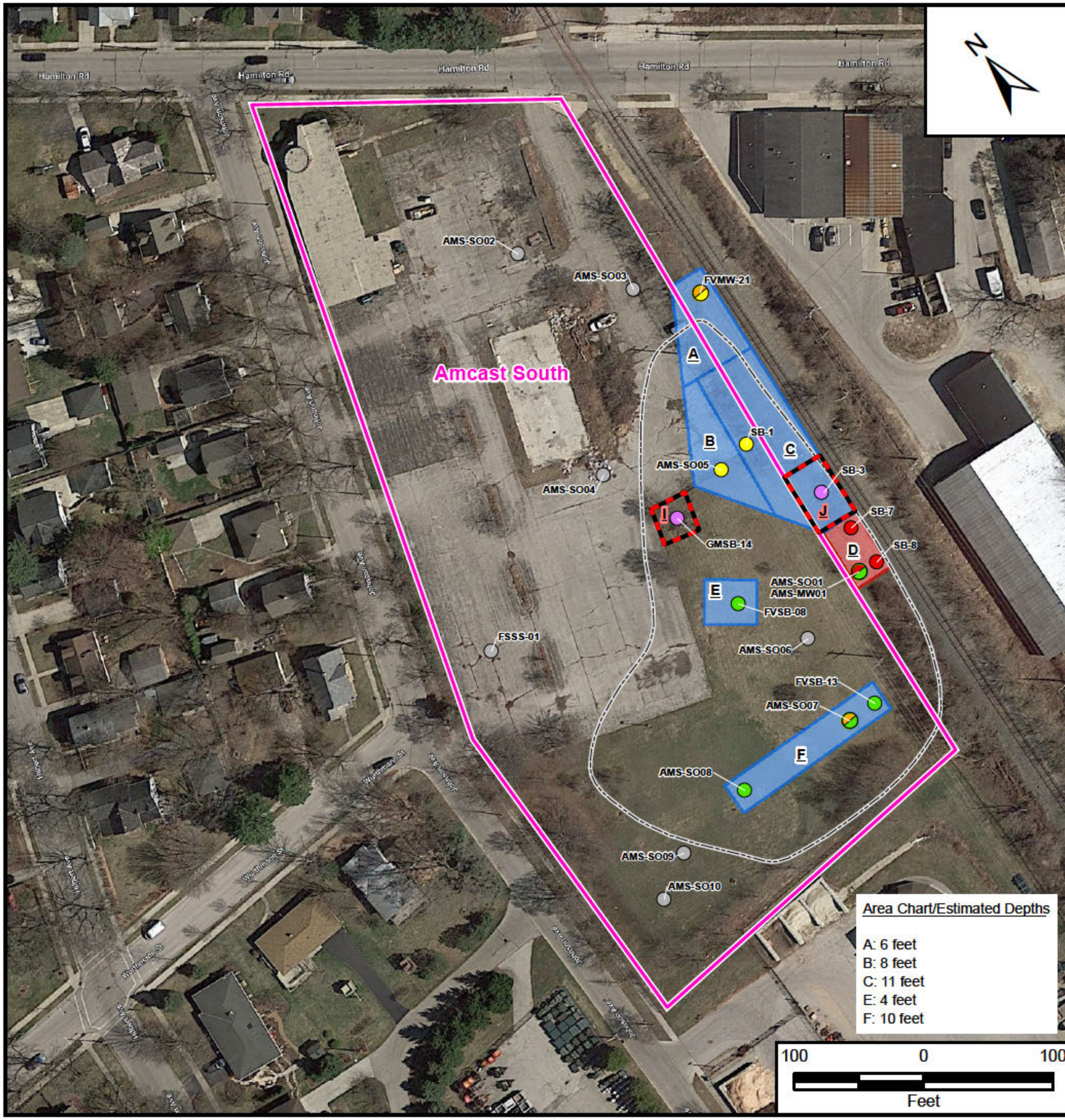

- Subsurface soil area requires remedial action at depth specified in chart
- Area D subsurface soil 12 - 21 feet requires remedial action
- Soil area exceeds TSCA high-occupancy use threshold/requires remedial action
- Approximate Study Area
- Approximate Location of Former Disposal Area
- Total PCB concentrations exceed TSCA high-occupancy threshold of 10 mg/kg
- Exceeds Human Health Residential PCB PRG and Ecological PCB PRG (0.22 mg/kg Total PCBs)
- Exceeds Human Health Industrial PCB PRG (7.3 mg/kg Total PCBs)
- TPCB 438 (19.5 – 21) = Total PCB concentration. depth bgs of 50 mg/kg TSCA threshold
- Exceeds Human Health Residential or Soil to Groundwater PAH PRGs (2 - 4') Depth of PAH Exeedance
- Sample Location without concentrations exceeding PRGs

Notes:
SB - April 1992 (Fox Environmental)
GMSB, GMMW - November 1993 (Geraghty & Miller)
FVMW - October 2003 (Foth & VanDyke)
FVSB - October, November 2003 (Foth & VanDyke)
FVSS - November 2003 (Foth & VanDyke)
AMS - September 2011 (USEPA/CH2MHILL)
mg/kg = milligrams per kilogram
PAH = polyaromatic hydrocarbon

Area Chart/Estimated Depths
PCB = polychlorinated biphenyl
PRG = preliminary remediation goal for soil as outlined in the Remedial Alternatives Study Report text
No Human Heal h Industrial PRG PAH exceedances in subsurface soil samples

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 8
Amcast South Property
Subsurface Soil PRG Exceedances

TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

File Path: D:\G\G9031-START V\Wisconsin\Amcast\mxd\2023-03\Fig8-SubSurfaceSoilPRGExceedances-South.mxd

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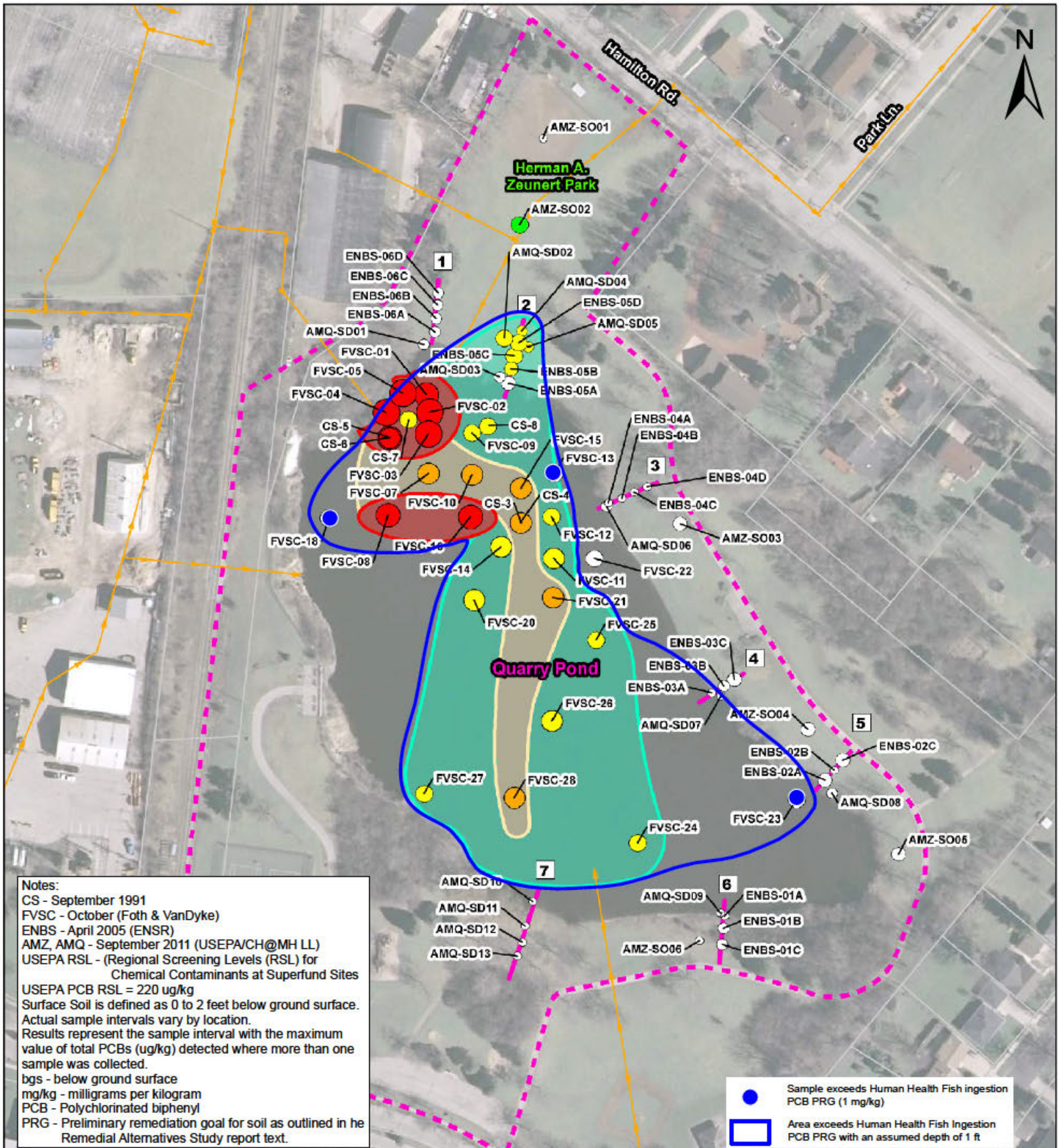
Datum: North American 1983
Units: Foot US



Notes:
CS - September 1991
FVSC - October (Foth & VanDyke)
ENBS - April 2005 (ENSR)
AMZ, AMQ - September 2011 (USEPA/CH@MH LL)
USEPA RSL - (Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites
USEPA PCB RSL = 220 ug/kg
Surface Soil is defined as 0 to 2 feet below ground surface.
Actual sample intervals vary by location.
Results represent the sample interval with the maximum value of total PCBs (ug/kg) detected where more than one sample was collected.
bgs - below ground surface
mg/kg - milligrams per kilogram
PCB - Polychlorinated biphenyl
PRG - Preliminary remediation goal for soil as outlined in he Remedial Alternatives Study report text.

Legend
- Sewer Flow Direction
- Storm Sewer Line
- Approximate Extent of Quarry Pond
- Sediment Transect Line
- 3 Transect ID

Sample Locations Legend
- ND
- ND - 100
- 101 - 1,000
- 1,000 - 10,000
- 10,001 - 100,001
- 100,001 - 1,000,000
- 1,000,001 - 20,000,000

- Area exceeds Ecological PRG with an assumed depth of 3 feet
- Area exceeds TSCA threshold - assumes remedial action required for 3 feet deep
- Area exceeds Human Health Recreational PCB PRG with an assumed depth of 2 feet
- * Human Health data represents sample intervals between 0 - 5.33' bgs with highlighted data representing the maximum total concentration by location
- ** Ecological data represents Total PCB concentration at the 0 - 0.5' bgs interval. Actual sampled interval varies by location.
- Sample Locations without concentrations exceeding PRGs
- Exceeds Ecological** PCB PRG (1.9 mg/kg)
- Exceeds Human Health* Recreational PCB PRG (21 mg/kg)
- Total PCB concentrations exceed TSCA threshold of 50 mg/kg
- Exceeds Ecological PCB PRG for surface soil (1 mg/kg Total PCBs) (0 - 0.5' sample interval)

0 125 250
Feet

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

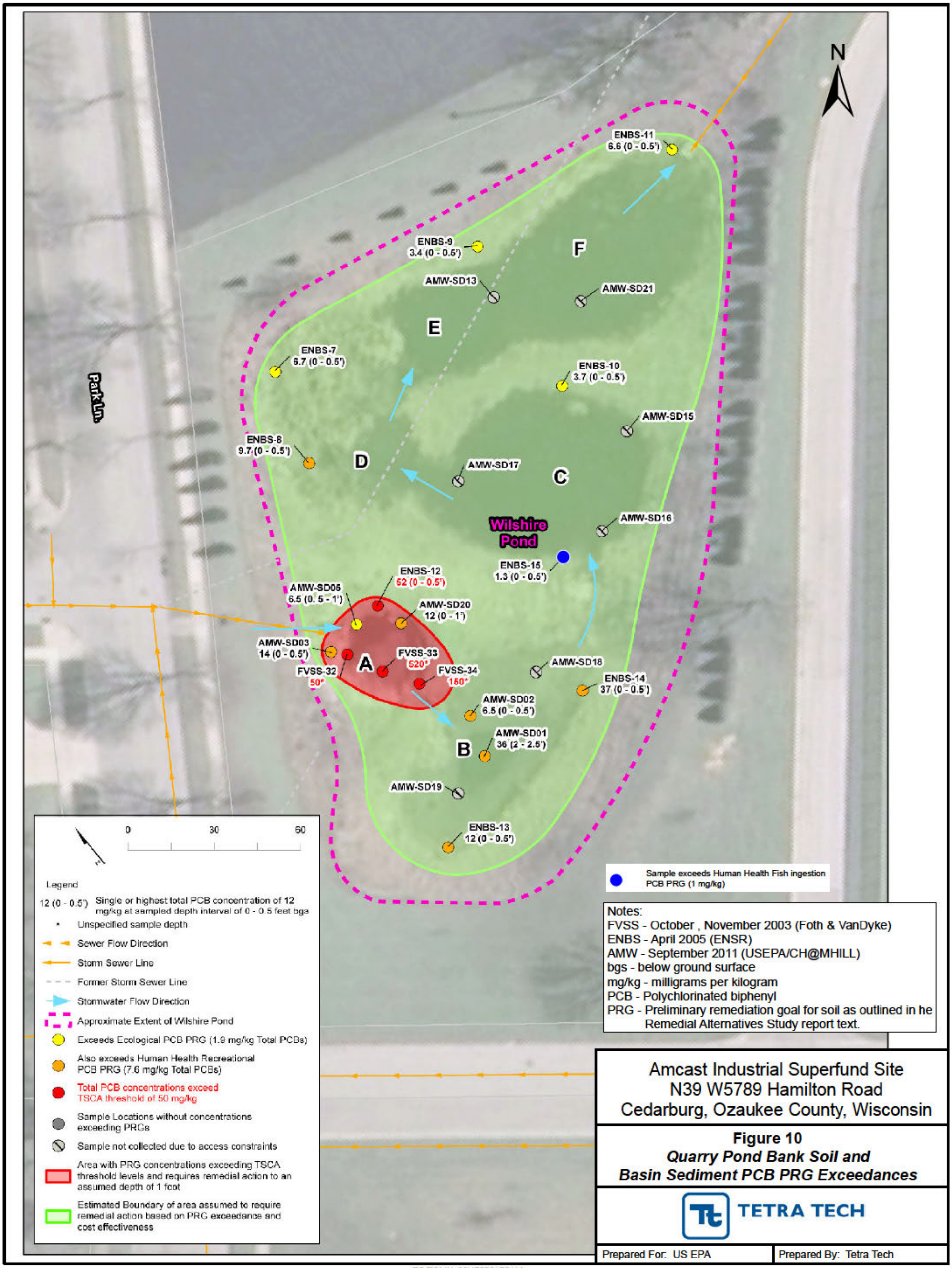
Figure 9
Quarry Pond and Zeunert Park Surface Soil and Sediment PCB PRG Exceedances

TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2023-03\Fig9-QuarryPondSS&SedPCB_PRGExceedances.mxd

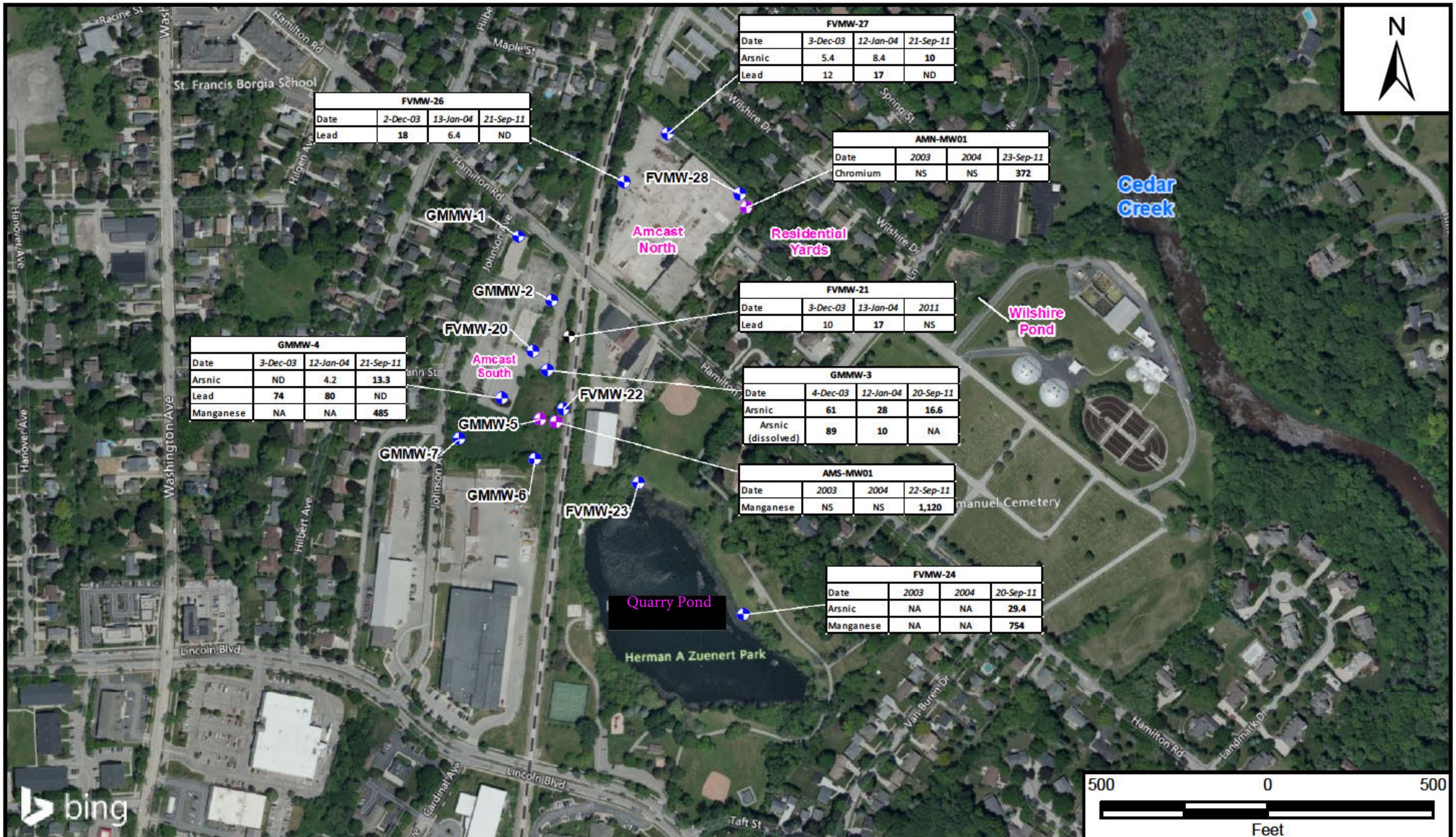
Date Saved: 2/28/2023
EPA Contract No.: 68HE0519D0005
TO/TOLIN: 68HE0521F0114
Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2023-03\Fig10-QuarryPond-SedimentPCBExceedances.mxd

Date Saved: 2/28/2023 EPA Contract No.: 68HE0519D0005 TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



FVMW-27			
Date	3-Dec-03	12-Jan-04	21-Sep-11
Arsnic	5.4	8.4	**10**
Lead	12	**17**	ND

FVMW-26			
Date	2-Dec-03	13-Jan-04	21-Sep-11
Lead	**18**	6.4	ND

AMN-MW01			
Date	2003	2004	23-Sep-11
Chromium	NS	NS	**372**

FVMW-21			
Date	3-Dec-03	13-Jan-04	2011
Lead	10	**17**	NS

GMMW-4			
Date	3-Dec-03	12-Jan-04	21-Sep-11
Arsnic	ND	4.2	**13.3**
Lead	**74**	**80**	ND
Manganese	NA	NA	**485**

GMMW-3			
Date	4-Dec-03	12-Jan-04	20-Sep-11
Arsnic	**61**	**28**	**16.6**
Arsnic (dissolved)	**89**	**10**	NA

AMS-MW01			
Date	2003	2004	22-Sep-11
Manganese	NS	NS	**1,120**

FVMW-24			
Date	2003	2004	20-Sep-11
Arsnic	NA	NA	**29.4**
Manganese	NA	NA	**754**

Legend

- Shallow (Unit 2) Groundwater Monitoring Well
- Deep (Unit 3) Groundwater Monitoring Well
- Groundwater Monitoring Well (damaged)
- Approximate Study Area

Notes:

Groundwater was collected from site wells during the 2003, 2004, and 2011 sampling events except as follows:

dry□ FVMW-22 (2003, 20004, 2011), FVMW-28 (2003, 20004, 2011), GMMW-6 (2003, 2004)

damaged□ Monitoring Well FVMW-21 was damaged and could not be sampled in 2011

not installed□ Monitoring Well AMN-MW01 and AMS-MW01 were installed in 2011

bold□ Bold text indicates the concentration was above the preliminary remediation goal (PRG)

ND□ The analyte or analyte group was not detected during the sampling event

NS□ The monitoring well was not sampled during the event

NA□ Not applicable; the well was not sampled for the analyte or analyte group was not detected during the event

PRG□ Preliminary remediation goals for groundwater as outlined in the Feasibility Study Report

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 11
Grondwater PRG Exceedances Metal

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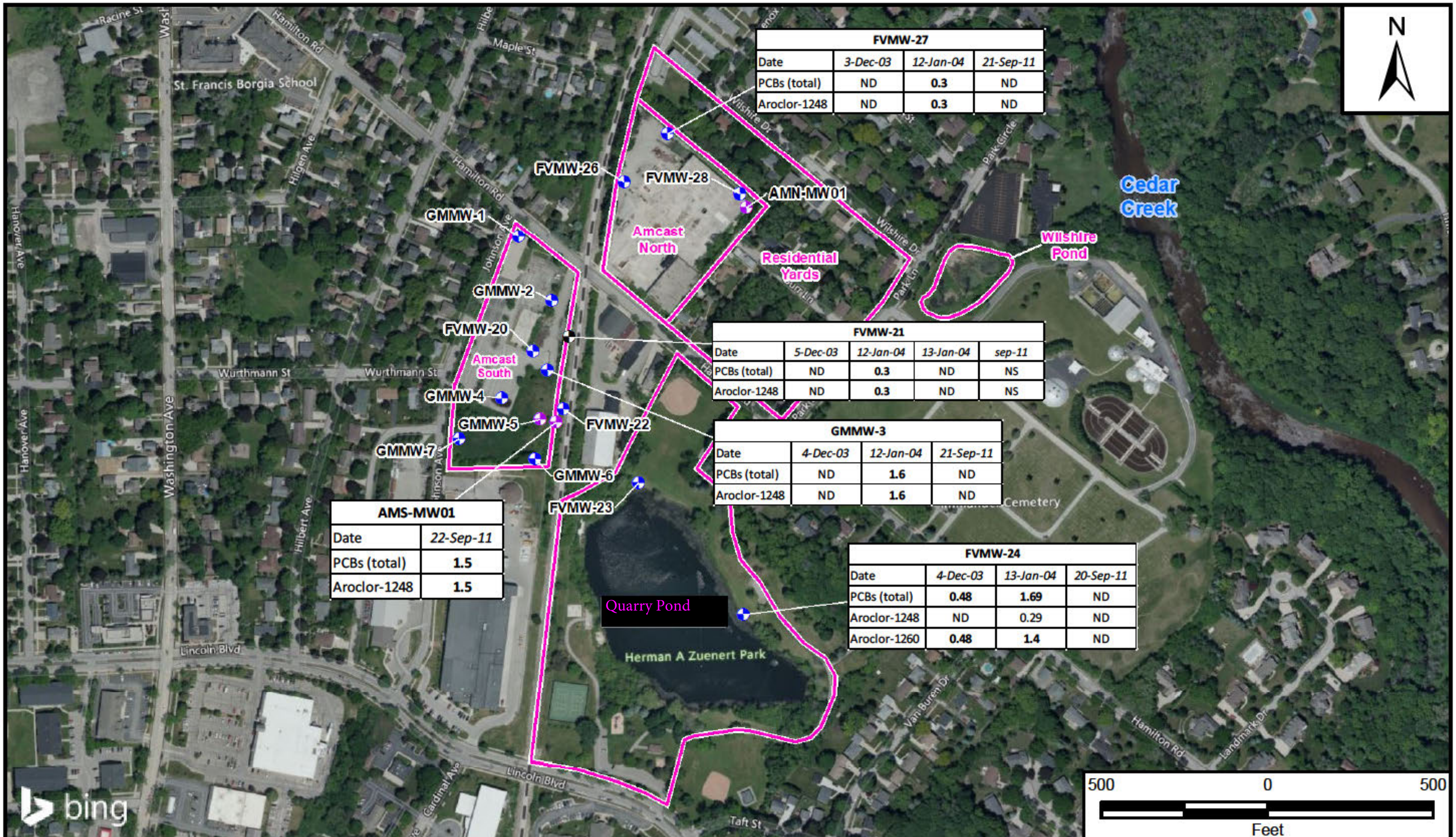
File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig11-GWExceedances-Metal.mxd

Date Saved: 2/27/2023 | EPA Contract No.: 68HE0519D0005 | TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



FVMW-27			
Date	3-Dec-03	12-Jan-04	21-Sep-11
PCBs (total)	ND	**0.3**	ND
Aroclor-1248	ND	**0.3**	ND

FVMW-21				
Date	5-Dec-03	12-Jan-04	13-Jan-04	sep-11
PCBs (total)	ND	**0.3**	ND	NS
Aroclor-1248	ND	**0.3**	ND	NS

GMMW-3			
Date	4-Dec-03	12-Jan-04	21-Sep-11
PCBs (total)	ND	**1.6**	ND
Aroclor-1248	ND	**1.6**	ND

AMS-MW01	
Date	22-Sep-11
PCBs (total)	**1.5**
Aroclor-1248	**1.5**

FVMW-24			
Date	4-Dec-03	13-Jan-04	20-Sep-11
PCBs (total)	**0.48**	**1.69**	ND
Aroclor-1248	ND	0.29	ND
Aroclor-1260	**0.48**	**1.4**	ND

Legend

- Shallow (Unit 2) Groundwater Monitoring Well
- Deep (Unit 3) Groundwater Monitoring Well
- Groundwater Monitoring Well
- Approximate Study

Notes:
Groundwater was collected from site wells during the 2003, 2004, and 2011 sampling events except as follows:
dry FVMW-22 (2003, 20004, 2011), FVMW-28 (2003, 20004, 2011), GMMW-6 (2003, 2004)
damaged Monitoring Well FVMW-21 was damaged and could not be sampled in 2011
not installed Monitoring Well AMN-MW01 and AMS-MW01 were installed in 2011

bold Bold text indicates the concentration was above the preliminary remediation goal (PRG)
ND The analyte or analyte group was not detected during the sampling event
NS The monitoring well was not sampled during the event
NA Not applicable; the well was not sampled for the analyte or analyte group was not detected during the event
PRG Preliminary remediation goals for groundwater as outlined in the Feasibility Study Report

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 12
Grondwater PRG Exceedances
PCBs

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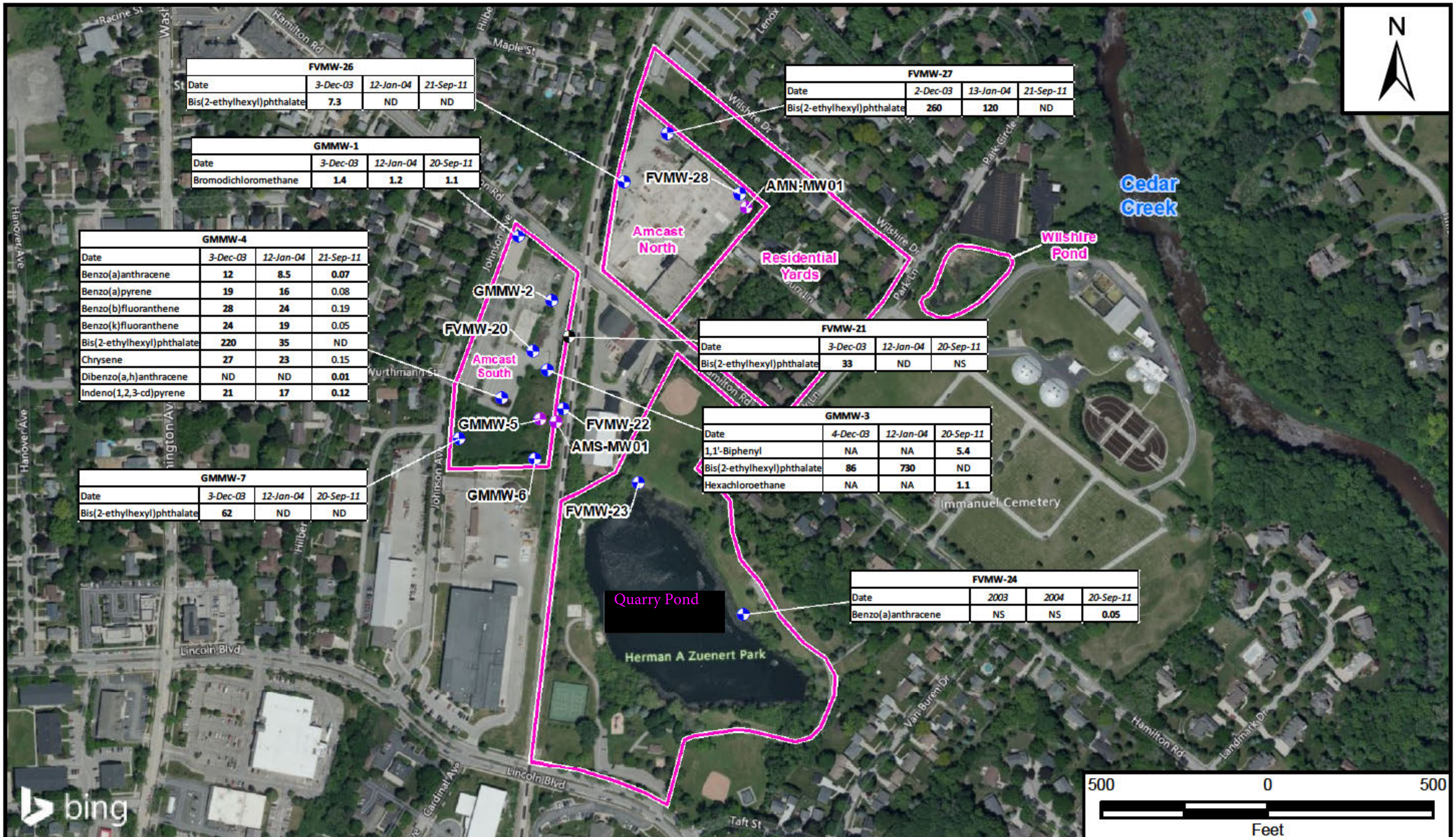
File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig12-GWExceedances-PCBs.mxd

Date Saved: 2/27/2023 EPA Contract No.: 68HE0519D0005 TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



FVMW-26

Date	3-Dec-03	12-Jan-04	21-Sep-11
Bis(2-ethylhexyl)phthalate	**7.3**	ND	ND

GMMW-1

Date	3-Dec-03	12-Jan-04	20-Sep-11
Bromodichloromethane	**1.4**	**1.2**	**1.1**

GMMW-4

Date	3-Dec-03	12-Jan-04	21-Sep-11
Benzo(a)anthracene	**12**	**8.5**	**0.07**
Benzo(a)pyrene	**19**	**16**	0.08
Benzo(b)fluoranthene	**28**	**24**	0.19
Benzo(k)fluoranthene	**24**	**19**	0.05
Bis(2-ethylhexyl)phthalate	**220**	**35**	ND
Chrysene	**27**	**23**	0.15
Dibenzo(a,h)anthracene	ND	ND	**0.01**
Indeno(1,2,3-cd)pyrene	**21**	**17**	**0.12**

GMMW-7

Date	3-Dec-03	12-Jan-04	20-Sep-11
Bis(2-ethylhexyl)phthalate	**62**	ND	ND

FVMW-27

Date	2-Dec-03	13-Jan-04	21-Sep-11
Bis(2-ethylhexyl)phthalate	**260**	**120**	ND

FVMW-21

Date	3-Dec-03	12-Jan-04	20-Sep-11
Bis(2-ethylhexyl)phthalate	**33**	ND	NS

GMMW-3

Date	4-Dec-03	12-Jan-04	20-Sep-11
1,1'-Biphenyl	NA	NA	**5.4**
Bis(2-ethylhexyl)phthalate	**86**	**730**	ND
Hexachloroethane	NA	NA	**1.1**

FVMW-24

Date	2003	2004	20-Sep-11
Benzo(a)anthracene	NS	NS	**0.05**

Legend

- Shallow (Unit 2) Groundwater Monitoring Well
- Deep (Unit 3) Groundwater Monitoring Well
- Groundwater Monitoring Well (damaged)
- Approximate Study Area

Notes:
Groundwater was collected from site wells during the 2003, 2004, and 2011 sampling events except as follows:
dry□ FVMW-22 (2003, 20004, 2011), FVMW-28 (2003, 20004, 2011), GMMW-6 (2003, 2004)
damaged□ Monitoring Well FVMW-21 was damaged and could not be sampled in 2011
not installed□ Monitoring Well AMN-MW01 and AMS-MW01 were installed in 2011

bold□ Bold text indicates the concentration was above the preliminary remediation goal (PRG)
ND□ The analyte or analyte group was not detected during the sampling event
NS□ The monitoring well was not sampled during the event
NA□ Not applicable; the well was not sampled for the analyte or analyte group was not detected during the event
PRG□ Preliminary remediation goals for groundwater as outlined in the Feasibility Study Report

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 13
Grondwater PRG Exceedances VOCs and SVOCs

TETRA TECH

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File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig13-GWExceedances-VOCs.mxd

Date Saved: 12/12/2022
EPA Contract No.: 68HE0519D0005
TO/TOLIN: 68HE0521F0114
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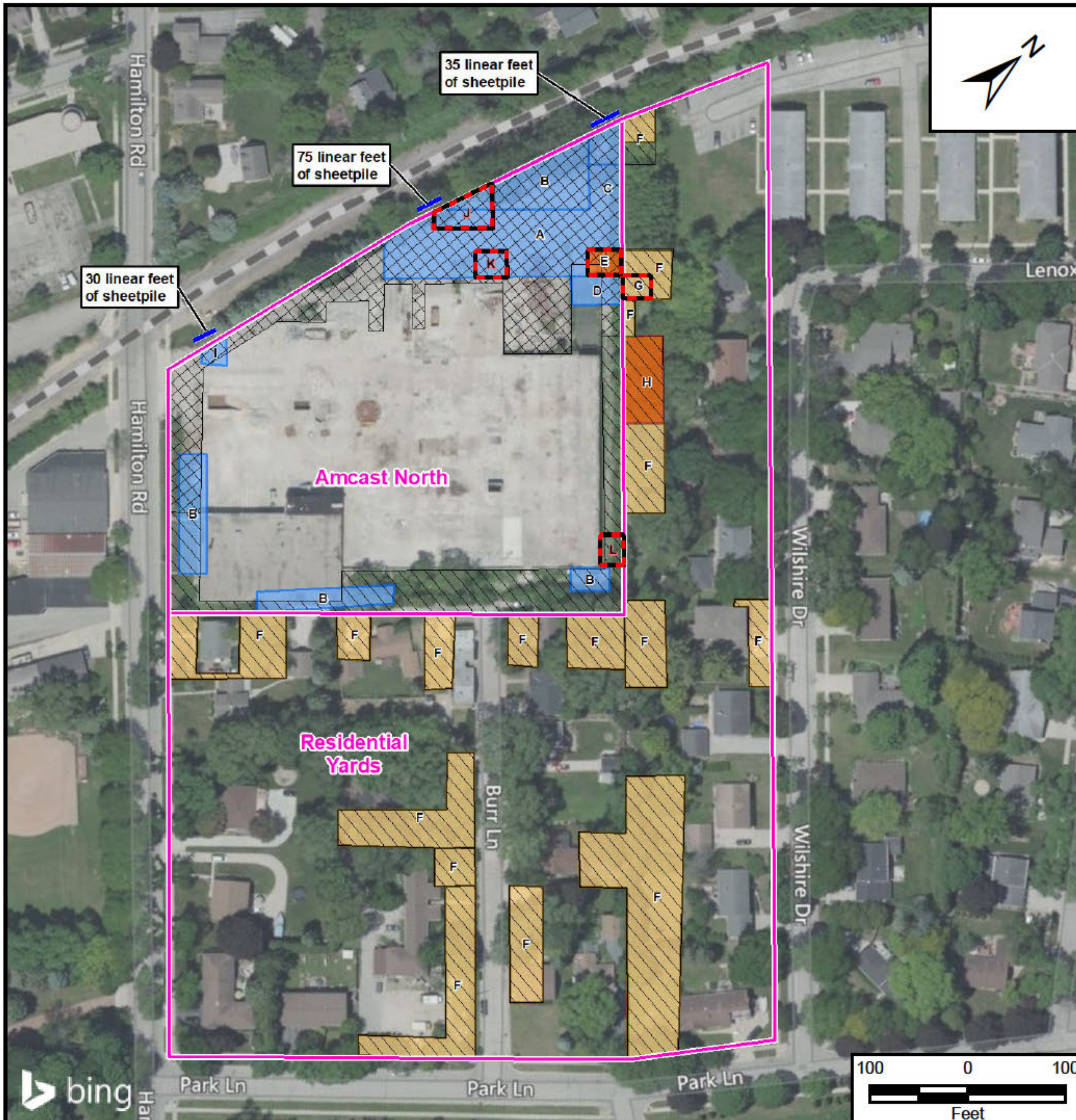
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



Legend

- Sheetpile Wall
- Cleaning/Grubbing
- Pavement Removal
- Industrial non-TSCA excavation (AMN-2) or isolation cover (AMN-3)
- Residential non-TSCA excavation (RY-2) or isolation cover (RY-3)
- TSCA excavation
- Soil area exceeds TSCA high-occupancy use threshold/requires remedial action
- Approximate Study Area

Area/Type	Estimated Excavation Depths	Approximate Square Feet
Pavement Removal	N/A	43,947
Clearing/Grubbing	N/A	94,699
Area A	5 feet	17,100
Area B	2 feet	12,803
Area C	6 feet	3,600
Area D	4 feet	1,549
Area E	3 feet	500
Area F	2 feet	66,058
Area G	4 feet	1,300
Area H	2 feet	3,600
Area I	10 feet	600
Area J	5 feet	1,917
Area K	3 feet	887
Area L	3 feet	748

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 14
Amcast North Property Residential Yards Alternatives

TETRA TECH

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File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2023-03\Fig14-ResidentialYardsAlt-North.mxd

Date Saved: 3/3/2023 EPA Contract No.: 68HE0519D0005 TO/TOLIN: 68HE0521F0114

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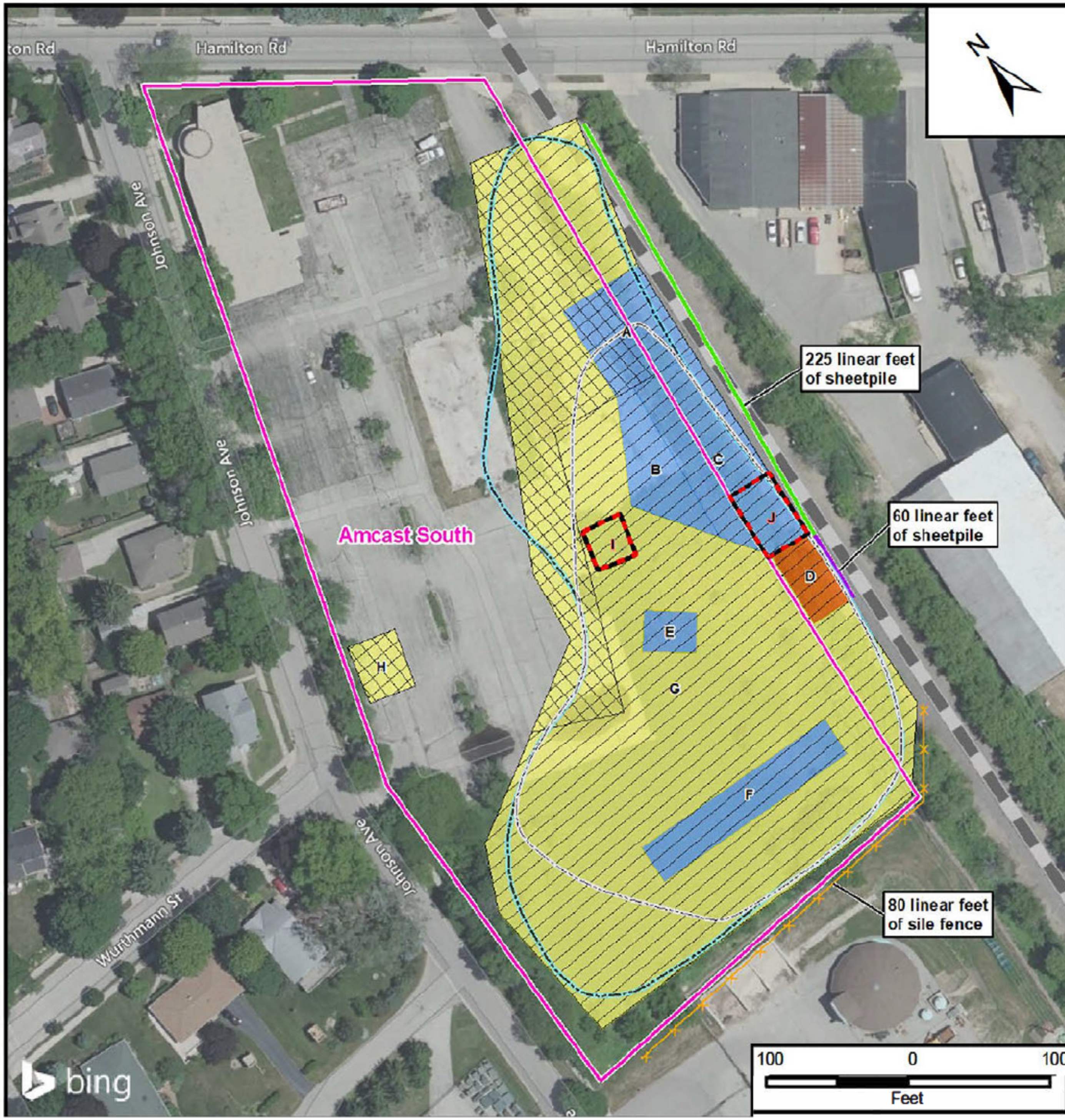
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



Silt Fence
Sheetpile Wall, AMS-2
Sheetpile Wall, AMS-3
Cleaning/Grubbing
Pavement Remova
AMS-2: Shallow (2-ft) non-TSCA Excavation Area
AMS-2: Excavation Areas > 2 1
TSCA Excavation Area
AMS-3: Isolation cover area
Soil area exceeds TSCA high-occupancy use threshold/requires remedial action
Approximate Study Area
Approximate Location of Former Disposal Area

Note AMS-4 extents left off figure in error. Extents similar to AMS-2.

Area/Type	Estimated Excavation Depths	Approximate Square Feet
Pavement Removal	N/A	21,953
Clearing/Grubbing	N/A	86,219
AMS-3: Isolation cover area	N/A	100,273
Area A	6 feet	4,500
Area B	8 feet	3,100
Area C	11 feet	7,400
Area D	22 feet	1,700
Area E	4 feet	1,100
Area F	10 feet	4,500
Area G	2 feet	88,185
Area H	2 feet	1,500
Area I	13 feet	883
Area J	19 feet	1,660

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 15
Amcast South Alternatives

TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

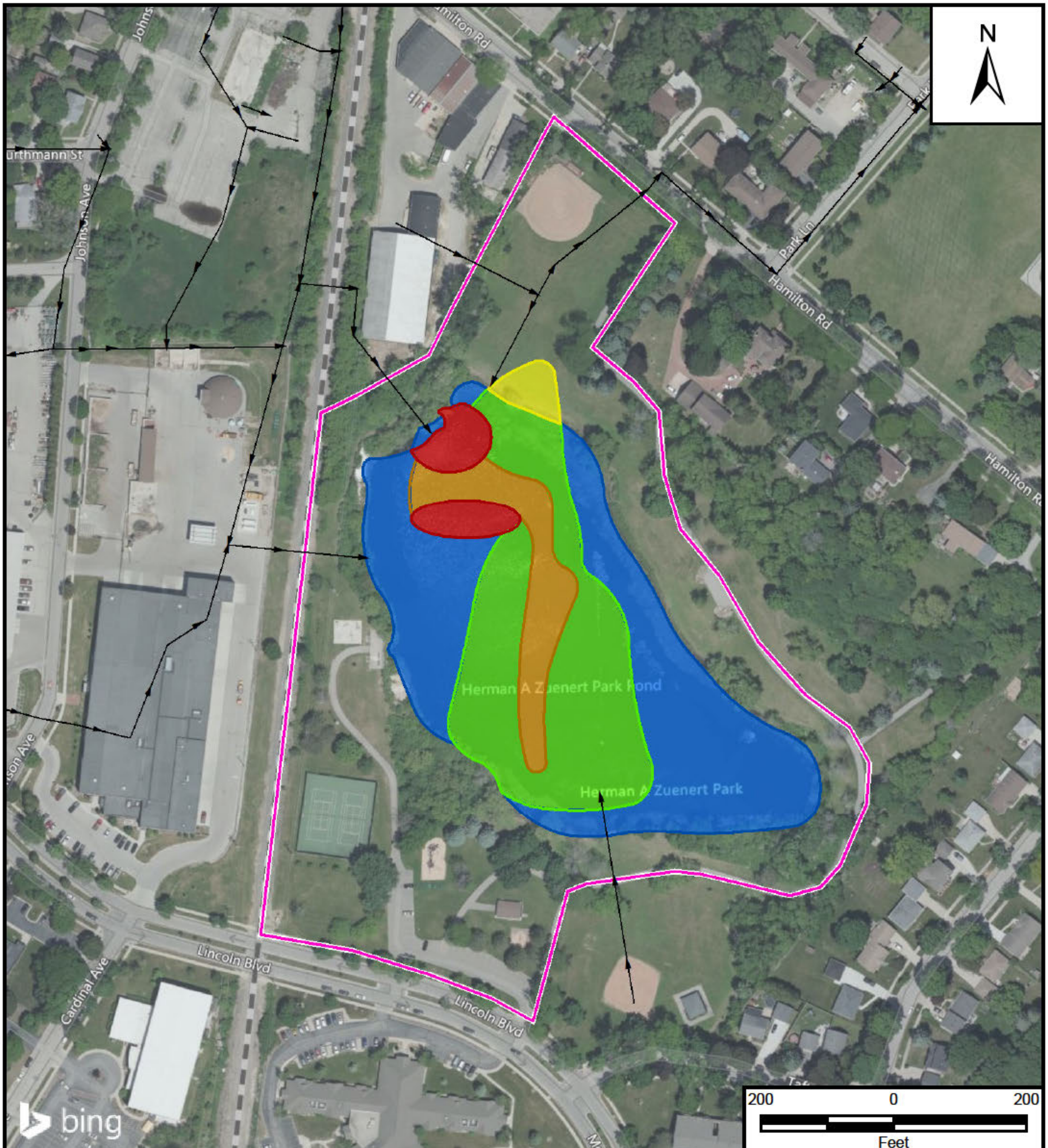
File Path: J:\G\G9031-START V\Wisconsin\Amcast\mxd\2023-03\Fig15-Alternatives-South.mxd

Date Saved: 3/3/2023

EPA Contract No.: 68HE0519D0005

TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



- Storm Sewer Line
- Approximate Extent of Quarry Pond
- Sediment Exceeds Ecological PRG (3 feet)
- Bank Soil Exceeds Ecological PRG (3 feet)
- Sediment Exceeds Recreational PRG (2 feet)
- TSCA Sediment (3-5 feet)
- Sediment Removal to 1 mg/kg (1 feet)

Notes:
PRG = preliminary remediation goal for soil/sediment as outlined in the Feasibility Study Report text

Area/Type	Estimated Excavation Depths	Approximate Square Feet
Area A	2 feet	29,000
Area B	3 feet	93,000
Area C1	5 feet	7,991
Area C2	3 feet	7,309
Area D	3 feet	5,900
Area E	1 feet	126,000

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 16
Quarry Pond Alternatives

TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig16-QuarryPondAlternatives.mxd

Date Saved: 1/3/2023

EPA Contract No.: 68HE0519D0005

TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US

Notes:
Drawing source(s) = Figure 2 - City of Cedarburg Detention Ponds (AOI-1) Bank Sample Locations (Phase 2) and Sediment Core Locations (Phase 3), Foth & Van Dyke, June 2004. Original source = "As Constructed" Grading/Erosion Control Plan, Sheet 5 of 7, Bonestroo Rosene Anderlik and Associates, November 1994

Legend:
- Storm Sewer Line
- Former Storm Sewer Line
- Basin Toe of Slope
- Top of Basin
- Berm
- Basin
- TSCA Area
- Approximate Extent of Wilshire Pond

Area/Type	Estimated Excavation Depths	Approximate Square Feet
Bank	NA	10200
Area A	2 feet	1,500
Area B	4 feet	2,700
Area C	2 feet	18,200
Area D	2 feet	1,200

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 17
Wilshire Pond Alternatives

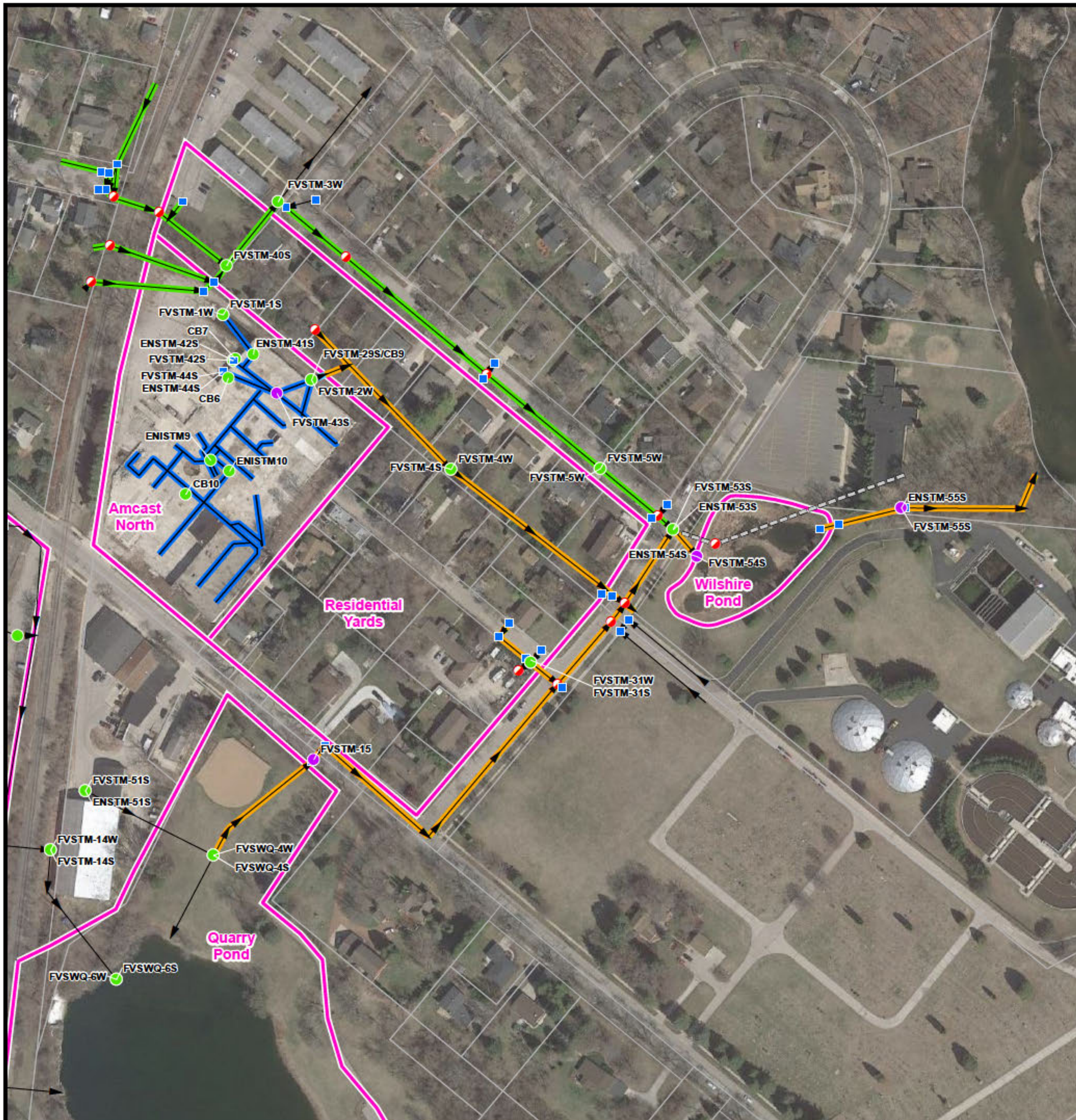
TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig17-WilshirePondAlternatives.mxd

Date Saved: 12/27/2022 EPA Contract No.: 68HE0519D0005 TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



Legend

- Not Sampled
- Sample Collected
- Storm Sewer
- Catch Basin
- Approximate Study
- Storm Sewer Line
- Former Storm Sewer Line
- Downgradient pipes
- Onsite pipes outside of building footprint
- Onsite pipes within building footprint
- Upgradient/other pipes

N

200 0 200

Feet

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 18
Amcast North Storm Sewer Alternatives

TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

File Path: G:\GIG9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig18-AmcastNorthStormSewerAlternatives.mxd

Date Saved: 12/15/2022 EPA Contract No.: 68HE0519D0005 TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US

Legend

- Not Sampled
- Sample Collected
- Storm Sewer
- Catch Basin
- Approximate Study
- Storm Sewer Line
- Former Storm Sewer Line
- Downgradient pipes
- Onsite pipes outside of building footprint
- Onsite pipes within building footprint
- Upgradient/other pipes

N

100 0 100

Feet

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 19

Amcast South Storm Sewer Alternatives

TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

File Path: G:\G\G9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig19-AmcastSouthStormSewerAlternatives.mxd

Date Saved: 12/15/2022

EPA Contract No.: 68HE0519D0005

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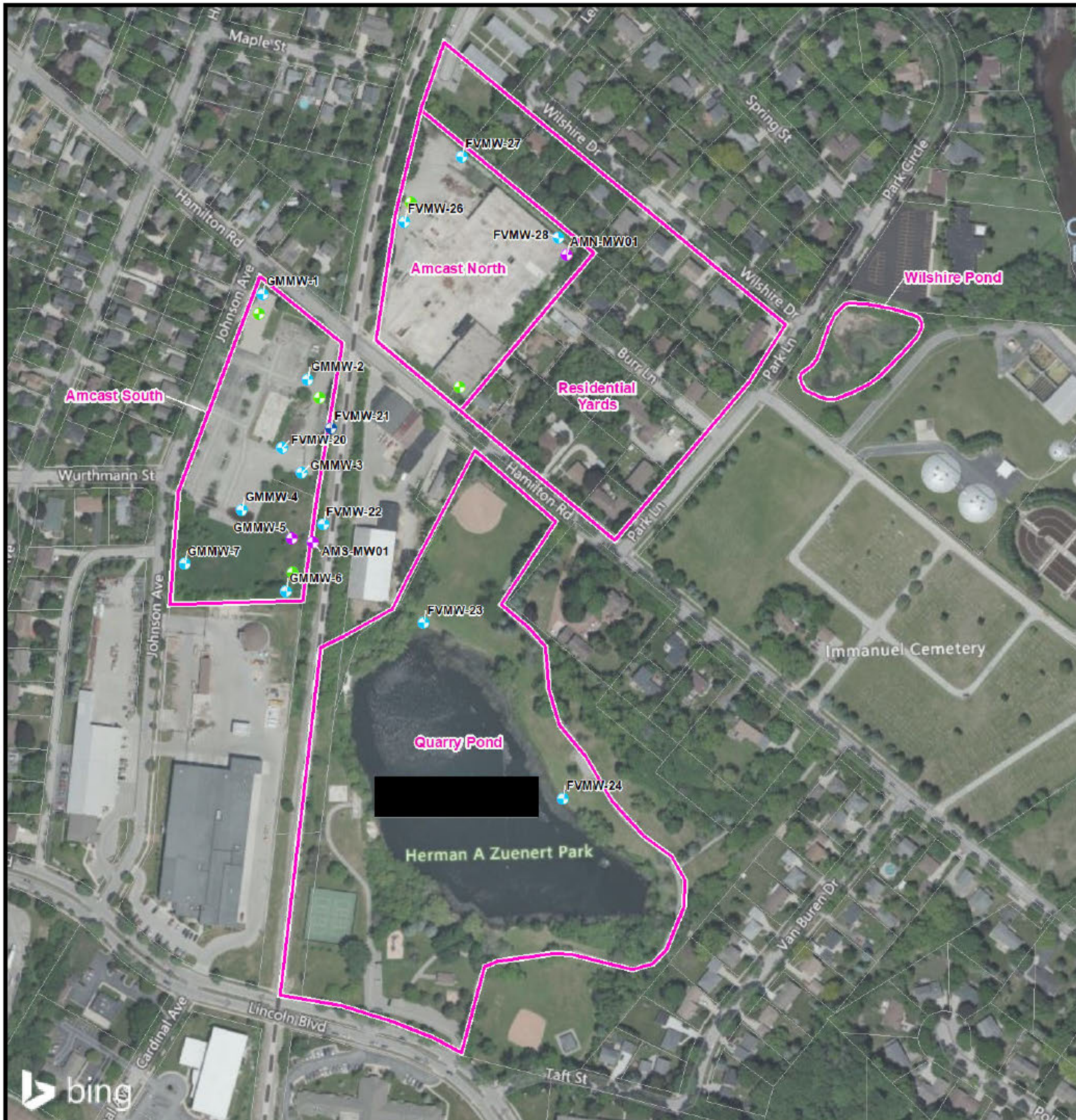
Datum: North American 1983
Units: Foot US



Legend

- New Deep Groundwater Monitoring Well
- Existing Shallow Groundwater Monitoring Well
- Existing Deep Groundwater Monitoring Well
- Monitoring Well To Be
- Approximate Study
- Parcel

N

300 0 300

Feet

Amcast Industrial Superfund Site
N39 W5789 Hamilton Road
Cedarburg, Ozaukee County, Wisconsin

Figure 20
Groundwater Monitoring Well Alternatives

TETRA TECH

Prepared For: US EPA | Prepared By: Tetra Tech

File Path: G:\GG9031-START V\Wisconsin\Amcast\mxd\2022-12\Fig20-GWM_Alternatives.mxd

Date Saved: 12/21/2022 EPA Contract No.: 68HE0519D0005 TO/TOLIN: 68HE0521F0114

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US

Table 1
Summary of Maximum Concentrations of Soil and Sediment Concentrations
Amcast Industrial Superfund Site, Cedarburg, Wisconsin

Class	Contaminant	Regulatory Enforceable Standards		Surface Soil (mg/kg)					Subsurface Soil (mg/kg)		Sediment (mg/kg)	
		Wisconsin NR700 Groundwater Protection Value[1]	Wisconsin NR700 Soil Direct Contact[2]	Amcast North	Residential Yards	Amcast South	Zeunert Park Pond Banks	Wilshire Pond Banks	Amcast North	Amcast South	Quarry Pond	Wilshire Pond
PCBs	PCBs	--	0 22	33	79	11	9	36	690	15000	11000	520
Metals	Arsenic	--	--	5 3	--	5 7	--	--	--	8 2	--	3 2
	Manganese	91 6	--	670	--	620	--	--	810	1200	--	--
	Lead	--	400	73 4	--	95	--	13	73 4	1200	--	--
	Copper	39 1	--	--	--	100	--	--	--	1600	--	--
PAHs	Total PAHs	--	--	5 09	--	62 86	--	--	50 8	2 92	--	--
	Benzo(a)anthracene	--	0 15	0 23	--	13	--	--	4 5	71	--	--
	Benzo(a)pyrene	0 47	0 015	0 3	--	8 1	--	--	3 7	80	--	--
	Benzo(b)fluoranthene	0 48	0 15	1 1	--	3 5	--	--	3 1	86	--	--
	Benzo(k)fluoranthene	--	0 15	--	--	7 2	--	--	3	58	--	--
	Chrysene	0 15	--	--	--		--	--	--	78	--	--
	Dibenzo(a,h)anthracene	--	0 015	0 086	--	1 2	--	--	0 92	14	--	--
	Indeno(1,2,3-cd)pyrene	--	0 15	0 56	--	7 5	--	--	3 4	78	--	--

Notes:

1	Obtained from WDNR's RCL spreadsheet and a Wisconsin dilution factor (DF) default value of 2
2	Calculated using Wisconsin NR720 12 guidance using toxicity factors used in the 2015 Human Health Risk Assessment, a hazard quotient of 1, and an excess lifetime cancer risk of $1x10^{-6}$
--	Not applicable or not detected
mg/kg	Milligrams per kilogram
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
RCL	Residual contaminant levels
Surface Soil	0 to 2 feet below ground surface with ingestion, dermal contact, and inhalation assumed
Subsurface Soil	Total soil 0 to 10 feet below ground surface
WDNR	Wisconsin Department of Natural Resources

Table 2
Summary of Maximum Concentrations of Groundwater Contaminants
Amcast Industrial Superfund Site, Cedarburg, Wisconsin

Class	Contaminant	WDNR Groundwater Quality Enforcement Standards (µg/L)	EPA MCL (µg/L)	Human Health Risk-Based PRG (µg/L)	Sitewide Groundwater (µg/L)
PCBs	PCBs	0.03	--	--	1.7
Metals	Arsenic	10	10	--	89D/61
	Chromium	100	100	--	46D/370
	Manganese	300	--	--	1100
	Lead	15	15	--	80
PAHs	Benzo(a)anthracene	--	--	0.0016[a]	12
	Benzo(a)pyrene	0.2	0.2	--	19
	Benzo(b)fluoranthene	0.2	--	--	28
	Benzo(k)fluoranthene	--	--	0.0011[a]	24
	Chrysene	0.2	--	--	27
	Dibenzo(a,h)anthracene	--	--	0.00007[a]	0.02
	Indeno(1,2,3-cd)pyrene	--	--	0.00065[a]	21
Non-PAH SVOCs	bis(2-ethylhexyl)phthalate	--	6	--	730
	Hexachloroethane	--	--	3[b]	17
	Pentachlorophenol	1	1	--	0.18
VOCs	1,1'-biphenyl	--	--	0.3[b]	54
	1,2,4-trimethylbenzene	480	--	--	58
	Benzene	5	5	--	3.8
	Bromodichloromethane	0.6	80	--	1.4
	Chloroform	6	80	--	1.1
	Ethylbenzene	700	700	--	31
	Naphthalene	100	--	--	17

Notes:
µg/L - micrograms per liter
a - based on an excess lifetime cancer risk of 1E-06
b - based on a target organ hazard index of 1
PAH - Polycyclic aromatic hydrocarbon
PCB - Polychlorinated biphenyl
SVOC - Semi-volatile organic compound
VOC - Volatile organic compound
WDNR - Wisconsin Department of Natural Resources

Table 3
Contaminants of Concern
Amcast Industrial Superfund Site, Cedarburg, Wisconsin

Exposure Location/Media	Potential Receptor Group	PCBs	Metals					PAHs								Non-PAH SVOCs			VOCs						
		PCBs	Arsenic	Chromium	Manganese	Lead	Copper	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	HMW PAHs	bis(2-ethylhexyl)phthalate	Hexachloroethane	Pentachlorophenol	1,1'-biphenyl	1,2,4-trimethylbenzene	Benzene	Bromodichloromethane	Chloroform	Ethylbenzene	Naphthalene
Amcast North Surface Soil (0-2 feet)	Ecological	X			X																				
Amcast North Total Soil (0-10 feet)	Residents (adults and children)	X						X	X	X	X		X	X											
	Industrial Workers	X																							
	Construction Workers	X																							
Residential Yards (0-2 feet)	Residents (adults and children)	X																							
	Ecological	X																							
Amcast South Surface Soil (0-2 feet)	Ecological	X			X	X	X								X										
Amcast South Total Soil (0-10 feet)	Residents (adults and children)	X				X		X	X	X	X	X	X	X											
	Industrial Workers	X						X	X	X	X		X	X											
	Construction Workers	X																							
Zeunert Park Surface Soil	None	No COCs																							
Quarry Pond Sediment	Residents (adults and children)	X																							
	Ecological	X																							
Quarry Pond Surface Water	None	No COCs																							
Quarry Pond Fish Fillets	Recreational Anglers (adults and children)	X																							
Wilshire Pond Bank Surface Soil	Recreational Users (adults and children)	X																							
Wilshire Pond Surface Water	None	No COCs																							
Wilshire Pond Sediment	Ecological	X																							
Sidewide Groundwater (tapwater use)	Adults and Children	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
	Industrial Workers	X	X	X				X	X	X	X	X	X	X		X	X								

Notes:
HMW PAHs are the sum total of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perlyene, chrysene, dibenzo(a,h)anthracene, and pyrene.

COC	Contaminant of concern
mg/kg	Milligrams per kilogram
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
SVOC	Semi-volatile organic compound
VOC	Volatile organic compound
Surface Soil	0 to 2 feet below ground surface with ingestion, dermal contact, and inhalation assumed
Subsurface Soil	Total soil 0 to 10 feet below ground surface

Table 4
Potential Applicable or Relevant and Appropriate Requirements and To-Be-Considered Criteria
Amcast Industrial Superfund Site, Cedarburg, Wisconsin

Requirement	Citation	Description	ARAR/TBC Determination by Area: Amcast North	Amcast South	Residential Yards	Wilshire & Quarry Ponds	Comment
Chemical-specific ARARs							
Toxic Substances Control Act (TSCA)	40 CFR 761.61 (c)	Allows development of risk-based cleanup levels for removing PCB-contaminated remediation waste. Requires approval from the Regional Administrator of the EPA region in which the site is located.	A	A	A	A	EPA intended complex remediation situations such as those found at the Amcast site to be addressed as a risk-based cleanup. This provision allows for flexibility in developing remedial alternatives.
Water Quality Standards for Wisconsin Surface Water	WAC NR 102.04(1)(a) and (d); WAC NR 105.06 and 105.07 40 CFR 132	Substances that will cause objectionable deposits on the shore or in the bed or a body of water, shall not be present in such amounts as to interfere with public rights in water of the state; and Substances in concentrations or combinations that are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts that are acutely harmful to animal, plant, or aquatic life. The wildlife criterion is the concentration of a substance which, if not exceeded, protects Wisconsin's wildlife from adverse effects resulting from ingestion of surface waters of the state and from ingestion of aquatic organisms taken from surface waters of the state. Federal guidance identifies minimum water quality standards, antidegradation policies, and implementation procedures for the Great Lakes System to protect human health, aquatic life, and wildlife.				R/A	WDNR placed the first 5 miles of Cedar Creek upstream of the confluence with the Milwaukee River on Wisconsin's 303(d) Impaired Waters List for Fish Consumption Advisories due to PCBs in contaminated sediments.
PCB Total Maximum Daily Load for Cedar Creek	WDNR 2008	PCBs Total Maximum Daily Load for Cedar Creek and Milwaukee River (Thiensville Segment) Ozaukee County, WI; proposes a long-term goal of sediment PCB concentrations for Cedar Creek.				TBC	WDNR has established a TMDL for Cedar Creek. The Cedar Creek TMDL = 0.17 grams per day of PCBs. To meet the TMDL, a reduction in PCB loading is needed. Table 4 estimates that the PCB load from Wilshire Pond is 0.081 gram per day; therefore, a 100% load reduction from Wilshire Pond is needed to meet the TMDL and ultimately WDNR's goal of reducing fish tissue levels of PCBs in Cedar Creek to the target value of 0.21 milligram per kilogram. This will allow for the removal of the special fish consumption advisory for Cedar Creek and will meet narrative water quality standards that aim to protect the public health and recreational activities.
Sediment Sampling and Analysis and Review Requirements	WAC NR 347.06	Establishes sediment sampling and analysis requirements for dredging projects regulated by the State of Wisconsin.				R/A	Relevant and appropriate because it applies to dredging projects regulated under certain WI statutes; whereas this is a CERCLA project. However, the sampling requirements are appropriate to be followed.
Groundwater Quality	WAC NR 140 and 160	Establishes groundwater quality standards for substances detected in or having a reasonable probability of entering the groundwater resources of the state; to specify scientifically valid procedures for determining if a numerical standard has been attained or exceeded; to specify procedures for establishing points of standards application, and for evaluating groundwater monitoring data.	A	A		A	Table 1 contains Public Health Groundwater Quality Standards, and Table 2 contains Public Welfare Groundwater Quality Standards.
Water Quality Antidegradation	WAC NR 207	WAC NR 207 Water Quality Antidegradation establishes procedures for evaluating degradation in certain waters.	A or R/A	A or R/A		A or R/A	Status is to dependent on Remediation Alternative Chosen; could apply to groundwater treatment, sediment dewatering, and/or pond water removal; applicable for establishing discharge limits for a temporary water treatment system used during implementation.
Wisconsin Pollutant Discharge Elimination System	WAC NR 205	This regulation outlines the general conditions to be included in all WPDES permits issued by the WDNR.				A or R/A	This regulation applies to remedial alternatives involving point discharges where a WPDES permit equivalency would be required. The City of Cedarburg has an MS4 permit that covers the storm sewers.
Procedures for Calculating Water Quality Based Effluent Limits	WAC NR 106	Specifies the procedures to calculate effluent limits for toxic and organoleptic substances and if and how these limits will be included in WPDES permits.				X	
Safe Drinking Water	WAC NR 809	Establishes drinking water standards for water supplies, including federal MCLs. Also specifies sampling and analysis requirements.	A	A	A	A	

Table 4
Potential Applicable or Relevant and Appropriate Requirements and To-Be-Considered Criteria
Amcast Industrial Superfund Site, Cedarburg, Wisconsin

Action-specific ARARs

Dust	WAC NR 415	Establishes standards for fugitive dust emissions and specifies that precautions should be taken to prevent particulate matter from becoming airborne.	A	A	A	A	
Stormwater	WAC NR 216.46 and NR 216.47	Prevents and controls water pollution and soil erosion by minimizing the amount of sediment and other pollutants carried by runoff or discharged from land-disturbing construction activity to waters of the state for construction activities that disturb more than 1 acre of land through identification and implementation of best management practices plan.	A	A	A	A	Obtaining a permit and an approved erosion and sediment control plan or stormwater pollution protection plan is an administrative requirement and is not required for onsite activities. However, the requirements and best management practices associated with this regulation are applicable to some of the proposed remedial alternatives.
Toxic Substances Control Act (TSCA)	40 CFR 761.61 (c)	Establishes cleanup options and storage options for PCB remediation waste, including PCB-contaminated soils. Options include risk-based approval by EPA. Risk-based approval option must demonstrate that cleanup or storage plan will not pose an unreasonable risk of injury to health or the environment.	A	A	A	A	Applicable to remedial actions that involve PCB remediation wastes.
	40 CFR 761.40	Requirements regarding the marking of PCB containers and PCB storage areas.	A	A	A	A	Applicable to remedial actions that involve PCB remediation wastes.
	40 CFR 761.65(b)(2)(v), 40 CFR 761.65(c)(3), and 40 CFR 761.65(c)(9)	Requirements regarding storage of PCB remediation waste.	A	A	A	A	Applicable to remedial actions that involve PCB remediation wastes.
Groundwater Quality	WAC NR 141	Establish minimum acceptable standards for the design, installation, construction, abandonment, and documentation of groundwater monitoring wells.	X	X	X	X	A few of the existing groundwater monitoring wells are no longer functional and will be abandoned and new wells will be installed.
Hazardous Waste	WAC NR 661	This part identifies those solid wastes that are subject to regulation as hazardous wastes under parts 262 through 265, and 268 when transported and disposed offsite. Sets TCLP concentrations above which generated wastes must be managed as hazardous waste. Waste is generated when it is removed from the ground and taken outside of the area of contamination.	X	X	X	X	Applicable if concentration in waste exceeds TCLP concentrations. Includes procedure for notification of hazardous waste activities.
Hazardous Waste Management Standards Applicable to Generators	WAC NR 662.011 and NR 662.030 through .033	A generator needs to characterize all wastes (including media) that are generated and then appropriately manage any hazardous waste. Generator requirements include properly labeling waste containers, storing containers in containment areas, and protecting them from the elements.	R/A	R/A	R/A		Each site could potentially generate waste that exhibits hazardous characteristics.
Hazardous Waste Management Standards Applicable to Use and Management of Containers	WAC NR 665.0171 through 0173	Containers must be in good condition; compatible with the type of waste place the container; always be closed during storage except when it is necessary to add or remove waste; and must not be opened, handled, or stored in a manner that could cause it to rupture or leak.					R/A if hazardous waste is generated.
Hazardous Waste Management Land Disposal Restriction Requirements	WAC NR 668.07 and NR 668.40 and .48	Provides testing, tracking, and recordkeeping requirements for generators, treatment, and disposal facilities. Provides treatment standards for hazardous wastes. Hazardous wastes must be treated to specific concentrations before they can be placed back on the ground.					R/A if hazardous waste is generated. If a hazardous waste is generated, the hazardous waste characteristic and all UHCs would need to be treated to the applicable land disposal restriction (LDR) concentration (for the characteristic) (NR 668.40) or the UTS (for the UHCs) (NR 668.48) before it can be placed on the ground.
Management of Contaminated Soils	WAC NR 718	Establishes minimum standards for the storage, transportation, treatment, and disposal of contaminated soil and certain other solid wastes excavated during response actions.	X	X	X	X	
Guidance for Cover Systems as Soil Performance Standard Remedies	WDNR 2013	Provide remedy selection, design, construction, and operation and maintenance (O&M) concepts, including specific examples, for cover systems for soil performance standard remedies.		TBC			
Notification for Closure	WAC NR 725	Specifies the minimum notification requirements that shall be met before it can be determined that a specific site or facility may be closed with a continuing obligation or residual contamination, or to approve a remedial action plan that includes a continuing obligation.	X	X	X		Substantive requirements would be met through the CERCLA process for areas of the site that require maintenance of an engineered system, action in the future, restricting development or activities at a site, or requiring additional environmental work be completed before land use at a site changes.
Sites with Residual Contamination	Wisconsin Statutes Section 292.12 292.12(2)(d); 292.12(5m)	This regulation provides notification about residual contamination or other continuing obligations on a property.				X	This potentially applies after completion of the CERCLA process, if residual PCBs in sediment are left in place at levels requiring notification, maintenance of an engineered system such as a sediment cap, action in the future, restricting development or activities at a site, or additional environmental work before land use at a site changes.

Table 4
Potential Applicable or Relevant and Appropriate Requirements and To-Be-Considered Criteria
Amcast Industrial Superfund Site, Cedarburg, Wisconsin

Historic Landfill	WDNR 2013	WDNR's Remediation and Redevelopment and Waste and Materials Management programs have jointly developed a process and guidance for development on historic fill sites and licensed landfills.		TBC			Guidance may be considered if disposal site was developed prior to 1970 and is intended for redevelopment.
Wetlands	WAC NR 350-353	Establish standards for development, monitoring, and long-term maintenance of wetland compensatory mitigation projects that are approved by the department, and to establish procedures and standards for the establishment and maintenance of mitigation banks.				R/A	Relevant and Appropriate if a wetland compensatory mitigation project is needed.
Oil Pollution Prevention	40 CFR 112	Governs management of oils or fuels in amounts greater than 1,320 gallons, if held in containers 55 gallons or larger. Requirements include secondary containment, routine inspections of containment before discharging accumulated stormwater, implementation of spill prevention procedures, and spill response procedures					Applicable , if >1,320 gallons of oil are managed. If oil or oil-based compounds are managed during the remediation, then the design and management requirements of this rule would apply.
Location-specific ARARs							
US Fish and Wildlife Coordination Act	16 USC 661	The purpose is to protect fish and wildlife when federal actions result in the control or structural modification of a water body. Federal agencies may take action to prevent loss or damage to fish and wildlife resources.				A	Consultation is administrative and not required for onsite actions. However, expertise resides within the U.S. Fish and Wildlife Service, and consultation is encouraged to tap this expertise.
EPA Guidance - OSWER	OSWER Directive 9355.7-04, May 1995	Land Use in CERCLA Remedy Selection Process. Identifies considerations for incorporating anticipated future land use in the remedy selection process.	TBC	TBC			Provides guidance for consideration of future site land use in selection of a site remedy.
Migratory Bird Treaty Act of 1972	16 USC 703-712	Prohibits the taking, possessing, buying, selling, or bartering of any migratory bird, including feathers, or other parts, nest eggs, or products, except as allowed by regulations. This includes disturbing nesting birds.	A	A	A	A	Applicable if migratory birds are identified during the action. Migratory birds are known to pass over the area, although no nesting habitats are believed to exist in the four area/sites. If migratory birds, their nests, or eggs are discovered, the design will specify measures to minimize disturbance.
Endangered Species Act of 1973 16 USC §1531 et seq.	50 CFR 200	Requires that federal agencies ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.					No endangered species are known to be present that would be affected by remedial activities. Applicable if listed species or critical habitat is identified.
Beneficial Reuse Solid Waste Exemption	WAC NR 500.08(6)	Establishes criteria for possible beneficial use of solid wastes after treatment. Applies for onsite reuse options only.					TBD if considered part of an alternative. Applicable for onsite beneficial reuse of treated soils meeting criteria.

Notes:
Occupational Safety and Health Administration requirements have not been identified as potential ARARs or TBS; these requirements are not ARARs becaue they are not an environmental siting or law.
The hazardous waste program (RCRA), CWA's NPDES program, and SDWA has been delegated to the State.
A = Applicable
R/A = Relevant and Appropriate
X = Likely Relevant and Appropriate but need more information before finalizing.

ARAR = Applicable, or Relevant and Appropriate Requirements
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
NR = Natural Resources
PCB = Polychlorinated biphenyl
TBC = To be considered
TBD = To be determined
TCLP = Toxicity Characteristic Leaching Procedure
TMDL = Total maximum daily load
USC = United States Code
WAC = Wisconsin Administrative Code
WDNR = Wisconsin Department of Natural Resources

References:
Development at Historic Fill Sites and Licensed Landfills: Guidance for Investigation, WDNR PUB-RR-684, November 2013
Guidance for Cover Systems as Soil Performance Standard Remedies, WDNR PUB-RR-721, October 2013
Guidance for Determining Soil Contaminant Background Levels at Remediation Sites, WDNR PUB-RR-721, October 2013
Land Use in CERCLA Remedy Selection Process, EPA OSWER Directive No. 9355.7-04, May 25, 1995
PCB Remediation in Wisconsin under the One Cleanup Program MOA, WDNR PUB-RR-786, October 2013
PCBs Total Maximum Daily Load for Cedar Creek and Milwaukee River (Thiensville Segment) Ozaukee County, WI, WDNR, August 2008

Table 5
Preliminary Remediation Goals for Soils and Sediments (Units in mg/kg)
Amcast Industrial Superfund Site, Cedarburg, Wisconsin

		Surface Soil (mg/kg)					Subsurface Soil		Sediment			Fish Fillet
Class	**Contaminant**	**Amcast North**	**Residential Yards**	**Amcast South**	**Zeunert Park (Pond Banks)**	**Wilshire Pond Banks**	**Amcast North**	**Amcast South**	**Quarry Pond**	**Wilshire Pond**	**Storm Sewers**	**Quarry Pond**
PCBs	PCBs	0.22	0.22	0.22	1	1	1	1	1 (SWAC 0.5/0.25)*	1 (SWAC 0.5/0.25)*	1	0.025
Metals	Copper	--	--	80	--	--	--	--	--	--	--	--
	Lead	--	--	400	--	--	--	--	--	--	--	--
	Manganese	--	--	450	--	--	--	--	--	--	--	--
PAHs	Benzo(a)anthracene	0.15	0.15	0.15	--	--	--	--	--	--	--	--
	Benzo(a)pyrene	0.015	0.015	0.015	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	0.15	0.15	0.15	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	0.15	0.15	0.15	--	--	--	--	--	--	--	--
	Chrysene	--	--	0.52	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	0.015	0.015	0.015	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	0.15	0.15	0.15	--	--	--	--	--	--	--	--
	High Molecular Weight PAHs	--	--	18	--	--	--	--	--	--	--	--

Notes:

mg/kg	milligrams per kilogram
*	The PRG for Quarry Pond and Wilshire Pond is the 0.25 mg/kg long-term SWAC. The 1 mg/kg sediment cleanup level and 0.5 mg/kg short-term SWAC are Remedial Action Levels.
--	PRG not applicable for parameter and potential receptor

High molecular weight PAHs are the sum total of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene.

PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
Surface Soil	0 - 2 feet
Subsurface Soil	Total soil 0 - 10 feet
SWAC	Surface weighted average concentration

Post construction SWAC target is 0.5 mg/kg with a long term goal of 0.25 mg/kg

ADMINISTRATIVE RECORD INDEX

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
AMCAST INDUSTRIAL CORPORATION
CEDARBURG, OZAUKEE COUNTY, WISCONSIN

UPDATE 1
APRIL19, 2023
SEMS ID: 980406

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	979245	03/26/91	Castner Law Offices Amcast Counsel	WDNR	Report - Re: Amcast Industrial PCB Sampling Data	46
2	323632	03/24/93	Geraghty & Miller, Inc.	WDNR	Report - Re: Amcast Industrial South Disposal Area Investigation	69
3	323643	05/17/94	Geraghty & Miller, Inc.	WDNR	Report - Re: Amcast Industrial Site Assessment	55
4	323642	09/01/01	Sigma Environmental Services, Inc.	Amcast Industrial Corporation	Report - Re: Amcast Industrial Phase I Environmental Site Assessment	50
5	400089	06/06/07	ENSR / AECON	U.S. EPA	Report - Re: Amcast Industrial Site – Phase II Investigation	238
6	919101	09/01/11	CH2M Hill, Inc.	U.S. EPA	Report - Re: Quality Assurance Project Plan for Remedial Investigation/Feasibility Study at the Amcast Industrial Site	334
7	941052	05/01/15	CH2M Hill, Inc.	U.S. EPA	Report - Re: Final Remedial Investigation at the Amcast Industrial Site	1905
8	941051	05/01/17	CH2M Hill, Inc.	U.S. EPA	Report - Re: Remedial Alternatives Evaluation	161

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9	978408	06/12/20	CH2M Hill, Inc.	U.S. EPA	Report - Re: Final Feasibility Study Report	261
10	980396	03/13/23	Tetra Tech, Inc.	U.S. EPA	Report - Re: Evaluation of Preliminary Remediation Goals and Update to Alternative Cost Estimates (Revision 3)	123
11	981536	04/13/23	Wisconsin DNR	U.S. EPA	Memo - Re: Comments on Proposed Plan	5