

**Project Background**

The Lower Rouge River Old Channel Remediation (LRROC) project is located in Detroit, Michigan. The EPA’s Great Lakes National Program Office is working with Honeywell, Inc to clean up a 0.75-mile stretch of the Lower Rouge River.

The remediation will consist of removing approximately 90,000 cy of Polycyclic Aromatic Hydrocarbons (PAH)-impacted sediment over 11 acres with a small capping area of approximately 1 acre.

A water intake is located along the channel and provides water to a number of industrial users. These users have indicated that elevated TSS in the intake waters cause issues for their facilities.

Mackworth-Enviro has designed a Water Intake Protection Barrier (WIPB) system that will be fabricated and deployed during the remedial dredging of LRROC anticipated to begin in 2023. The purpose of this barrier will be to prevent an increase in suspended solids being drawn into a set of industrial water intakes during the remedial dredging. This system will add another level of protection for these intakes, in addition to the Dredge Silt Control System and Operational Controls of the dredging operation, designed to minimize the potential exposure of the intakes to sediment derived from dredging activities.

**Design**

Due to the importance and difficulty of protecting the intake from levels of suspended solids exceeding the respective industrial users’ needs and challenges associated with the intake’s large flow rate of 250 MGD, Mackworth used a computational fluid dynamic (CFD) model to assist in developing the final design.

The components of the Final WIPB system are (1) a primary filter barrier directly in front of the intake, comprised of multi-layer composite geotextile filter panels, supported by a nylon strapping skeletal frame



Figure 1. Aerial view of Lower Rouge River Old Channel remediation project

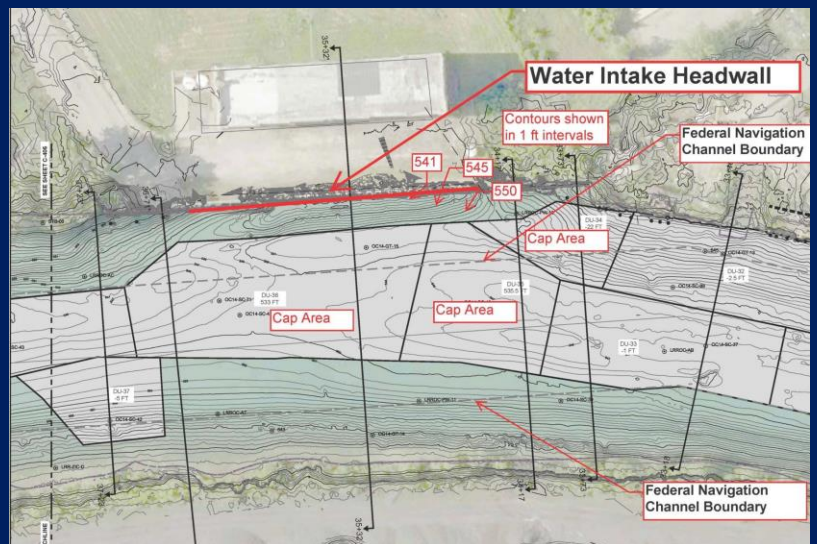


Figure 2. LRROC dredging location

in a bottom-sealing curtain structure, (2) full-depth, flexible filter barrier geotextile curtains attached to the ends of the primary barrier that can be closed to the shore or opened to cleaner water current as appropriate, and (3) bottom-sealed or near-full-depth, flexible impermeable diversion barrier curtains for attachment to the primary barrier and/or the shore as appropriate. The filter barrier curtains and the diversion barriers either facilitate flow of cleaner water into the intake, filtered or not, or divert turbid water flow away from the intake.

The primary filter barrier is designed to allow the installed filter barrier panels to be deployed or retracted/removed as appropriate for operations: the upper portion of the barrier can be dropped below the waterline when fine filtration is not needed, or as a high force contingency, and quickly be brought to the surface when needed. The bottom of this barrier will have a continuous impermeable sealing skirt with heavy chain ballast.

The bottom-sealing, full-depth, floating filter barrier curtain will be comprised of multi-layer composite geotextile within a nylon strapping skeletal frame structure, extending the full depth of the water column, and sealing to the bottom with a heavy, impermeable bottom skirt with a chain ballast. It will contain flotation billets at the top and is to be held in place by barges at the surface and possible shore-based anchors. Vertical reefing lines are integrated into the system design for reefing functionality from the water's surface.

The full-depth, impermeable diversion barrier (DB) will be utilized upstream and in front of the intake, as well as between the primary barrier and the shore. The diversion barrier curtains will be comprised of impermeable material within a nylon strapping skeletal frame structure. DB design includes flotation billets at the top, which are to be held in place by barges at the surface. Anchors may be attached to the curtain bottom to weight and secure the barriers. The design allows the diversion barriers to be installed, moved, or removed as appropriate.

The Michigan Department of Environmental Quality has established water quality requirements ( $\leq 50$  NTU increase) for the amount of suspended sediment allowable from the dredging and water quality will be continuously monitored to make sure the requirements are met.

**LRROC Site Characteristics for design consideration:**

- Max river current velocity = 1.3 fps
- River level low 571.3, high 575.3, 100-yr 578.8
- Ambient TSS Min= 0.0 mg/L Max= 24.0 mg/L, Avg = 2.0 mg/L
- Possible winter icing along shoreline

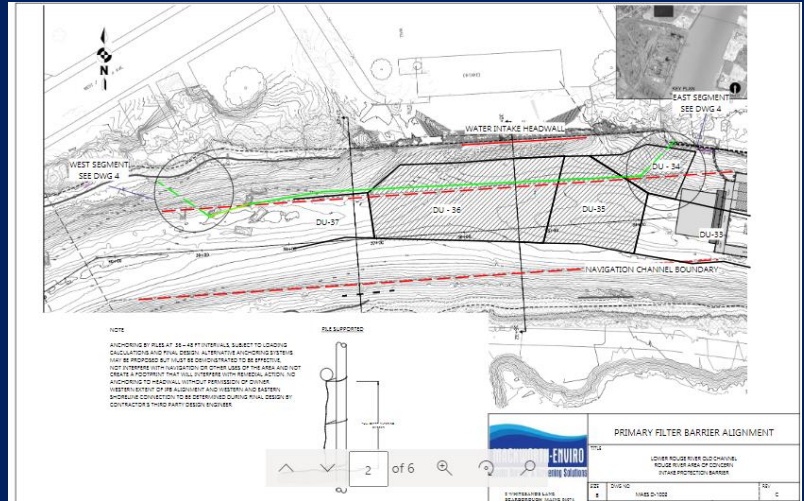


Figure 3. Proposed alignment for the LRROC primary filter barrier

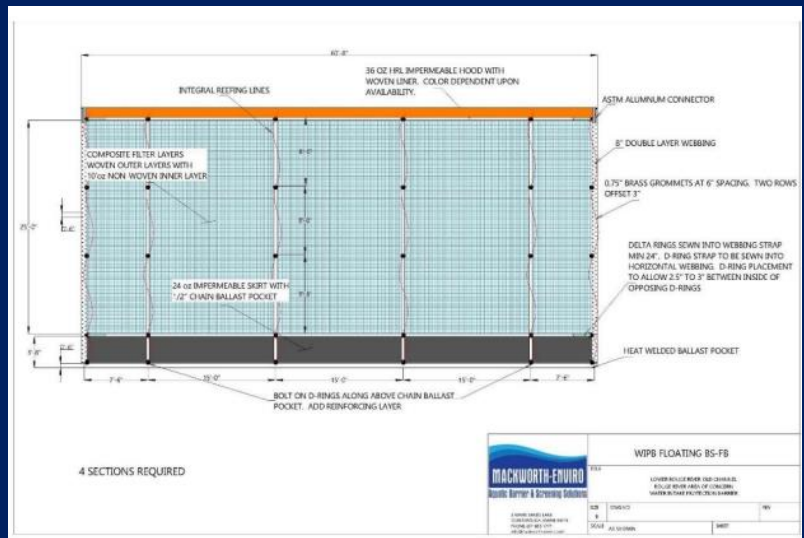


Figure 4. Drawing for the LRROC bottom-sealed filter barrier

**Contact Mackworth-Enviro for more information**

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