# Focused Feasibility Study Addendum

## Monguagon Creek - Upper Trenton Channel
## Detroit River Area of Concern
## Riverview, Michigan

*Prepared for*
**U.S. Environmental Protection Agency**
**Great Lakes National Program Office**
Chicago, IL

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 2,4-DP | 2,4-di-*tert*-amylphenol |
| AOC | area of concern |
| AOI | area of interest |
| BATO | Bridgestone Americas Tire Operations, LLC |
| COC | chemical of concern |
| FFS | Focused Feasibility Study |
| MCUTC | Monguagon Creek - Upper Trenton Channel |
| PAH | polycyclic aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| Ramboll | Ramboll US Corporation |
| RAO | remedial action objective |
| RI | Remedial Investigation |
| TLC | thin layer cover |
| TU | toxic unit |
| USEPA | U.S. Environmental Protection Agency |
| UTC | Upper Trenton Channel |

# 1 INTRODUCTION

In 2018, Ramboll US Corporation (Ramboll), on behalf of Bridgestone Americas Tire Operations, LLC (BATO), submitted a Focused Feasibility Study (FFS) for the Monguagon Creek - Upper Trenton Channel (MCUTC) Site to the U.S. Environmental Protection Agency (USEPA) Great Lakes National Program Office. The parties' understanding of Site conditions, particularly as they related to a buried utility line, has evolved since the FFS was completed. The overall purpose of the 2018 FFS was to identify and evaluate remediation alternatives that address chemicals of concern (COCs) in Site sediments. Towards that end, the FFS addressed the following underlying objectives: 1) define remedial action objectives (RAOs); 2) identify potential remediation technologies and screen based on effectiveness, implementability, and cost; and 3) develop, evaluate, and compare candidate remediation alternatives.

The overall purpose of this addendum is to determine whether the recommended remediation alternative differs as a result of updated information about the buried utility line. The vast majority of the FFS is not affected by the updated information; this addendum addresses only those portions of the FFS that are affected by the updated information on the buried utility line. RAOs, cleanup goals, and definition and screening of remedial technologies remain unchanged as a result of the updated information. The preferred remedy for AOI-D (dredging) also is not affected by the updated information. It is only the evaluation of Remediation Alternative 5 (Dredge in AOI-C and -D) that warrants updating to reflect the new understanding of the water line. In addition to the updated evaluation of Remediation Alternative 5, this addendum provides concise excerpts from the FFS that provide context and aid overall understanding, as well as replacement of the term "enhanced monitored natural recovery" with "thin layer cover" because the latter is a more intuitive descriptor of the technology.

Like the FFS, this addendum was prepared in accordance with the Great Lakes Legacy Act Project Agreement executed on August 12, 2015, between USEPA and BATO for Remedial Investigation (RI) and FFS of the MCUTC Site. The FFS and this addendum were prepared voluntarily by BATO, the Non-Federal Partner, to facilitate and define potential voluntary remedial work in coordination with USEPA. Completion of the RI was led by USEPA, which contracted CH2M. The RI (CH2M 2017) was completed in August 2017.

The MCUTC Site is located within the Detroit River area of concern (AOC). The Site location is shown on the Site vicinity map included as Figure 1-1. A Site plan is included as Figure 1-2 and the MCUTC Site's spatial relationship to the Upper Trenton Channel (UTC) Site is illustrated in Figure 1-3. COCs that are the focus of the FFS and this addendum are polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), mercury, and 2,4-di-*tert*-amylphenol (2,4-DP).

## 1.1 BACKGROUND

This subsection provides context and background regarding the MCUTC Site; it is a condensed version of Section 2 of the FFS, provided here for ease of access and to highlight aspects of the Site most relevant to the updated information about the buried utility line. Readers are referred to the FFS for a more detailed description of the Site, Detroit River, AOC, investigation and remediation history, sampling data, conceptual site model, COCs, and basis for defining areas of interest (AOIs).

The MCUTC Site is located within the Detroit River AOC and includes the lower 1,700 feet of Monguagon Creek and approximately 50 acres of Trenton Channel immediately downstream of the Grosse Ile Toll Bridge and across to Grosse Ile in Riverview, Michigan (Figure 1-1). Monguagon Creek flows into the Trenton Channel, which is an 8-mile stretch of the lower Detroit River. The Detroit River flows south into Lake Erie. The Site represents a small portion of the UTC Site and an even smaller portion of the Detroit River AOC.

The MCUTC Site is divided into three main areas: Monguagon Creek, UTC-West, and UTC-East (Figure 1-2). UTC-East was included within the MCUTC Site because it may present opportunities to improve habitat (Detroit River Public Advisory Council 2014). The presence of the navigation channel between UTC-East and UTC-West likely limits or prevents contributions of contamination to UTC-East from any of the industrial sources adjacent to UTC-West. Rather, UTC-East reflects conditions that are generally consistent with urban background, as opposed to direct releases from point sources from within the MCUTC Site.

Monguagon Creek is approximately 0.7 mile long and 30 to 40 feet wide, discharging to UTC-West in Riverview, just south of Bridge Road and the Grosse Ile Toll Bridge. Largely channelized and partially culverted, Monguagon Creek is located within a highly industrialized area of Riverview. Monguagon Creek is one of five tributaries that flow into the Detroit River AOC. Flow within Monguagon Creek is largely derived from the Huntington Drain, which conveys stormwater from the City of Riverview.

Monguagon Creek receives untreated stormwater runoff from the streets and industrial properties that surround it via the storm sewer system. Huntington Drain receives stormwater from an approximately 1 square mile area of Riverview; it flows into the northern reach of Monguagon Creek. Other storm sewer drains that discharge to Monguagon Creek are located north of the West Jefferson Avenue Bridge and approximately 300 feet downstream of the bridge on the east bank. A total of five stormwater outfalls, originally installed in 1919 and the 1960s, discharge to Huntington Drain or Monguagon Creek.

During the period from 1951 to 1982, manufacturing wastes and products were released to portions of the Huntington Drain (upstream of the Site) and adjacent to Monguagon Creek. In addition, this area was used as a surface impoundment for sludge, chromium, and corrosive waste. A reach of the creek was subsequently capped as a landfill, and another section became a parking lot. During the 1970s, 2,4-DP, oil and grease, lead, and zinc were discharged to Monguagon Creek from an outfall at the former ATOFINA Chemicals, Inc., West Plant facility. This outfall was redirected to the Trenton Channel in January 1997 (CRA 1997).

The shoreline of Monguagon Creek and UTC-West is a mixture of natural shoreline, concrete and rock fill, and sheet pile. Some embankments are quite steep, particularly at the mouth of Monguagon Creek. Monguagon Creek's shoreline vegetation is dominated by invasive shrubs (e.g., honeysuckle [*Lonicera maackii*] and buckthorn [*Rhamnus* spp.]). A few mature cottonwood trees (*Populus* spp.) grow along the banks. There is minimal herbaceous cover. Some undercutting of both banks and exposed tree roots are evidence of bank erosion throughout the creek. Concrete debris is prevalent in the creek. There is minimal woody debris within Monguagon Creek, though shrubs overhang the creek by about 5 to 10 ft.

Much of the bank of UTC-West is lined with a steel retaining wall, concrete debris, and/or riprap. The vegetation along the bank of UTC-West is represented by invasive shrubs, a few mature trees, and some herbaceous understory. The banks appear relatively stable, though the use of a retaining wall and riprap for bank stabilization limit the quality and quantity of foraging and cover habitat for wildlife.

AOI-C is located at the mouth of Monguagon Creek and appears to be strongly influenced by backwater/eddy effects of UTC. Elevated concentrations of most COCs occur within the PAH toxic unit (TU)=1 footprint of AOI-C and, for that reason, the PAH TU=1 isopleth preliminarily defines the boundary of AOI-C.

Work is currently under way to support a pre-design investigation, including sampling, analysis, and modeling. The outcomes of that work will be reported separately and may result in changes to the AOI boundaries, which in turn may result in changes to remediation costs.

## 1.2 UPDATED UNDERSTANDING OF UTILITY LINE

When the 2018 FFS was prepared, the main source of information about a buried utility line at the mouth of Monguagon Creek was derived from CRA (1997), which described the 1994 remedial action of Monguagon Creek. The remedial action was conducted under a voluntary agreement between the Michigan Department of Environmental Quality, Elf Atochem North America Inc., Bridgestone/Firestone Inc., and Jones Chemicals Inc. Approximately 34,500 tons of contaminated, nonhazardous sediments was excavated to the underlying clay. The sediment removal also included a portion of the Huntington Drain. CRA (1997) reported that a water main utility crossing near the confluence of Monguagon Creek and UTC prevented sediment removal from occurring in the mouth of the creek. That description suggested the utility line crossed the mouth of Monguagon Creek.

The FFS noted that subsurface utility clearance and mapping would be a critical component of engineering design for Remediation Alternative 4; the same is true for Remediation Alternative 5. To support such mapping and clearance, USEPA identified historical maps and plans that noted the location of an 8-in. welded steel pipe that crosses UTC at the Grosse Ile Toll Bridge and flows into a pumping station on Grosse Ile (Figures 1-4 and 1-5). Given its connection to a pumping station, the utility line is inferred to be a water line. Both the map and the plan depict this water line as tracking directly under the full length of bridge, following the southern side of the bridge.

Representatives of Grosse Ile Township indicate that two inactive water lines exist near AOI-C. The original water main that supplied water to the township of Grosse Ile was a buried 8-inch diameter line that ran parallel to the toll bridge, 4 feet south of the centerline of the bridge. That line was replaced by a 12-inch diameter line. There are no records related to the decommissioning of the 8-inch diameter line, though it was presumably cut and capped at both ends. The 12-inch diameter replacement line ran parallel to and approximately 50 feet south of the bridge. In 1943, the 12-inch diameter line was replaced by a 16-inch diameter line that remains active and runs directly under the north side of the bridge. Though there also are no decommissioning records for the 12-inch diameter line, Grosse Ile representatives were confident that it had been cut and capped at both ends.

During the completion of hydrographic bathymetry, magnetometry, and side scan sonar surveys of the project area in the fall of 2020, a linear feature was observed south of, and running parallel to, the bridge in the sediment of the river bottom (Figure 1-6). This feature appears to be the inactive 12-inch diameter water line, which is partially buried. The magnetometry survey provided limited information about the water line due to high interference from the nearby bridge.

The inactive water lines do not influence the preferred remediation alternative for AOI-D. The FFS determined that dredging is the preferred remedy for AOI-D. The northern boundary of AOI-C, as defined in the FFS, tracks closely to the southern side of the Grosse Ile Toll Bridge. Work that is being conducted in 2022 related to the remedial design will refine the dredging footprint, debris removal, and other activities necessitated by the presence of the inactive water lines.

# 2 UPDATE TO REMEDIATION ALTERNATIVE 5

The FFS developed five remediation alternatives:

- Remediation Alternative 1: No Action
- Remediation Alternative 2: Thin Layer Cover in AOI-C and Cap in AOI-D ("TLC & Cap")
- Remediation Alternative 3: Thin Layer Cover in AOI-C and Dredge in AOI-D ("TLC & Dredge")
- Remediation Alternative 4: Dredge in AOI-C and Cap in AOI-D ("Dredge & Cap")
- Remediation Alternative 5: Dredge in AOI-C and -D ("Dredge").

Institutional controls were incorporated into all remediation alternatives except No Action. Similarly, habitat restoration in AOI-C and -D was incorporated into all remediation alternatives except No Action.

Table 2-1 summarizes the five remediation alternatives. Of the five remediation alternatives, only Remediation Alternative 5: Dredge in AOI-C and -D is affected by the new information about the water line near AOI-C. Therefore, the evaluation of this alternative is updated in this addendum to accurately reflect conditions in and near AOI-C.

Remediation Alternative 5 involves four main components: a) dredging followed by backfilling with a 6-in. sand cover in AOI-C; b) dredging followed by backfilling with a 6-in. sand cover in AOI-D, with optional monitored natural recovery adjacent to AOI-D; c) habitat restoration in AOI-C and –D[1]; and d) institutional controls. The updated information on the two inactive water lines affects only the first of the four components, and only with respect to the dredge area and dredge volume. The inactive water lines track along the length of bridge, parallel to and south of the bridge's southern side.

Of the six National Contingency Plan criteria considered in the FFS, the updated information did not affect three criteria, namely:

- Overall protection of human health and the environment
- Reduction in mass, toxicity, mobility, or volume through treatment
- Short-term effectiveness.

[1] Optional restoration work in UTC-East, described in the Focused Feasibility Study (Ramboll 2018), has since been initiated by Friends of Detroit River, independent of the MCUTC project. That optional restoration work therefore is removed from Remediation Alternative 5.

This section, therefore, updates the evaluation of Remediation Alternative 5 relative to the remaining three criteria: a) long-term effectiveness and permanence; b) implementability; and c) cost. Figure 2-1 illustrates the conceptual layout of Remediation Alternative 5. This section closes with an update to the overall comparative analysis of the five remediation alternatives.

## 2.1 LONG-TERM EFFECTIVENESS AND PERMANENCE

Remediation Alternative 5 involves dredging in AOI-C and -D. Management of residuals and sequencing relative to the UTC remediation may influence recontamination and therefore effectiveness of the remedy. Within AOI-D, it is assumed that complete dredging would be possible and the remedy therefore would be permanent.

## 2.2 IMPLEMENTABILITY

Remediation Alternative 5 involves dredging in AOI-C and -D. Dredging in AOI-C is implementable, provided the two inactive water lines that cross the dredge footprint are removed prior to dredging. Dredging in AOI-D would be technically and administratively implementable. For both AOI-C and -D, implementability would depend on vertical and lateral delineation sampling during engineering design. Treatability studies also may be necessary during engineering design, to optimize dewatering and any amendments that may be warranted prior to disposal of dredged materials.

## 2.3 COST

The cost of implementing Remediation Alternative 5 is the highest of the active options. Its estimated cost is $7.1M. This estimated cost is contingent on the dredging approach specified in the FFS, particularly with respect to dredging footprint, dredging depth (i.e., to native clay plus 6-in. overdredge), and application of a 6-in. sand backfill layer after dredging to control residuals. There is uncertainty in costs associated with the dredge volume (to be refined during engineering design).

## 2.4 COMPARATIVE ANALYSIS

Table 2-2 compares the five remediation alternatives relative to six National Contingency Plan criteria. Based on the detailed evaluation of the remediation alternatives presented in the FFS, combined with updates to two criteria relative to Remediation Alternative 5, the key advantages and disadvantages of each are summarized in Table 2-3.

# 3 SUMMARY AND RECOMMENDATIONS

This FFS Addendum updates the evaluation of Remediation Alternative 5 to reflect current understanding of the two inactive water lines. When the FFS was prepared in 2018, the main source of information about a utility line at the mouth of Monguagon Creek was derived from CRA (1997), which reported that utility crossings near the confluence of Monguagon Creek and UTC prevented sediment removal from some portions of the creek.

Representatives of Grosse Ile Township subsequently shared information about two inactive water lines in the vicinity of AOI-C. The original water main was an 8-inch diameter line that ran parallel to the toll bridge, 4 feet south of the centerline of the bridge. That line was replaced by a 12-inch diameter line that ran parallel to and approximately 50 feet south of the bridge. The 12-inch diameter line was replaced by a 16-inch diameter line that remains active and runs directly under the north side of the bridge.

The FFS identified the following five remediation alternatives:

- Remediation Alternative 1: No Action
- Remediation Alternative 2: Thin Layer Cover in AOI-C and Cap in AOI-D (TLC & Cap)
- Remediation Alternative 3: Thin Layer Cover in AOI-C and Dredge in AOI-D (TLC & Dredge)
- Remediation Alternative 4: Dredge in AOI-C and Cap in AOI-D (Dredge & Cap)
- Remediation Alternative 5: Dredge in AOI-C and -D (Dredge).

This addendum focuses on Remediation Alternative 5, which is the only remediation alternative affected by the improved understanding of the buried water line. The 2018 FFS had identified Remediation Alternative 3 (TLC & Dredge) as the preferred alternative. With the improved understanding of the inactive water lines, Remediation Alternative 5 (Dredge) is equally appropriate. The relatively small increase in cost ($300,000) of Remediation Alternative 5 (compared to Remediation Alternative 3) is balanced by improved long-term effectiveness; consequently, this addendum recommends changings the preferred alternative to Remediation Alternative 5. If, however, the cost of dredging differs markedly from that assumed in the FFS—for example if the unit cost of disposal increases substantially—the added cost of dredging AOI-C may not be justified and the preferred alternative would revert to Remediation Alternative 3.

# 4 REFERENCES

CH2M. 2017. Final Remedial Investigation Report, Monguagon Creek, Upper Trenton Channel, Detroit River Area of Concern, Riverview, Michigan. July.

CRA. 1997. Completion of Construction Report Monguagon Creek Remedial Action. Conestoga-Rovers & Associates. July.

Detroit River Public Advisory Council. 2014. Targets for Removal of the Loss of Fish & Wildlife Habitat and Degradation of Fish & Wildlife Populations Beneficial Use Impairments of the Detroit River Area of Concern. Fish & Wildlife Technical Committee. Submitted to Michigan Department of Environmental Quality, Office of the Great Lakes, Lansing, MI. Originally adopted April 17, 2009; revised May 12, 2014.

Ramboll. 2018. Focused Feasibility Study. Monguagon Creek, Upper Trent Channel, Detroit River Area of Concern. Riverview, Michigan. Prepared for U.S. Environmental Protection Agency, Great Lakes National Program Office, Chicago, IL. Ramboll US Corporation.

# Figures


Vicinity Map

FIGURE 1-1

DRAFTED BY: CWD

DATE: 1/11/2018

PROJECT

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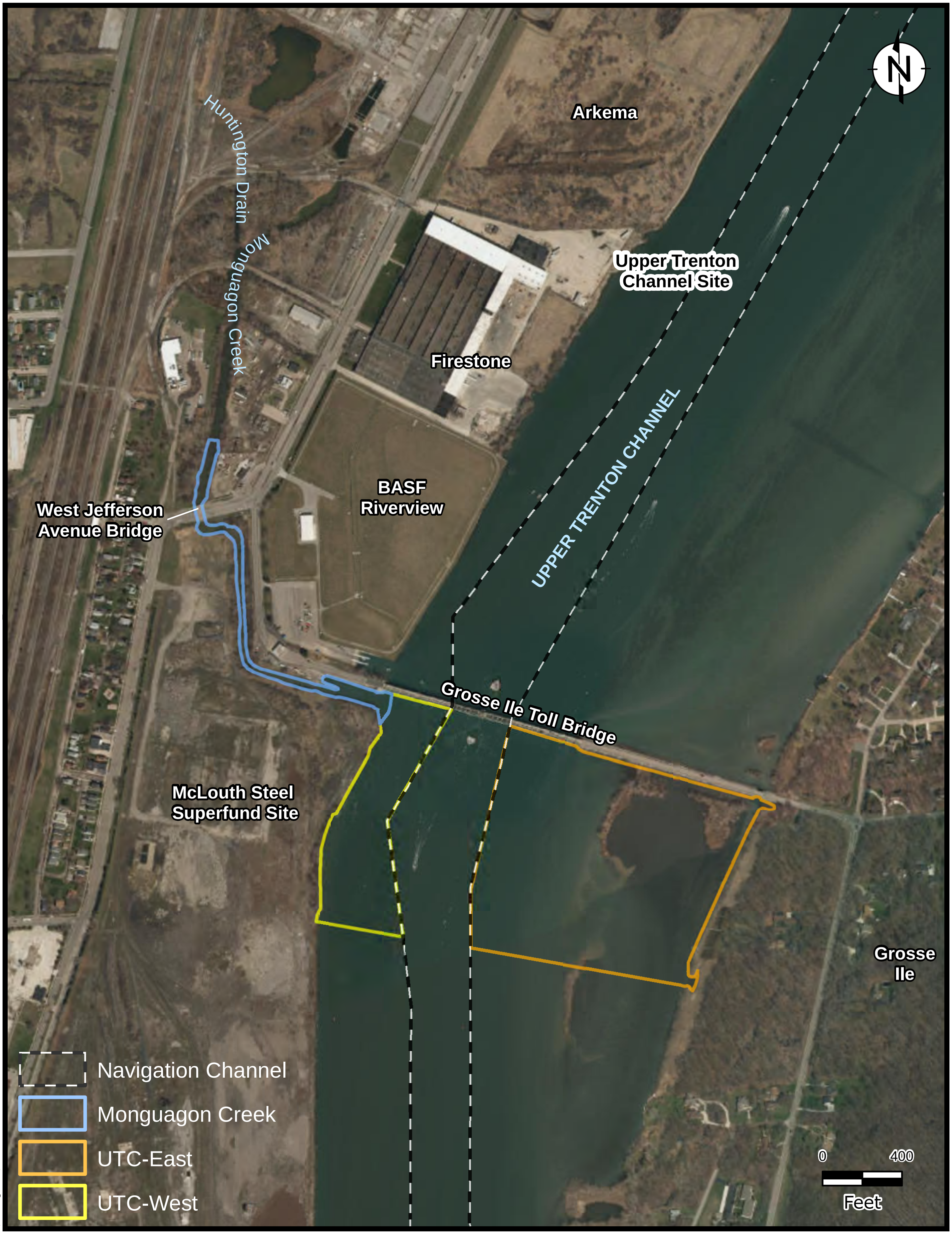


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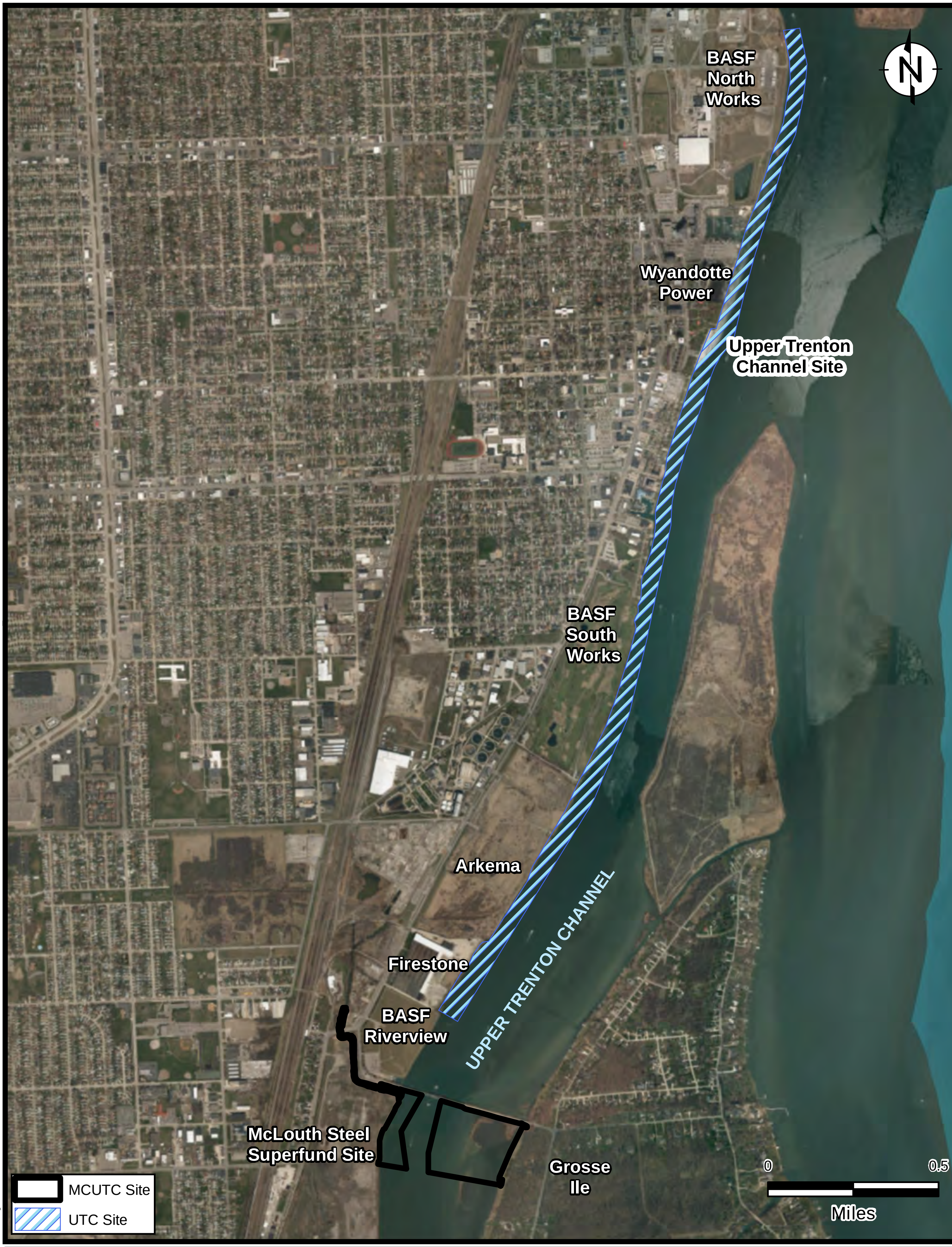
**Site Plan**

FIGURE
**1-2**

DRAFTED BY: CWD | DATE: 1/11/2018 | PROJECT

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RAMBOLL

MCUTC and UTC Sites

FIGURE 1-3

DRAFTED BY: CWD | DATE: 5/17/2018 | PROJECT

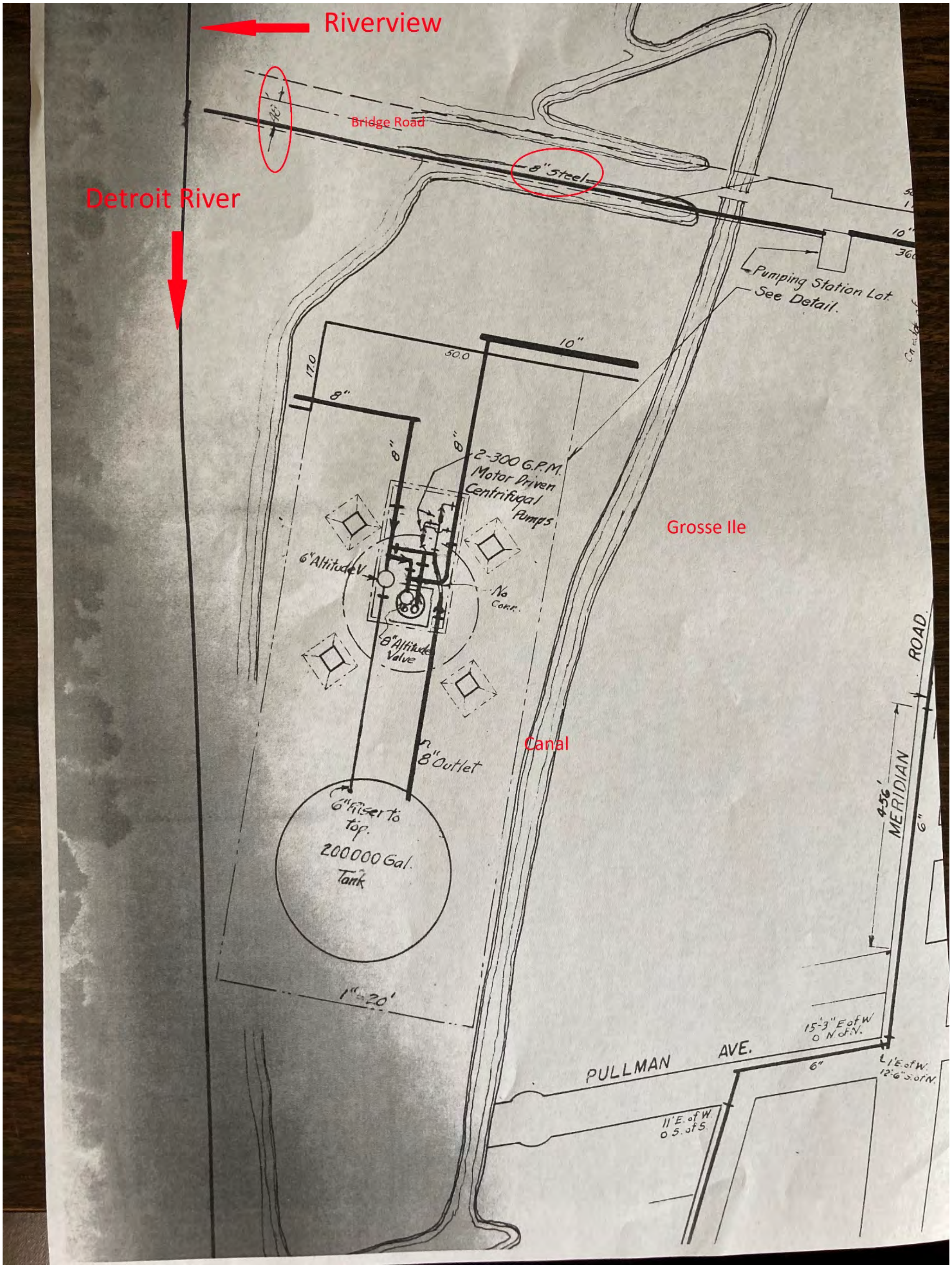


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**Figure 1-4.**
Annotated Water Line Plan


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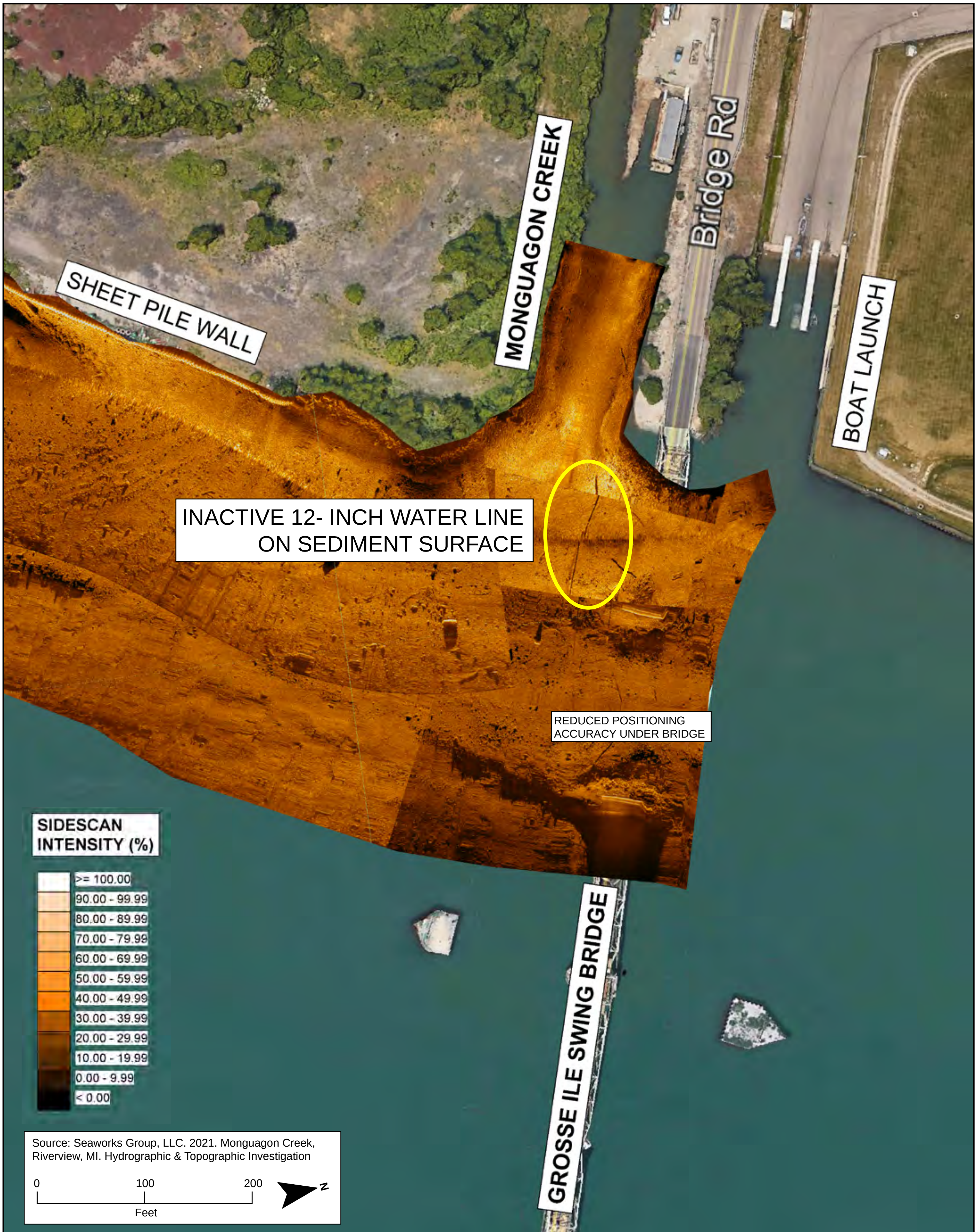
**Figure 1-5.**
Annotated Water Line Map




integral consulting inc.

**Figure 1-6.**
Sidescan Sonar Survey

G:\BATO MCUTC\GIS\MCUTC_Sources\MCUTC_Sources.aprx\Figure 1-7

PROJECT: 169000XXXX | DATED: 1/14/2022 | DESIGNER: MLINDMAN


Inactive water line
AOIs
**Remediation Alternative**
Dredge with Backfill
Optional MNR

Habitat Enhancement

0 100 200 Feet

## CONCEPTUAL LAYOUT
### REMEDIATION ALTERNATIVE 5

## FIGURE 2-1

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# Tables

Table 2-1. Summary of Remediation Alternatives, Monguagon Creek Upper Trenton Channel Site

| Remediation Alternative | Remedy Description | Total Remedy Area (acres) | TLC Area (acres) | Cap Area (acres) | Dredge Area (acres) | Estimated Dredge Volume (cubic yards)[a] | 6-in. Overdredge Volume (cubic yards)[a] | Total Estimated Dredge Volume (cubic yards)[a] |
|---|---|---|---|---|---|---|---|---|
| 1 | No Action | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | TLC in AOI-C and Cap in AOI-D | 2.8 | 0.95 | 1.8 | 0 | 0 | 0 | 0 |
| 3 | TLC in AOI-C and Dredge in AOI-D | 2.8 | 0.95 | 0 | 1.8 | 35,900 | 1,460 | 37,360 |
| 4 | Dredge in AOI-C and Cap in AOI-D | 2.6 | 0 | 1.8 | 0.8 | 1,590 | 615 | 2,205 |
| 5 | Dredge in AOI-C and AOI-D | 2.6 | 0 | 0 | 2.6 | 37,490 | 2,075 | 39,565 |

Notes:

AOI = area of interest

TLC = thin layer cover

[a] Dredge volumes are estimated based on spatial interpolation of soft sediment thickness. Because soft sediment thickness is not constrained in all areas of the Site, these numbers are uncertain and will be evaluated during the remedy design.

Table 2-2. Comparative Analysis of Alternatives, Monguagon Creek Upper Trenton Channel Site

| | REMEDIATION ALTERNATIVES | | | | |
|---|---|---|---|---|---|
| | **Remediation Alternative 1**<br>**No Action** | **Remediation Alternative 2**<br>**TLC & Cap** | **Remediation Alternative 3**<br>**TLC & Dredge** | **Remediation Alternative 4**<br>**Dredge & Cap** | **Remediation Alternative 5**<br>**Dredge** |
| **Threshold Criteria** | | | | | |
| **Overall Protection of Human Health and the Environment** | No action would not detectably change conditions from baseline. Baseline conditions include PAH TUs greater than 1 to 4, which suggest that the bioavailable fraction of PAHs has potential to impact benthic invertebrates. Risks to human health, to the extent that they may be posed in part by current conditions at the MCUTC Site, are currently managed through a fish consumption advisory. No Action, therefore, is protective of human health, but not the environment. | Remediation of AOI-C and -D through a combined remedy using TLC, cap, and/or dredge, or through dredging alone, would replace the existing biologically active zone with clean material and suitable benthic habitat for benthos or sturgeon spawning. Remediation Alternatives 2 through 5 therefore would be protective of the environment. Risks to human health, to the extent that they may be posed in part by current conditions at the MCUTC Site, are currently managed through a fish consumption advisory. | | | |
| **Attain RAOs:** | | | | | |
| 1. Support restoration of beneficial uses within Detroit River AOC by reducing the mass, volume, and concentration of COCs in MCUTC sediment | No action would not reduce mass, volume, or concentration of COCs in MCUTC sediment. | Remediation of AOI-C and -D through a combined remedy using TLC, cap, and/or dredge, or through dredging alone, would reduce mass, volume, and/or concentrations of COCs in MCUTC sediment. | | | |
| 2. Reduce short- and long-term risks to human health and the environment | No action would not reduce risks, though its implementation also would not cause any short-term risks to human health or the environment. | Remediation of AOI-C and -D through a combined remedy using TLC, cap, and/or dredge, or through dredging alone, would reduce risks, while limiting physical, chemical, or biological harm to the ecosystem associated with implementation of Remediation Alternatives 2 through 5. | | | |
| 3. Improve habitat of the Site through targeted restoration | No action would not improve habitat of the Site through restoration. | Under Remediation Alternatives 2 through 5, habitat restoration would be implemented in AOI-C and -D following remediation, as well as within UTC-East. | | | |
| 4. Manage contaminated sediments that are susceptible to scour and downstream transport | No action would not manage any sediments, including those that are susceptible to scour and downstream transport | Remediation of AOI-C and -D through a combined remedy using TLC, cap, and/or dredge, or through dredging alone, would manage contaminated sediments that are currently susceptible to scour and downstream transport. | | | |
| **Balancing Criteria** | | | | | |
| **Long-Term Effectiveness and Permanance** | No action would not be effective in the long-term and does not provide a permanent remedy. | The long-term effectiveness and permanence of TLC in AOI-C and of cap in AOI-D depend on proper engineering design to ensure that both covers can withstand high energy events. | The effectiveness of Remediation Alternative 3 would be a function of sequencing of the UTC remedy. Assuming recontamination risk is mitigated, the long-term effectiveness of TLC in AOI-C would depend on proper engineering design to ensure that the thin cover can withstand existing conditions.<br><br>Also assuming recontamination risk is mitigated, the dredging proposed for AOI-D would be effective in the long-term and would be essentially permanent. | The effectiveness of Remediation Alternative 4 would be a function of sequencing of the UTC remedy.<br><br>In addition, the long-term effectiveness of the AOI-D cap would depend on proper engineering design to ensure that the cap can withstand high energy events. The steep bathymetry within AOI-D and high energy in the channel pose some risks to the long-term effectiveness of a cap over AOI-D, particularly in case of extreme events, such as flooding, earthquake, or ice scour.<br><br>Because contaminated sediments would be left in place underneath the AOI-D cap, this remediation alternative would not be permanent. | The effectiveness of Remediation Alternative 5 would be a function of sequencing of the UTC remedy. Dredging would be permanent. |
| **Reduction in Toxicity, Mobility, or Volume through Treatment** | No action would not reduce the toxicity, mobility, or volume of COCs. | Amendments may be integrated into the cover materials used with TLC and capping, in order to reduce bioavailability of PAHs and PCBs. Cover materials will be selected during engineering design. | Amendments may be integrated into the cover materials used with TLC and capping, in order to reduce bioavailability of PAHs and PCBs. Cover materials will be selected during engineering design.<br><br>Dredged materials may be treated prior to disposal in order to yield physical and chemical characteristics that will reduce mobility. | Dredged materials may be treated prior to disposal in order to yield physical and chemical characteristics that will reduce mobility.<br><br>Amendments may be integrated into the cover materials used with TLC and capping, in order to reduce bioavailability of PAHs and PCBs. Cover materials will be selected during engineering design. | Dredged materials may be treated prior to disposal in order to yield physical and chemical characteristics that will reduce mobility. |
| **Short-Term Effectiveness** | Because no action does not require any Site work, its implementation would not pose short-term risks. It also would not mitigate any short-term risks that are potentially posed under current conditions. | Site work associated with TLC, capping, and/or dredging would involve Site access and equipment staging, thin cover placement, cap placement, sediment removal, treatment, transport and disposal, and long-term monitoring. Site access and equipment staging could harm wetland vegetation. Vegetative restoration typically requires at least one growing season. Placement of thin cover and/or cap and dredging can have short-term effects on the benthic community. Benthic recolonization with suitable substrate typically occurs within weeks to months following the completion of construction. Most recolonization occurs through natural import of biological species. To the extent practicable, materials used for TLC, cap or backfill would be selected based on compatibility with habitat preferences for local invertebrates to support rapid recolonization.<br><br>Short-term risks to field technicians include the potential for exposure to chemicals in sediment and the hazards of offshore construction. These risks would be mitigated through compliance with OSHA regulations and Site-specific health and safety plans to reduce on-site construction risks and the risk of chemical exposure. Therefore, short-term risks of remedy implementation would be mitigated. Short-term community risks also exist due to the need to transport cap/cover materials to the Site via local roads—these risks could be reduced by developing a Site-specific transportation plan during design. | | | |

Table 2-2. Comparative Analysis of Alternatives, Monguagon Creek Upper Trenton Channel Site

| | REMEDIATION ALTERNATIVES | | | | |
|---|---|---|---|---|---|
| | **Remediation Alternative 1**<br>**No Action** | **Remediation Alternative 2**<br>**TLC & Cap** | **Remediation Alternative 3**<br>**TLC & Dredge** | **Remediation Alternative 4**<br>**Dredge & Cap** | **Remediation Alternative 5**<br>**Dredge** |
| **Implementability** | No implementation would be associated with the No Action alternative. There are therefore no constraints on the No Action alternative's technical or administrative feasibility. | TLC would be implementable in AOI-C, requiring the design and installation of a thin cover layer, and preparation and approval of a long-term monitoring plan and implementation of that plan. Field characterization would be needed during engineering design to confirm lateral extent and to assess geotechnical characteristics of the existing soft sediment layer to ensure stability of the thin cover.<br><br>Capping would be implementable in AOI-D, though there are some factors unique to AOI-D that would create challenges. Implementation would require the design and installation of the cap, and preparation and approval of a long-term monitoring plan and implementation of that plan. Some portions of AOI-D may not be conducive to capping due to steep bathymetry and high energy. Field characterization would be needed during engineering design to confirm lateral extent and to assess the geotechnical characteristics of the existing soft sediment layer and bathymetry to ensure cap stability. Hydrological modeling also may be warranted during engineering design to ensure that reduced water depths would not significantly affect flood storage capacity or flow. | TLC in AOI-C would be implementable, requiring the design and installation of a thin cover layer, and preparation and approval of a long-term monitoring plan and implementation of that plan. Field characterization would be needed during engineering design to confirm lateral extent and to assess geotechnical characteristics of the existing soft sediment layer to ensure stability of the thin cover.<br><br>Dredging would be implementable in AOI-D, requiring vertical and lateral delineation sampling during engineering design, remedy design and implementation, and preparation and approval of a long-term monitoring plan and implementation of that plan. Treatability studies also may be necessary during engineering design, in order to optimize dewatering and any amendments that may be warranted prior to disposal of dredged materials. | Dredging would require vertical and lateral delineation sampling during engineering design, remedy design and implementation, and preparation and approval of a long-term monitoring plan and implementation of that plan. Treatability studies also may be necessary during engineering design, in order to optimize dewatering and any amendments that may be warranted prior to disposal of dredged materials.<br><br>Constraints on the implementability of capping in AOI-D may be related to hydrodynamics, bathymetry, and maintenance of water depths. Testing to be undertaken during engineering design may find that some portions of AOI-D are too steep or subject to sheer stresses too great to allow capping throughout the entire AOI. Hydrological modeling also may be warranted during engineering design to ensure that reduced water depths would not significantly affect flood storage capacity or flow. Permitting may place some limits on administrative implementability, particularly if capping cannot be permitted without first conducting some dredging to maintain water depth. | Dredging in AOI-C and -D would be technically and administratively implementable. Dredging would require vertical and lateral delineation sampling during engineering design, remedy design and implementation, and preparation and approval of a long-term monitoring plan and implementation of that plan. Treatability studies also may be necessary during engineering design, in order to optimize dewatering and any amendments that may be warranted prior to disposal of dredged materials. |
| **Cost** | No costs are associated with the No Action alternative. | Least expensive of the active remediation alternatives.<br>Cost uncertainty more likely to lead to higher than lower actual costs; current assumption is that no dredging is necessary in AOI-D prior to capping. If hydrological modeling determines otherwise, costs will increase. | Intermediate in expense, relative to the other active remediation.<br>Cost uncertainty is associated with dredge depth, which is currently assumed to extend to native clay. Vertical delineation sampling conducted during engineering design may reduce dredge depth and costs. | | Most expensive of the active remediation alternatives.<br>Cost uncertainty is associated with dredge depth, which is currently assumed to extend to native clay. Vertical delineation sampling conducted during engineering design may reduce dredge depth and costs. |

Notes:
AOI = area of concern
COC = chemical of concern
CUG = cleanup goal
MCUTC = Monguagon Creek Upper Trenton Channel
MNR = monitored natural recovery
OSHA = Occupational Safety and Health Administration
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
RAO = remedial action objective
RI = remedial investigation
TLC = thin layer cover
TU = toxic unit
UTC = Upper Trenton Channel

Table 2-3. Advantages and Disadvantages of Each Remediation Alternative

| Remediation Alternative | Advantages | Disadvantages |
|---|---|---|
| 1. No Action | No cost.<br><br>No implementation and therefore no short-term risk associated with implementation. | Not adequately protective of the environment.<br><br>Does not achieve RAOs. |
| 2. TLC & Cap | Least expensive of the active remediation alternatives.<br><br>TLC is readily implementable in AOI-C, as it will not disturb underground utilities. | Some portions of AOI-D may not be conducive to capping, due to steep bathymetry and high energy.<br><br>If hydrodynamic modeling indicates that TLC in AOI-C and/or capping in AOI-D will reduce flood storage capacity, then it may be necessary to dredge before installing the thin cover and/or cap, which could substantially increase costs. |
| 3. TLC & Dredge | TLC is readily implementable in AOI C, as it will not disturb underground utilities.<br><br>Dredging in AOI-D, including overdredging and backfilling, enhances this remedy's long-term effectiveness and reduces risk of scour and downstream transport of COCs.<br><br>The steep bathymetry of AOI-D likely poses fewer implementation challenges for dredging than it does for capping. | If hydrodynamic modeling indicates that TLC in AOI-C will reduce flood storage capacity, then it may be necessary to dredge before installing the thin cover, which could pose implementability challenges and increase costs.<br><br>Vertical and lateral delineation of AOI-D necessary during engineering design.<br><br>More expensive than TLC & Cap and Dredge & Cap, though costs may be reduced based on delineation of AOI-D. |
| 4. Dredge & Cap | Dredging in AOI-C enhances this remedy's long-term effectiveness and reduces risk of scour and downstream transport of COCs. | Some portions of AOI-D may not be conducive to capping, due to steep bathymetry and high energy.<br><br>If hydrodynamic modeling indicates that capping in AOI-D would reduce flood storage capacity, it may be necessary to dredge before capping in AOI-D, which could substantially increase costs. |
| 5. Dredge | Dredging, including overdredging and backfilling, enhances this remedy's long-term effectiveness and reduces risk of scour and downstream transport of COCs.<br><br>The steep bathymetry of AOI-D likely poses fewer implementation challenges for dredging than for capping. | Most expensive of the active remediation alternatives. |

Notes:
AOI = area of interest
COC = chemical of concern
TLC = thin layer cover