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73251

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT REVISION 2

FORMER GREEN BAY MANUFACTURED GAS PLANT SITE


Photographs courtesy J.F. Brennan

RAMBOLL Bright ideas. Sustainable change.

ANCHOR QEA

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT REVISION 2 FORMER GREEN BAY MANUFACTURED GAS PLANT SITE

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ACRONYMS AND ABBREVIATIONS

ADS	Advanced Disposal Services
AET	American Engineering Testing, Inc.
Anchor QEA	Anchor QEA, LLC
AOC	Administrative Order on Consent for Remedial Design
A/OT	Agency and Oversight Team
ARAR	Applicable or Relevant and Appropriate Requirements
BCS	Broadcast Capping System™
bgs	below ground surface
bss	below sediment surface
BMP	best management practice
BRRTS	Bureau for Remediation and Redevelopment Tracking System
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CERCLA	("Superfund") Comprehensive Environmental Response, Compensation, and Liability Act
CIL	chemical isolation layer
cm	centimeter
cm/s	centimeters per second
CQAPP	Construction Quality Assurance Project Plan
COC	contaminant of concern
CY	cubic yards
DNAPL	dense non-aqueous phase liquid
ERTB	East River Turning Basin
FID	Facility ID
ftp	file transfer protocol
FS	Feasibility Study
FSIR	Focused Sediment Investigation Report
Foth	Foth Infrastructure & Environment, LLC
GAC	granular activated carbon
GLT	Glatfelter
GP	Georgia Pacific
g	gram
J.F. Brennan	J.F. Brennan Company, Inc.
lb	pound
LFR	Lower Fox River
LFRR LLC	Lower Fox River Remediation LLC
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MGP	Manufactured Gas Plant
NAD	North American Datum
NAVD 88	North American Vertical Datum of 1988
NCR	NCR Corporation
NFA	North Focus Area
NRT	Natural Resource Technology, Inc.
NTU	Nephelometric Turbidity Unit
OBG	O'Brien & Gere Engineers, Inc., part of Ramboll

OC	organoclay
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PEC	Probable Effects Concentration
PCB	polychlorinated biphenyl
PID	photoionization detector
ppm	part per million
psf	pounds per square foot
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RA	Remedial Action
RAWP	Remedial Action Work Plan
RAO	remedial action objective
RCM	reactive core mat
RD	remedial design
RDF	Refuse Disposal Facility
RI	Remedial Investigation
ROD	Record of Decision
RTK-GPS	real-time kinetic global positioning system
SDE	safe dredge elevation
SFA	South Focus Area
SAP	Sampling and Analysis Plan
SAS	Superfund Alternative Site
SOP	standard operating procedure
SPCS	State Plane Coordinate System
SPRI	Stuyvesant Projects Realization, Inc.
SWAC	surface weighted area concentration
Tetra Tech	Tetra Tech, Inc.
TPAH13	total PAH (13 analytes), a subset of 13 of the 17 USEPA Hazardous Substance List PAH
TSS	total suspended solids
TVOCs	total volatile organic compounds
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WGM	Work Group MeetingWTP water treatment plant
WDNR	Wisconsin Department of Natural Resources
WPDES	Wisconsin Pollutant Discharge Elimination System
WPS	Wisconsin Plane System
WPSC	Wisconsin Public Service Corporation

1. INTRODUCTION

This North Focus Area Remedial Action (NFA RA) Summary Report (RA Summary Report) documents a voluntary early remedial action completed from May to November 2019 at the Former Green Bay Manufactured Gas Plant (MGP) facility (Figure 1). Although MGP residuals are not the focused contaminants of concern (COCs) for the Lower Fox River (LFR) polychlorinated biphenyl (PCB) remedy, they are co-contaminants that needed to be addressed. This voluntary early RA addressed the MGP residuals in sediments adjacent to the Georgia Pacific (GP) Day Street Facility. The RA was performed in coordination with the LFR Operable Unit (OU) 2–5 Project. The work was conducted under an authorization from the United States Environmental Protection Agency (USEPA) pursuant to Section 107(d) and 122(e)(6) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9622(e)(6). In addition, USEPA and Wisconsin Department of Natural Resources (WDNR) reviewed the documents and all comments were incorporated into the work plans. Multiple working meetings with USEPA, WDNR, Wisconsin Public Service Corporation (WPSC), and the Lower Fox River Remediation LLC (LFRR LLC) led to the development of the Addendum to the Final 2019 Update to Phase 2B Remedial Action Work Plan- Manufactured Gas Plant North Focus Area (RAWP Addendum), submitted August 30, 2019 (Tetra Tech et al. 2019a). The Response Agencies provided the LFRR LLC a letter on September 4, 2019 (USEPA 2019) which stated:

> *"…the Response Agencies approve the "Manufactured Gas Plant (MGP) North Focus Area (NFA) Remedial Action Work Plan (RAWP), submitted August 30,2019."*

The NFA RA was performed in accordance with the methods and procedures already established for the LFR PCB Project, and documents describing those plans and procedures are referenced throughout this report.

As such, Section 1.1 of the RAWP Addendum (Tetra Tech et al. 2019a) presents the goals of a sediment removal design that achieves the LFR Performance Standards for the OU 2-5 PCB remedy and, to the extent practicable and reasonably cost-effective, removes visually identified dense non-aqueous phase liquid (DNAPL) and sediment and clay with elevated polynuclear aromatic hydrocarbons (PAHs).

1.1 Site Description and Background

Project Contact:	Wisconsin Public Service Corporation 700 North Adams Street, P.O. Box 19002 Green Bay, WI 54307-9002 Mr. Robert Paulson (414-221-4948)
Facility Address:	700 North Adams Street Green Bay, Wisconsin
Site Location:	Section 25 and 26, T24N, R20E City of Green Bay, Brown County, Wisconsin (Figure 1)
Current Use of Property:	WPSC Corporate Headquarters
Past Use of Property:	Manufactured Gas Plant
USEPA ID #	WIN000509948
WDNR BRRTS #	02-05-000254
WDNR FID #	405063890

The former Green Bay MGP is located at 700 North Adams Street in Green Bay, Wisconsin (Figure 1). The current site layout is provided on Figure 2. The site consists of an upland area and two distinct sediment areas – the North Focus Area (NFA) and the South Focus Area (SFA). These sediment areas were delineated based on previous sampling events described in Section 1.4. The Site is currently enrolled in the USEPA Superfund Alternative Site (SAS) program per the *Administrative Settlement Agreement and Order on Consent (AOC) for Remedial Investigations and Feasibility Studies (RI/FS)*, effective May 5, 2006, CERCLA Docket No. V-W-06-C-847.

The upland portion of the site is approximately 6.5 acres located adjacent to the confluence of the Lower Fox and East Rivers to the north (Figure 3). The upland portion of the site was remediated in 2003 under the WDNR Program. Elements of the 2003 upland remediation are provided in Appendix C of the Green Bay MGP Remedial Design Report (Design Report, OBG 2018a) for the SFA of the East River, which was remediated in 2018. Upland Area 3, adjacent to the East River, was excavated to address the suspected discharge area for the former concrete channel to the East River, where heavily impacted soils and debris were found. MGP impacted wood, wood chips, and wood debris (likely from historic building demolition and filling of the former shoreline) was also excavated. Sheet pile was installed along the East River to facilitate excavation and was cut off in place to serve as a barrier between upland soil remediation and East River sediment areas, specifically the SFA. Details for sheet pile wall construction are included in Appendix C of the Design Report (OBG 2018a). Excavation depths in Upland Area 3 ranged from 8 to 12 feet below ground surface (bgs) and approximately 7,715 tons of MGP impacted soil were excavated and thermally treated. Thermally treated soil and imported sand were used for excavation backfill.

In 2018, adjacent riverbank shoreline soils and bedded soft sediment and clay were removed from SFA in the East River (Figure 2). The SFA RA was completed from July 9 to November 13, 2018 (OBG 2019a). A review of the post-construction bathymetric surface indicates target removal elevations were achieved, with the exception of high subgrade areas, in accordance with the LFR PCB Project performance metrics (i.e., 90% of the total area excavated to target removal elevations, corrected for high-subgrade from the actual attainment value of 74%), indicating that the Remedial Action Objectives (RAOs) were achieved by the RA. Observations of DNAPL and total PAH (13 analytes) (TPAH13, a subset of 13 of the 17 USEPA Hazardous Substance List PAH) concentrations in surficial sediments were documented as a part of SFA post-removal sampling and will be included in the site-wide Remedial Investigation/Feasibility Study (RI/FS) to be completed by WPSC for the USEPA.

1.2 NFA Remedial Action Objectives

As described in the Response Agencies' approved RAWP Addendum (Tetra Tech et al. 2019a), the main objective of the NFA RA was to achieve the Fox River performance standards and, to the extent cost effective, leave the area in a condition that following remediation is environmentally protective. Remediation of the PCB and MGP residuals in soft sediment and clay will be performed, to the extent practicable and with consideration given to the stability of adjacent bulkheads and shorelines, and will meet the following objectives and cleanup levels:

- Removal of all soft sediment in the NFA footprint
- Removal of all soft sediment between the containment system and the NFA footprint
- Removal of all soft sediment with PAH concentrations above 80 part per million (ppm)

- Removal of visually identified DNAPL in clay
- Isolation of remaining DNAPL and elevated PAHs in sediment or clay and PCBs in sediment, under an armored cap

PCBs are also present in the soft sediment. A majority of the PCB-contaminated sediment will be removed as part of the NFA RA, which is subject to remediation under the Administrative Order for RA in OU 2-5 at the Site (USEPA 2007). The NFA RA will be performed in accordance with the methods and procedures already established for the LFR OUs 2-5 PCB removal action.

Beginning in October 2018, a series of joint Work Group Meetings (WGMs) were typically held twice per week to discuss the remedial design (RD) options for the NFA. During the WGMs, the following four conceptual dredge design options were reviewed:

- Bench Option
- Bench Plus PCB Option
- 3 Horizontal to 1 Vertical (3H:1V) Soft Only Option (3:1 Soft)
- 3H:1V Plus Clay Option (3:1 Plus Clay)

These dredging options were reviewed jointly with the Agency and Oversight Team (A/OT) and design team in concept form prior to development of draft three-dimensional designs to facilitate the development of conceptual cost estimates.

The WGMs also included discussions about the post-dredge armored cap design to isolate remaining contamination and its applicability for each dredging option. On December 4, 2018, the Agencies provided a letter to NCR Corporation (NCR), WPSC, and the design team indicating their selected option was the 3:1 Plus Clay dredge design option.

The dredge design presented herein is the 3:1 Plus Clay.

The RA was performed to primarily remove all soft sediment and clay with observed DNAPL beyond the 3H:1V safe dredge slope in the NFA footprint, followed by placement of an amended armored cap over the 3H:1V safe dredge slope area and a residual sand cover/benthic layer over the remaining NFA area footprint. The amended armored cap was designed to maintain an acceptable level of stability and be protective of human health and the environment as a final remedy for both remaining PCB and MGP related contamination, however the evaluation of the cap as an acceptable final remedy for remaining MGP contaminated sediment will be determined through the RI/FS process to be completed by WPSC for the Former Green Bay MGP site.

The Agencies did not concur that using 80 ppm TPAH13 as the objective in the amended armored cap "Dissolved Phase Modeling" was appropriate. However, the Agencies agreed there was enough conservancy in the overall cap design assumptions that the design may proceed with the use of 80 ppm TPAH13 for the NFA cap pending approval of the RAWP Addendum (Tetra Tech et al. 2019a).

1.3 Project Team Organization

WPSC owns the property on which the former MGP was located. O'Brien & Gere Engineers, Inc., part of Ramboll (OBG) is a contractor for WPSC.

The RA was implemented in conjunction with the LFRR PCB Project. The same contractors, processes, plans, and standard operating procedures (SOPs) were used to implement the NFA MGP RA as are used for the ongoing PCB project.

Tetra Tech, Inc. (Tetra Tech) is the prime remediation contractor for the LFRR LLC PCB Project. Tetra Tech retained Stuyvesant Projects Realization, Inc. (SPRI) to operate the desanding and dewatering system. Tetra Tech retained J.F. Brennan Company, Inc., (J.F. Brennan) of La Crosse, Wisconsin, as the subcontractor responsible for dredging and cap/sand placement.

USEPA and WDNR provided regulatory oversight in coordination with their subcontractor, The Boldt Company. USEPA, WDNR, and The Boldt Company are collectively referred to as the A/OT.

1.4 Supporting Documents

Documents used to support the design, construction, and oversight of the removal action include the following:

- RAWP Addendum (Tetra Tech et al. 2019a), Section 1.
- Focused Sediment Investigation Report [FSIR; Natural Resource Technology, Inc. (NRT[1]) 2015], which summarizes the results of the 1995, 2012, and 2014 sediment characterization activities.
- Additional borings were advanced in 2017 on an approximately 20-foot grid to further refine visual observations of DNAPL (Tetra Tech et al. 2017).
- NAPL Mobility Data Summary Report (OBG 2018b), which summarizes the results of a 2017 NAPL mobility investigation.
- LFR Construction Quality Assurance Project Plan for Remedial Action of Operable Units 4 and 5 in 2014 and Beyond (CQAPP, Tetra Tech et al. 2015), which includes field procedure SOPs.
- Third-Party Quality Assurance Provisions Plan for Operable Units 2-5 (Foth 2014), includes field procedure SOPs prepared for Appleton Papers, Inc.; Georgia Pacific Consumer Products, LP; and NCR Corporation.
- Lower Fox River Remedial Design; 100 Percent Design Report Volume 1 (Tetra Tech et al. 2009), which describes the remedial design and sediment dewatering facility.
- Lower Fox River Remedial Design; 100 Percent Design Report Volume 2 (Tetra Tech et al. 2012), which describes the remedial design and sediment dewatering facility.
- Operations and Maintenance Plan for Dredging, Sand Covering and Capping Activities (J.F Brennan 2001), which describes the dredging and capping operations, marine construction activities, and maintenance activities.
- Former Green Bay MGP Site North Focus Area Remedial Action Sampling and Analysis Plan, Revision 2 (NFA SAP, OBG 2019b), describes the post-removal sampling approach.
- Former Green Bay MGP Site Specific Health and Safety Plan, Revision 2 (NRT 2015), describes health and safety considerations when working at the site.

[1] Natural Resource Technology, Inc., formerly OBG, part of Ramboll, now Ramboll.

1.5 Description of Remedial Action

The RA was developed in accordance with discussions with USEPA, WDNR, and the LFRR LLC, and summarized in the RAWP Addendum (Tetra Tech et al. 2019a). A summary of the RA is provided below.

RA construction included the following activities:

- Mobilization – March 25 to April 1, 2019: mobilization to the site and establish staging area (Figure 2).
- Installation of the turbidity containment system – April 1 to May 2, 2019: surrounding the entire NFA.
- Baseline air monitoring -- May 6-10, 2019: collect baseline air monitoring data at Pulliam Offloading Facility.
- Construction of Pulliam Offloading Facility – May 6 to June 4, 2019: grading, road installation, scale set-up, tracking and decontamination pad construction, and sediment storage bin construction (Figure 4).
- Hydraulic dredging of overburden material (Stage 1) – May 15 to May 23, 2019.
- Mechanical dredging (Stage 2)– June 3 to August 6, 2019: mechanical excavation of soft sediment to an approved structurally determined safe dredge profile and removal of DNAPL affected clay to target removal elevation. Stage 2 allowed for safe rail traffic upland at GP.
- Mechanical dredging (Stage 3)– July 24 to August 6, 2019: Stage 3 was the same as Stage 2 mechanical dredging but required GP railroad tracks to be out of service.
- Site Preparation – July 11 to November 1, 2019: remove GP railroad tracks from service for Stage 3 dredging, remove berm, and install fencing (Figure 5).
- Mechanical Dredged Material Handling – June 4 to August 14, 2019: Dredged material was dewatered, transloaded to hopper barges for sediment stabilization and offloading at the Pulliam Offloading Facility (Figure 4), transportation and disposal at an off-site landfill, and performance of air monitoring during stabilization and offloading. Decant water was treated at the LFR water treatment plant (WTP).
- Bathymetric surveying – May 2 to August 6, 2019: conducted after dredging each component of the design.
- Installation of post-dredge clean sand backfill – August 9 to August 13, 2019: installed as needed in areas where clay was dredged at slopes too steep for stable placement of chemical isolation layer (CIL).
- Installation of the CIL – August 15 to September 22, 2019: includes two CIL layers, a filter layer, and an erosion protection layer, with portions of the NFA receiving supplemental amendment placement concurrent with armored cap placement to achieve design (Figure 6).
- Installation of armored cap – August 27 to October 24, 2019: to protect CIL from erosion (Figure 7).
- Bathymetric surveying – August 23 to October 23, 2019: conducted following placement of each cap layer (two CIL layers, filter layer, and erosion protection layer).

- Removal of the turbidity containment system – October 24 to November 7, 2019: surrounding the entire NFA.
- Post-removal confirmation coring – August 6 to August 8, 2019: post-removal sediment and clay within the NFA footprint were sampled and analyzed to characterize material to remain in place beneath the cap and post-removal clay outside the cap footprint was sampled and analyzed to characterize material to be covered by residual sand (Figure 8).
- Installation of bulkhead stabilization buttresses – October 25 to November 5, 2019: the buttresses were not required for remediation but were intended to maintain the long-term stability of the adjacent GP bulkheads following removal of sediment from the LFR[2].
- Benthic layer and buttress sand thickness verification – October 28 to October 29, 2019: poling data and sand thickness cores collected to confirm benthic layer/buttress sand thickness achieved project objectives prior to buttress stone placement (Figure 9).
- Bathymetric surveying – November 6, 2019: conducted following installation of the buttresses.
- Installation of residual sand cover –November 6 to November 8, 2019: above the portion of the armored cap not overlain by the stabilization buttress and over the remaining dredge footprint outside the extent of the armored cap to the limits of the containment wall, beyond the NFA.
- Bathymetric surveying – November 12, 2019: conducted following installation of the residual sand cover.
- Residual sand cover thickness verification – November 14 to November 18, 2019: poling data and sand thickness cores collected to confirm residual sand cover thickness achieved project objectives (Figure 10)

1.6 Report Organization

The following table summarizes the locations in this report, including tables, figures, and appendices where each activity and its relevant environmental monitoring or quality assurance (QA)/quality control (QC) activity, if applicable, is found.

Topic	Construction Activities Report Section	Environmental Monitoring Report Section	Figure	Table	Appendix
Mobilization and RA Prep/ Demobilization	3.1, 3.2.1, 3.5	NA	1-5	NA	C
Turbidity Containment System	3.2.2	4.4, 4.5	5	NA	C
Removal	3.3.1	4.1, 4.2	8, 11, 12	1, 3, 4	D, G, H, J

[2] The post-dredge North Focus Area (NFA) armored cap was designed as a potential final remedy for the MGP site, subject to further consideration as part of the USEPA MGP CERCLA RI/FS process for the Adams Street MGP site, which includes the NFA and adjacent South Focus Area (SFA). If the NFA armored cap is retained as a final remedy for the NFA, it is NCR's, GP's, Glatfetler's (GLT) and WPS' expectation that this cap will become part of the MGP site remedy, and the cap monitoring and maintenance will be included as part of WPS's implementation order with USEPA and WDNR. Until a final decision is made by the Agencies and a legally enforceable document under CERCLA authority transfers liability for the NFA armored cap to a different entity (e.g., WPS), the LFR Cap Operation, Monitoring, and Maintenance Plan (COMMP) requirements of this cap are the responsibility of the PCB project's RPs subject to their respective CDs, which identify GP as first in line for this responsibility.".

Sediment Processing, Water Treatment, and Disposal	3.3.1.2	4.1, 4.3	4	NA	B, K, L
CIL	3.3.2	3.4.2	6	2	A, E, G
Armored Cap	3.3.2, 5	3.4.2	7	NA	E, F
Bulkhead Stabilization Buttresses	3.3.3	3.4.3	9	5	G, I
Residual Sand Cover and Benthic Layer Placement	3.3.4	3.4.3	10	6	G, I

2. REMEDIAL DESIGN

RD activities were conducted from September 25, 2018 to August 27, 2019. A description of the RD is included in the following sections.

2.1 Principal Design Components

This section presents a summary of the RD design components, which are described in the following sections and included dredging of all soft sediment above a safe dredge elevation (SDE) and dredging all soft sediment and clay with observed DNAPL above a three-to-one (3H:1V) safe dredge slope in the NFA footprint, followed by placement of an armored cap over the 3H:1V safe dredge slope area and a residual sand cover/benthic layer over the remaining NFA. Please note that the NFA RAWP (Tetra Tech et al. 2019a) refers to a minimum estimated service life of 100 years for various cap components. The RAWP reference to estimated service life is located on page 1, Appendix H – Armored Cap Chemical Isolation Layer Technical Memorandum, which states "The CIL is designed to maintain the TPAH13 target concentration in the top 6 inches of the cap for a period of at least 100 years."

2.1.1 Dredge Components

There were two dredging designs that were implemented at the NFA. Overburden material that was a minimum of 2 feet above the highest elevation of recorded DNAPL observations (from the 2017 borings; refer to Appendix C of the RAWP Addendum) was removed by hydraulic dredging (Stage 1 dredging). The intent of the overburden dredging was to reduce the volume of mechanically dredged soft sediment and clay to be dredged following installation of the containment system. This was done by identifying prisms that could be dredged without substantial risk of encountering DNAPL. Specifically, at each design transect, the highest elevation at which DNAPL was observed was noted, and by combining groups of design transects (e.g., N-H through N-K), prisms were designed with 3H:1V slopes connecting the prisms. The overburden dredging intersected a staged dredging slope (3H:1V) at transects N-S through N-AK, where the flat prisms followed the slope upwards to the bathymetry, leaving a wedge of material behind that was included in "Stage 3 dredging". Refer to the cross sections (Engineered Plan Drawings DC-1 through DC-6 in Appendix A of the RAWP Addendum). The overburden design was depicted in plan view on Engineered Plan Drawing D-1 (Appendix A of the RAWP Addendum).

2.1.1.1 Safe Dredge Elevation (SDE) Footprint

A critical factor in the basis of the dredging design was to maintain the stability of the adjacent GP bulkhead wall, which comprised two separate walls in varying condition. The elevation of dredging for 30 feet westward of the bulkhead (i.e., toward the center of the river) was based on the lowest dredge elevation that would maintain a short-term factor of safety of 1.3 for GP's bulkhead during the RA until a stabilization buttress could be installed, which would provide a minimum long-term factor of safety of 1.5 (AECOM 2016) based on a stability evaluation conducted by AECOM (Appendix F of the RAWP Addendum). Following the minimum 30-foot westward horizontal cut from the bulkhead, the SDE design surface follows a 3H:1V slope down to the lowest elevation where DNAPL was observed in clay located between the 3H:1V safe dredge slope and the East River Turning Basin (ERTB) at each transect.

As noted, the bulkhead comprises two segments with corresponding safe dredge elevations. The northern portion (from Transect N-A to N-R) was dredged to a horizontal elevation of 553.5 feet

(referenced to North American Vertical Datum of 1988 [NAVD 88]) for 30 feet westward from the bulkhead. The transects are depicted on the Engineered Plan Drawings included as Appendix A of the NFA RAWP. The southern portion of the bulkhead, from transect N-S to N-AM, was dredged to an elevation of 561.6 feet (NAVD88). The elevations noted correspond to the "design elevation", with an additional 0.5 feet of allowable overdredge. Figure 8 shows in plan view the portion of the NFA that was part of the wall stabilizing 3:1 wedge where sediment was left behind for stability reasons and the portions of the NFA where all soft sediment was targeted for removal. Figure 8 also shows the as-built boundary between the stabilizing wedge and the "removal all sediment" area as well as the post-dredge sample points.

2.1.1.2 Clay Footprint

The design was based on visual DNAPL observations within the clay. Flat-bottomed dredge prisms were designed to remove DNAPL observed in clay at each boring location, with 2 horizontal to 1 vertical (2H:1V) slopes connecting adjacent dredge prisms as the design surface moved channel-ward. Lateral slopes (i.e., parallel to the bulkhead) were maintained as 3H:1V. The 2H:1V slopes were determined, during WGM discussions with the A/OT, Tetra Tech, the LFRR LLC, and J.F. Brennan, as being feasible for construction based on previous dredging of clay in the MGP SFA.

From the DNAPL observations at the last boring within a given transect, a 2H:1V slope connected the dredge surface upwards in elevation to the sediment/clay interface. The design then followed the sediment/clay interface to the outer extent of the NFA footprint, where it sloped back down in elevation at 2H:1V and was tied to the PCB dredge surfaces within the ERTB consistent with what is typical for the LFR project.

2.1.2 Amended Armored Cap Components

An amended armored cap was designed to manage the potential migration of DNAPL and PAHs in porewater that may remain following dredging. The armored cap was constructed from the following (described from the dredge cut surface upward):

- Post-dredge sand backfill (in select areas, as needed for flattening post-construction dredge slopes)
- DNAPL sorbent layer and a dissolved-phase sorbent layer (collectively called the CIL)
- Geotextile filter layer
- Grouted mattress armor layer

The following sections describe the design of each component of the amended armored cap.

2.1.2.1 Chemical Isolation Layers

Following dredging, some sediment containing DNAPL and PAHs remained. The purpose of the CIL was to isolate this sediment and retard upward migration of DNAPL and dissolved phase PAHs.

The CIL design included analysis of two contaminant physical states: 1) DNAPL; and 2) dissolved-phase TPAH13 in sediment porewater. The two contaminant states have different physical and chemical properties that result in different requirements for CIL design; therefore, layers for DNAPL and dissolved-phase TPAH13 were assessed separately.

The CIL was designed to achieve an ≤80 ppm TPAH concentration in the top 6-inches of the armored cap (i.e., 6-inch sand layer) for an estimated service life of at least 100 years and consisted of the following two layers:

- DNAPL sorbent layer (placed first [i.e., before the dissolved-phase sorbent layer])
  - A minimum 6-inch thick layer of sand mixed with 10% organoclay (OC; dry weight basis)
  - 3-inch allowable over-placement
- Dissolved-phase sorbent layer (placed on top of the DNAPL sorbent layer)
  - A minimum 6-inch thick layer of sand mixed with 3% granular activated carbon (GAC; dry weight basis)
  - 3-inch allowable over-placement

The design requirements for a DNAPL sorbent layer were based on the DNAPL properties, sediment chemical and physical properties, and the location of the DNAPL after dredging.

The DNAPL sorbent capacity within the DNAPL sorbent layer portion of the CIL is referred to in terms of the percent of dry weight organoclay (%OC) required to sequester DNAPL. OC was recommended for the DNAPL sorbent layer based on the sorbent capacity of OC for DNAPL, the ability to mix OC with carrier media (e.g., sand), and the ability to place OC in aquatic environments. The %OC in the DNAPL sorbent layer was estimated for different sub-areas within the CIL area by matching the required DNAPL sorbent capacity to equal the assumed NAPL load for each sub-area.

The sub-area DNAPL load was based on averaging the DNAPL saturation measured in the laboratory samples for each sub-area and applying the conservative assumption that 25% of the DNAPL volume would upwardly migrate into the CIL.

Potential DNAPL[3] mobility, including the very conservative assumption that 25% of the DNAPL volume in soft sediment and in clay would mobilize, was discussed during the January 17, 2019 presentation to the A/OT and titled, F*ox River: MGP North Focus Area Chemical Isolation Layer Design* (included in Appendix A1). As discussed during that presentation, the conservative assumption was based on the following factors:

- The design objective for the dredging was to remove the soft sediment and shallow clay that contained DNAPL, with only limited DNAPL remaining in soft sediment and in fractures within the underlying clay layer following dredging (observations of DNAPL in remaining soft sediment and clay in 19 sediment cores collected after dredging was completed confirmed that the dredge design objective was generally achieved, verifying this assumption).
- Based on practical experience and engineering judgement gained from sediment/NAPL sampling and laboratory testing to support the design of more than two dozen sediment caps that address NAPL, it is highly unlikely that as much as 25% of the remaining DNAPL would mobilize." In particular, DNAPL mobility potential is very low for the measured DNAPL saturations in sediment samples (maximum measured NAPL saturation of 9.3% in NFA sediment samples; see PTS Laboratories March 12, 2018 report to E. Hritsuk, included in Appendix A2). During previous discussions with the A/OT, their general concerns regarding the reliability of DNAPL mobility testing results were expressed. However, the measurement

[3] The laboratory that measured mobility uses the generic term non-aqueous phase liquids (NAPL). In the NFA, only DNAPL is present.

of DNAPL saturation is a reliable component of the overall DNAPL mobility testing because it is a straightforward comparison of the measured DNAPL volume to measured sediment pore volume. Our assertion that DNAPL mobility potential is low for the range of DNAPL saturations measured in sediment samples from the NFA is based on experience for previous caps through design, construction, and monitoring, and discussions with laboratory personnel regarding the general range of DNAPL saturations in laboratory testing that demonstrate potential DNAPL mobility. Note also that most of the DNAPL saturation tests were conducted in 2017 laboratory testing in samples collected from sediment that was then removed as part of the dredging in 2019. DNAPL mobility testing indicated that the DNAPL was not mobile under laboratory test conditions.

These factors combine to support the design assumption that potentially mobile DNAPL is limited to 25% of the DNAPL volume is a very conservative assumption.

The DNAPL sorbent layer sorbent capacity is dependent on the OC 2:1 DNAPL sorbent capacity (i.e., 2 grams [g] OC to 1 g NAPL) and the amount of OC used in the DNAPL sorbent layer. The 2:1 sorbent capacity is based on technical data sheets provided by the vendor (CETCO 2013a and 2013b), included in Appendix A3. The amount of OC is typically expressed in terms of percentage dry weight, relative to other sorbent layer media. The recommended other sorbent layer medium was sand, based on availability and compatibility with OC mixing and placement operations. A minimum 6-inch-thick sand/OC layer was selected for the DNAPL sorbent layer design, based on the minimum constructible layer thickness for this water depth and waterway environmental conditions.

Ten percent was the highest %OC (e.g., a combination of the highest NAPL loading from both advection and consolidation) calculated for the CIL subareas, even though this %OC applied to only a subarea (i.e., where DNAPL was exposed at the dredge cut in soft sediment underlain by clay also containing DNAPL) that was 8% of the total CIL cap surface area. The recommended 10% OC CIL was thus conservatively based on the highest estimated loading in the CIL area, rather than an averaged or most widespread DNAPL loading. This recommended uniform application approach, in combination with the conservative assumptions, made the design even more protective.

To address upward migration of dissolved-phase PAHs in pore water from the DNAPL sorbent layer, OC or activated carbon was evaluated as an additional sorptive amendment layer. One-dimensional chemical fate and transport modeling for PAHs (see Appendix H of the RAWP Addendum) was performed and indicated that 0.7% activated carbon mixed with sand would be sufficient to meet the target TPAH13 concentration for at least 100 years. However, to be sufficiently conservative, the A/OT required the activated carbon content of the dissolved-phase amendment layer to contain 3%. This required uniform application of 400% more active carbon than modeling indicated would be necessary, which made the amended armor cap design even more environmentally protective.

An evaluation of PCB concentrations in the LFR cores that are within the footprint of the NFA cap indicates that the NFA armored cap would contain the PCB contamination remaining below the cap for a period greater than the 100-year CIL service life. The evaluation is included as Table 1 in Appendix A4 and includes the PCB concentrations remaining in the post-dredge sediment surface based on post-dredge elevations. These remaining PCB concentrations were compared to the LFR cap design criteria (presented in Section 6 of the 2012 Volume 2 100 Percent Design

[Tetra Tech et al. 2012]). The evaluation indicates that an LFR Cap Type "B" would be appropriate to isolate the remaining PCBs in the NFA, consistent with the LFR cap design.

Table 1 in Appendix A4 shows that remaining PCB concentrations in the NFA are below 50 ppm in all cores, with the maximum PCB concentration of 26.9 ppm detected below the surface in Core 4075-22; therefore, a Cap Type B would be applicable. Cap Type B requires a minimum of 6 inches of sand in the CIL. Table 1 of Appendix A4 also provides the estimated thickness of the NFA cap chemical isolation layer sand, which exceeds 6 inches at each location where PCB concentrations remain above 1 ppm. Based on this evaluation, the CIL is consistent with Cap Type B requirements and is therefore expected to isolate remaining PCBs, consistent with the LFR cap design.

2.1.2.2 Armor Layer

As the cap is located adjacent to an active navigation channel, an erosion protection layer was designed to protect the CIL from both propeller wash erosion and scour. The armor layer was designed for an estimated service life of at least 100 years. The estimated service life required the armor layer to withstand erosional forces, with the most significant of the erosional forces considered to be propeller wash (propwash) associated with commercial vessels maneuvering in the ERTB near the NFA MGP. The armor layer was also required to be stable on top of the CIL, which was installed over the post-dredge slope comprising residual soft sediment and clay.

AB1200 grouted mattresses with a mat thickness of 12 inches were selected for the armor layer. Mattresses were zipped together and placed prior to filling with grout, so no gaps remained between adjacent grouted mattress panels. A geotextile filter layer was attached to the bottom of the grouted mattresses at the time of fabrication. To resist sliding, helical ground anchors were installed along the edges, through ports in, or between the mattresses.

2.1.3 Stabilization Buttress

Following installation of the armor layer, a buttress layer was placed mechanically against the GP bulkhead at a 4 horizontal to 1 vertical (4H:1V) slope over the grouted mattresses to provide long term bulkhead stability. The buttress, which is not a component of the amended armored cap design, consisted of 12 inches of sand placed in a layer above the grouted mattress armor layer with the balance of the buttress material being crushed stone with a minimum size stone of 0.75 inch ranging up to no greater than 6 inches. The stone selected was Wisconsin Department of Transportation Select Crush material of 3 to 6 inches screened with a median stone size (D_{50}) of approximately 2.9 inches.

3. REMEDIAL ACTION SUMMARY

RA activities were conducted from March 25 to November 14, 2019 with sheetpile decontamination activities continuing through February 2020. A description of the RA is included in the following sections.

3.1 Pre-construction Activities

Wisconsin Diggers Hotline was contacted to verify the utilities present and their locations prior to any invasive work. The marine contractor, J.F. Brennan, surveyed the upland support area located in the parking lot of the WPSC building to document site features for post-construction restoration. Utilities include overhead electric, underground electric and a 12-inch storm sewer within the upland support area. No underwater or overhead utilities are present within the limits of the NFA. A sheet pile wall and chain link fence are located between the GP site and East River.

3.1.1 Permitting Equivalency

Although CERCLA projects are exempted from Federal, State, and local permitting requirements, the RA met the substantive requirements of the associated permitting programs. Dredging activities met the substantive requirements of the following environmental laws, per the Applicable or Relevant and Appropriate Requirements (ARARs) of the Lower Fox River Remedial Design- 2019 Update to Phase 2B Remedial Action Work Plan (2019 RAWP for OU 2-5, Tetra Tech et al. 2019b), WDNR Chapter 30 Permit, WDNR stormwater management regulations, WDNR surface water quality standards, United States Army Corps of Engineers (USACE) Section 10 River and Harbor Act Dredging Permit, and Wisconsin floodplain management regulations. Local erosion control laws are also applicable. Discharge of water was conducted in accordance with the effluent standards included in the Wisconsin Pollutant Discharge Elimination System (WPDES) substantive requirements of the existing OU 2-5 LFR project. Wastewater monitoring was required to meet the substantive requirements of the WPDES Program for MGP dredging and as detailed in the modified ARARs for the LFR record of decision (ROD, WDNR 2003a). This monitoring was also in accordance with a memorandum from USEPA (USEPA 2018). Stormwater erosion control permits were secured for the Pulliam Offloading Facility, which will continue to support LFRR capping operations in 2020. The infrastructure constructed at the Pulliam Offloading Facility will remain in place; as part of the decommissioning of the plant, a stormwater management pond will be constructed and the dock graded, covered with topsoil, and seeded.

3.1.2 Waste Profile

The waste disposal profile was completed with Waste Management. Comingled MGP residual and PCB-containing waste (PCB131180WI) were disposed of at Waste Management's Ridgeview Refuse Disposal Facility (RDF) in Whitelaw, Wisconsin. Waste manifests for PCB-containing sediment and clay are included in Appendix B1. Waste material strength reports are included in Appendix B2 and amendment material reports are in Appendix B3.

3.1.3 Vessel Management

Vessel management was required during construction of the turbidity containment system, throughout RA activities, and during removal of the containment system to prevent damage to vessels and the containment system walls. The vessel management program allowed for continuous use of the LFR and the ERTB for typical commercial and recreational purposes.

Throughout the RA activities, no vessels required assistance turning in the ERTB.

3.2 Remedial Action Preparation

Site preparation activities in advance of the RA included mobilization, installation of the turbidity containment system, and a baseline bathymetry evaluation, described in the sections below.

3.2.1 Mobilization and Site Preparation

Mobilization and site preparation included the following activities:

- Establishment of site controls
- Set-up of staging area
- Construction of Pulliam Offloading Facility
- Preparation of GP property for Stage 3 dredging

Site controls were established to protect the public and adjacent properties from construction activities. These controls included signage and buoys around the project area in the LFR. In river notifications were submitted to the Port of Green Bay and U.S. Coast Guard in accordance with Section 7.8 of the LFR LLC 100 Percent Design, Volume 1 (Tetra Tech et al. 2009) and Section 4.3.1, Pipeline Marking System, of the LFR RAWP 2017/2018 (Tetra Tech et al. 2018).

A support area was established adjacent to the ERTB and NFA at the secured Graymont dock facility (Figure 2). The staging area provided a facility for daily health and safety meetings, temporary mooring for support boats and crews, and an area for sheetpile loading and off-loading during turbidity containment construction/demobilization.

The Pulliam Offloading Facility had erosion control measures installed, was graded to promote drainage to an on-site stormwater pond, and a haul road constructed for sediment management activities. The facility included tracking pads, a sediment storage bin, amendment storage area, a truck scale, and a decontamination pad (Figure 4).

Modifications to the GP property were required to be protective of the bulkhead wall during Stage 3 dredging. This included temporary lock out of the rail spur lines on the property and removal of a berm behind the bulkhead wall. Fencing was also installed to be protective of the disturbed area, as illustrated on Figure 5.

3.2.2 Turbidity Containment Installation

Prior to excavating material from the LFR, a steel sheetpile turbidity containment system was installed to provide a safe operating environment for dredging to occur, minimize migration of DNAPL and sheens outside of the containment area, protect adjacent shoreline areas from DNAPL staining, and meet the turbidity requirements of the LFR Site, as discussed in Section 4.2.

The turbidity containment system was designed by Foth Infrastructure & Environment, LLC (Foth 2019) on behalf of the LFRR LLC. The containment system was installed in the NFA from April 1 to May 2, 2019 and removed from October 19 to November 7, 2019. The containment system location is shown on Figure 5. It consisted of steel sheet piles, a dual curtain of polyvinyl chloride (PVC)-coated polyester impermeable material, a non-woven polypropylene fabric for shoreline protection, and absorbent booms. Steel sheet piles were installed using an American 7260 Crane with vibro hammer. The turbidity curtain was installed using an excavator and crews working from floating barges or jon boats.

3.2.3 Baseline Bathymetry

J.F. Brennan performed a baseline bathymetry survey on May 2, 2019 to establish the pre-construction river bottom elevation contours. The survey was performed using the methods described in Section 3.4.1.

3.3 Remedial Action Activities

The RA comprised the following activities:

- Removal
- Cap construction
- Bulkhead stabilization buttress placement
- Residual sand cover and benthic layer placement
- Turbidity containment system removal

These activities are described in the sections below and contractor daily reports are included as Appendix C. As-built drawings of the RA are included in Appendix G.

3.3.1 Removal

LFR dredging was performed from May 16 to August 6, 2019 and took place in three "stages" in order to maintain the existing stability of GP's bulkhead and uninterrupted operations. Dredging consisted of hydraulically dredging approximately 8,600 cubic yards (CY) soft sediment identified as Stage 1 "overburden dredging"; then mechanically dredging DNAPL-impacted soft sediment and clay to target removal elevations for Stages 2 and 3. The lateral extent of dredging and target removal elevations were based on the previous delineations completed after the investigation activities described in Section 1.4 were performed.

Hydraulically dredged overburden sediment was pumped through a pipeline installed by J.F. Brennan directly to the Pulliam Offloading Facility for dewatering and combined with the slurry from the other operating dredges. The design and installation of the dredge pipeline and booster pump station(s) are described in Section 3.2.8 of the *100 Percent Design Report Volume 1* (Tetra Tech et al. 2009) and summarized in the 2019 RAWP for OU 2-5 (Tetra Tech et al. 2019b).

3.3.1.1 Post-Overburden Soft Sediment and Clay Removal

Stage 2 involved mechanical dredging of the soft sediment and clay below the overburden to the extent that it could be done without impacting operations at the GP Day Street Mill. Stage 2 dredging also included soft sediment between the extent of the NFA footprint and the containment system wall to remove all soft sediment that existed in this area so that additional dredging would not be required following removal of the containment system walls. Stage 2 dredging occurred June 3 to July 23, 2019. Stage 3 mechanical dredging addressed the remaining soft sediment and clay below the overburden, which occurred once rail traffic was prevented and following removal of the upland berm adjacent to the bulkhead. Stage 3 dredging occurred July 24 to August 6, 2019.

Approximately 28,900 CY of soft sediment and clay (Stages 2 and 3) were dredged mechanically from the LFR. Table 1 presents a summary of QA observations during excavation and Appendix D includes removal QC documentation, which is discussed in Section 3.4.

3.3.1.2 Removal Elevation Deviations from Remedial Design

Target removal elevations were not achieved in some instances due to slope stability and high subgrade[4] (i.e., refusal[5]) at locations as noted in Section 3.4. Target removal volumes were achieved although elevation was at or below target elevation for approximately 74% of the NFA (see Section 3.6). The high-subgrade corrected attainment value is 90%. However, the instances of final elevation above design elevation did not prevent the RA from achieving removal goals as a maximum of 12.5 CY of residual soft sediment outside the SDE remained following dredging completion.

3.3.1.3 Residual Soft Sediment Thickness

After bathymetric surveying confirmed that the target removal elevation had been achieved over at least 74% of the area of the NFA excluding high subgrade (see Section 3.6), Tetra Tech and J.F. Brennan advanced sediment cores to characterize residual sediments and to inform the selection of appropriate residuals management, if applicable. One-inch cores were advanced approximately 1-foot into the post-removal surface, on an approximate 15-foot interval to assess remaining soft sediment thickness and DNAPL observations following sampling SOPs in Attachment A of the CQAPP (Tetra Tech et al. 2015).

At each location, the core coordinates, total core recovery, soft sediment thickness, and visual observations of DNAPL were recorded on field forms and daily maps. Cores indicated that less than four inches of soft sediment remained, except for cores adjacent to the containment system, which indicated that soft sediment removal was complete in the rest of the NFA. The soft-sediment cores document high subgrade conditions per the CQAPP (Tetra Tech et al. 2015). Soft sediment QC coring results are discussed further in Section 3.4 and included in Appendix D. QA cores were also collected outside of the SDE footprint and were used to assess residual soft sediment thickness (see Section 3.6).

3.3.1.4 Sediment Processing, Water Treatment, and Disposal

Mechanically dredged soft sediment and clay were initially placed in a scow located within the containment area for dewatering. Decant water from the scow was pumped to frac tanks located on a barge for later treatment at the LFR WTP. The RAWP Addendum (Tetra Tech et al. 2019a) summarized the WTP operations at the Pulliam Offloading Facility. The WTP process, as shown in Figure 4-4 of the 2019 RAWP for OU 2-5 (Tetra Tech et al. 2019b), included sand filtration, bag filtration, and GAC adsorption. Treated water was discharged to the LFR after meeting the substantive WPDES requirements.

The soft sediment and clay were then trans-loaded from the scow located within the containment area to a hopper barge positioned outside the containment area. The hopper barge was pushed downriver to the Pulliam Offloading Facility where Portland cement or a combination of Portland and Calciment® amendment was added into dredged sediment utilizing an Allu-brand pneumatic mixing system. After solidification, the amended soft sediment and clay were transferred into an upland lined holding bin for curing before loading and transportation to the disposal facility (Figure 4).

[4] If the QC core indicates soft sediment thickness < 0.3 foot over hard subgrade (e.g., sand, gravel, or rock), then the sample location passes as high subgrade and no further sampling action is required.
[5] Inability to advance core sampler.

Solidified sediment was transported to Waste Management Ridgeview Recycling and Disposal Facility (Ridgeview RDF) in Whitelaw, WI, by Gene Frederickson Trucking & Excavating, Inc. of Kaukauna, WI. Solidified material was required to achieve a minimum strength of 800 pounds per square foot (psf) before transport to Ridgeview RDF was allowed as part of the project QA procedures to meet the landfill's acceptance requirements. Appendix B includes summaries of amendment quantities and material strength tests, as well as waste manifests.

No decant water or stormwater was collected from the dredged material barges at the Pulliam Offloading Facility due to the effectiveness of amendment mixing and solidification. Although a sump was installed in the lined storage bin, free water and stormwater runoff that contacted solidified material curing in the bins reacted with the amendments and did not yield any water drainage to the sump. Therefore, no contact water was trucked from the Pulliam Offloading Facility to the LFR WTP, as anticipated in the RAWP Addendum. Stormwater collected within the sediment management area of the Pulliam Offloading Facility was pumped to an on-site stormwater basin that discharges to a water treatment facility permitted to operate under WPDES permit No. WI-0000965. Discharge is directed into the adjacent canal and ultimately flows to the Fox River. Tetra Tech operated the treatment facility for the duration of the RA.

3.3.2 Cap Construction

As described in Section 2.1.2, an armored cap was designed to manage in-place DNAPL and PAHs remaining within the NFA following dredging. The following sections describe the design and placement of each component of the armored cap.

3.3.2.1 Post-Dredge Sand Backfill Placement

Once the post-dredge bathymetric survey confirmed dredging was completed to the target removal elevations and post-removal sampling was complete, clean sand backfill was installed in areas where clay was dredged to a slope steeper than 3H:1V. The backfill was installed over 23 areas to create a 3H:1V slope to allow for placement of the CIL and armor layer and enhance cap stability. The backfill material was placed mechanically to the required minimum 6-inch thickness and slope, which were verified by bathymetric surveying prior to installation of the CIL and accepted by the A/OT on August 14, 2019.

Sand used for the post-dredge sand backfill complied with the LFR Project specifications (see Appendix C-0 of the *LFR 100 Percent Design, Volume 2*, Tetra Tech et al. 2012). Approximately 375 CY of sand was placed as post-dredge backfill in the NFA.

3.3.2.2 Chemical Isolation Layers Placement

The CIL was installed after dredging in the NFA and any required backfilling to flatten slopes was completed. The CIL placement sequence included placement of the DNAPL sorbent layer, followed by placement of the dissolved-phase sorbent layer on top of the DNAPL sorbent layer. Other cap layers were placed on the CIL, starting with the layer placed over the CIL and proceeding upward:

- A geotextile (attached to the underside of the grouted mattress) was placed over the CIL as a filter layer.
- A grouted mattress was placed over the CIL to protect the CIL from erosion.
- A buttress, which is not part of the cap, was placed over the armor layer against the GP bulkhead for bulkhead stabilization, including a 12-inch layer of sand to protect the grouted mattress, followed by a wedge-shaped layer of 3-inch to 6-inch diameter stone.

- A 6-inch-thick sand cover, which is not part of the cap, was placed over the grouted mattress in areas not covered by the buttress to support benthic recolonization.

After initial phases of CIL installation, data were collected to verify CIL placement, including the following:

- Laboratory measurements of %GAC and %OC for five CIL samples collected from the conveyor belt that transported the CIL material to the spreader used to install the CIL.
- Laboratory measurements of %GAC and %OC for five CIL samples (labelled MGP NFA DP1 through MGP NFA DP5 in Figure 6) collected from catch pans after the CIL was installed.
- The thickness of the CIL layers was measured as follows:
  - Using bathymetric surveys completed after each layer of the CIL was installed
  - In 18 core samples (labelled GAC-1 through GAC-18) collected from the CIL after the CIL was installed
  - In samples MGP-NFA-DP1 through MGP-NFA-DP5

The %OC and %GAC were verified at Anchor QEA, LLC's (Anchor QEA) Environmental Geochemistry Laboratory in Portland, Oregon, using heavy liquid separation analysis.

Some of the sample measurements indicated that the layer thickness, %OC, and/or %GAC did not meet the design requirements along much of the steeper sloped portions of the CIL area. It is assumed that CIL material was placed in this area, but some of the material was not stable and sloughed off the slope. Figure 6 depicts the re-spread placement lanes where additional CIL material was placed to meet the design criteria.

The percentages of OC for the DNAPL sorbent layer material and the GAC for the dissolved-phase layer were verified by collecting three samples from the stockpiled materials prior to CIL placement: one sample at the start of mixing, one sample half-way through, and one sample at the end of mixing. The %OC and %GAC were verified at Anchor QEA's Environmental Geochemistry Laboratory in Portland, Oregon, using heavy liquid separation analysis. The results, provided as an email and table, are included in Appendix A5.

The OC-sand and GAC-sand mixtures were placed using J.F. Brennan's patented Broadcast Capping System™ (BCS), which has three main systems/components that include the land plant, transportation, and the broadcast spreader. The OC-sand mixture was placed first, followed by the GAC-sand mixture. The land plant was located onshore at the Pulliam Offloading Facility, where cover sand and OC or GAC was stored and mixed before being transported to the spreader plant.

Once the OC-sand or GAC-sand mixture reached the broadcast spreader, it was deposited onto the dual spinners of the BCS and spread in an overlapping manner. The spinners then broadcasted the cap material over an approximately 30-foot-by-35-foot area. By broadcasting the material at a high delivery rate over a large footprint and using the water column to reduce the mixture's velocity, there was little mixing of the capping material and underlying in situ or cap materials, and a uniform amendment/sand mixture was placed. The BCS used for the amendment/sand mixing used the same spreader as that used on the project for sand covers and caps. This system minimized mixing at the sediment and sand interface, as well as slope failures and "mud wave" effects. Layer thicknesses were field-verified using push cores or catch pans during initial material spreading to verify equipment setting and spreading rates compared to

layer thickness. Table 2 presents the summary of CIL placement activities. Appendix E includes CIL placement thickness results and post-placement maps.

3.3.2.3 CIL Placement Corrective Measures

After bathymetric surveying and spreader placement data indicated target OC-sand thickness was achieved, Tetra Tech advanced sediment cores and collected catch pans during spreading activities to verify placement of OC. Sediment cores were also advanced after spreading was completed. In addition, samples were collected from the stockpile on the barge during OC-sand placement to test amendment mixture. The same approach was used for quality control of GAC placement. Details of CIL placement evaluation are discussed in Section 3.4. Preliminary analytical results received after initial OC placement (August 15-16, 2019) in conjunction with survey isopach maps and field observations indicated that the initial OC placement did not achieve design requirements over the entire NFA, nor did the initial GAC.

Further CIL evaluation included comparing effectiveness for managing DNAPL and dissolved phase contaminants based on measurements of CIL layer thickness at eighteen locations, combined with laboratory measurements of the percent amendment (i.e., OC in the lower DNAPL management layer or GAC in the upper dissolved phase contaminant management layer) in CIL samples collected from 5 locations. The CIL thickness and percent amendments were evaluated in combination to compare the amendment weight per square foot (i.e., the CIL amendment unit weight) in the CIL to the unit weight of amendment required in the design. The percent amendment at each of the 18 locations was estimated by averaging the percent amendments measured in samples at the two amendment measurement locations nearest the subject CIL thickness measurement location. The CIL amendment unit weight is the product of the percent amendment measured in the CIL, amendment density, and CIL thickness, per square foot of CIL.

The unit weight of CIL amendment met design requirements at 6 of the 18 locations. At the remaining 12 locations, the DNAPL sorbent layer did not meet design objectives, because the OC unit weight did not meet the design requirement for DNAPL management. As discussed in Section 2.1.2.1, the CIL design included a DNAPL sorbent layer overlain by a dissolved phase sorbent layer. The DNAPL sorbent layer was designed to prevent DNAPL from migrating to the dissolved phase sorbent layer and potentially fouling the GAC, which could limit GAC capacity for treating dissolved phase contaminants. Therefore, the placement of the DNAPL sorbent layer and dissolved phase sorbent layer were evaluated individually. This meant that placing additional CIL with OC to manage DNAPL on top of the CIL already placed at these 12 locations required subsequent placement of additional CIL to manage dissolved phase in the upper portion of the additional CIL.

The already placed CIL containing OC was considered to contribute to DNAPL management. The evaluation of additional CIL needed to meet the DNAPL sorbent layer design considered the already placed CIL containing OC. The capacity of GAC (in the already placed dissolved phase sorbent layer) for managing both DNAPL and dissolved phase is expected to be limited due to potential fouling of the GAC by DNAPL. Therefore, the capacity of the GAC layer initially placed at these twelve locations for DNAPL and dissolved phase management is unknown. Because the GAC capacity is unknown, the dissolved phase layer that was initially placed at these twelve locations was ignored when developing the additional CIL, i.e., the GAC layer was not considered in determining the thickness and %OC required for managing DNAPL and dissolved phase contaminants in the additional CIL. Because OC is considered effective for managing both DNAPL and dissolved phases, placement of additional CIL containing only OC (i.e., no GAC) was selected

to simplify additional CIL placement. For practical purposes, the sampling locations where additional CIL placement was required were mapped onto spreader lanes.

Results indicated that CIL achieved design requirements in spreader Lanes A and B up to section A and B but additional CIL was required in the spreader lanes from section B to the end of the lanes in secondary spreader lanes C, D, and E (see Appendix E2). Additional CIL was placed in all areas where the originally placed CIL did not meet design criteria. Concurrent with the additional CIL placement, the armor layer was placed over areas where the original CIL met design criteria or over areas where the additional CIL had already been placed. This sequencing allowed the project to proceed on schedule while maintaining design criteria for cap placement. To address areas where the DNAPL or dissolved phase sorbent layer thickness, %OC, and/or %GAC did not meet the design requirements, placement of an additional 12-inch thick sand/OC layer containing 12% OC was recommended. In addition, a slightly more coarse-grained sand was used in the sand/OC mixture to potentially increase the stability of the CIL on slopes. After repeated attempts to place CIL, design criteria thickness could not be achieved in an area measuring approximately 15 feet by 64 feet and located near the western end of grouted mattress sections between grouted mattress 29 through grouted mattress 33. This area was relatively flat. A single layer of organoclay reactive core mat (RCM) was successfully placed over this area on September 10, 2019. Even though this area was relatively flat and sliding of the grouted mattress over the RCM was therefore not a significant concern, the RCM was attached to the bottom of the overlying grouted mattresses using copper rings to decrease the potential for sliding. The RCM was attached to the grouted mattresses prior to placement, anchoring, and grouting of the grouted mattresses. The edges of adjacent armored mat sections were connected and zippered together. Figure 6 identifies the NFA areas where additional OC thickness was placed to meet design and Figure 7 identifies where the organoclay RCM was placed.

3.3.2.4 Armor Layer Placement

Following placement of the CIL, a grouted mattress erosion protection layer was placed over the CIL between September 24 and October 24, 2019. Each mat section was manufactured to be 18 feet wide (oriented parallel to the shoreline) by the length (oriented perpendicular to the shoreline) required to extend to cover the CIL. The length of the mat sections varied according to location, so the mat sections were fabricated to length and numbered to correspond to a specific location. Divers were used to install the mats, which included unrolling, placing the CIL, anchoring, and grout filling. Examples of mattress materials and installation progress charts documenting QA survey and grout thickness measurements are included in Appendix F.

3.3.2.5 Armor Mattress Thickness and Length Corrective Measures

The following issues were observed after initial grouted mattress placement:

- The grouted mattress thickness was less than the design criterion of 12 inches
- There was a gap between the top of the grouted mattresses and the GP bulkhead wall at the top of the cap area, because some grouted mattresses did not butt up against the GP bulkhead wall, as was required by the design
- The length of some grouted mattresses did not extend over the full cap area identified in the design

Corrective actions were developed for each of these issues to achieve design criteria. The location and type of corrective actions are shown on Figure 7. These corrective actions are described below.

Grouted Mattress Thickness

During placement of the grouted mattresses, J.F. Brennan reported measuring as-built grouted mattress thicknesses less than the design 12-inch thickness. J.F. Brennan informed Anchor QEA that the constructed mattresses were generally 12 inches thick near the toe of the mattresses and thinned to approximately 8 inches moving upslope away from the toe. A Synthetex representative arrived on site on September 14, 2019 to assist with modifications to the installation method to increase the thickness of the mattresses.

Anchor QEA re-evaluated the minimum thickness for a mattress that would provide comparable resistance against hydraulic flows (i.e., propeller wash) to that considered in the design while considering the field verified loading capacity for each of the anchors, which were initially not considered in the design. Based on this evaluation, a minimum mattress thickness of 5.1 inches that includes anchors with an average load capacity of 12,000 pounds (lbs) per anchor (the average of the field verified loads) would have provided resistance to hydraulic flows equivalent to the original 12-inch design thickness without anchors.

Anchor QEA evaluated the portion of the grouted mattress that had been placed to date, with the understanding that the as-built mattress thickness was less in some areas than the design thickness of 12 inches. Conservatively assuming that the mattresses installed to date averaged 8-inch thickness, the as-built grouted mattress with anchors exceeded design requirements for resistance to flows. Although the as-built conditions exceeded design requirements, the team worked with Synthetex to improve grout filling outcomes. An adjustment to the sequence of grout filling, connecting with neighboring mattresses, and anchoring facilitated subsequently filled mattresses to substantially achieve the design thickness of 12 inches. Divers recorded mattress thicknesses to document for QA progress reports.

Grouted Mattress Length

In order to achieve full coverage of the CIL near the western edge of the cap area (i.e., the toe of the cap), mattress extensions were added on to the toe of those mattresses that were shorter than the design length. The extensions were constructed using the same methods and materials as the original mattresses and were connected to the original mattresses using the same connection methods and anchoring system as were used to connect the original mattresses. Hydrographic QA surveys verified mattress extensions achieved the spatial coverage design requirements.

Gap Between Grouted Mattresses and GP Bulkhead Wall

Diver observations, confirmed by hydrographic QA surveys, identified that some grouted mattresses were not positioned flush up against the GP bulkhead wall, creating a gap between the bulkhead and the protective armor layer, and potentially leaving the CIL vulnerable to erosion in these areas. The A/OT-accepted corrective measure was to fill the gap with supplemental, smaller mattresses manufactured to cover the gap. These supplemental, smaller mattresses were placed in the gaps, filled with grout, and where more than one mattress was needed, stacked, and connected to the grouted mattresses using the same connection methods and anchoring system as the original mattresses. Hydrographic QA surveys verified all gaps were filled.

3.3.3 Bulkhead Stabilization Buttress Placement

A buttress was installed against the GP bulkhead at a 4H:1V slope following installation of the erosion protection layer. The buttress was placed mechanically and consisted of sand to protect the armored mattress from the following stone layer. Sand was placed 12-inches thick between October 25 to October 30, 2019 and 3- to 6-inch stone was placed between October 30 to November 6, 2019. No issues were encountered during stabilization buttress placement.

3.3.4 Residual Sand Cover and Benthic Layer Placement

Following placement of the armored cap and the buttress adjacent to the bulkheads, a sand cover composed of an equivalent 6-inch thick layer of sand (measured on a volumetric basis) was placed to support benthic recolonization on exposed portions of the erosion protection layer not covered by the buttress. This sand cover also acts as a residual sand cover that was installed over the remainder of the NFA footprint following dredging. The sand cover consisted of sand that was free from excessive moisture, rocks, sticks, or vegetation. In addition, the placement methods were consistent with those used for the LFR PCB Project.

The sand cover/benthic layer installation was verified by hydrographic surveys. Physical measurements of the sand cover above the grouted mattress were not taken due to the difficulty of collecting samples; however, residual sand thickness placed beyond the grouted mattress to the extent of the turbidity containment was verified in accordance with the NFA SAP, which is described in Section 3.4.

3.3.5 Turbidity Containment Removal

Removal of the containment system involved the same equipment as used for installation. Two crews each using a 100-ton crawler crane, vibratory hammer, and barges worked concurrently to extract the sheet piles. Sheetpile pairs were offloaded at the Graymont staging area and observed for potential signs of project-related impact. Any dry clay soil or aquatic mussels attached to the sheet pile pairs was scraped from the sheets onto polysheeting and placed into a roll-off box for off-site disposal at Ridgeview RDF.

Sheetpile pairs that were dry decontaminated were transported to the Pulliam Offloading Facility to be wet decontaminated in the truck wash within building B. Sheetpile decontamination activities occurred after demobilization, during December 2019 to February 2020. Sediments collected in the truck wash sump were solidified with Portland cement and disposed of at Advanced Disposal Services' (ADS) Hickory Meadows Landfill under the PCB project. Wash water was treated in the LFR processing plant water treatment facility.

3.4 Verification Activities

Activities performed to verify that the RA was performed as planned in the NFA and environmental controls were adequate in accordance with the RAWP Addendum and SAP including bathymetric surveying and QA/QC sampling, which are described below.

3.4.1 Bathymetric Surveying

In accordance with Section 9 of the CQAPP (Tetra Tech et al. 2015), equipment used for dredging, sand spreading, and survey purposes employed hydrographic surveying, engineering, and equipment positioning software. Survey methods for multi-beam and single beam acoustical systems generally conformed to guidelines set forth by USACE Guidance document EM1110-2-1003

(USACE 2004). Positioning data for surveys were based on real time kinematic global positioning system (RTK-GPS), which typically provides accuracies of ± 1 centimeters (cm) horizontally and ± 4 cm vertically.

RTK corrections were provided from either a project base station via radio link or Wisconsin RTK network, depending on the availability of a state network. All survey data and control were referenced to the following datum:

Horizontal Datum

- Wisconsin State Plane Coordinate System (SPCS or WPS)
- Central Zone (FIPS 480)
- North American Datum 1983, 1997 adjustment [NAD 83(97)]
- Units: United States survey feet

Vertical Datum

- NAVD 88
- Units: U.S. survey feet

Bathymetric QA surveys were performed as follows:

- Prior to dredging the overburden surface (May 2, 2019)
- Following overburden dredging (May 24, 2019)
- Following mechanical dredging of soft sediment & clay (August 6, 2019)
- Following installation of the post-dredge backfill layer (August 13, 2019)
- Following installation of each layer of the CIL (GAC – August 23, 2019; Organoclay – September 24, 2019)
- Following installation of the erosion control layer (October 23, 2019)
- Following installation of the buttress (November 6, 2019)
- Following installation of the residual sand cover/benthic layer (November 12, 2019)

Per the CQAPP (Tetra Tech et al. 2015), if and when an area encountered high subgrade (i.e., clay, hard sand/gravel, or rock) that prevented removal of soft sediment to the target design elevation, which is based on an interpolated clay surface from the 2017 sampling event, poling and coring was performed in accordance with the approved SOPs (Tetra Tech et al. 2015). This was done to confirm the high subgrade and determine the extent of this high subgrade area. The CQAPP procedure for delineating the high subgrade area calls for submission of a figure outlining the area for review and approval by the LFRR LLC and the A/OT. Daily soft sediment verification field forms and maps for high subgrade delineation were provided to the LFRR LLC and A/OT daily via the Tetra Tech project file transfer protocol (FTP) site for review and acceptance of high subgrade areas. Upon receiving acceptances, the verified high subgrade area was then excluded from further dredging. Soft sediment removal and high subgrade verification, if applicable, were performed under the LFR PCB Project, not the WPSC MGP project, so information is included in the LFR PCB Project Daily Reports and is not included in this report. Verification of soft sediment removal by LFRR LLC is discussed in Section 3.4.2.

Appendix G2 includes bathymetric survey charts for each project milestone.

3.4.2 Quality Control

QA/QC documentation included:

- Daily reports
- Field notes
- Bathymetric surveying
- Visual observations of residual material in sediment cores
- Visual observations of excavated material in buckets
- As-placed thicknesses or mixtures
- Photographs

These activities are further described in this section and further referenced in Section 3.3 while describing the RA.

3.4.2.1 Contractor Daily Field Reports

J.F. Brennan's daily reports (Appendix C) included a description of activities that took place on each day, such as mobilization/demobilization, turbidity containment wall installation, hydraulic dredging operations, mechanical dredging operations, CIL placement, armor mattress placement, vibration monitoring, vessel management, odor/sheen management, surveying/sampling, and miscellaneous notes. Daily reports also included quantities, such as volume of material excavated, area of CIL or sand placement; or number of sheets driven/pulled, photographs, and a list of personnel and equipment on-site.

3.4.2.2 Visual Core Observations

After bathymetric survey indicated dredging outside the SDE footprint achieved target elevations, visual QC core observations were performed to assess soft sediment and DNAPL removal. Cores were visually characterized, logged, and sampled in general accordance with the LFR SOP included in Attachment A of the CQAPP (Tetra Tech et al. 2015) and Documenting DNAPL while Dredging in NFA, Revision 2 dated June 28, 2019 (OBG 2019c). A photoionization detector (PID) was used to monitor the breathing zone air for worker health and safety purposes and to field screen the samples. The logs included visual observations of oil-wetted/coated material[6], if any, and are included in Appendix D1.

QC visual core sampling was initiated July 23 and continued almost daily for over a week, through August 2. Initial coring results indicated sediment thicknesses <0.33-feet at 208 of 327 coring locations (63.6% pass rate). This residual soft sediment thickness does not require sediment sampling and/or remedial actions per the LFR CQAPP SOP High Subgrade Sampling (Tetra Tech et al. 2015) if the area is deemed to have achieved 90% target elevation attainment (with high subgrade included). Only one core location had observations of DNAPL on the core tube and one location had sheen observed on water. The distribution of residual sediment thickness exceedances indicated residual sediment was accumulating against the containment wall. Based on these results, dredging of residuals occurred over the weekend to maintain project

[6] "Oil-wetted" is defined as visible brown or black oil wetting the sediment sample; oil appears as a liquid and is not held by sediment grains.
"Oil-coated" is defined as visible brown or black oil coating sediment particles; typically associated with coarse-grained sediment such as coarse sand, gravels, and cobbles.

schedule and focus removal efforts at the containment wall. A subset of the initial coring locations was revisited following residuals dredging as agreed to during WGMs held the week of July 29, 2019 to maintain project schedule. Forty-eight "failed" locations were revisited following residuals dredging, which were distributed throughout the containment and outside the SDE footprint. These locations occurred in all but the southern-most area where a high percentage of initial QC cores had passed. Forty of the 48 revisited core locations achieved the thickness criterion (83% pass rate).

As some resampled locations still exceeded the thickness criterion of 0.33 feet, soft sediment from nine of the QC cores stored at Tetra Tech's core processing facility were processed for PCB analysis. Results of the analyses indicated that PCBs were at concentrations that could be managed by sand cover per the LFR PCB Project criteria, the documentation of which is included in Appendix D3. Residual sediment volume calculated from areas exceeding 0.33 feet of soft sediment was approximately 12.5 CY.

The lack of DNAPL observations in original and "revisited" QC soft sediment cores, extensive additional dredging performed to remove residual soft sediment, and resulting de minimis volume of sediment exceeding the soft sediment thickness tolerance supported residual management by placement of a residual sand cover.

3.4.2.3 Visual Bucket Observations

After the targeted dredge elevation was achieved at the end of Stage 3 dredging, sediment and clay from the excavator bucket were inspected for DNAPL observations from July 31 to August 2, 2019 (OBG 2019c).

OBG visually observed material as it was excavated. Documentation of sediment and clay bucket observations are included in Table 1 and Appendix D2. The photographs in Appendix D2 were taken from material as it was being excavated, at or below the target removal elevation. Visual observations of DNAPL, such as oil-wetted or oil-coated material, were documented and determined whether the sampled clay contained "significant"[7] visual DNAPL. Two QC core locations, F-24 and VC-11, were determined to contain "significant" visual DNAPL, and therefore additional "step-out" dredging was performed in the immediate vicinity of the original bucket sample to the extent practicable. Step-out dredging was also performed for location VC-11W. Details on the containment wall residuals and the "step-out" dredging that was performed are documented in the NFA Containment Wall Residuals Summary Memorandum provided in Appendix D3.

3.4.2.4 CIL Thicknesses and Percentages of Amendment Placed

Verification of the placed thickness of the CIL was conducted on August 15-16 and August 22 by Tetra Tech using push cores, following the standard methods and verification criteria for the LFR PCB Project. A summary of CIL placement activities is provided in Table 2, and Appendix E provides additional details on CIL verification, including post-placement summary tables (Appendix E1), post-placement maps (Appendix E2), and the project timeline summary (Appendix E3).

[7] "Significant" observations were discussed and agreed to in the field among representatives of WPSC and the Agencies in accordance with the accepted DNAPL Observation Memorandum (OBG 2019c). The field method used to identify "significant" DNAPL was characterized as any reproduceable mobile "bleeding" DNAPL and/or DNAPL >20% of the entire clay matrix (bucket sample).

As described in Section 2.2.3, additional CIL material was placed in spreader lanes C, D, and E to address either thickness shortfalls or mix ratio shortfalls. The final page of Appendix E3 presents a detailed timeline of OC and GAC placement and A/OT acceptance of CIL verification results on October 2, 2019.

3.4.2.5 Grouted Mattress Thickness Observations

Divers visually inspected the mats from September 18 to October 21, 2019 for consistent filling of the grout chambers and general conditions of the mats (i.e., mats were installed flat on post-dredge surface with no folds or wrinkles). QC thickness progress charts are provided in Appendix F. The A/OT accepted armor layer installation results on November 8, 2019.

3.4.3 Post-Removal Verification

Prior to residual sand cover placement, post-removal verification of attainment of the target removal elevations was performed from August 6 through August 9, 2019 in accordance with the approved Sampling and Analysis Plan Rev 2 (OBG 2019b) and referenced LFR PCB Project CQAPP SOPs (Tetra Tech et al. 2015), described below. Post-removal sample locations are shown on Figure 8, and post-removal sampling analytical data are provided in Table 3. Appendix H provides additional details on post-construction removal verification, including post-removal poling data (Appendix H1), post-removal sampling core logs (Appendix H2), post-removal sampling photographic log (Appendix H3), and post-removal sampling analytical laboratory reports (Appendix H4). Sampling results were approved by the A/OT on September 4, 2019.

3.4.3.1 Inside the SDE Footprint

Sample locations GB-NFA-PC-012 through 028, even numbered, were located inside the SDE. As expected, the highest residual TPAH13 concentrations were detected inside the SDE footprint. Typically, the higher concentrations occurred lower in the vertical profile; however, remaining soft sediment thickness within the SDE footprint was highly variable. The surface weighted area concentration (SWAC) was calculated by taking the surface sediment concentration (0 to 0.5 ft below sediment surface (bss), except at location -026 that was to 0.7-ft bss) times the area of the grid over which the sample represents (10 cores per 1 acre), summing the product and dividing by the areal sum. The TPAH13 SWAC inside the SDE, beneath the cap footprint, is 197.3 milligram per kilogram (mg/kg). The maximum concentration of 6,595.9 mg/kg was detected 1.5-2.5 feet below top of sediment at location GB-NFA-PC-022. Similarly, benzene (9.1 mg/kg SWAC), toluene (5.1 mg/kg SWAC), ethylbenzene (8.7 mg/kg SWAC), and xylene (7.2 mg/kg SWAC; BTEX), metals and cyanide concentrations were also reported at higher concentrations inside the SDE footprint than in samples collected from outside the SDE footprint and correspond to visual observations of DNAPL. Only cadmium, copper, lead, mercury, and zinc exceeded screening levels. Their calculated SWACs were 1.1 mg/kg, 82.7 mg/kg, 264 mg/kg, 2 mg/kg, and 173 mg/kg, respectively. These results will be incorporated into the ongoing RI/FS process.

Geotechnical samples were collected at selected verification locations inside the SDE footprint from August 6 through August 9, 2019 to characterize the sediments beneath the CIL and armor cap layers. Geotechnical results are presented in Table 4. Moisture content was highly variable, ranging from 33.0% to 171.1%. Regardless of texture (grain size), the coefficients of permeability were quite low, on the order of 10^{-8} centimeters per second (cm/s).

Locations GB-NFA-PC-014 through 26 (even numbered) had visual observations of DNAPL noted during core characterization.

3.4.3.2 Outside the SDE Footprint

Sample locations GB-NFA-PC-011 through 029, odd numbered, were located outside the SDE. As expected, the lowest residual TPAH13 concentrations were detected outside the SDE footprint. The TPAH13 SWAC outside the SDE, beneath the residual sand, is 3.8 mg/kg[8]. The maximum TPAH13 concentration outside the SDE footprint of 14.7 mg/kg was reported at GB-NFA-PC-025 at 0-0.5 feet below top of sediment and was below the Probable Effects Concentration (PEC) (WDNR 2003b), but higher than the subsurface unit below. These results may be indicative of the presence of dredged residuals. Similar to TPAH13, PVOC parameters including BTEX SWACs did not exceed screening levels (benzene 0.04 mg/kg; toluene 0.04 mg/kg; ethylbenzene 0.21 mg/kg; total xylene 0.15 mg/kg). The only metals for which SWAC exceeded ecological screening levels were iron (21,000 mg/kg), mercury (0.28 mg/kg), and nickel (25.4 mg/kg).

Only GB-NFA-PC-015 had an observation of sheen (0-5%). No locations had visual observations of DNAPL, which is consistent with the low-level analytical results.

3.4.3.3 Residual Sand Cover Thickness and Buttress Verification

The residual sand cover layer was installed above the erosion control layer inside the SDE outside the limits of the stabilization buttress or over residual sediment/clay outside the SDE with a minimum 6-inch-thick layer. Physical measurements of the sand cover inside SDE footprint were not taken due to the difficulty of collecting samples above the grouted mattress because sand would not stay in the core collection tube because no sediment plug was present to form a bottom seal. Instead, the sand layer was measured and verified on a volumetric basis, with a minimum 6-inch layer plus an assumed minimum 3-inch over-placement allowance corresponding to approximately 1,210 CY per acre of footprint. Compliance was assessed based on a review of contractor placement records demonstrating that the specified volume of material was placed over a unit area. The sand cover/benthic layer installation was verified by bathymetric survey on November 12, 2019.

Buttress sand thickness verification coring locations, which were collected on October 28 and October 29, 2019, are shown on Figure 9. Verification of the buttress sand layer thickness is provided in Table 5, which shows that poled sand thicknesses ranged from 13.4 inches to 27.2 inches. Residual sand thickness verification coring locations are shown on Figure 10, and verification of the residual sand thickness is provided in Table 6. Depths of refusal and poled sand thicknesses were used to verify thickness in cases of poor sand recovery. Appendix I provides additional details on residual sand cover, buttress, and benthic layers verification, including residual sand cover thickness verification poling data (Appendix I1), residual sand cover verification sampling photographic log (Appendix I2), and benthic layer and buttress verification survey (Appendix I3). The A/OT accepted sand/stone buttress installation on November 12, 2019.

3.5 Demobilization and Site Restoration

Following the conclusion of the RA, all equipment, land improvements, and infrastructure installed to support the RA was disassembled, cleaned, and appropriately reused or disposed

[8] Note that if a Theissen polygon area was used to calculate the area represented by the surface concentration the calculated SWAC would be lower than SWAC calculated by using the representative grid area.

off-site. Disturbed shoreline, vegetation, railroad, and other items disturbed during the RA were restored to pre-RA conditions including but not limited to:

- Removal of temporary fence and gates
- Restoring grades behind the GP bulkhead wall
- Removal of all temporary erosion controls and dispose of material in an appropriate manner
- Restoring GP railway access
- Removal of turbidity curtain from bulkhead wall

Site restoration and demobilization activities were substantially completed by November 14, 2019, with sheetpile decontamination activities continuing through the winter months, as previously described.

3.6 Evaluation of Post-Removal Conditions

Figure 11 presents the post-removal contours, prior to cap placement, to reflect the sediment surface at the time of post-removal verification (QA) sampling and visual core and visual bucket observation (QC) sampling. Different symbology is used to distinguish the QA samples collected inside the SDE (where sediment and clay containing DNAPL was left behind due to bulkhead wall stability) and outside the SDE (where significant DNAPL should not remain if the RA is successful). Figure 11 also shows the constructed extents of residual sand cover, benthic sand, and the stabilization buttress. Pre-construction characterization (design) core locations are shown for context of the RA evaluation, which are shown on select cross-sections in Appendix G1 of the as-built drawings.

Post removal soft sediment QC visual observation coring performed after residuals dredging indicated that approximately 83% of the sample cores (40 of 48 revisited) had less than four inches of soft sediment remaining in the areas targeted for soft sediment removal to the clay surface. The cores that contained more than four inches of soft sediment were due to sloughing from the sloped surface, which settled against the containment wall or in topographically low areas. The bathymetric survey comparison to design elevation included in Appendix G1 and included as Figure 12 indicates that the RA achieved the target removal elevations except for high subgrade areas. A topographic ridge parallels the bulkhead wall and is evident on the cross-sections N-N and N-O in Appendix G1. Post-construction QA sample location GB-NFA-PC-023 (Appendix H2) and QC visual core observations from rows D and E (Appendix D1) confirm the ridge is composed of lean clay and not soft sediment.

High subgrade was confirmed by the absence of sediment (<0.33 feet) encountered during soft sediment coring and coring refusal. Approximately 12.5 CY soft sediment remained based on soft sediment verification coring results estimated by multiplying the average sediment thickness by the area over which thickness exceedances occurred. However, two QA cores collected outside the SDE footprint, GB-NFA-PC-015 (south end of NFA) and 029 (north end of NFA), had soft sediment thicknesses greater than 0.33 feet, having 0.7 feet and 0.9 feet, respectively. These two cores did not have elevated detections of site COCs, but GB-NFA-PC-015 did have sheen observed, which was mitigated by the six inches of residual sand placed over residual soft sediment. Only QA core locations inside the SDE footprint had observations of DNAPL, which was mitigated by the placement of the CIL and armored cap layers.

Analytical samples and visual observations from post-removal borings advanced into the post-removal surface are summarized in Table 3, and geotechnical results are presented in Table 4. As previously described, the results indicate the RA achieved the objectives of the RD and the sediments that remain beneath the cap although impacted, have very low permeability. Results of the post-removal sampling will be included in the ongoing RI/FS.

4. MONITORING ACTIVITIES

Several activities took place to monitor that the RA was performed as planned in the NFA and that environmental controls were adequate. These activities included air monitoring, turbidity monitoring, MGP wastewater effluent monitoring, vibration monitoring, and GP wall monitoring, as described below.

4.1 Air Monitoring

Air monitoring included background air monitoring, which occurred prior to the start of the RA to establish baseline conditions, and performance air monitoring, which occurred during the course of the RA to monitor air quality. The air monitoring (background and load out) was performed in the load out facility (Pulliam Offloading Facility) and not in the NFA because most of the sediment disturbing work was below the water line. Three air monitoring stations were selected as shown on Figure 4.

4.1.1 Background Air Monitoring

Prior to handling excavated material at the Pulliam Offloading Facility, background air monitoring was conducted by OBG from May 6 to May 10, 2019 to establish baseline conditions at the locations identified on Figure 4. Monitoring was performed as described in Section 4.1.2 below. Baseline ambient air monitoring data is included in Table 7a and Appendix K.

4.1.2 Fugitive Emissions, Vapor, and Odors

Potential emissions that were managed and controlled during the RA include odor, fugitive respirable particulate matter, and vapor phase COCs. Potential sources of emissions include 1) Fugitive dust as part of stabilizing and loading sediment for transportation/disposal; 2) Fugitive dust as part of the delivery and storage of stabilization agent; and 3) MGP related vapor/odor from removal of DNAPL-impacted sediment.

Fugitive emissions, vapors and odors were monitored at the load out facility but not at the NFA because most of the sediment disturbing work was below the water line. The load out facility handled mechanically excavated soft sediment and clay, mixed solidification amendment, and was located at the Pulliam Offloading Facility.

Mitigation measures used to reduce and minimize the effects of organic vapors, fugitive dust emissions, and odor resulting from the sediment management activities at the Pulliam Offloading Facility included amendment filter bag equipment upgrade, adjusting amendment addition rate to storage pig and to dewatered sediments barge, and varying how full mixing barge is with sediment affected release rates.

<u>Air Monitoring</u>

Background ambient air concentrations at the mechanically dredged material load out facility (i.e., the Pulliam Offloading Facility) were measured between May 6 and May 10, 2019. Background air monitoring consisted of the following:

1. Recording meteorological conditions each day of the background air monitoring events
2. Daily air monitoring reports are included in Appendix K1.
    a. Respirable particles (PM10) were monitored using handheld Thermo Scientific™ DustTrak™ II Aerosol Monitor 8530.

b. Real-time air monitoring of total volatile organic compounds (TVOCs) data was completed using an UltraRAE 3000 PID.

3. Time-weighted average (24-hour) perimeter air monitoring samples were collected using Summa canisters. Sample sets were collected from three locations (AMS-4, AMS-5, and AMS-6, as shown on Figure 4), generally one upwind and two downwind air monitoring locations. Summa samples were analyzed by TestAmerica for BTEX and naphthalene by USEPA Method TO-15. Time-weighted average samples were collected on May 7, May 8, and May 10[9] (Appendix K3).

Performance air monitoring during load out activities was performed between June 3 and August 15, 2019 at three air monitoring station locations shown on Figure 4. AMS-5 was relocated on June 13, 2019 to be closer to the eastern perimeter of the site in order to better represent site conditions and to provide a safer work environment due to the proximity of construction equipment.

The air monitoring program consisted of the following:

1. Recording meteorological conditions each day during the RA
2. Real-time air monitoring including:
   a. Daily air monitoring reports are included in Appendix K1.
   b. Real-time data is included as Appendix K2.
   c. Respirable particles (PM10) were monitored using handheld Thermo Scientific™ DustTrak™ II Aerosol Monitor 8530.
      i. Exceedances of the action level for PM10 did occur and appeared to coincide with amending operations; however, some exceedances occurred at the upwind monitoring station, allowing for the possibility of a potential source outside the work zone.
      ii. Additional dust control measures were implemented as noted above to decrease the number of action level exceedances.
   d. Real-time air monitoring of TVOCs data was completed using an UltraRAE 3000 PID.
      i. Real-time readings of TVOCs were below action levels for the duration of the RA (Appendix K1).
3. Time-weighted average (24-hour) perimeter air monitoring samples were collected at least once per week during sediment off-loading using Summa canisters. Sample sets were collected from three locations (AMS-4, AMS-5, and AMS-6, as shown on Figure 4), generally one upwind and two downwind air monitoring locations. Summa samples were analyzed by TestAmerica for BTEX and naphthalene by USEPA Method TO-15. Time-weighted average samples were collected on June 5, 7, 12, 14, 20, and 26; July 3, 10, 17, 25, and 31; and August 8[10] (Appendix K3).

[9] Date listed is the date the samples were submitted to the lab. Since the samples were collected over 24-hours, the canisters were set up the previous day. For example, a canister was set up on May 6 and collected and sent to the lab on May 7.

[10] Date listed is the date the samples were submitted to the lab. Since the samples were collected over 24-hours, the canisters were set up the previous day. For example, a canister was set up on June 4 and collected and sent to the lab on June 5.

The results of both the baseline and performance (during off-loading operations) air monitoring are summarized on Table 7a and 7b. Analytical results from performance air monitoring were compared to both the baseline air monitoring data and the acceptable 24-hour Average Concentrations adopted from the Wisconsin Bureau of Environmental and Occupational Health Department of Health and Family Services "Health-based Guidelines for Air Management, Public Participation, and Risk Communication During the Excavation of Former Manufactured Gas Plants" (Wisconsin Department of Health Services Division of Public Health Bureau of Environmental and Occupational Health 2004). There were occurrences of downwind or crosswind sample concentrations that exceeded the upwind sample concentration for BTEX and naphthalene during the course of the RA. However, both such concentrations were well below the Wisconsin Bureau of Environmental and Occupational Health Department of Health and Family Services' acceptable 24-hour concentrations, indicating that off-loading operations did not significantly increase the concentration of MGP COCs in the air.

Odor

Odor was assessed in a qualitative manner based on perception of odors potentially being a public nuisance concern. Best management practices (BMPs) to reduce odor were available at both the NFA and the Pulliam Offloading Facility and included:

- Engineering Controls: Short and long duration biodegradable odor control products to minimize odor and vapor emissions.
- Physical Controls: Temporary plastic sheeting or clean fill placed on stockpiles, light water sprays used to control dust from stockpiles, excavated areas, and access roads.
- Work Sequencing: Material handling procedures and strategies targeted at preventing or mitigating emissions, such as sequencing operations to minimize the footprint and material exposed to the public.
- Site Layout: Locating stockpile and material management areas away from potentially sensitive receptors, to the extent practical.

Minimal fugitive emission mitigation measures were required during the RA. The duration of sediment stockpiled for load out proved to effectively contain fugitive emissions and odor; therefore, odor control products, while available, were not used.

4.2 Turbidity Monitoring

Turbidity monitoring during the RA was performed by Tetra Tech from April 1 to August 9, 2019 in accordance with Section 10 of the CQAPP (Tetra Tech et al. 2015). Copies of turbidity monitoring logs are included in Appendix J.

In situ nephelometers mounted on rafts were used for turbidity monitoring. The upstream (background) monitoring station was located approximately 500 feet upstream of the equipment performing RA. The upstream turbidity raft was placed in the Fox River to avoid entrainment with debris flowing out of the East River due to flooding and rainfall events that occurred during the RA. The exact location varied to be representative of the water that passed through the RA area (i.e., not in the main river channel where the water is flowing faster and not so close to the area as to be affected by remediation activities). The downstream monitoring station (point of compliance) was located within approximately 200 feet downstream of the in-river RA (the length of the mixing zone boundary) to allow room for material barges to move in and out of the MGP NFA. At each station, turbidity was monitored at or near the midpoint of the water column.

A turbidity action level of 80 milligrams per liter (mg/L) total suspended solids (TSS) above background, measured at the downstream point of compliance, was used. This was based on site-specific 1:1 or 80 nephelometric turbidity unit (NTU) correlations between turbidity (NTU) and TSS as measured during the RA. In addition, a turbidity trigger level, or early warning criterion, corresponding to 40 mg/L TSS above background or 40 NTU was used. Upstream and downstream turbidity measurements were collected at 15-minute intervals by the nephelometers mounted on rafts. Turbidity measurements were obtained automatically, and results were transmitted to a base station located at the Pulliam Offloading Facility located at 1611 State Street in Green Bay, Wisconsin.

Per the CQAPP (Tetra Tech et al. 2015), if the turbidity trigger level (NTU level corresponding to 40 mg/L above background or 40 NTU) was exceeded over four consecutive readings (i.e., 60 minutes), and the elevated turbidity was reasonably attributed to RA and not to other potential causes such as wind, rain, surficial runoff, or marine traffic, the equipment operator was notified and directed to evaluate BMPs or potentially modify the in-river RA.

The CQAPP (Tetra Tech et al. 2015) also specified the RA in the affected area would be suspended if the turbidity action level (NTU level corresponding to 80 mg/L above background or 80 NTU) was exceeded over four consecutive readings (i.e., 60 minutes). In this event, in-river RA in the affected area did not resume until the turbidity level returned to below the action level (NTU level corresponding to 80 mg/L above background or 80 NTU) for four consecutive readings (i.e., 60 minutes), unless it could be demonstrated that the in-river RA was not the cause of the exceedance.

RA activities were not suspended at any point due to an exceedance of the turbidity action level. While the turbidity action level (NTU level corresponding to 80 mg/L above background or 80 NTU) was reached on three occasions on April 24, 2019, field observations on April 24 and April 25, 2019 indicated that the elevated downstream turbidity values were due to discharge from the East River and were not dredge-related. Recent rain events generated suspended solids in the East River which were higher than in the Fox River where the downstream turbidity raft was positioned.

Sheens resulting from excavation activities were managed by deploying absorbent booms inside the containment system as necessary. No sheens were observed outside the turbidity containment system.

4.3 MGP Wastewater Effluent Monitoring

MGP wastewater effluent discharge summary tables are provided in Appendix L. Wastewater effluent was monitored for manganese, PAHs (group of 8), and PAHs (group of 10) toxicity equivalency factor. None of the reported results exceed permit criteria. The WTP effectively treated water received from the RA.

4.4 Vibration Monitoring

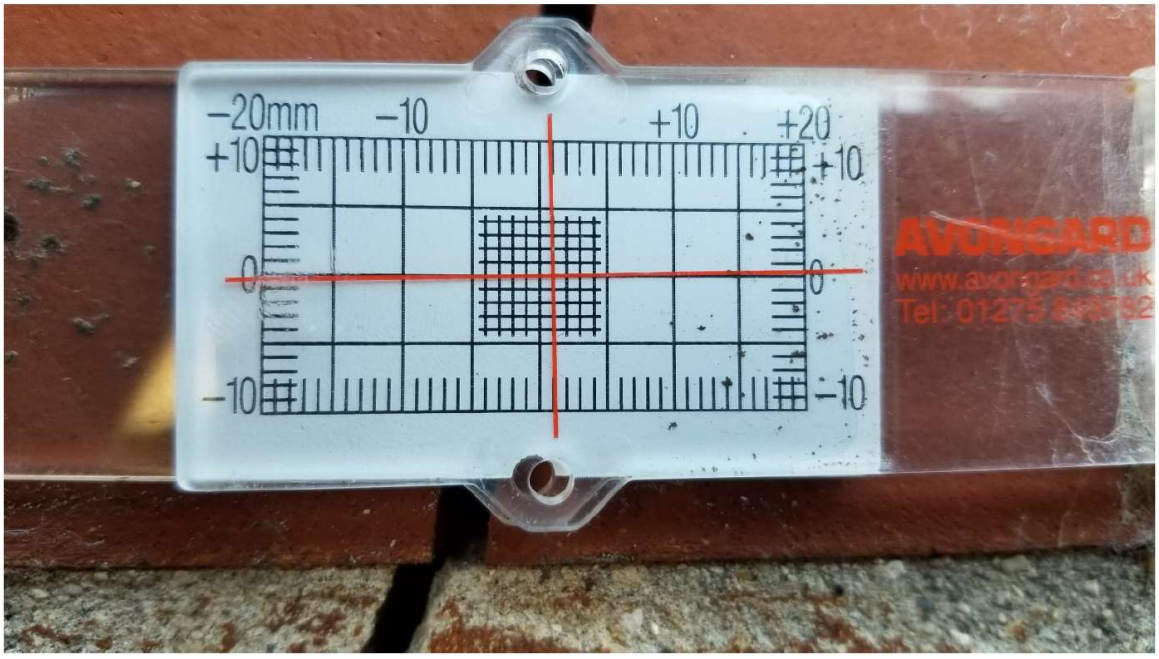
Vibration monitoring during the RA was performed by American Engineering Testing, Inc. (AET) at the GP Day Street Mill Site. GP noted vibrations during sheetpile driving near the intake structure area, which was discussed during an April 23, 2019 WGM. J.F. Brennan offered to place seismic/vibration monitoring equipment, as sheetpile driving was occurring concurrent with GP's building demolition activities near the bulkhead. With the direction of Mr. Bill Czaja of GP, two vibration monitoring systems were installed on April 23, 2019. System equipment consisted of

Instantel Micromate seismograph(s) with ISEE Geophones calibrated by Instantel prior to installation. The systems were located near the GP clarifier intake building (location #1) and the southern extent of the NFA approximately 80 feet from the shoreline (location #2), as shown on Figure 5. Monitoring was performed remotely from April 23 to November 25, 2019 with a threshold level of 0.30 inches per second[11] set to notify AET. Daily peak vibrations were also recorded.

Readings meeting or exceeding the threshold were not observed during the monitoring period by AET. The maximum peak vibrations recorded were at 11:10 am on October 2, 2019 with a reading of 0.124 inches per second at a frequency greater than 100 hertz at location #1 and at 6:25 am on July 11, 2019 with a reading of 0.201 inches per second at a frequency of 24 hertz at location #2. No vibration causing activities were identified for July 11th. Grouted mattress anchor installation occurred on October 2nd. The peak events and other daily readings were determined by AET to be not of significant concern to the structural integrity of the surrounding structures.

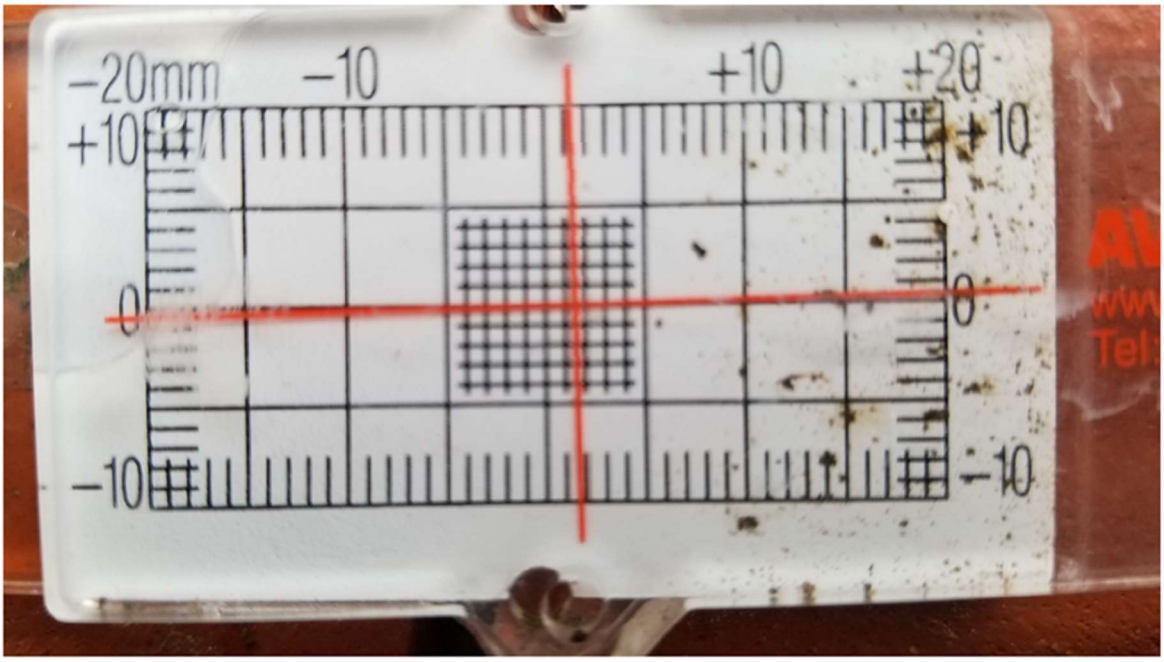
4.5 GP Wall Monitoring

Wall monitoring during the RA was performed by AET at the GP Day Street Mill Site also at the request of GP. Two crack monitors were installed by AET at the GP clarifier intake building in 2018, as shown on Figure 5. Monitoring by AET continued into 2019 during the RA, concurrent with GP's building demolition near the bulkhead, with no significant movement observed on either monitor. Photos taken before and after the monitoring period are shown for reference.

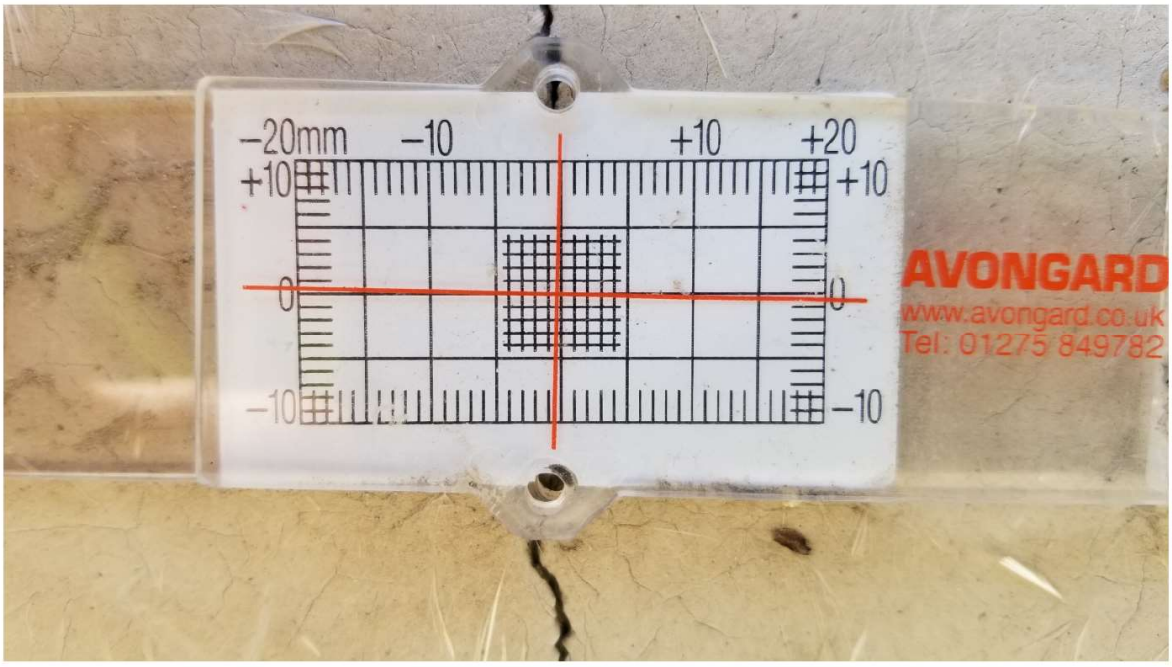


1. Crack Monitor #1 – North Side of Intake Building, April 2019
Provided by American Engineering Testing, Inc.

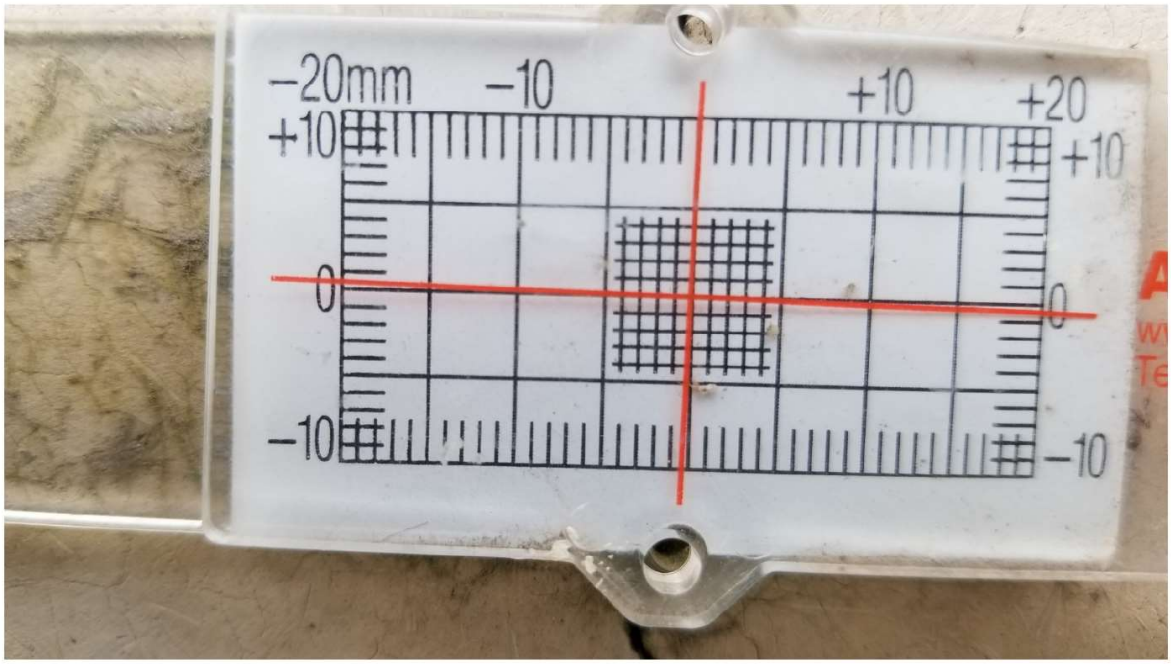
[11] ISO 10816 Vibration Severity Standards sets 0.3 inches per second as the upper limit for 'good' operation.



2. Crack Monitor #1 – North Side of Intake Building, November 2019
Provided by American Engineering Testing, Inc.



3. Crack Monitor #2 – North Side of Intake Building, April 2019
Provided by American Engineering Testing, Inc.



4. Crack Monitor #2 – North Side of Intake Building, November 2019
Provided by American Engineering Testing, Inc.

5. MGP NFA – CAP OPERATION, MONITORING, AND MAINTENANCE (COMM)

Long term monitoring will be performed to ensure the long-term integrity and protectiveness of the engineered cap. However, residual sand covers and buttress will not require long-term monitoring or maintenance, consistent with the LFR ROD Amendment (USEPA 2007).

5.1 LFR PCB Project COMM Plan

The LFR Cap Operation, Monitoring, and Maintenance Plan (COMMP; Tetra Tech et al. 2019c) describes that an initial post-construction bathymetric surveying of an armored capped area as described in the CQAPP (Year 0) will be followed by long-term COMMP monitoring of the capping area. The long-term monitoring hydrographic surveys will be performed using multi-beam acoustical systems that conform to guidelines following USACE guidance (USACE 2004).

Post-construction hydrographic surveys of the capped area were conducted with Year 0 work in 2019, and Year 3 in 2022, etc. Cap monitoring after 2019 will be coordinated to combine monitoring events as practicable to take place during the same year as other LFR certified cap units. Follow up surveys will adhere to the requirements specified in the COMMP.

The COMMP presents the evaluation and decision framework. Evidence of potential erosion may warrant further evaluation, to be decided in a working group, which may include additional types of monitoring (e.g. coring).

6. SUMMARY

The main objective of the NFA RA was to achieve the LFR OU 2-5 performance standards and, to the extent cost effective, leave the area in a condition that following remediation is environmentally protective. Remediation of the PCB and MGP residuals in soft sediment and clay was performed, to the extent practicable and with consideration given to the stability of adjacent bulkheads and shorelines, and to meet the following objectives and cleanup levels:

- Removal of all soft sediment in the NFA footprint
- Removal of all soft sediment between the containment system and the NFA footprint
- Removal of soft sediment with PAH concentrations above 80 ppm
- Removal of visually identified DNAPL in clay
- Isolation of remaining DNAPL and elevated PAHs in sediment or clay and PCBs greater than the RA level in sediment under an armored cap

The RAWP Addendum (Tetra Tech et al. 2019a) identified target removal elevations to achieve the RAOs. The target removal elevations were based on sediment sampling completed in the NFA in 2017. The RA was completed from March 25 to November 20, 2019.

A review of the post-construction hydrographic surface indicates target removal elevations were achieved, with the exception of high subgrade areas, in accordance with the LFR PCB Project performance metrics (i.e., 90% of the total area excavated to target removal elevations, corrected for high-subgrade from the actual attainment value of 74%), indicating that the RAOs were achieved by the RA. Observations of DNAPL and TPAH13 concentrations in surficial material were documented as a part of post-removal sampling and will be included in the site-wide RI/FS to be completed in 2020.

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TABLES

Table 1. Clay Visual Observations During Excavation

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 USEPA#: WIN000509948

Location/Sample ID	*Date*	*Time*	*Northing*	*Easting*	*Texture*	*Munsell Color*	*Sheening (%)*	*Oil Coating (%)*	*Oil Wetted (%)*	*Visual DNAPL Observations*
GB-NFA-VC-01	7/31/2019	16:39	257552.87	2487629.35	Clay	5YR5/4	0-5%	NA	0-5% in soft sediment	No visual evidence in clay. 0-5% pinhead sized droplets in soft sediment.
GB-NFA-VC-01	8/1/2019	13:27	257559.02	2487633.61	Clay	5YR5/4	0-5%	NA	0-5% in soft sediment	No visual evidence in clay. Oil wetted in soft sediment; pinhead to 2 mm diameter spots.
GB-NFA-VC-02	7/31/2019	16:45	257525.46	2487640.9	Clay	5YR5/4	0-5% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-02	8/1/2019	13:35	257530.03	2487644.98	Soft Sediment & Clay	10YR3/2 & 5YR5/4	0-10% on soft sediment	NA	NA	No visual evidence.
GB-NFA-VC-03	7/31/2019	16:55	257499.13	2487634.85	Clay	5YR5/4	0-5%	NA	0-5% in soft sediment	No visual evidence in clay. Pinhead sized spots in soft sediment.
GB-NFA-VC-03	8/1/2019	13:45	257502.08	2487640.65	Soft Sediment & Clay	5YR5/4	10-15% on soft sediment	NA	5-10% on water	No visual evidence in clay. Pinhead to 3 mm diameter spots on water.
GB-NFA-VC-04	7/31/2019	17:04	257484.91	2487656.07	Clay	5YR5/4	0-5% on soft sediment	NA	0-5% in soft sediment	No visual evidence in clay. Trace pinhead sized spots in soft sediment.
GB-NFA-VC-04	8/1/2019	13:55	257483.27	2487651.61	Clay	5YR5/4	10-15% on surface of clay	NA	0-5% on water; pinhead sized spots	No visual evidence in clay.
GB-NFA-VC-05	7/31/2019	17:12	257450.49	2487666.1	Clay	5YR5/4	0-5% from bucket sampling on water	NA	NA	No visual evidence.
GB-NFA-VC-05	8/1/2019	14:14	257453.24	2487669.53	Soft Sediment & Clay	5YR5/4	10-15% on soft sediment	NA	NA	No visual evidence. Faint odor.
GB-NFA-VC-06	7/31/2019	17:24	257435.95	2487687.89	Clay	5YR5/4	0-5% from bucket sampling on water	NA	NA	No visual evidence in clay. Sheen on water.
GB-NFA-VC-06	8/1/2019	14:25	257432.74	2487684.98	Soft Sediment & Clay	10YR3/2 & 5YR5/4	15-25% on soft sediment	NA	10% in soft sediment	No visual evidence in clay. Pinhead to 2 mm diameter spots in soft sediment.
GB-NFA-VC-07	7/31/2019	17:32	257409.6	2487700.67	Clay	5YR5/4	10-15%	NA	5-10%	Oil wetted in clay fractures; 2 mm to 5 mm spots; faint odor. Sheen in bucket and soft sediment. Not "significant" DNAPL.
GB-NFA-VC-07	8/1/2019	14:35	257407.86	2487696.83	Clay	5YR5/4	NA	NA	5-10% in fractures of clay	Oil wetted in fractures; 2 mm to 5 mm spots; not "significant" DNAPL.
GB-NFA-VC-08	7/31/2019	17:40	257373.31	2487702.13	Clay	5YR5/4	0-10% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-09	7/31/2019	18:00	257354.29	2487728.85	Clay	5YR5/4	0-5% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-10	7/31/2019	14:28	257338.3	2487740.38	Clay	5YR5/4	0-10%	NA	NA	No visual evidence of DNAPL in clay. Sheen on surface.
GB-NFA-VC-11	7/31/2019	14:32	257298.54	2487752.67	Clay	5Y5/4	5-15%	15-20%	25-35%	"Significant" DNAPL "bleeding" from clay and fractures.
GB-NFA-VC-11B	8/1/2019	14:58	257298.33	2487753.45	Clay	5Y5/4	100%	NA	25-35%	"Significant" DNAPL in sand seams and fractures; strong odor.
GB-NFA-VC-11W	8/1/2019	15:08	257302.65	2487749.6	Clay with Sand Seams	5YR5/4	100%	NA	25-35%	"Significant" DNAPL in sand seams; 100% oil wetted in sand seams.

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Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 USEPA#: WIN000509948

Location/Sample ID	*Date*	*Time*	*Northing*	*Easting*	*Texture*	*Munsell Color*	*Sheening (%)*	*Oil Coating (%)*	*Oil Wetted (%)*	*Visual DNAPL Observations*
GB-NFA-VC-11N	8/1/2019	15:19	257293.94	2487757.85	Clay	5YR5/4	100%	NA	10-15% in soft sediment, likely slough	No visual evidence in clay; 2 mm droplets in slough.
GB-NFA-VC-11S	8/1/2019	15:26	257302.98	2487760.48	Soft Sediment & Clay	10YR3/1 & 5YR5/3	100% on soft sediment	NA	10-15% in soft sediment	No visual evidence in clay. Oil wetted in soft sediment; moderate odor.
GB-NFA-VC-11E	8/1/2019	15:38	257295	2487747.82	Clay & soft sediment	10YR3/1 & 5YR5/4	100% on soft sediment	NA	5-10% in trace fractures	Pinhead sized spots in clay fractures; trace sheen.
GB-NFA-VC-11WW	8/1/2019	15:56	257312.04	2487743.79	Clay & soft sediment	10YR3/1 & 5YR5/4	100% on soft sediment	NA	0-5% in soft sediment	No visual evidence in clay.
GB-NFA-VC-11WS[1]	8/1/2019	16:18	257290.57	2487740.44	Clay & soft sediment	5YR5/4	5-10% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-11WN	8/1/2019	16:26	257308.28	2487764.33	Clay & trace soft sediment	5YR5/4	0-5% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-11WB	8/1/2019	16:37	257302.65	2487749.6	Clay	5YR5/4	100% on soft sediment	NA	10-15% in fractures	Pinhead to 3 mm diameter spots; moderate odor; not "significant" DNAPL.
GB-NFA-VC-11WBB	8/1/2019	17:06	257302.65	2487749.6	Clay	5YR5/4	20% on soft sediment and surface of clay	NA	0-5% in fractures	Pinhead to 3 mm diameter spots in fractures; oil wetted; faint odor.
GB-NFA-VC-12	7/31/2019	14:36	257289.91	2487766.31	Clay	5Y5/4	0-10% on soft sediment	NA	0-5% in soft sediment	No visual evidence in clay. Trace oil wetted on surface.
GB-NFA-VC-13	7/31/2019	14:45	257267.93	2487771.24	Clay	5YR5/4	0-5% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-14	7/31/2019	14:50	257244.88	2487784.03	Clay	5YR5/4	10-15% on soft sediment	NA	5-10%	Trace to few "not significant" DNAPL in fractures of clay.
GB-NFA-VC-15	7/31/2019	14:55	257216.6	2487798.08	Clay	5YR5/4	5-10% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-16	7/31/2019	15:02	257196.5	2487810.66	Clay	5YR5/4	0-5% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-17	7/31/2019	15:09	257171.62	2487836.17	Clay	5YR5/4	0-5% on soft sediment	NA	NA	No visual evidence in clay.
GB-NFA-VC-18	7/31/2019	15:15	257144.53	2487849.47	Clay	5YR5/4	0-5% on surface	NA	NA	No visual evidence in clay.
GB-NFA-VC-19	7/31/2019	16:17	257117.57	2487854.67	Clay	5YR5/4; 5YR5/2 in mottling	NA	NA	NA	No visual evidence in clay.
GB-NFA-VC-20	7/31/2019	16:07	257094.72	2487878.06	Clay and Soft Sediment	5YR5/4	0-5% Trace	NA	0-5% in soft sediment	No visual evidence in clay. Trace droplets in soft sediment; pinhead sized spots.
GB-NFA-VC-21	7/31/2019	15:58	257072.23	2487900.78	Clay and Soft Sediment; Trace Wood	5YR5/4	NA	NA	NA	No visual evidence in clay.
GB-NFA-VC-22	7/31/2019	15:53	257053.82	2487892.67	Clay	5YR5/4	NA	NA	NA	No visual evidence in clay.
GB-NFA-VC-23	7/31/2019	15:45	257023.37	2487910.35	Clay	5YR5/4	NA	NA	5-10%	No "significant" DNAPL in clay; oil wetted in trace fractures.

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Location/Sample ID	*Date*	*Time*	*Northing*	*Easting*	*Texture*	*Munsell Color*	*Sheening (%)*	*Oil Coating (%)*	*Oil Wetted (%)*	*Visual DNAPL Observations*
GB-NFA-VC-23	8/2/2019	11:35	257024.34	2487909.91	Clay	10YR5/4	5-10% on soft sediment 0% in clay	NA	0-5% in soft sediment 0-10% in clay fractures	0-10% in fractures; 1-5 mm droplets.
GB-NFA-VC-24	7/31/2019	15:35	257008.58	2487936.93	Clay and Soft Sediment	5YR5/4	0-10% on soft sediment	NA	NA	No visual evidence in clay. Faint to moderate odor.
GB-NFA-VC-24	8/2/2019	11:48	257008.5	2487936.86	Clay	10YR5/4	0% on soft sediment and clay	0-5% in soft sediment on reeds 0% in clay	0% in soft sediments 0% in clay	No visual evidence in clay.
GB-NFA-VC-25	7/31/2019	15:30	256989.69	2487938.27	Clay	5YR5/3	NA	NA	NA	No visual evidence in clay.
GB-NFA-F24	8/1/2019	17:17	257223.86	2487813.68	Soft Sediment & Clay	5YR5/4	NA	NA	35-40% in soft sediment 25-30% in clay	"Significant" DNAPL in soft sediment and clay; oil wetted pinhead to 5 mm diameter spots; strong odor.
GB-NFA-F24B	8/2/2019	09:36	257223.15	2487814.63	Clay with Sand	10YR5/4	30-50% on soft sediment 15-30% on clay	NA	15-30% in fractures and sand only	0-5% in water and pinhead to 3 mm diameter droplets.
GB-NFA-F24BB	8/2/2019	9:50	257223.22	2487814.65	Clay	10YR5/4	30-50% on soft sediment 5-15% on clay	0-5% in clay	10-25% in fractures and sand	Clay matrix 10-20% oil wet; no visual evidence in blocky clay.
GB-NFA-F24E	8/2/2019	10:05	257219.21	2487817.05	Silt and Clay	10YR5/3	50-70% on soft sediment 0-5% in fractures	NA	20-40% in soft sediment 0-5% in clay fractures	Pinhead to 2mm in soft sediment; 0-5% in clay fractures.
GB-NFA-F24W	8/2/2019	10:19	257228.89	2487811.56	Silt with wood & Clay	10YR5/4	15-30% on soft sediment & clay	0-5% on wood 0% in clay	5-10% in sand on wood 10-20% in clay sand seams	10-20% in clay seams.
GB-NFA-F24S	8/2/2019	10:37	257220.45	2487809.64	Clay	10YR5/3	50-100% on soft sediment 5-15% in clay	NA	20-40% in soft sediment 5-20% in clay sand seam	5-20% in sand seam in clay.
GB-NFA-F24N	8/2/2019	10:54	257227.67	2487818.67	Silt & Clay	10YR5/3	5-20% on soft sediment 0-10% on clay	0-10% on reed fractures	0-10% pinhead sized in water 0-5% in clay	Mostly soft sediment. One bucket deeper for more clay.
GB-NFA-F24NB	8/2/2019	11:14	257227.71	2487818.68	Clay	10YR5/3	30-50% on surface 5-15% on soft sediment 5-15% on clay	15-30% in soft sediment 5-15% in clay	5-15% in soft sediment 0% in clay	Oil odor on water; oil coated in fractures; pinhead to 5 mm.
GB-NFA-E36	8/2/2019	12:12	257360.04	2487719.45	Silt & Clay	10YR5/4	5-15% on soft sediment 15-30% on clay parting	NA	5-10% in soft sediments, pinhead to 1 mm 0-5% pin sized in clay	NAPL in water; 0-5% in clay parting.

DNAPL = dense nonaqueous phase liquid; NFA = North Focus Area

Notes:

1. Location adjusted from GB-NFA-VC-11WS due to no recovery from slope and mechanical limitations.
2. Positional locations provided by J.F. Brennan.

Table 2. Chemical Isolation Layer Placement Summary

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 USEPA#: WIN000509948

Date	Activity
15-Aug	Agency approval of CIL installation; spread organoclay
16-Aug	spread organoclay
17-Aug	spread GAC
19-Aug	spread GAC
20-Aug	demob
21-Aug	spread organoclay
22-Aug	Agency approval of placing GAC over organoclay; spread GAC
6-Sep	sheet pile removal for spreader access
9-Sep	Install armor mat, organoclay respread
10-Sep	reactive core mat, organoclay respread-spreader and mechanical
19-Sep	spread GAC
20-Sep	demob
21-Sep	organoclay respread
22-Sep	GAC respread
23-Sep	Demob
2-Oct	Agency accepts results of CIL thickness sampling

Notes:
CIL = Chemical Isolation Layer
GAC = Granular Activated Carbon

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	TPAH(13)[1]	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
			Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag
080919068	GB-NFA-PC-011	0 - 0.5	08/09/2019	0.1975	0.0228 UJ	0.0111 J	0.0070 J	0.0107 J	0.010 J	0.0081 J	0.0086 J	0.0034 J	0.0052 J	0.0095 J	0.0031 U	0.0168 J	0.0057 J	0.0030 U	0.0705 J	0.0175 J	0.0168 J
080919069	GB-NFA-PC-011	0.5 - 1.5	08/09/2019	0.1178	0.0066 U	0.0051 U	0.0044 U	0.0075 U	0.0042 U	0.0033 U	0.0037 U	0.0027 U	0.0033 U	0.0045 U	0.0030 U	0.0069 U	0.0055 U	0.0029 U	0.0829 J	0.0154 U	0.0060 U
080619001	GB-NFA-PC-012	0 - 0.5	08/06/2019	1.4468	0.309	0.240	0.0261	0.128	0.0587	0.0608	0.0555 J	0.0351	0.0256 J	0.0585	0.0086 J	0.134	0.114	0.0277	0.0826	0.322	0.141
080919066	GB-NFA-PC-013	0 - 0.5	08/09/2019	0.1002	0.0068 U	0.0053 U	0.0045 U	0.0078 U	0.0049 J	0.0047 J	0.0041 J	0.0028 U	0.0034 U	0.0046 U	0.0030 U	0.0071 U	0.0056 U	0.0030 U	0.0525 J	0.0159 U	0.0069 J
080919067	GB-NFA-PC-013	0.5 - 1.5	08/09/2019	1.2558	0.104 J	0.0386	0.0091 U	0.0157 U	0.0087 U	0.0069 U	0.0078 U	0.0056 U	0.0069 U	0.0093 U	0.0061 U	0.0143 U	0.0114 U	0.0060 U	1.150 J	0.0320 U	0.0124 U
080619002	GB-NFA-PC-014	0 - 0.5	08/06/2019	7.964	0.828	0.637	0.141	0.403	0.510	0.508	0.585 J	0.211	0.175 J	0.508	0.0560	0.947	0.320	0.178	1.030	1.370	0.830
080619003	GB-NFA-PC-014	0.5 - 1.5	08/06/2019	65.302	1.950	1.260	1.270	3.920	8.150	7.690	13.100 J	3.720	4.930 J	8.240	1.360	4.710	0.782	3.700	3.090	4.040	4.120
080619004	GB-NFA-PC-014	1.5 - 2.5	08/06/2019	64.521	9.750	6.670	0.607	3.940	2.470	1.720	1.890 J	0.851	0.884 J	2.870	0.246 J	6.080	3.180	0.639	14.800	13.700	5.710
080619005	GB-NFA-PC-014	2.5 - 3.5	08/06/2019	454.170	92.300	36.400	3.030 J	19.600	7.390	5.800	4.740 J	2.790	2.380 J	7.430	0.915 U	14.800	14.800	2.110 J	280.000	40.700	17.100
080619006	GB-NFA-PC-014 Dup	2.5 - 3.5	08/06/2019	599.360	111.000	47.000	4.760 J	29.400	11.200	9.270	7.440 J	4.210	3.790 J	11.300	1.000 U	23.400	20.400	3.220 J	344.000	60.700	26.700
080619007	GB-NFA-PC-014	3.5 - 4.2	08/06/2019	2311.400	496.000	257.000	24.800	156.000	58.400	44.900	35.900 J	20.100	17.100 J	56.300	4.820 U	118.000	114.000	15.200 J	975.000	323.000	131.000
080619008	GB-NFA-PC-014	4.2 - 4.7	08/06/2019	22.723	1.660 J	0.401 U	0.340 U	0.590 U	0.327 U	0.259 U	0.292 U	0.210 U	0.259 U	0.348 U	0.231 U	0.538 U	0.427 U	0.227 U	20.000	1.200 U	0.466 U
080919063	GB-NFA-PC-015	0 - 0.7	08/09/2019	2.8175	0.206	0.283	0.0924	0.202	0.182	0.198	0.187 J	0.108	0.0921 J	0.178	0.0257	0.272	0.135	0.0871	0.062 U	0.467	0.275
080919064	GB-NFA-PC-015	0.7 - 1.2	08/09/2019	0.1920	0.0237 UJ	0.0297	0.0047 U	0.0113 J	0.0095 J	0.0074 J	0.0080 J	0.0029 U	0.0037 J	0.0083 J	0.0032 U	0.0178 J	0.0110 J	0.0031 U	0.0398 UJ	0.0298 J	0.0187 J
080919065	GB-NFA-PC-015	1.2 - 2.2	08/09/2019	0.0512	0.0220 UJ	0.0058 J	0.0043 U	0.0075 U	0.0042 U	0.0033 U	0.0037 U	0.0027 U	0.0033 U	0.0044 U	0.0029 U	0.0069 U	0.0055 U	0.0029 U	0.0370 UJ	0.0154 U	0.0059 U
080619009	GB-NFA-PC-016	0 - 0.5	08/06/2019	15.200	0.500	0.502	0.324	0.626	1.290	1.460	1.620 J	0.797	0.670 J	1.290	0.188	2.460	0.360	0.665	0.748	2.080	1.770
080619010	GB-NFA-PC-016	0.5 - 1.5	08/06/2019	3.2059	0.246	0.182	0.0807	0.116	0.197	0.234	0.263 J	0.124	0.0992 J	0.216	0.0314	0.375	0.107	0.106	0.524	0.477	0.335
080619011	GB-NFA-PC-016	1.5 - 2.5	08/06/2019	7.082	0.413	0.274	0.160	0.235	0.533	0.653	0.705 J	0.250	0.312 J	0.571	0.0679	0.892	0.170	0.243	1.000	0.811	0.766
080619012	GB-NFA-PC-016	2.5 - 3.5	08/06/2019	9.542	1.100	0.479	0.291	0.424	0.552	0.708	0.681 J	0.418	0.287 J	0.593	0.0999	0.949	0.276	0.313	2.160	1.280	0.862
080619013	GB-NFA-PC-016	3.5 - 4.5	08/06/2019	10.569	1.310	0.682	0.235	0.475	0.601	0.656	0.663 J	0.415	0.269 J	0.623	0.0925	1.100	0.365	0.315	2.250	1.640	1.010
080619014	GB-NFA-PC-016	4.5 - 5.5	08/06/2019	28.455	3.540	1.630	0.526	1.530	1.280	1.280	1.180 J	0.824	0.568 J	1.340	0.186 J	2.590	0.911	0.616	8.650	4.450	2.520
080619015	GB-NFA-PC-016	5.5 - 6.8	08/06/2019	1680.790	371.000	178.000	7.360 J	85.200	20.000	14.400	11.900 J	6.790 J	5.630 J	20.700	3.020 U	51.700	63.300	5.640 J	994.000	168.000	60.600
080619016	GB-NFA-PC-016 Dup	5.5 - 6.8	08/06/2019	2,263	468.000	218.000	19.200 J	110.000	46.000 J	35.000 J	28.400 J	19.100 J	16.300 J	53.200 J	11.600 U	74.700 J	77.400	14.200 J	1,310	188.000 J	86.800
080619017	GB-NFA-PC-016	6.8 - 7.3	08/06/2019	11.1423	1.810	0.506	0.161 J	0.194 U	0.108 U	0.0854 U	0.0960 U	0.0691 U	0.0853 U	0.115 U	0.0760 U	0.177 U	0.141 U	0.0748 U	9.700	0.396 U	0.153 U
080919061	GB-NFA-PC-017	0 - 0.5	08/09/2019	0.7338	0.0220 UJ	0.0262	0.0147	0.0340	0.0642	0.0548	0.0676 J	0.0166	0.0290 J	0.0523	0.0045 J	0.135	0.0131 J	0.0174	0.0680 J	0.0679	0.107
080919062	GB-NFA-PC-017	0.5 - 1.5	08/09/2019	0.1715	0.0218 UJ	0.0152 J	0.0043 U	0.0127 J	0.0110 J	0.0091 J	0.0104 J	0.0035 J	0.0058 J	0.0097 J	0.0029 U	0.0213 J	0.0065 J	0.0032 J	0.0368 UJ	0.0245 J	0.0174 J
080619018	GB-NFA-PC-018	0 - 0.5	08/06/2019	1.6553	0.111	0.0831	0.0413	0.0912 J	0.110	0.140	0.153 J	0.100	0.0715 J	0.147	0.0211 J	0.261	0.0474 J	0.0756	0.0908 J	0.220	0.199
080619019	GB-NFA-PC-018	0.5 - 1.5	08/06/2019	18.064	0.707	0.346 J	0.774	0.786	1.840	1.720	1.930 J	0.963	0.601 J	1.990	0.293	2.630	0.307	0.706	1.000	1.610	2.530 J
080619020	GB-NFA-PC-018	1.5 - 2.5	08/06/2019	9.885	0.578	0.251	0.197	0.390	0.709	0.765	0.904 J	0.486	0.344 J	0.793	0.120	1.500	0.192	0.407	1.630	1.070	1.140
080619021	GB-NFA-PC-018	2.5 - 3.5	08/06/2019	29.882	2.780	2.160	0.563	1.540	1.710	1.730	1.840 J	1.020	0.519 J	1.680	0.233	3.470	1.110	0.785	5.090	5.240	3.230
080619022	GB-NFA-PC-018	3.5 - 4.5	08/06/2019	14.468	1.620	1.020	0.239	0.847	0.791	0.800	0.800 J	0.442	0.307 J	0.752	0.107	1.640	0.522	0.336	2.700	2.500	1.550
080619023	GB-NFA-PC-018	4.5 - 5.5	08/06/2019	4.684	0.236	0.202	0.126	0.215	0.343	0.479	0.497 J	0.256	0.167 J	0.359	0.0676	0.567	0.129	0.207	0.502	0.587	0.511
080619024	GB-NFA-PC-018	5.5 - 6.5	08/06/2019	10.513	0.872	0.416	0.230	0.475	0.762	0.808	0.946 J	0.532	0.347 J	0.816	0.116	1.450	0.283	0.370	1.600	1.270	1.110
080619025	GB-NFA-PC-018	6.5 - 7.5	08/06/2019	178.570	22.400	11.600	2.340	12.600	7.510	6.350	5.820 J	3.620	2.660 J	6.900	0.737 J	15.300	6.090	2.710	56.300	29.500	15.600
080619026	GB-NFA-PC-018	7.5 - 8	08/06/2019	168.720	31.400	12.900	1.820 J	7.790	4.750	4.290	3.730 J	2.320	2.040 J	5.340	0.533 J	7.440	6.040	1.770	87.300	16.200	9.080
080619027	GB-NFA-PC-018	8 - 8.5	08/06/2019	985.760	210.000	98.400	32.100	51.300	18.700	14.100	10.800 J	5.910 J	7.360 J	22.400	2.410 U	44.600	52.300	4.110 J	449.000	128.000	56.700
080619028	GB-NFA-PC-018 Dup	8 - 8.5	08/06/2019	515.940	118.000	56.700	14.600	21.900	8.030	5.820	4.960 J	2.360 J	2.870 J	9.760	1.210 U	21.000	29.000	1.680 J	251.000	67.600	22.700
080819059	GB-NFA-PC-019	0 - 0.5	08/08/2019	0.0617	0.0216 UJ	0.0050 U	0.0043 U	0.0074 U	0.0041 U	0.0032 U	0.0036 U	0.0026 U	0.0032 U	0.0044 U	0.0029 U	0.0067 U	0.0053 U	0.0028 U	0.0363 UJ	0.0151 U	0.0058 U
080819060	GB-NFA-PC-019	0.5 - 1.5	08/08/2019	0.0670	0.0218 UJ	0.0060 J	0.0043 U	0.0075 U	0.0041 U	0.0033 U	0.0037 U	0.0027 U	0.0033 U	0.0044 U	0.0029 U	0.0068 U	0.0054 U	0.0029 U	0.0367 UJ	0.0152 U	0.0059 U
080719029	GB-NFA-PC-020	0 - 0.5	08/07/2019	72.730	8.050	5.240	1.160	4.120	3.090	3.130	3.190 J	2.030	1.260 J	2.910	0.416	7.730	2.460	1.450	19.300	12.400	6.740
080719030	GB-NFA-PC-020	0.5 - 1.5	08/07/2019	208.820	26.600	17.600	2.290	13.600	9.550	8.920	9.170 J	4.950	4.020 J	9.970	1.100 J	21.600	8.700	4.060	47.300	35.800	20.300

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	TPAH(13)[1]	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(e)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
			Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag
080719031	GB-NFA-PC-020	1.5 - 2.5	08/07/2019	153.320	27.100	10.900	1.020 J	6.070	2.890	2.500	2.500 J	1.530 J	1.430 J	3.550	0.510 U	6.480	4.270	1.140 J	91.600	13.600	6.510
080719032	GB-NFA-PC-020	2.5 - 3.5	08/07/2019	2596.5000	669.000	278.000	20.600	131.000	41.200	29.400	24.200 J	12.800	14.200 J	47.300	3.810 U	90.600	118.000	9.810 J	1,380	295.000	127.000
080719033	GB-NFA-PC-020 Dup	2.5 - 3.5	08/07/2019	990.500	238.000	88.500	4.630 J	42.500	9.700 J	5.770 J	5.420 J	2.760 J	3.380 J	12.300 J	2.600 U	25.000	36.700	2.560 U	642.000	85.700	28.900
080719034	GB-NFA-PC-020	3.5 - 4.5	08/07/2019	4825.2000	1,080	472.000	125.000	196.000	80.800	59.500	38.400 J	16.600 J	41.500 J	85.000	8.180 U	191.000	264.000	13.200 J	2,440	618.000	214.000
080719035	GB-NFA-PC-020	4.5 - 5	08/07/2019	156.330	37.800	14.200	3.080	8.230	2.320	1.610 J	1.630 J	0.879 J	1.040 J	3.230	0.474 U	5.710	6.240	0.762 J	87.500	15.000	6.540
080819056	GB-NFA-PC-021	0 - 0.5	08/08/2019	0.0802	0.0221 UJ	0.0060 J	0.0044 U	0.0076 U	0.0042 U	0.0033 U	0.0037 U	0.0027 U	0.0033 U	0.0045 U	0.0030 U	0.0069 U	0.0055 U	0.0029 U	0.0418 J	0.0154 U	0.0060 U
080819057	GB-NFA-PC-021	0.5 - 1.5	08/08/2019	0.0466	0.0065 U	0.0051 U	0.0043 U	0.0075 U	0.0041 U	0.0033 U	0.0037 U	0.0027 U	0.0033 U	0.0044 U	0.0029 U	0.0068 U	0.0054 U	0.0029 U	0.0368 UJ	0.0152 U	0.0059 U
080819058	GB-NFA-PC-021 Dup	0.5 - 1.5	08/08/2019	0.0154 U	0.0066 U	0.0051 U	0.0044 U	0.0075 U	0.0042 U	0.0033 U	0.0037 U	0.0027 U	0.0033 U	0.0045 U	0.0030 U	0.0069 U	0.0055 U	0.0029 U	0.0111 U	0.0154 U	0.0060 U
080719036	GB-NFA-PC-022	0 - 0.5	08/07/2019	72.620	11.100	7.930	1.260	4.530	2.990	2.630	2.390 J	1.440	1.130 J	2.690	0.319	6.120	3.560	1.140	18.800	12.200	6.390
080719037	GB-NFA-PC-022	0.5 - 1.5	08/07/2019	5033.1000	1,080	646.000	53.900	290.000	133.000	106.000	82.700 J	43.400	36.500 J	127.000	8.340 J	279.000	284.000	33.400	1,830	828.000	337.000
080719038	GB-NFA-PC-022	1.5 - 2.5	08/07/2019	6595.9000	1,480	745.000	46.500 J	358.000	103.000	68.300	58.700 J	22.900 J	30.400 J	109.000	10.300 U	261.000	284.000	19.200 J	3,480	763.000	289.000
080719039	GB-NFA-PC-022	2.5 - 3	08/07/2019	186.460	37.900	18.700 J	3.070	11.300	3.380	2.310	2.070 J	0.546 U	1.070 J	3.290	0.601 U	7.440	8.140	0.591 U	93.500	23.700	8.490 J
080819054	GB-NFA-PC-023	0 - 0.5	08/08/2019	1.2964	0.0532 J	0.0597	0.0182	0.102	0.0943	0.0932	0.0985 J	0.0599	0.0407 J	0.0869	0.0142	0.211	0.0360	0.0500	0.0989 J	0.202	0.155
080819055	GB-NFA-PC-023	0.5 - 1.5	08/08/2019	0.0149 U	0.0064 U	0.0050 U	0.0042 U	0.0073 U	0.0041 U	0.0032 U	0.0036 U	0.0026 U	0.0032 U	0.0043 U	0.0029 U	0.0067 U	0.0053 U	0.0028 U	0.0108 U	0.0149 U	0.0058 U
080719040	GB-NFA-PC-024	0 - 0.5	08/07/2019	487.190	102.000	50.300	8.380	27.000	11.700	9.330	8.240 J	3.360	3.640 J	12.100	1.020 U	23.900	22.000	2.740 J	223.000	60.100	27.500
080719041	GB-NFA-PC-024	0.5 - 0.9	08/07/2019	2563.2000	565.000	259.000	47.800	114.000	48.800	32.500 J	31.300 J	14.200 J	15.400 J	57.400	9.500 U	114.000	138.000	10.300 J	1,250	333.000	122.000
080719042	GB-NFA-PC-024	0.9 - 1.4	08/07/2019	199.170	40.800	20.300	2.930	11.500	3.520	2.360	2.070 J	0.960 J	1.050 J	4.140	0.568 U	8.500	7.750	0.739 J	103.000	22.600	9.450
080819052	GB-NFA-PC-025	0 - 0.5	08/08/2019	14.677	0.664	0.814	0.202	0.749	1.150	1.210	1.300 J	0.763	0.553 J	1.020	0.157	2.280	0.479	0.634	1.100 J	2.060	1.760
080819053	GB-NFA-PC-025	0.5 - 1.5	08/08/2019	0.6388	0.0590 J	0.0536	0.0080 J	0.0376	0.0368	0.0364	0.0356 J	0.0266	0.0171 J	0.0359	0.0046 J	0.0913	0.0260	0.0194	0.0878 J	0.101	0.0717
080719043	GB-NFA-PC-026	0 - 0.7	08/07/2019	1109.850	261.000	114.000	10.500	54.900	17.400	12.500	10.500 J	5.930	5.050 J	18.900	1.800 U	39.200	47.400	4.540 J	615.000	121.000	43.500
080719044	GB-NFA-PC-026	0.7 - 1.2	08/07/2019	23.670	3.210	1.090 J	0.222 U	0.629 J	0.248 J	0.170 U	0.191 U	0.137 U	0.169 U	0.228 U	0.151 U	0.385 J	0.367 J	0.148 U	19.000	1.050 J	0.411 J
080819050	GB-NFA-PC-027	0 - 0.5	08/08/2019	6.0738	1.100	0.705	0.0783	0.348	0.211	0.201	0.167 J	0.120	0.0865 J	0.194	0.0248	0.433	0.296	0.0934	1.930	0.946	0.478
080819051	GB-NFA-PC-027	0.5 - 1.5	08/08/2019	1.7221	0.224	0.177 J	0.0262	0.135	0.0735	0.0779	0.0676 J	0.0500	0.0299 J	0.0742	0.0111	0.158	0.0798	0.0406	0.038 U	0.301	0.155 J
080719045	GB-NFA-PC-028	0 - 0.5	08/07/2019	1.8482	0.356	0.118	0.0239 J	0.0603 J	0.0169 U	0.0134 U	0.0151 U	0.0108 U	0.0134 U	0.0180 U	0.0119 U	0.0278 U	0.0430 J	0.0117 U	1.420	0.103 J	0.0277 J
080719046	GB-NFA-PC-028 Dup	0 - 0.5	08/07/2019	7.2992	1.460	0.626	0.0842 J	0.287	0.0806 J	0.0465 J	0.0400 J	0.0268 U	0.0331 U	0.0934 J	0.0295 U	0.170 J	0.246	0.0290 U	4.850	0.550	0.209
080719047	GB-NFA-PC-029	0 - 0.9	08/07/2019	11.760	1.040	1.260	0.224	0.899	0.671	0.719	0.655 J	0.385	0.345 J	0.628	0.0810	1.400	0.584	0.325	0.865	2.190	1.320
080719048	GB-NFA-PC-029	0.9 - 1.4	08/07/2019	1.1213	0.0916	0.108	0.0142 J	0.0955	0.0619	0.0540	0.0529 J	0.0299	0.0257 J	0.0657	0.0076 J	0.140	0.0514	0.0239	0.103	0.209	0.140
080719049	GB-NFA-PC-029	1.4 - 2.4	08/07/2019	0.1121	0.0145 J	0.0133 J	0.0043 U	0.0093 J	0.0046 J	0.0035 J	0.0038 J	0.0027 U	0.0033 U	0.0044 U	0.0029 U	0.0074 J	0.0054 U	0.0029 U	0.0357 J	0.0191 J	0.0067 J

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	TPAH(13)[1]	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(e)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
			Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag	Result Flag
Total Number of Samples Analyzed:				69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Number of Detections:				67	56	62	54	57	57	56	56	51	53	54	32	56	56	49	59	57	58
Min:				0.0466	0.0145	0.0058	0.007	0.0093	0.0046	0.0035	0.0038	0.0034	0.0037	0.0083	0.0045	0.0074	0.0057	0.0032	0.0357	0.0175	0.0067
Max:				6,596	1,480	745	125	358	133	106	82.7	43.4	41.5	127	8.34	279	284	33.4	3,480	828	337

Notes:
Sorted by 9-digit Code

-- = Analysis not performed
% = percent
Dup = Quality Control Field Duplicate Sample
GEO = Geotechnical Property
J = Estimated concentration
mg/kg = milligrams per kilogram
MGP = Manufactured Gas Plant
PAH = Polycyclic Aromatic Hydrocarbon
PVOC = Petroleum Volatile Organic Compound
TPAH = Total PAHs
U = Concentration was not detected above the reported limit

1. The following rules apply to the summation of Total PAH (13) calculated by OBG, Part of Ramboll:
   a. Where no detections were observed, the maximum individual reported detection limit is presented.
   b. Where detections were observed, ½ the reported detection limit for non-detects was used in the summation.
   c. The list of Total PAH (13) is as follows: Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Fluoranthene, Fluorene, Naphthalene, Phenanthrene and Pyrene.

Lab comments and definitions can be found in associated laboratory reports.

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				PVOC		PVOC		PVOC		PVOC		PVOC		PVOC		PVOC		Phenol		Phenol		Phenol		Phenol		Inorganic		Inorganic		Inorganic	
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	1,2,4-Trimethylbenzene		1,3,5-Trimethylbenzene		Benzene		Ethylbenzene		Toluene		Xylene, o		Xylenes, m + p		Xylenes, Total		2,4-Dimethylphenol		2-Methylphenol		3 & 4-Methylphenol		Phenol		Nitrogen, Ammonia, Total		Nitrogen, Kjeldahl, Total		Phosphorus, Total	
			Reporting Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
				Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
080919068	GB-NFA-PC-011	0 - 0.5	08/09/2019	0.173		0.0489	J	0.0857		0.927		0.0250	U	0.187		0.143	J	0.330		0.0450	U	0.0413	U	0.0417	U	0.0540	U	--		--		--	
080919069	GB-NFA-PC-011	0.5 - 1.5	08/09/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0436	UR	0.0400	U	0.0404	U	0.0523	UR	--		--		--	
080619001	GB-NFA-PC-012	0 - 0.5	08/06/2019	1.650		0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0458	U	0.0421	U	0.0424	U	0.0550	U	--		--		--	
080919066	GB-NFA-PC-013	0 - 0.5	08/09/2019	0.0857		0.0250	U	0.127		0.478		0.0250	U	0.201		0.0827	J	0.284		0.0449	U	0.0413	U	0.0416	U	0.0539	U	--		--		--	
080919067	GB-NFA-PC-013	0.5 - 1.5	08/09/2019	1.240		0.324	J	0.160	J	2.410		0.100	U	0.608		0.200	U	0.781	J	0.0453	U	0.0416	U	0.0420	U	0.0544	U	--		--		--	
080619002	GB-NFA-PC-014	0 - 0.5	08/06/2019	8.910		2.980		0.0532	U	0.0532	U	0.0532	U	0.0532	U	0.231	J	0.322	J	0.317	U	0.291	U	0.294	U	0.380	U	--		--		--	
080619003	GB-NFA-PC-014	0.5 - 1.5	08/06/2019	10.200		2.580		0.0250	U	0.0250	U	0.0250	U	0.121	J	0.128	J	0.249	J	0.744	U	0.683	U	0.689	U	0.893	U	--		--		--	
080619004	GB-NFA-PC-014	1.5 - 2.5	08/06/2019	16.900		5.830		1.810		0.563		0.0510	U	0.435		0.425	J	0.860		0.712	J	0.271	U	0.273	U	0.354	U	--		--		--	
080619005	GB-NFA-PC-014	2.5 - 3.5	08/06/2019	9.510		3.420		15.900		34.700		0.500	U	9.970		19.700		29.700		2.030	U	1.860	U	1.880	U	2.440	U	--		--		--	
080619006	GB-NFA-PC-014 Dup	2.5 - 3.5	08/06/2019	8.570		2.760	J	15.600		32.300		0.526	U	9.550		18.100		27.600		2.210	U	2.030	U	2.050	U	2.650	U	--		--		--	
080619007	GB-NFA-PC-014	3.5 - 4.2	08/06/2019	27.200		8.280	J	11.800	J	55.800		5.000	U	16.100	J	37.300		53.400		3.790	U	3.480	U	3.510	U	4.540	U	--		--		--	
080619008	GB-NFA-PC-014	4.2 - 4.7	08/06/2019	2.790	J	1.000	U	6.420		13.200		1.720	J	3.490		7.200		10.700		0.170	U	0.157	U	0.158	U	0.205	U	--		--		--	
080919063	GB-NFA-PC-015	0 - 0.7	08/09/2019	0.0250	U	0.0250	U	0.0250	U	0.142		0.0885	J	0.0250	U	0.0500	U	0.0750	U	0.0731	U	0.0672	U	0.132	J	0.0877	U	--		--		--	
080919064	GB-NFA-PC-015	0.7 - 1.2	08/09/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0467	U	0.0429	U	0.0433	U	0.0561	U	--		--		--	
080919065	GB-NFA-PC-015	1.2 - 2.2	08/09/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0434	U	0.0399	U	0.0402	U	0.0521	U	--		--		--	
080619009	GB-NFA-PC-016	0 - 0.5	08/06/2019	3.050		0.781		0.0342	U	0.0342	U	0.130	J	0.113	J	0.0685	U	0.103	U	0.0899	U	0.0826	U	0.130	J	0.108	U	--		--		--	
080619010	GB-NFA-PC-016	0.5 - 1.5	08/06/2019	1.330		0.196		0.0250	U	0.0693	J	0.306		0.0772	J	0.0500	U	0.0750	U	0.0779	UJ	0.0715	U	0.296		0.0935	U	--		--		--	
080619011	GB-NFA-PC-016	1.5 - 2.5	08/06/2019	1.990		0.103	J	0.0301	U	0.0301	U	0.163		0.0301	U	0.0602	U	0.0904	U	0.179	J	0.0603	U	1.000		0.0904	J	--		--		--	
080619012	GB-NFA-PC-016	2.5 - 3.5	08/06/2019	5.750		2.150		0.150	J	0.106	J	0.114	J	0.114	J	0.0568	U	0.242	J	0.462	J	0.219	U	0.541	J	0.287	U	--		--		--	
080619013	GB-NFA-PC-016	3.5 - 4.5	08/06/2019	3.430		1.910		0.537		0.524		0.0722	J	0.223		0.381		0.604		0.226	U	0.207	U	0.256	J	0.271	U	--		--		--	
080619014	GB-NFA-PC-016	4.5 - 5.5	08/06/2019	4.460		1.720		0.594		3.860		0.0844	J	1.340		2.200		3.540		0.231	U	0.212	U	0.247	J	0.277	U	--		--		--	
080619015	GB-NFA-PC-016	5.5 - 6.8	08/06/2019	25.500	J	8.360	J	21.100	J	89.100	J	15.800		23.700	J	53.100	J	76.800	J	5.570	U	5.120	U	5.160	U	6.680	U	--		--		--	
080619016	GB-NFA-PC-016 Dup	5.5 - 6.8	08/06/2019	11.200	J	3.890	J	12.000	J	46.500	J	3.080	J	11.600	J	27.400	J	39.100	J	5.350	U	4.910	U	4.950	U	6.420	U	--		--		--	
080619017	GB-NFA-PC-016	6.8 - 7.3	08/06/2019	1.410	J	0.500	U	3.620		5.510		2.780		1.550	J	3.190	J	4.730	J	0.180	U	0.165	U	0.166	U	0.215	U	--		--		--	
080919061	GB-NFA-PC-017	0 - 0.5	08/09/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0435	U	0.0400	U	0.0403	U	0.0522	U	--		--		--	
080919062	GB-NFA-PC-017	0.5 - 1.5	08/09/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0433	U	0.0398	U	0.0401	U	0.0519	U	--		--		--	
080619018	GB-NFA-PC-018	0 - 0.5	08/06/2019	0.193		0.0291	U	0.0291	U	0.0601	J	0.0760	J	0.0291	U	0.0581	U	0.0872	U	0.0598	U	0.0550	U	0.0554	U	0.0718	U	--		--		--	
080619019	GB-NFA-PC-018	0.5 - 1.5	08/06/2019	0.605		0.0258	U	0.0258	U	0.115	J	0.0565	J	0.0898	J	0.0515	U	0.0773	U	0.0693	U	0.0637	U	0.259		0.0832	U	--		--		--	
080619020	GB-NFA-PC-018	1.5 - 2.5	08/06/2019	0.768		0.0255	U	0.0255	U	0.0547	J	0.125		0.0531	J	0.0510	U	0.0765	U	0.0576	U	0.0530	U	0.183		0.0692	U	--		--		--	
080619021	GB-NFA-PC-018	2.5 - 3.5	08/06/2019	2.100		0.116	J	0.128		0.132		0.0812	J	0.0725	J	0.0500	U	0.0750	U	0.204	U	0.187	U	0.253	J	0.245	U	--		--		--	
080619022	GB-NFA-PC-018	3.5 - 4.5	08/06/2019	1.730		0.765		1.160		0.248		0.0709	J	0.187		0.175	J	0.362	J	0.101	J	0.0614	U	0.297		0.0802	U	--		--		--	
080619023	GB-NFA-PC-018	4.5 - 5.5	08/06/2019	0.579		0.0705	J	0.0250	U	0.0496	J	0.0882	J	0.0250	U	0.0500	U	0.0750	U	0.0614	U	0.0564	U	0.125	J	0.0737	U	--		--		--	
080619024	GB-NFA-PC-018	5.5 - 6.5	08/06/2019	1.010		0.0579	J	0.0250	U	0.0544	J	0.0939	J	0.0250	U	0.0500	U	0.0750	U	0.0673	U	0.0618	U	0.164	J	0.0808	U	--		--		--	
080619025	GB-NFA-PC-018	6.5 - 7.5	08/06/2019	1.630		0.628		7.880		2.280		0.130	U	0.785		1.340		2.120		0.173	U	0.159	U	0.329	J	0.207	U	--		--		--	
080619026	GB-NFA-PC-018	7.5 - 8	08/06/2019	3.280		1.300	J	19.700		9.770		0.250	U	3.060		4.980		8.040		0.224	U	0.205	U	0.207	U	0.268	U	--		--		--	
080619027	GB-NFA-PC-018	8 - 8.5	08/06/2019	7.190		3.640	J	16.700		23.800		17.000		6.170		14.600		20.800		2.230	U	2.050	U	2.060	U	2.670	U	--		--		--	
080619028	GB-NFA-PC-018 Dup	8 - 8.5	08/06/2019	9.180		4.180	J	16.900		28.100		19.000		7.490		17.500		25.000		0.897	U	0.824	U	0.831	U	1.080	U	--		--		--	
080819059	GB-NFA-PC-019	0 - 0.5	08/08/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0427	U	0.0393	U	0.0396	U	0.0513	U	--		--		--	
080819060	GB-NFA-PC-019	0.5 - 1.5	08/08/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0432	U	0.0397	U	0.0401	U	0.0519	U	--		--		--	
080719029	GB-NFA-PC-020	0 - 0.5	08/07/2019	2.570		0.0532	J	15.300		3.130		0.0583	J	0.186		0.431		0.617		0.209	U	0.192	U	0.194	U	0.251	U	--		--		--	
080719030	GB-NFA-PC-020	0.5 - 1.5	08/07/2019	2.100		0.200	U	16.000		5.380		0.200	U	0.200	U	0.845	J	0.600	U	0.190	U	0.175	U	0.225	J	0.228	U	--		--		--	

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				PVOC		PVOC		PVOC		PVOC		PVOC		PVOC		PVOC		Phenol		Phenol		Phenol		Phenol		Inorganic		Inorganic		Inorganic	
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	1,2,4-Trimethylbenzene		1,3,5-Trimethylbenzene		Benzene		Ethylbenzene		Toluene		Xylene, o		Xylenes, m + p		Xylenes, Total		2,4-Dimethylphenol		2-Methylphenol		3 & 4-Methylphenol		Phenol		Nitrogen, Ammonia, Total		Nitrogen, Kjeldahl, Total		Phosphorus, Total	
			Reporting Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
				Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
080719031	GB-NFA-PC-020	1.5 - 2.5	08/07/2019	2.830		0.915	J	16.200		10.900		0.312	U	2.620		6.230		8.850		0.753	U	0.692	U	0.698	U	0.904	U	--		--		--	
080719032	GB-NFA-PC-020	2.5 - 3.5	08/07/2019	15.200		5.030		68.600		64.900		8.020		16.900		40.600		57.500		2.640	J	2.070	U	2.080	U	2.700	U	--		--		--	
080719033	GB-NFA-PC-020 Dup	2.5 - 3.5	08/07/2019	11.400		4.100	J	50.900		49.900		3.320	J	13.200		30.200		43.500		4.790	U	4.400	U	4.430	U	5.740	U	--		--		--	
080719034	GB-NFA-PC-020	3.5 - 4.5	08/07/2019	62.300		20.400	J	143.000		242.000		213.000		60.700		149.000		209.000		7.460	J	4.190	U	18.800		5.470	U	--		--		--	
080719035	GB-NFA-PC-020	4.5 - 5	08/07/2019	4.930		1.760	J	15.900		18.700		20.500		4.970		10.700		15.700		0.352		0.136	J	0.963		0.143	J	--		--		--	
080819056	GB-NFA-PC-021	0 - 0.5	08/08/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0437	U	0.0402	U	0.0405	U	0.0525	U	--		--		--	
080819057	GB-NFA-PC-021	0.5 - 1.5	08/08/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0432	U	0.0397	U	0.0400	U	0.0518	U	--		--		--	
080819058	GB-NFA-PC-021 Dup	0.5 - 1.5	08/08/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0435	U	0.0400	U	0.0403	U	0.0522	U	--		--		--	
080719036	GB-NFA-PC-022	0 - 0.5	08/07/2019	2.780		0.351	U	16.000		5.460		0.909	J	0.744	J	1.810	J	2.550	J	0.104	J	0.0624	U	0.249		0.0932	J	--		--		--	
080719037	GB-NFA-PC-022	0.5 - 1.5	08/07/2019	25.700		8.490	J	45.000		78.100		19.300		19.700		44.300		64.000		5.230	U	4.810	U	4.850	U	6.280	U	--		--		--	
080719038	GB-NFA-PC-022	1.5 - 2.5	08/07/2019	53.800		16.300	J	119.000		209.000		153.000		59.800		123.000		183.000		7.620	U	7.010	U	15.700	J	9.150	U	--		--		--	
080719039	GB-NFA-PC-022	2.5 - 3	08/07/2019	7.510		2.300	J	16.800		23.100		21.100		6.300		14.600		20.900		0.887	U	0.815	U	0.985	J	1.060	U	--		--		--	
080819054	GB-NFA-PC-023	0 - 0.5	08/08/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0431	U	0.0396	U	0.0399	U	0.0517	U	--		--		--	
080819055	GB-NFA-PC-023	0.5 - 1.5	08/08/2019	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0422	U	0.0388	U	0.0391	U	0.0506	U	--		--		--	
080719040	GB-NFA-PC-024	0 - 0.5	08/07/2019	3.530		0.625	U	7.690		8.390		6.700		1.770	J	4.410	J	6.180	J	0.379	U	0.349	U	0.352	U	0.455	U	--		--		--	
080719041	GB-NFA-PC-024	0.5 - 0.9	08/07/2019	37.500		6.310	U	79.100		131.000		120.000		35.200		82.700		118.000		4.210	U	3.870	U	3.900	U	5.050	U	--		--		--	
080719042	GB-NFA-PC-024	0.9 - 1.4	08/07/2019	3.840		1.250	U	15.700		14.000		15.900		3.720	J	9.090		12.800		0.350		0.179	J	0.398		0.284	J	--		--		--	
080819052	GB-NFA-PC-025	0 - 0.5	08/08/2019	0.239		0.0250	U	0.0250	U	0.170		0.0462	J	0.0444	J	0.0983	J	0.143	J	0.0464	U	0.0426	U	0.0793	J	0.0557	U	--		--		--	
080819053	GB-NFA-PC-025	0.5 - 1.5	08/08/2019	0.0250	U	0.0250	U	0.0348	J	0.0250	U	0.0250	U	0.0250	U	0.0500	U	0.0750	U	0.0419	U	0.0385	U	0.0389	U	0.0503	U	--		--		--	
080719043	GB-NFA-PC-026	0 - 0.7	08/07/2019	14.500		3.120	U	34.400		49.000		30.900		14.800		30.000		44.800		3.210	U	2.950	U	2.970	U	3.850	U	--		--		--	
080719044	GB-NFA-PC-026	0.7 - 1.2	08/07/2019	5.060		1.830	J	13.500		19.700		9.730		5.620		12.400		18.000		0.133	U	0.123	U	0.124	U	0.201	J	--		--		--	
080819050	GB-NFA-PC-027	0 - 0.5	08/08/2019	0.447		0.122		0.0586	J	0.137		0.0250	U	0.0343	J	0.0500	U	0.0750	U	0.0452	U	0.0415	U	0.0419	U	0.0542	U	--		--		--	
080819051	GB-NFA-PC-027	0.5 - 1.5	08/08/2019	0.107		0.0411	J	0.129		0.275		0.0250	U	0.0536	J	0.0500	U	0.104	J	0.0892	U	0.0820	U	0.0827	U	0.107	U	--		--		--	
080719045	GB-NFA-PC-028	0 - 0.5	08/07/2019	3.370	J	1.250	U	8.260		12.300		7.130		2.720	J	7.900	J	10.600	J	0.0440	U	0.0405	U	0.0408	U	0.0634	J	--		--		--	
080719046	GB-NFA-PC-028 Dup	0 - 0.5	08/07/2019	3.080	J	1.000	U	7.890		11.000		7.120		3.060	J	7.000		10.100		0.0435	U	0.0400	U	0.0404	U	0.0523	J	--		--		--	
080719047	GB-NFA-PC-029	0 - 0.9	08/07/2019	0.303	J	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.250	U	0.375	U	0.176	U	0.162	U	0.163	U	0.212	U	--		--		--	
080719048	GB-NFA-PC-029	0.9 - 1.4	08/07/2019	0.488		0.179	J	1.950		1.980		1.230		0.577		1.300		1.880		0.0444	U	0.0408	U	0.0411	U	0.0533	U	--		--		--	
080719049	GB-NFA-PC-029	1.4 - 2.4	08/07/2019	0.0650	J	0.0250	U	0.141	J	0.207		0.119		0.0525	J	0.138	J	0.191	J	0.0434	U	0.0399	U	0.0402	U	0.0521	U	--		--		--	

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				PVOC		PVOC		PVOC		PVOC		PVOC		PVOC		Phenol		Phenol		Phenol		Inorganic		Inorganic		Inorganic	
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	1,2,4-Trimethylbenzene		1,3,5-Trimethylbenzene		Benzene		Ethylbenzene		Toluene		Xylene, o		Xylenes, m + p		Xylenes, Total		2,4-Dimethylphenol		2-Methylphenol		3 & 4-Methylphenol		Phenol		Nitrogen, Ammonia, Total		Nitrogen, Kjeldahl, Total		Phosphorus, Total	
			Reporting Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
				Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Total Number of Samples Analyzed:				69		69		69		69		69		69		69		69		68		69		69		68		--		--		--	
Number of Detections:				55		37		43		50		39		47		40		42		9		2		22		7		--		--		--	
Min:				0.065		0.0411		0.0348		0.0496		0.0462		0.0343		0.0827		0.104		0.101		0.136		0.0793		0.0523		--		--		--	
Max:				62.3		20.4		143		242		213		60.7		149		209		7.46		0.179		18.8		0.284		--		--		--	

Notes:
Sorted by 9-digit Code

-- = Analysis not performed
% = percent
Dup = Quality Control Field Duplicate Sample
GEO = Geotechnical Property
J = Estimated concentration
mg/kg = milligrams per kilogram
MGP = Manufactured Gas Plant
PAH = Polycyclic Aromatic Hydrocarbon
PVOC = Petroleum Volatile Organic Compound
TPAH = Total PAHs
U = Concentration was not detected above the reported limit

1. The following rules apply to the summation of Total PAH (13) calculated by OBG, Part of Ramboll:
   a. Where no detections were observed, the maximum individual reported detection limit is presented.
   b. Where detections were observed, ½ the reported detection limit for non-detects was used in the summation.
   c. The list of Total PAH (13) is as follows: Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Fluoranthene, Fluorene, Naphthalene, Phenanthrene and Pyrene.

Lab comments and definitions can be found in associated laboratory reports.

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Cyanide		GEO	
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	Aluminum, Total		Antimony, Total		Arsenic, Total		Barium, Total		Cadmium, Total		Chromium, Total		Copper, Total		Iron, Total		Lead, Total		Manganese, Total		Mercury, Total		Nickel, Total		Selenium, Total		Silver, Total		Vanadium, Total		Zinc, Total		Cyanide, Total		Percent Moisture	
			Reporting Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		%	
				Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
080919068	GB-NFA-PC-011	0 - 0.5	08/09/2019	17,800		0.22	U	3.9		101		0.13	U	34.0		28.6		22,900		9.7		413		0.026	J	28.4		2.5		0.12	U	44.3		48.6		0.087	U	26.5	
080919069	GB-NFA-PC-011	0.5 - 1.5	08/09/2019	18,400		0.20	U	4.3		114		0.12	U	34.1		28.7		23,500		7.3		427		0.027	J	29.9		2.7		0.11	U	46.2		45.4		0.13	U	24.3	
080619001	GB-NFA-PC-012	0 - 0.5	08/06/2019	15,000		0.30	J	4.2		86.4		0.25	J	31.4		33.4		23,000		19.2		398		0.080		26.5		1.2		0.15	J	41.4		57.4		0.47	J-	27.9	
080919066	GB-NFA-PC-013	0 - 0.5	08/09/2019	19,600		0.22	U	4.4		134		0.13	U	36.6		30.6		25,200		7.6		443		0.030	J	31.2		2.6		0.13	U	48.2		47.5		0.11	J	26.5	
080919067	GB-NFA-PC-013	0.5 - 1.5	08/09/2019	19,500		0.22	U	4.2		135		0.13	U	36.2		30.3		25,300		7.6		446		0.035	J	31.3		2.5		0.13	U	47.3		47.8		0.12	U	27.1	
080619002	GB-NFA-PC-014	0 - 0.5	08/06/2019	14,400		10.2		6.2		198		1.1	J	127		150		18,000		1,550		191		2.1		20.5		2.5		0.63		27.9		301		1.7	J	47.9	
080619003	GB-NFA-PC-014	0.5 - 1.5	08/06/2019	13,500		4.2		6.4		777		1.7		39.2		205		25,800		1,390		268		6.0		29.2		1.3	J	0.69	J	34.7		904		0.95	J	55.6	
080619004	GB-NFA-PC-014	1.5 - 2.5	08/06/2019	17,400		3.7		8.8		493		1.9		35.1		457		25,000		408		244		0.76		24.3		1.5		0.61		37.3		592		0.69	J	44.1	
080619005	GB-NFA-PC-014	2.5 - 3.5	08/06/2019	17,400	J	16.4	J	23.2	J	234	J	2.0	J	40.4		675	J	28,200		540	J	192		3.5		28.9	J	4.2		0.70		33.4	J	573	J	1.5	J	51.2	
080619006	GB-NFA-PC-014 Dup	2.5 - 3.5	08/06/2019	12,500	J	37.4	J	38.3	J	2,880	J	8.0	J	52.3		2,160	J	33,100		2,530	J	195		3.3		45.4	J	4.7		2.6		24.4	J	2,440	J	1.9	J	55.3	
080619007	GB-NFA-PC-014	3.5 - 4.2	08/06/2019	6,530		27.5		12.7		548		1.6		29.0		2,150		50,900		2,700		274		16.3		52.8		0.83	J	1.0		19.3		702		0.58	UJ	30.3	
080619008	GB-NFA-PC-014	4.2 - 4.7	08/06/2019	17,800		0.20	U	4.1		103		0.12	U	34.5		30.3		25,300		8.1		437		0.028	J	30.3		1.2		0.11	U	46.0		45.5		0.39	UJ	22.5	
080919063	GB-NFA-PC-015	0 - 0.7	08/09/2019	14,600		0.45	J	4.3		115		0.89	J	46.9		58.9		16,400		76.1		261		1.8		19.0		2.3		0.76		30.5		153		0.20	J	54.9	
080919064	GB-NFA-PC-015	0.7 - 1.2	08/09/2019	20,000		1.7		4.6		145		0.14	U	37.9		32.1		26,100		11.0		475		0.025	J	31.6		3.2		0.13	U	48.6		78.7		0.075	U	29.5	
080919065	GB-NFA-PC-015	1.2 - 2.2	08/09/2019	19,800		0.21	U	4.4		111		0.13	U	36.0		30.6		25,400		7.6		459		0.016	J	31.5		2.7		0.12	U	48.4		46.6		0.13	J	24.0	
080619009	GB-NFA-PC-016	0 - 0.5	08/06/2019	17,300		1.2	J	7.5		131		2.6		45.1		136		20,900		290		207		6.4		24.0		1.8		1.2		43.2		306		0.89	J	63.3	
080619010	GB-NFA-PC-016	0.5 - 1.5	08/06/2019	14,200		6.3		8.2		929		3.3		55.4		198		27,000		1,190		268		2.6		26.0		1.4	J	0.86		32.9		1,490		1.2	J	57.6	
080619011	GB-NFA-PC-016	1.5 - 2.5	08/06/2019	16,500		1.1	J	5.7		120		1.7		37.6		159		21,300		188		238		4.3		23.4		1.5		0.87		38.6		260		0.93	J	49.7	
080619012	GB-NFA-PC-016	2.5 - 3.5	08/06/2019	16,600		1.5	J	7.1		139		3.1		43.3		188		21,100		203		189		0.94		24.1		1.7		1.1		37.8		352		0.90	J	58.5	
080619013	GB-NFA-PC-016	3.5 - 4.5	08/06/2019	20,300		1.2	J	6.7		116		2.1		43.2		191		24,500		137		249		0.78		27.2		1.6		0.89		43.7		297		0.97	J	56.2	
080619014	GB-NFA-PC-016	4.5 - 5.5	08/06/2019	15,900		1.6		8.1		128		2.5		39.2		197		22,200		210		175		0.84		23.1		1.6		1.4		35.4		360		0.84	UJ	57.1	
080619015	GB-NFA-PC-016	5.5 - 6.8	08/06/2019	14,300		3.4		7.0		94.5		1.4	J	24.3		525	J	15,600		386	J	156		0.54	J	18.1		0.91	J	0.37	J	29.3		431	J	1.10	UJ	70.4	
080619016	GB-NFA-PC-016 Dup	5.5 - 6.8	08/06/2019	16,400		14.1		8.6		100		3.2		28.8		308	J	17,900		858	J	186		1.4	J	20.6		1.1	J	0.41	J	32.0		682	J	1.10	UJ	69.1	
080619017	GB-NFA-PC-016	6.8 - 7.3	08/06/2019	21,300		0.22	U	3.9		126		0.13	U	40.4		33.6		30,500		8.6		483		0.013	U	34.0		1.3		0.13	U	53.2		56.4		0.39	UJ	26.5	
080919061	GB-NFA-PC-017	0 - 0.5	08/09/2019	18,100		0.21	U	4.2		94.9		0.12	U	33.7		28.8		23,500		9.0		421		0.018	J	29.0		2.8		0.12	U	45.0		51.3		0.098	U	24.2	
080919062	GB-NFA-PC-017	0.5 - 1.5	08/09/2019	17,700		0.20	U	4.1		90.8		0.12	U	32.8		27.8		22,800		7.8		405		0.019	J	28.2		2.7		0.12	U	43.4		49.4		0.12	J	23.6	
080619018	GB-NFA-PC-018	0 - 0.5	08/06/2019	6,400		0.46	J	2.9		58.6		0.53	J	22.6		38.2		9,350		76.1		164		2.3		10.8		0.77	J	0.76		19.0		115		0.44	UJ	44.8	
080619019	GB-NFA-PC-018	0.5 - 1.5	08/06/2019	14,500		0.99	J	6.1		99.5		1.8		38.4		132		17,400		154		191		12.6	J-	21.6		1.6		1.6		35.6		253		1.10	UJ	52.4	
080619020	GB-NFA-PC-018	1.5 - 2.5	08/06/2019	10,100		2.2		4.8		88.5		1.5		27.3		92.0		15,400		122		188		0.98		15.7		1.2		1.1		28.7		231		0.56	UJ	42.8	
080619021	GB-NFA-PC-018	2.5 - 3.5	08/06/2019	15,900		1.5		5.5		106		1.8		38.8		141		21,200		140		236		0.77		22.8		2.5		0.77		39.1		252		0.95	J	51.5	
080619022	GB-NFA-PC-018	3.5 - 4.5	08/06/2019	13,200		0.96	J	5.5		90.4		1.7		32.0		147		16,900		150		176		2.8		20.0		2.6		0.77		31.2		257		0.69	UJ	50.6	
080619023	GB-NFA-PC-018	4.5 - 5.5	08/06/2019	15,000		0.73	J	5.6		111		1.6		35.7		114		19,200		188		231		0.64		21.2		3.0		1.0		35.6		275		0.83	J	46.3	
080619024	GB-NFA-PC-018	5.5 - 6.5	08/06/2019	13,900		1.0	J	5.5		108		2.7		37.2		105		17,200		130		198		1.3		19.4		2.9		1.1		31.8		288		0.82	J	51.0	
080619025	GB-NFA-PC-018	6.5 - 7.5	08/06/2019	12,500		1.4		4.9		77.4		0.64	J	24.9		57.4		16,700		75.6		254		0.67		18.3		2.5		0.41	J	34.4		208		0.46	UJ	42.8	
080619026	GB-NFA-PC-018	7.5 - 8	08/06/2019	21,500		0.72	J	5.6		126		1.1	J	79.4		109		28,200		98.5		304		0.52		27.7		3.4		0.77		45.0		285		0.89	UJ	55.7	
080619027	GB-NFA-PC-018	8 - 8.5	08/06/2019	17,400		0.21	U	4.6		127	J	0.12	U	32.8		30.9		23,700		8.7		437		0.014	U	30.2		2.5		0.12	U	44.0		62.0	J	0.48	UJ	25.9	
080619028	GB-NFA-PC-018 Dup	8 - 8.5	08/06/2019	17,400		0.22	U	5.1		87.6	J	0.13	U	32.7		28.9		22,900		8.4		424		0.061		28.6		2.7		0.13	U	44.4		181	J	0.41	UJ	26.2	
080819059	GB-NFA-PC-019	0 - 0.5	08/08/2019	18,100		0.21	U	4.3		108		0.12	U	34.0		28.6		23,500		6.9		431		0.015	J	29.0		2.7		0.12	U	45.6		49.6		0.085	U	22.6	
080819060	GB-NFA-PC-019	0.5 - 1.5	08/08/2019	18,300		0.21	U	4.4		104		0.13	U	34.4		28.5		24,100		7.0		428		0.020	J	29.3		2.8		0.12	U	45.7		49.7		0.098	U	23.7	
080719029	GB-NFA-PC-020	0 - 0.5	08/07/2019	12,600		1.1	J	6.0		103		2.1		39.3		97.8		17,400		135		193		0.64		18.1		2.0		0.89		34.5		233		0.93	J	52.7	
080719030	GB-NFA-PC-020	0.5 - 1.5	08/07/2019	8,460		0.59	J	3.6		62.7		0.86	J	18.7		129		12,200		110		150		1.4		12.5		1.0	J	0.32	J	21.2		218		0.57	J	47.9	

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Cyanide		GEO	
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	Aluminum, Total		Antimony, Total		Arsenic, Total		Barium, Total		Cadmium, Total		Chromium, Total		Copper, Total		Iron, Total		Lead, Total		Manganese, Total		Mercury, Total		Nickel, Total		Selenium, Total		Silver, Total		Vanadium, Total		Zinc, Total		Cyanide, Total		Percent Moisture	
			Reporting Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		%	
				Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
080719031	GB-NFA-PC-020	1.5 - 2.5	08/07/2019	14,400		1.3	J	6.5		103		2.3		33.3		190		15,900		188		143		1.2		20.6		1.6		1.2		32.2		337		0.81	J	56.1	
080719032	GB-NFA-PC-020	2.5 - 3.5	08/07/2019	34,100	J	0.87	J	8.6		160	J	1.1	J	72.0	J	143	J	45,600	J	129		749	J	1.6		47.9	J	2.5		0.60	J	80.0	J	298	J	1.10	UJ	70.7	
080719033	GB-NFA-PC-020 Dup	2.5 - 3.5	08/07/2019	9,530	J	1.4	J	4.0		55.1	J	0.61	J	15.0	J	275	J	8,950	J	114		79.5	J	0.35	J	10.8	J	1.0	J	0.26	U	19.1	J	187	J	0.72	UJ	65.6	
080719034	GB-NFA-PC-020	3.5 - 4.5	08/07/2019	7,280		1.9		6.2		55.9		0.44	J	13.0		134		8,030		97.9		78.8		0.31	J	9.6		1.3	J	0.22	U	17.8		119		1.8	J	56.4	
080719035	GB-NFA-PC-020	4.5 - 5	08/07/2019	19,100		0.21	U	4.5		103		0.12	U	34.3		30.1		25,400		7.6		433		0.046	UJ	30.2		1.4		0.12	U	47.4		47.2		0.41	UJ	24.4	
080819056	GB-NFA-PC-021	0 - 0.5	08/08/2019	19,800		0.21	U	4.4		110		0.13	U	36.0		30.1		25,200		7.6		437		0.017	J	31.1		2.8		0.12	U	47.8		47.5		0.086	U	24.5	
080819057	GB-NFA-PC-021	0.5 - 1.5	08/08/2019	17,300		0.20	U	4.3		113		0.12	U	32.3		27.4		22,100		6.4		417		0.019	J	27.8		2.6		0.12	U	44.8		41.9		0.37	UJ	23.6	
080819058	GB-NFA-PC-021 Dup	0.5 - 1.5	08/08/2019	18,300		0.21	U	4.3		110		0.12	U	33.8		28.9		23,400		6.8		429		0.016	J	28.7		2.8		0.12	U	46.1		49.1		0.079	U	24.2	
080719036	GB-NFA-PC-022	0 - 0.5	08/07/2019	16,900		0.73	J	5.2		102		1.5		35.0		102		21,400		120		229		5.0		22.8		1.4		0.51	J	37.4		233		0.74	J	51.3	
080719037	GB-NFA-PC-022	0.5 - 1.5	08/07/2019	20,600		1.5	J	8.8		145		3.0		42.6		141		30,000		448		319		0.86	J	28.2		2.2		0.75	J	48.9		523		1.00	UJ	68.4	
080719038	GB-NFA-PC-022	1.5 - 2.5	08/07/2019	15,000		1.9		4.8		82.0		0.52	J	26.0		91.3		17,700		141		273		0.41	J	18.8		1.3	J	0.26	U	34.8		152		1.7	UJ	65.3	
080719039	GB-NFA-PC-022	2.5 - 3	08/07/2019	18,500		0.22	U	4.2		96.9		0.13	U	32.7		29.9		25,900		15.3		475		0.045	UJ	28.2		1.4		0.13	U	46.4		55.8		0.48	UJ	25.5	
080819054	GB-NFA-PC-023	0 - 0.5	08/08/2019	15,500		0.20	U	4.0		95.0		0.12	U	28.8		27.1		20,500		10.7		374		0.12		25.2		2.5		0.11	U	39.3		47.8		0.35	UJ	23.5	
080819055	GB-NFA-PC-023	0.5 - 1.5	08/08/2019	17,900		0.21	U	4.7		101		0.12	U	33.2		28.5		23,400		8.3		417		0.018	J	28.9		2.7		0.12	U	45.1		44.2		0.61	UJ	21.8	
080719040	GB-NFA-PC-024	0 - 0.5	08/07/2019	13,100		0.63	J	4.5		90.6		1.1	J	42.1		64.7		17,100		97.1		261		0.95		18.4		1.5		0.78		27.8		195		0.65	UJ	56.4	
080719041	GB-NFA-PC-024	0.5 - 0.9	08/07/2019	7,650		1.3	J	3.7		56.9		0.59	J	21.9		132		10,800		175		171		0.75		11.3		0.87	J	0.38	J	19.7		125		0.82	UJ	52.9	
080719042	GB-NFA-PC-024	0.9 - 1.4	08/07/2019	14,500		0.20	U	3.9		76.0		0.12	U	25.9		24.1		20,900		6.1		380		0.044	UJ	23.3		1.1		0.11	U	40.1		40.2		0.10	U	21.3	
080819052	GB-NFA-PC-025	0 - 0.5	08/08/2019	14,500		0.22	U	3.9		87.9		0.13	U	27.8		31.1		19,200		13.8		349		0.049		23.5		2.3		0.13	U	35.8		51.5		0.43	UJ	28.9	
080819053	GB-NFA-PC-025	0.5 - 1.5	08/08/2019	19,100		0.21	U	4.0		98.0		0.12	U	32.2		27.7		22,400		6.9		409		0.022	J	28.0		2.8		0.12	U	43.4		41.4		0.14	U	21.2	
080719043	GB-NFA-PC-026	0 - 0.7	08/07/2019	4,630		0.64	J	1.5		32.4		0.22	J	8.3		91.4		5,080		82.8		59.7		0.30	J	6.1		0.47	J	0.15	J	10.4		64.9		0.73	UJ	38.2	
080719044	GB-NFA-PC-026	0.7 - 1.2	08/07/2019	23,200		0.30	J	4.5		110		0.22	J	39.4		33.7		29,700		9.3		471		0.047	UJ	34.3		1.4		0.13	U	52.5		56.6		0.35	UJ	25.9	
080819050	GB-NFA-PC-027	0 - 0.5	08/08/2019	13,200		0.31	J	3.6		72.4		0.30	J	26.6		26.9		17,300		70.0		324		0.41		20.8		2.1		0.14	J	32.7		59.7		0.36	UJ	27.1	
080819051	GB-NFA-PC-027	0.5 - 1.5	08/08/2019	14,400		0.21	U	3.9		78.8		0.18	J	29.6		31.0		19,200		18.3		352		0.10		23.2		2.3		0.12	U	36.5		150		0.10	U	26.1	
080719045	GB-NFA-PC-028	0 - 0.5	08/07/2019	20,300		0.20	U	4.4		113		0.12	U	36.7		31.1		27,400		7.8		462		0.042	UJ	31.6		1.3		0.12	U	50.3		50.7		0.081	U	25.1	
080719046	GB-NFA-PC-028 Dup	0 - 0.5	08/07/2019	20,500		0.21	U	4.4		113		0.13	U	36.5		31.2		27,500		7.9		457		0.044	UJ	31.6		1.4		0.12	U	50.3		51.0		0.15	U	24.3	
080719047	GB-NFA-PC-029	0 - 0.9	08/07/2019	12,100		0.57	J	3.8		109		0.80	J	30.8		56.5		16,300		91.0		248		0.29	J	16.9		1.1	J	0.54	J	28.2		146		0.56	UJ	43.9	
080719048	GB-NFA-PC-029	0.9 - 1.4	08/07/2019	19,600		0.22	U	4.3		113		0.13	U	35.8		31.1		26,300		9.6		448		0.042	UJ	30.9		1.2		0.13	U	48.9		54.1		0.34	UJ	25.7	
080719049	GB-NFA-PC-029	1.4 - 2.4	08/07/2019	20,000		0.22	U	4.6		108		0.13	U	35.3		31.1		25,000		24.3		449		0.045	UJ	31.4		2.6		0.13	U	46.8		68.5		0.33	UJ	24.1	

Table 3. Post-Removal Sampling Analytical Data

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

				Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Metal		Cyanide		GEO	
9-digit Code	Sample Location	Sample Depth (feet)	Sample Date	Aluminum, Total		Antimony, Total		Arsenic, Total		Barium, Total		Cadmium, Total		Chromium, Total		Copper, Total		Iron, Total		Lead, Total		Manganese, Total		Mercury, Total		Nickel, Total		Selenium, Total		Silver, Total		Vanadium, Total		Zinc, Total		Cyanide, Total		Percent Moisture	
			Reporting Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		%	
				Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Total Number of Samples Analyzed:				69		69		69		69		69		69		69		69		69		69		69		69		69		69		69		69		69	
Number of Detections:				69		41		69		69		41		69		69		69		69		69		59		69		69		36		69		69		23		69	
Min:				4,630		0.3		1.5		32.4		0.18		8.3		24.1		5,080		6.1		59.7		0.015		6.1		0.47		0.14		10.4		40.2		0.11		21.2	
Max:				34,100		37.4		38.3		2,880		8		127		2,160		50,900		2,700		749		16.3		52.8		4.7		2.6		80		2,440		1.9		70.7	

[O:MGP 8/29/19, C:CMD 8/30/19, QA:SAE 9/5/19, UC:MGP 10/4/19]

Notes:
Sorted by 9-digit Code

-- = Analysis not performed
% = percent
Dup = Quality Control Field Duplicate Sample
GEO = Geotechnical Property
J = Estimated concentration
mg/kg = milligrams per kilogram
MGP = Manufactured Gas Plant
PAH = Polycyclic Aromatic Hydrocarbon
PVOC = Petroleum Volatile Organic Compound
TPAH = Total PAHs
U = Concentration was not detected above the reported limit

1. The following rules apply to the summation of Total PAH (13) calculated by OBG, Part of Ramboll:
   a. Where no detections were observed, the maximum individual reported detection limit is presented.
   b. Where detections were observed, ½ the reported detection limit for non-detects was used in the summation.
   c. The list of Total PAH (13) is as follows: Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Fluoranthene, Fluorene, Naphthalene, Phenanthrene and Pyrene.

Lab comments and definitions can be found in associated laboratory reports.

Table 4. Geotechnical Results

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 USEPA#: WIN000509948

Boring	Sample Depth (ft)	Sample Number	Coefficient of Permeability[1]		Moisture Content (%)	Washed Sieve			Atterberg Limits			Classification
			(cm/sec)	(ft/min)		% Gravel	% Sand	% Silt and Clay	LL	PL	PI	
12	0-2	GB-NFA-PC-012	$1.4*10^{-8}$	$2.8*10^{-8}$	33.0	0.1	2.1	97.8	47	19	28	(CL) LEAN CLAY, reddish brown
14	2-4	GB-NFA-PC-014	$1.8*10^{-8}$	$3.6*10^{-8}$	117.5	0.5	38.4	61.1	57	43	14	(OH) SANDY ORGANIC SILT, dark grey, trace fine gravel
16	4-6	GB-NFA-PC-016	$1.2*10^{-8}$	$2.4*10^{-8}$	139.1	2.8	53.7	43.5	65	49	16	(SM) SILTY SAND, dark grey, fine to coarse, trace fine gravel-sized pieces of partially decomposed wood and organic fines
20	2-4	GB-NFA-PC-020	$2.8*10^{-8}$	$5.5*10^{-8}$	171.1	13.6	66.4	20.0	157	90	67	(SM) SILTY SAND, dark grey, fine to coarse, trace fine gravel-sized pieces of partially decomposed wood and organic fines
26	2-4	GB-NFA-PC-026	$5.7*10^{-8}$	$1.1*10^{-8}$	34.2	0.0	0.2	99.8	49	21	28	(CL) LEAN CLAY, reddish brown
28	0-2	GB-NFA-PC-028	$2.6*10^{-8}$	$5.2*10^{-8}$	33.3	0.0	0.4	99.6	45	19	26	(CL) LEAN CLAY, reddish brown

cm/sec = centimeters per second; ft = feet; min = minute; % = percentage; LL = liquid limit; PL = Plasticity Limit; PI = Plasticity Index

Notes:
1 - Coefficient of Permeability at 20 degrees Centigrade

Table 5. Buttress Sand Layer Thickness Verification

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

Station ID	GPS Date	Northing[1]	Easting[1]	Poled Sand Thickness (inches)	Poled Sand Thickness (feet)	Total Thickness Sand and Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (feet)
MGP-NFA-BUTTRESS-C1	10/28/2019	257,039.64	2,487,991.70	17	1.4	17	1.4
MGP-NFA-BUTTRESS-C2	10/28/2019	257,054.71	2,487,930.52	18.4	1.5	18.4	1.5
MGP-NFA-BUTTRESS-C3	10/28/2019	257,122.41	2,487,924.71	13.4	1.1	13.4	1.1
MGP-NFA-BUTTRESS-C4	10/28/2019	257,168.72	2,487,853.61	16.6	1.4	16.6	1.4
MGP-NFA-BUTTRESS-C5	10/28/2019	257,216.49	2,487,877.44	13.8	1.2	13.8	1.2
MGP-NFA-BUTTRESS-C6	10/28/2019	257,253.47	2,487,828.03	14.8	1.2	14.8	1.2
MGP-NFA-BUTTRESS-C7	10/29/2019	257,305.31	2,487,785.21	17	1.4	17	1.4
MGP-NFA-BUTTRESS-C8	10/29/2019	257,367.75	2,487,781.99	16.2	1.4	16.2	1.4
MGP-NFA-BUTTRESS-C9	10/29/2019	257,448.83	2,487,744.21	18	1.5	18	1.5
MGP-NFA-BUTTRESS-C10	10/29/2019	257,499.59	2,487,709.89	16.2	1.4	16.2	1.4
MGP-NFA-BUTTRESS-C11	10/29/2019	257,570.06	2,487,704.36	27.2	2.3	27.2	2.3

Notes:

1 - The horizontal datum is in NAD83 Wisconsin State Plane, Central Zone U.S. Survey feet.

2 - 11 of 11 samples meet or exceed the buttress sand layer minimum thickness requirement of 12-inches.

Table 6. Residual Sand Thickness Verification

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 UPSEPA#: WIN000509948

Station ID	GPS Date	Northing[1]	Easting[1]	Distance between Proposed and Actual Sampling Locations (feet)	Poled Sand Thickness (inches)	Poled Sand Thickness (feet)	Recovered Core Sand Thickness (inches)	Recovered Core Sand Thickness (feet)
GB-NFA-RS-011	11/14/2019	256,962.51	2,487,997.38	15.5 [2]	6	0.5	6	0.5
GB-NFA-RS-012	11/14/2019	256,940.24	2,487,968.87	5.1	4.8	0.4	6	0.5
GB-NFA-RS-013	11/18/2019	257,003.13	2,487,925.23	3.1	6	0.5	14	1.2
GB-NFA-RS-014	11/18/2019	257,057.56	2,487,897.95	1.9	7.2	0.6	9	0.8
GB-NFA-RS-015	11/18/2019	257,106.68	2,487,847.90	6.6	9.6	0.8	7	0.6
GB-NFA-RS-016	11/18/2019	257,115.28	2,487,795.68	8.3	15.6	1.3	7	0.6
GB-NFA-RS-017	11/18/2019	257,174.80	2,487,795.81	10.7	8.4	0.7	16	1.3
GB-NFA-RS-018	11/18/2019	257,204.95	2,487,736.27	6.7	15.6	1.3	7	0.6
GB-NFA-RS-019	11/18/2019	257,266.96	2,487,768.74	0.7	2.4	0.2	12	1.0
GB-NFA-RS-020	11/16/2019	257,294.48	2,487,732.25	4.5	7.2	0.6	6	0.5
GB-NFA-RS-021	11/16/2019	257,337.68	2,487,664.33	1.1	12	1.0	5	0.4
GB-NFA-RS-022	11/16/2019	257,379.21	2,487,699.74	5.8	13.2	1.1	6	0.5
GB-NFA-RS-023	11/16/2019	257,401.71	2,487,635.31	9.2	8.4	0.7	6	0.5
GB-NFA-RS-024	11/16/2019	257,455.10	2,487,663.15	3.2	2.4	0.2	8	0.7
GB-NFA-RS-025	11/16/2019	257,485.55	2,487,640.59	10.9	9.6	0.8	7	0.6
GB-NFA-RS-026	11/16/2019	257,552.99	2,487,611.98	4.6	7.2	0.6	9	0.8
GB-NFA-RS-027	11/16/2019	257,626.45	2,487,687.41	26.2 [2]	14.4	1.2	6	0.5
GB-NFA-RS-028	11/16/2019	257,590.49	2,487,682.31	3.1	7.2	0.6	6	0.5

Notes:

1 - The horizontal datum is in NAD83 Wisconsin State Plane, Central Zone U.S. Survey feet.

2 - Locations GB-NFA-RS-011 and 027 were adjusted due to icy conditions in the Fox River at the time of sampling (ice obstruction).

Table 7a. Baseline Air Monitoring Analysis Results Summary

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 USEPA#: WIN000509948

					VOC		VOC		VOC		VOC		VOC	
9-digit Code	Sample Location	Orientation	Field Sample ID	Sample Date	Benzene		Ethylbenzene		Naphthalene		Toluene		Xylenes, Total	
				Reporting Units:	µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3	
					Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
				Acceptable 24-hour Average Air Concentration:	31.95		998.71		104.85		354.24		99.87	
050619001	AMS-4	Crosswind	AMS-4-20190507	05/07/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
050719007	AMS-4	Crosswind	AMS-4-20190508	05/08/2019	0.23	U	0.32	U	1.6	U	3.0		0.61	U
050819010	AMS-4	Crosswind	AMS-4-20190509	05/09/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
050919012-A	AMS-4	Upwind	AMS-4-20190510	05/10/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
050619003	AMS-5	Upwind	AMS-5-20190507	05/07/2019	0.33	J	0.32	U	1.6	U	6.0		0.69	J
050819009	AMS-5	Upwind	AMS-5-20190509	05/09/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
050919011	AMS-5	Upwind	AMS-5-20190510	05/10/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
050619004	AMS-6	Downwind	AMS-6-20190507	05/07/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
050719006	AMS-6	Downwind	AMS-6-20190508	05/08/2019	0.23	U	0.32	U	1.6	U	1.1		0.61	U
050819008	AMS-6	Downwind	AMS-6-20190509	05/09/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
050919013	AMS-6	Downwind	AMS-6-20190510	05/10/2019	0.23	U	0.32	U	1.6	U	0.31	J	0.61	U
				Total Number of Samples Analyzed:	11		11		11		11		11	
				Number of Detections:	1		0		0		4		1	
				Min:	0.33		0		0		0.31		0.69	
				Max:	0.33		0		0		6		0.69	
				Average:	0.33		0		0		2.6		0.69	

[O:MGP 6/27/19, C:SGW 6/28/19, Q: JQW 6/28/19, U: JQW 7/3/19]

Notes:
µg/m³ = micrograms per cubic meter
J = Estimated concentration
MGP = manufactured gas plant
U = Concentration was not detected above the reported limit
VOC = Volatile Organic Compound

Lab comments and definitions can be found in associated laboratory reports.

Acceptable 24-hour Average Concentrations adopted from the Wisconsin Bureau of Environmental and Occupational Health Department of Health and Family Services "*Health-based Guidelines for Air Management, Public Participation, and Risk Communication During the Excavation of Former Manufactured Gas Plants* ." Naphthalene concentration is DHFS-derived for 14-day acute exposure, and all other parameters are U.S. EPA reference concentrations (RfC) for lifetime exposure.

Table 7b. Performance Air Monitoring Analysis Results Summary

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 USEPA#: WIN000509948

				VOC		VOC		VOC		VOC		VOC	
9-digit Code	Sample Location	Orientation	Sample Date	Benzene		Ethylbenzene		Naphthalene		Toluene		Xylenes, Total	
			Reporting Units:	µg/m^3		µg/m^3		µg/m^3		µg/m^3		µg/m^3	
				Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
			Baseline Air Average Concentration:	**0.33**		**0**		**0**		**2.6**		**0.69**	
			Acceptable 24-hour Average Air Concentration:	31.95		998.71		104.85		354.24		99.87	
060419001	AMS-4	Downwind	06/05/2019	**0.48**	J	0.32	U	1.6	U	1.2		0.61	U
060619005	AMS-4	Downwind	06/07/2019	**1.1**		**0.33**	J	1.6	U	2.5		**1.5**	J
061119008	AMS-4	Downwind	06/12/2019	**0.53**	J	0.32	U	1.6	U	0.74		0.61	U
061319012/061319014 (N)	AMS-4	Upwind	06/14/2019	**0.56**	J	0.32	U	1.6	U	1.3		**1.2**	J
061919015	AMS-4	Crosswind	06/20/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
062519018	AMS-4	Crosswind	06/26/2019	**0.50**	J	0.32	U	1.6	U	0.37	J	0.61	U
070219021	AMS-4	Upwind	07/03/2019	0.29	J	0.32	U	1.6	U	0.45	J	0.61	U
070919026	AMS-4	Downwind	07/10/2019	**0.79**		**0.86**		**1.9**	J	1.2		**1.2**	J
071719027	AMS-4	Crosswind	07/17/2019	**0.71**		**6.8**		**2.3**	J	**16**		**27**	
072519030	AMS-4	Crosswind	07/25/2019	**1.1**		0.32	U	1.6	U	1.9		0.61	U
073119035	AMS-4	Upwind	07/31/2019	**1.1**		**2.2**		**2.5**	J	**20**		**7.4**	
080819036	AMS-4	Upwind	08/08/2019	0.31	J	0.32	U	1.6	U	0.90		0.61	U
060419002/060419004 (N)	AMS-5	Crosswind	06/05/2019	**0.85**		0.32	U	1.6	U	1.2		0.65	J
060619006	AMS-5	Upwind	06/07/2019	**0.77**		0.32	U	1.6	U	1.7		0.61	J
061119009	AMS-5	Downwind	06/12/2019	**0.38**	J	0.32	U	1.6	U	0.72	J	0.61	U
061319013	AMS-5	Downwind	06/14/2019	**2.5**		**3.1**		**8.9**		**2.7**		**3.9**	
061919016	AMS-5	Upwind	06/20/2019	0.23	U	0.32	U	1.6	U	0.26	U	0.61	U
062519019	AMS-5	Downwind	06/26/2019	**1.9**		**2.3**		**2.6**		1.5		**2.1**	J
070219024	AMS-5	Crosswind	07/03/2019	**3.4**		**2.9**		**5.7**		**11**		**5.8**	
070919024	AMS-5	Crosswind	07/10/2019	**0.38**	J	0.32	U	1.6	U	0.68	J	0.61	U
071719028	AMS-5	Upwind	07/17/2019	**1.7**		**1.8**		**7.4**		2.5		**1.6**	J
072519031	AMS-5	Downwind	07/25/2019	**2.0**		**1.1**		**1.9**	J	**8.5**		**2.3**	J
073119034	AMS-5	Downwind	07/31/2019	**0.41**	J	**0.44**	J	1.6	U	**3.1**		**1.5**	J
080819037	AMS-5	Downwind	08/08/2019	**1.1**		**1.4**		**4.7**		1.5		**1.7**	J
060419003	AMS-6	Upwind	06/05/2019	**0.39**	J	0.32	U	1.6	U	0.26	U	0.61	U
060619007	AMS-6	Crosswind	06/07/2019	**0.78**		0.32	U	1.6	U	2.0		**1.4**	J
061119010	AMS-6	Upwind	06/12/2019	**0.40**	J	0.32	U	1.6	U	0.83		0.61	U
061319011	AMS-6	Downwind	06/14/2019	**0.88**		**1.2**		1.6	U	**4.8**		**3.0**	
061919017	AMS-6	Downwind	06/20/2019	**2.1**		**6.2**		**20**		0.89		**4.9**	
062519020	AMS-6	Upwind	06/26/2019	0.23	U	0.32	U	1.6	U	0.43	J	0.61	U
070219022/070219023 (N)	AMS-6	Downwind	07/03/2019	**17**		**17**		**30**		**16**		**17**	
070919025	AMS-6	Upwind	07/10/2019	**0.38**	J	0.32	U	1.6	U	2.6		0.61	U
071719029	AMS-6	Downwind	07/17/2019	**11**		**13**		**38**		**12**		**10**	
072519032-A	AMS-6	Upwind	07/25/2019	**1.8**		**1.4**		1.6	U	**33**		**4.0**	
073119033	AMS-6	Crosswind	07/31/2019	**3.7**		**5.6**		**23**		**4.9**		**5.4**	
080819038	AMS-6	Crosswind	08/08/2019	**0.37**	J	0.32	U	1.6	U	0.64	J	0.61	U

Table 7b. Performance Air Monitoring Analysis Results Summary

North Focus Area Remedial Action Summary Report
Wisconsin Public Service Corporation
Green Bay Former MGP Site 700 N Adams St, Green Bay, Wisconsin
BRRTS#: 02-05-000254 USEPA#: WIN000509948

9-digit Code	Sample Location	Orientation	Sample Date	VOC Benzene	VOC Ethylbenzene	VOC Naphthalene	VOC Toluene	VOC Xylenes, Total
			Reporting Units:	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
				Result Flag	Result Flag	Result Flag	Result Flag	Result Flag
			Baseline Air Average Concentration:	**0.33**	**0**	**0**	**2.6**	**0.69**
			Acceptable 24-hour Average Air Concentration:	31.95	998.71	104.85	354.24	99.87
			Total Number of Samples Analyzed:	36	36	36	36	36
			Number of Detections:	33	17	13	33	21
			Min:	0.29	0.33	1.9	0.37	0.61
			Max:	17	17	38	33	27
			Baseline Air Average Concentration:	0.33	0	0	2.6	0.69
			Number of Samples above Baseline Air Concentration:	31	17	13	11	19
			Number of Samples above Upwind Values:	19	12	10	13	13
			Acceptable 24-hour Average Air Concentration:	31.95	998.71	104.85	354.24	99.87
			Number of Samples that Exceed Acceptable Air Concentration:	0	0	0	0	0

[O:MGP 6/28/19, C:SGW 7/2/19, QC:JQW 7/2/19, U:JQW 7/3/19, QC:SJM 7/8/19, U:JQW 7/10/19, U:MGP 7/17/19, C:SGW 7/18/19, Q:JQW 7/18/19,UC:MGP 7/31/19, Q:JQW 8/2/19, U:MGP 8/29/19, C:SGW 9/6/19]

	Sample Location	Acceptable 24-hour Average Concentration (µg/m³)				
		31.95	998.71	104.85	354.24	99.87
Average Concentration[3]:	AMS-4	0.63	0.95	1.15	3.89	3.36
	AMS-5	1.29	1.15	3.0	2.93	1.75
	AMS-6	3.24	3.78	9.78	6.51	3.93

Analyte concentration exceeds the standard for:
BOLD Value exceeds the Baseline Air Average Concentration
No Values Exceed the Acceptable 24-hour Average Concentration
Yellow highlighting in Statistics = detected concentrations above Baseline Average Concentration
Orange highlighting in Statistics = detected concentrations above Upwind Concentrations

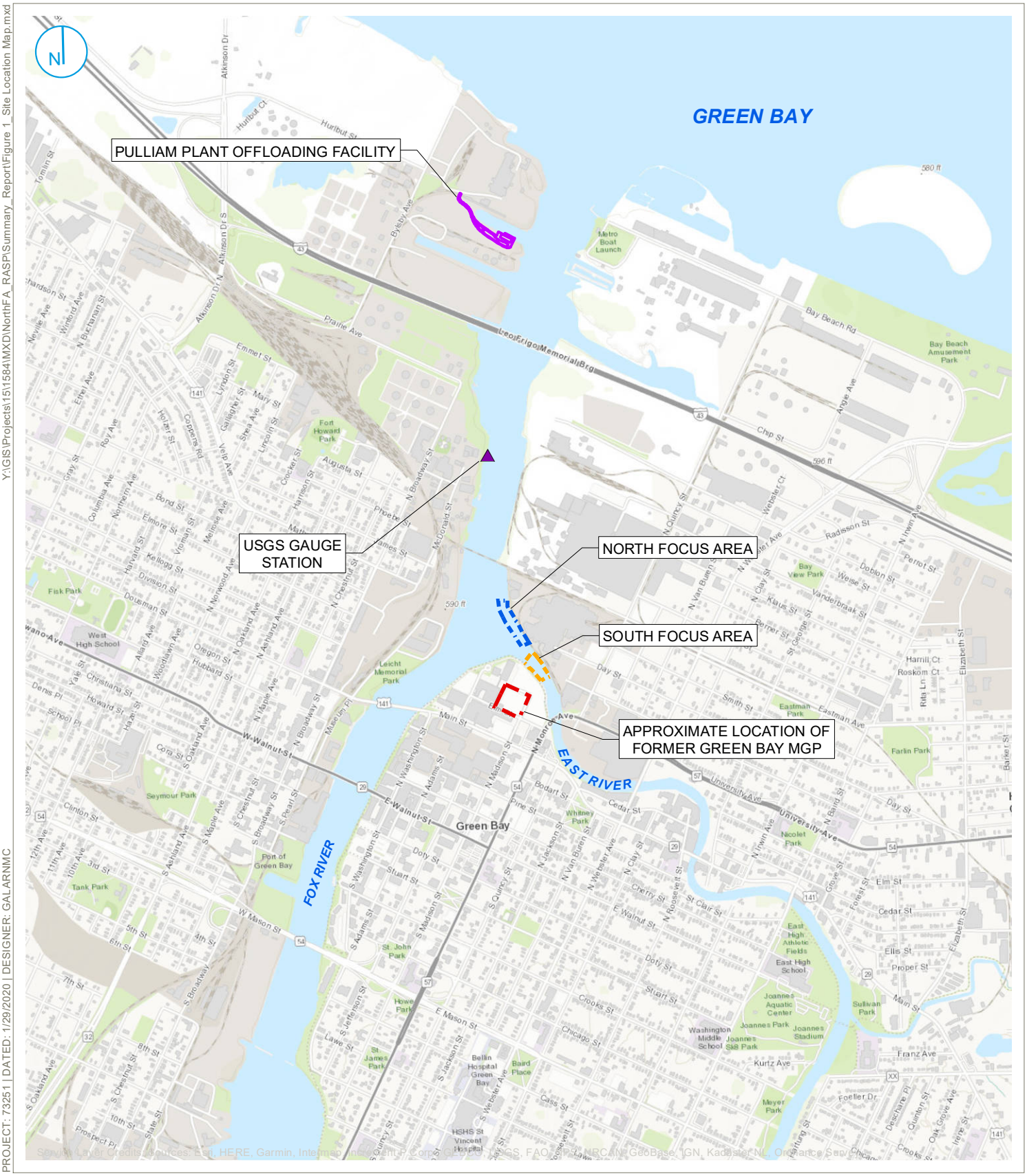
(N) = Normalized sample locations created from combining parent and field duplicate samples following EPA protocol
µg/m³ = micrograms per cubic meter
J = Estimated concentration
MGP = manufactured gas plant
NFA = North Focus Area
U = Concentration was not detected above the reported limit
VOC = Volatile Organic Compound

1. Baseline Air Average Concentrations derived from the average concentrations in Table 7a.
2. Acceptable 24-hour Average Concentrations adopted from the Wisconsin Bureau of Environmental and Occupational Health Department of Health and Family Services "*Health-based Guidelines for Air Management, Public Participation, and Risk Communication During the Excavation of Former Manufactured Gas Plants* ." Naphthalene concentration is DHFS-derived for 14-day acute exposure, and all other parameters are U.S. EPA reference concentrations (RfC) for lifetime exposure.
3. Non-detections were treated as 1/2 the detection limit.

Lab comments and definitions can be found in associated laboratory reports.

AMS-5 was relocated on 6/13/2019 to be closer to the eastern perimeter of the site in order to better represent site conditions and to provide safer work environment due to the proximity of construction equipment.

FIGURES



Y:\GIS\Projects\15\1584\MXD\NorthFA_RASP\Summary_Report\Figure 1_Site Location Map.mxd

PROJECT: 73251 | DATED: 1/29/2020 | DESIGNER: GALARNMC

KEY MAP

Map Scale: 1:1:24,000;
Map Center: 88°0'30"W 44°31'23"N

0 1,000 2,000 Feet

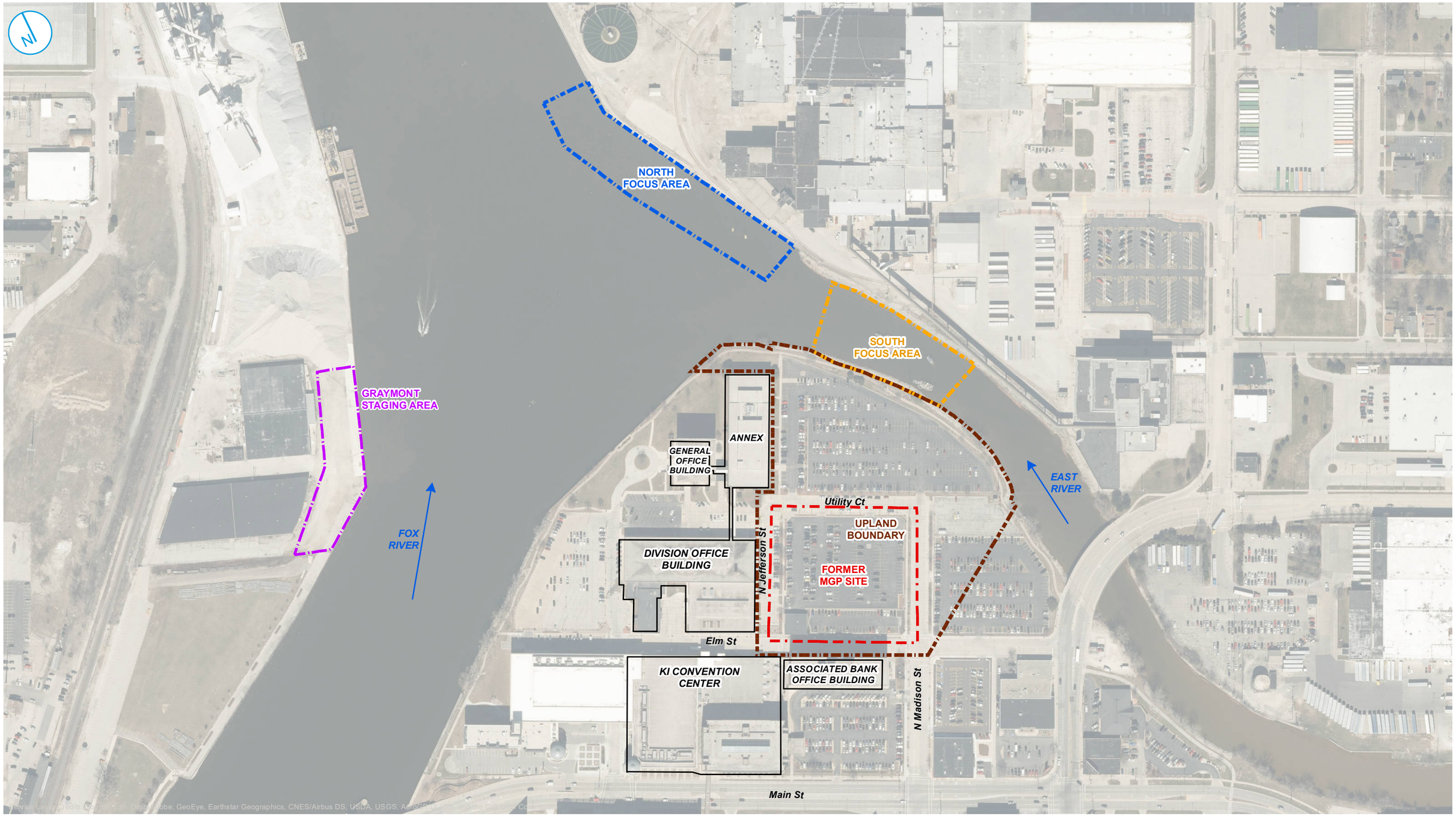
SITE LOCATION MAP

FIGURE 1

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL



Y:\GIS\Projects\15\15841MXD\NorthFA_RASP\Summary_Report\Figure 2_Site Layout Map.mxd

PROJECT: 73251 | DATED: 1/29/2020 | DESIGNER: GALARNMC

BUILDING FOOTPRINT
NORTH FOCUS AREA (REMEDIAL ACTION COMPLETED IN 2019)
SOUTH FOCUS AREA (REMEDIAL ACTION COMPLETED IN 2018)
UPLAND BOUNDARY (REMEDIAL ACTION COMPLETED IN 2003)
GRAYMONT STAGING AREA
FORMER MGP SITE

0 125 250 Feet

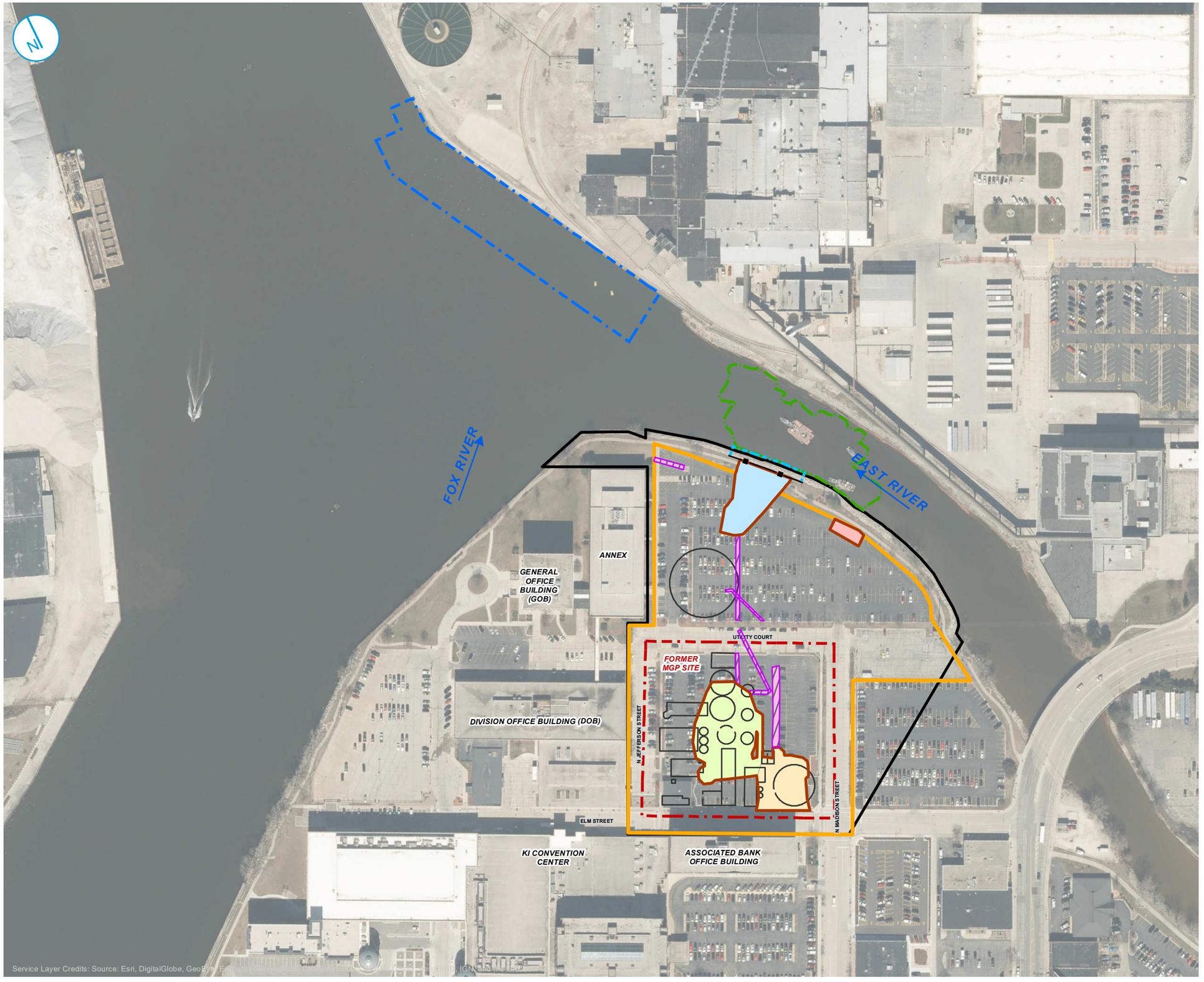
SITE LAYOUT MAP

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

FIGURE 2

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

Y:\GIS\Projects\151\1584\MXD\NorthFA_RASPI\Summary_Report\Figure 3_Previous Removal Areas.mxd



- SHEET PILE WALL
- SHORELINE EXCAVATION EXTENT (REMEDIAL ACTION COMPLETED IN 2018)
- FORMER STRUCTURE
- SOIL REMEDIATION EXCAVATION AREAS (2003)
- SOIL REMEDIATION MGP PIPING RUNS (2003)
- EXCAVATION AREA 1 (6-8 FT)
- EXCAVATION AREA 2 (8-14 FT) * TAR WELL (12-22 FT)
- EXCAVATION AREA 3 (8-12 FT)
- EXCAVATION AREA 1 (7 FT)
- EXCAVATED PIPING RUN
- CAP MAINTENANCE AREA
- NORTH FOCUS AREA (REMEDIAL ACTION COMPLETED IN 2019)
- SOUTH FOCUS AREA (REMEDIAL ACTION COMPLETED IN 2018)
- RIVER FLOW DIRECTION
- FORMER MGP SITE
- UPLAND SITE BOUNDARY

0 100 200 Feet

UPLAND REMOVAL AREAS

NORTH FOCUS AREA REMEDIAL ACTION
SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

FIGURE 3

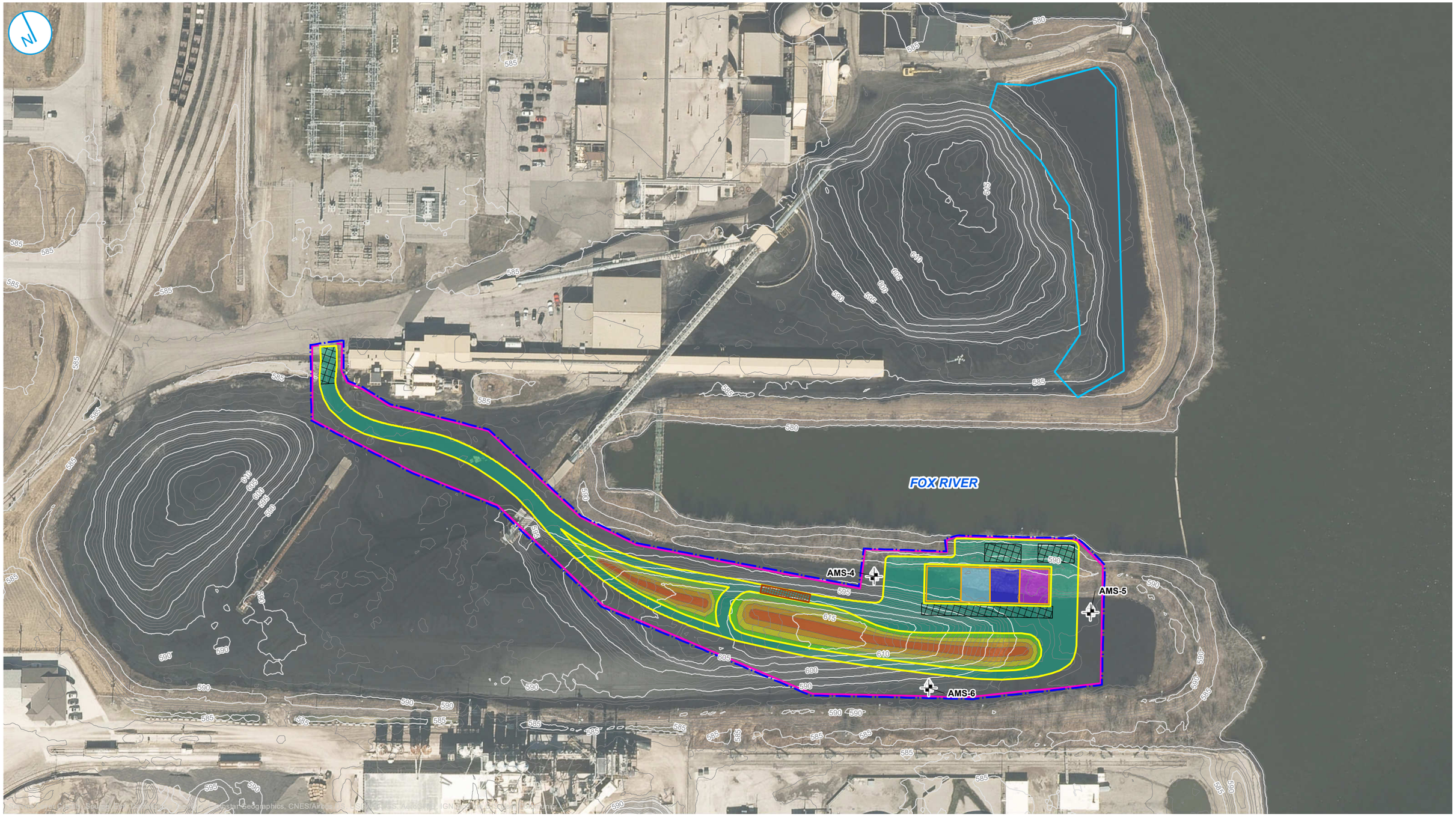
RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

PROJECT: 169000XXXX | DATED: 5/4/2020 | DESIGNER: galarnmc

Y:\GIS\Projects\115\1584\MXD\NorthFA_RASP\Summary_Report\Figure 4_Pulliam_Offloading_Facility.mxd

PROJECT: 73251 | DATED: 5/4/2020 | DESIGNER: galarmmc



- APPROXIMATE LIMITS OF DISTURBANCE
- AIR MONITORING STATION
- PROPOSED SILT FENCE
- MATERIAL BINS
- STORMWATER RUNOFF BASIN
- HAUL ROAD AND PAD
- TRACKING PAD/CRANE PAD
- 5-FT CONTOUR (BROWN COUNTY)
- 1-FT CONTOUR (BROWN COUNTY)

0 75 150 Feet

APPROXIMATE FINAL GRADE

- 585.00-585.25FT
- 585.25-585.50FT
- 585.50-585.75FT
- 585.75-586.00FT
- 586.00-586.25FT
- 586.25-586.50FT
- 586.50-586.75FT
- 586.75-587.00FT

PULLIAM OFFLOADING FACILITY

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT

WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

FIGURE 4

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

Y:\GIS\Projects\15\15684MXD\NorthFA_RASP\Summary_Report\Figure 5_Site Preparation.mxd

#1

#1

#2

#2

RAILROAD LINE
OUT OF SERVICE
FOR STAGE 3 DREDGING

Fence

Removed Berm

Georgia
Pacific
Pavement

Georgia Pacific
Railroad Line

Georgia Pacific
Railroad Spur

LOWER FOX RIVER

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PROJECT: 73251 | DATED: 5/4/2020 | DESIGNER: galarmmc

NORTH FOCUS AREA
CRACK MONITORING LOCATION
VIBRATION MONITORING LOCATION
CONTAINMENT WALL
FENCE
GEORGIA PACIFIC RAILROAD LINE
GEORGIA PACIFIC RAILROAD SPUR
GEORGIA PACIFIC PAVEMENT
REMOVED BERM

0 37.5 75 Feet

SITE PREPARATION

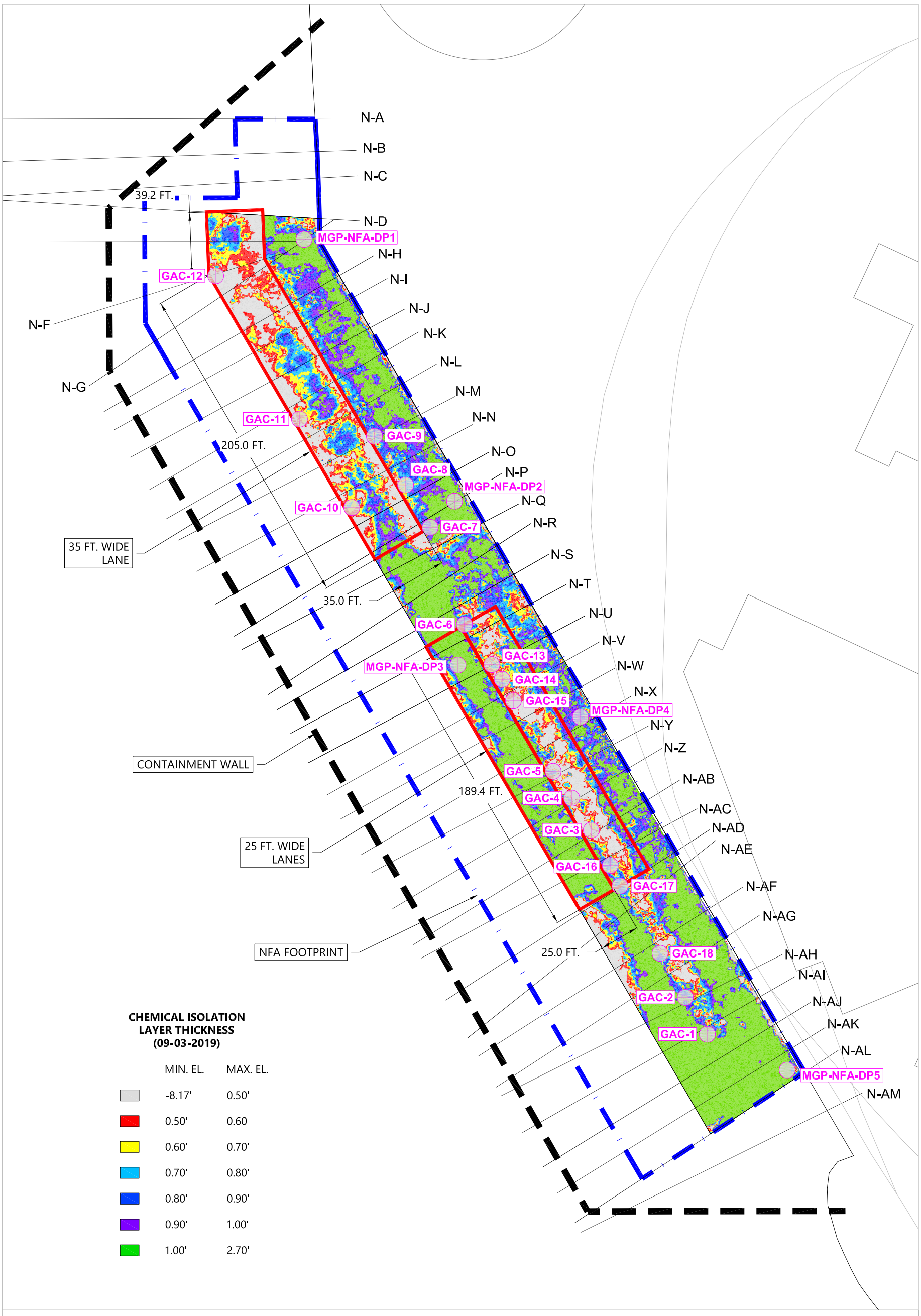
NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

FIGURE 5

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

DRAFT



Publish Date: 2020/05/04 1:42 PM | User: dbinkney
Filepath: \\amesbury1\Greenleaf\CAD - Boston\PROJECTS\080295-03 - FOX RIVER\2019\MGP NFA\2 Design\NFA-Post-Spread Iso-Lanes-04172020_NFA Summary Report.dwg AQ-B-Portrait

ANCHOR QEA

Figure 6
Chemical Isolation Layer Re-Spread Lanes

MGP North Focus Area Summary Report
Lower Fox River Remediation

Y:\GIS\Projects\115\15841\MXD\NorthFA_RASP\Summary_Report\Figure 7_Armored Mattress Installation Detail.mxd

BRENNAN (Marine Professionals Since 1919)	J.F. BRENNAN CO. 820 BAINBRIDGE ST. LA CROSSE, WI 54602 PHONE (608) 784-7173 FAX (608) 785-2090		TITLE: 200415 Armor Mattress Installation Detail		
			DRAWN BY: N. KAINZ	DATE: 04/15/2020	
			SCALE:	DWG #:	REV: 3

PROJECT: 73251 | DATED: 5/4/2020 | DESIGNER: galammc

ARMORED MATTRESS INSTALLATION DETAIL

FIGURE 7

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

Y:\GIS\Projects\151\584\MXD\NorthFA_RASP\Summary_Report\Figure 8_Post-Removal Sample Locations.mxd

PROJECT: 73251 | DATED: 5/4/2020 | DESIGNER: galarnmc

NORTH FOCUS

NORTH FOCUS AREA SAMPLE LOCATION

CONTAINMENT WALL

SAMPLING GRID

ARMORED MATTRESS EXTENT

STABILIZING WEDGE

0 50 100 Feet

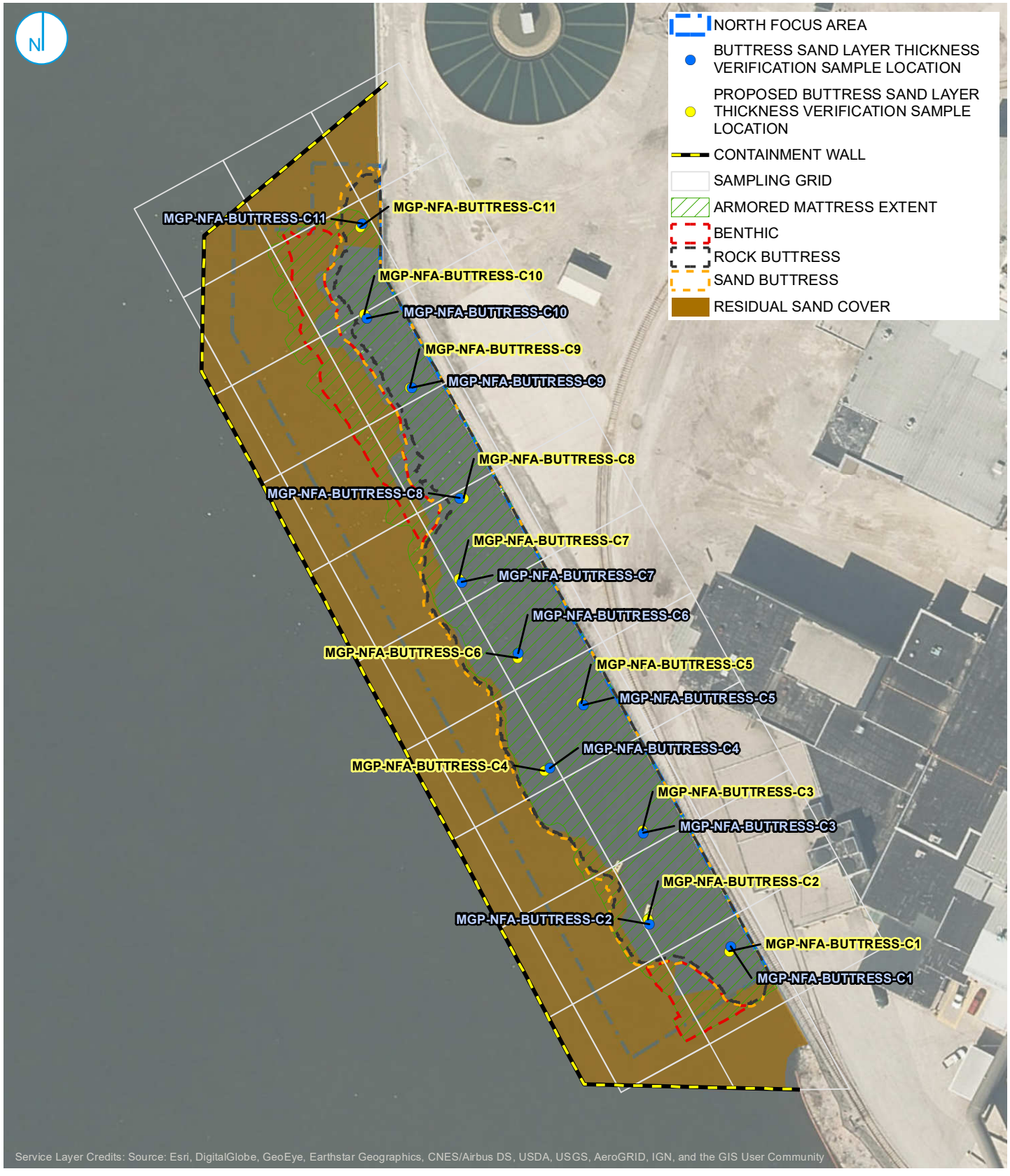
POST-REMOVAL SAMPLE LOCATIONS - AUGUST 2019

FIGURE 8

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL



Y:\GIS\Projects\151584\MXD\NorthFA_RASP\Summary_Report\Figure 9_Buttress Sand Thickness Verification.mxd

PROJECT: 73251 | DATED: 5/4/2020 | DESIGNER: galarnmc

0 50 100 Feet

BUTTRESS SAND THICKNESS VERIFICATION CORING LOCATIONS

FIGURE 9

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

Y:\GIS\Projects\15\1584\MXD\NorthFA_RASP\Summary_Report\Figure 10_Residual Sand Layer Verification.mxd

PROJECT: 73251 | DATED: 5/4/2020 | DESIGNER: galarnmc

0 50 100 Feet

RESIDUAL SAND LAYER POST-CONSTRUCTION THICKNESS VERIFICATION LOCATIONS

FIGURE 10

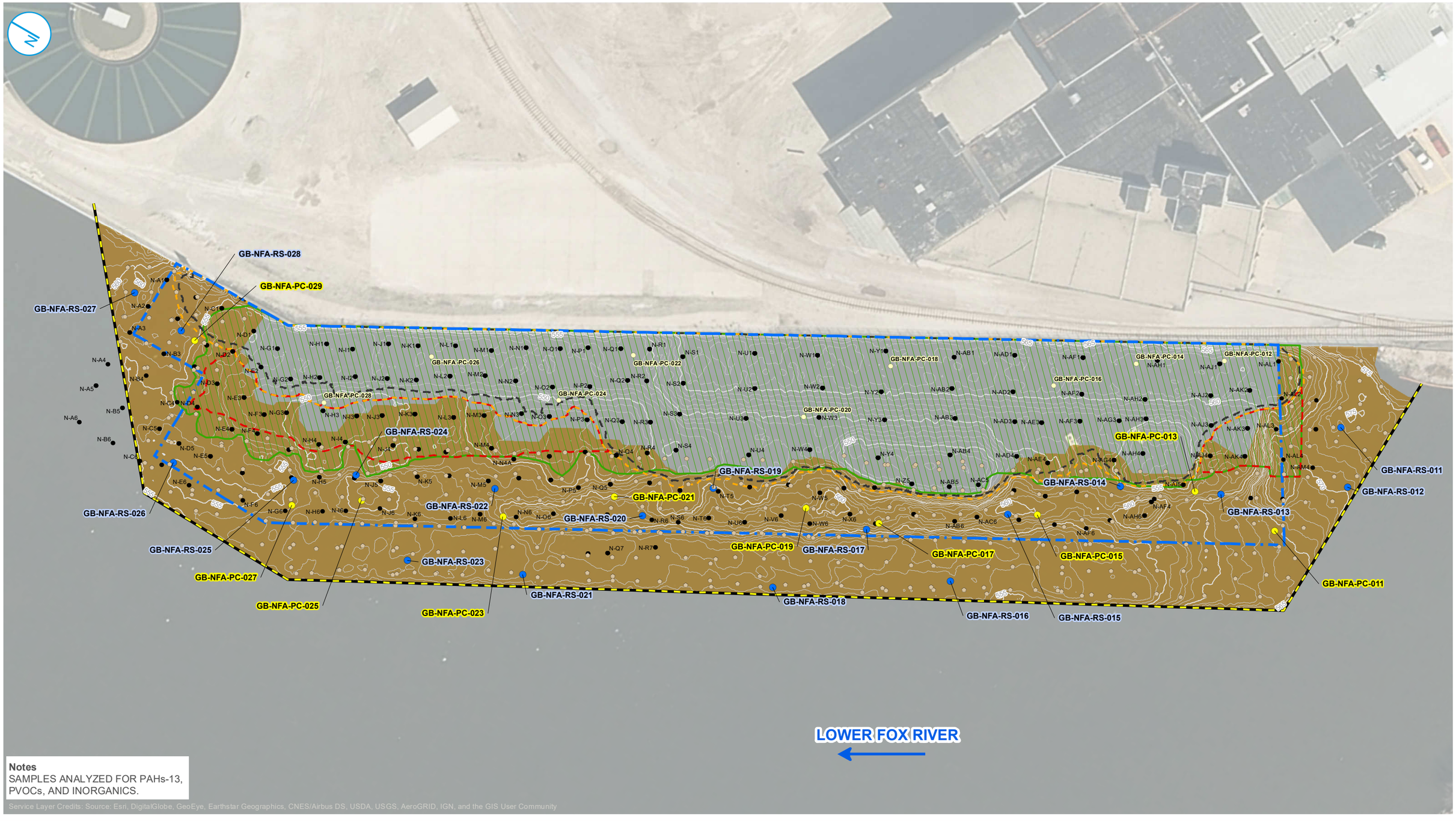
NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

Y:\GIS\Projects\15\15841MXD\NorthFA_RASP\Summary_Report\Figure 11_Evaluation of Post-Removal Observations.mxd

PROJECT: 73251 | DATED: 5/4/2020 | DESIGNER: galammc



Notes
SAMPLES ANALYZED FOR PAHs-13, PVOCs, AND INORGANICS.

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- NORTH FOCUS AREA
- RESIDUAL SAND LAYER THICKNESS POST-CONSTRUCTION SAMPLE LOCATION
- POST-REMOVAL SAMPLE LOCATION OUTSIDE ARMORED RUNOUT FOOTPRINT
- POST-REMOVAL SAMPLE LOCATION INSIDE ARMORED RUNOUT FOOTPRINT
- BRENNAN SOFT SEDIMENT OBSERVATION LOCATION
- 2017 SAMPLE LOCATION
- 5FT POST-REMOVAL ELEVATION CONTOUR
- 1FT POST-REMOVAL ELEVATION CONTOUR
- CONTAINMENT WALL
- ARMORED MATTRESS EXTENT
- BENTHIC
- ROCK BUTTRESS
- SAND BUTTRESS
- RESIDUAL SAND COVER

0 27.5 55 Feet

EVALUATION OF POST-REMOVAL OBSERVATIONS

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
FORMER GREEN BAY MANUFACTURED GAS PLANT
WISCONSIN PUBLIC SERVICE CORPORATION
CITY OF GREEN BAY, WISCONSIN

FIGURE 11

RAMBOLL US CORPORATION
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ACTUAL REMOVAL vs TARGET REMOVAL
MGP-NFA

LEGEND

MIN. EL.		MAX. EL.	AREA (sq.ft.)	
-10.77'	-	-4.00'	228.19	
-4.00'	-	-3.00'	363.06	
-3.00'	-	-2.00'	922.87	
-2.00'	-	-1.00'	2,503.32	
-1.00'	-	-0.01'	17,100.42	ACTUAL ABOVE TARGET
-0.01'	-	0.01'	807.31	
0.01'	-	6.40'	58,648.75	ACTUAL BELOW TARGET

OU# - D# - #
OPERABLE UNIT
DREDGE AREA
DREDGE MANAGEMENT UNIT
DREDGE MANAGEMENT UNIT (DMU)

SCALE (1" = 100')

100 50 0 100 200

SITE NOTES

1. HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE)
2. VERTICAL DATUM IS REFERENCED TO NAVD 88

TETRA TECH EC, INC.
1611 STATE STREET
GREEN BAY, WI 54304
TEL: (920) 445 - 0720 FAX: (920) 445 - 0719

CAD FILE: OU4-MGP-NFA As-Built-Actual v Target-revC
DRAWN BY: DAVID.FRISQUE
DATE: February 12, 2020
LAST REVISED: February 12, 2020
CHECKED BY: REG
SHEET: 3 OF 6

Fox River
LOWER FOX RIVER REMEDIATION LLC

PROJECT: 73251 | DATED: 5/4/2020 | DESIGNER: galamc

POST-REMOVAL SURVEY COMPARISON TO TARGET DREDGE ELEVATIONS

NORTH FOCUS AREA REMEDIAL ACTION SUMMARY REPORT
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FIGURE 12

RAMBOLL US CORPORATION
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APPENDICES (PROVIDED SEPARATELY)