

Feasibility Studies & Preliminary Designs for Contaminated Sediment Remediation in the Superior Slips in the St. Louis River Area of Concern (SLRAOC)

Brian Mastin (AECOM) | Joe Graham (Wisconsin Department of Natural Resources) | Kasia Dick and Alison Bitel (AECOM)

Objectives

Remedial investigations, feasibility studies, data gap investigations, assessments of recontamination potential, preliminary design, and other work necessary to support and subsequently complete feasibility studies and remedial designs for all four Superior Slips (**C Street, General Mills, Oil Barge Dock and Tower Avenue**). Geotechnical investigations were conducted for inclusion in site stability evaluations and treatability studies to evaluate

efficacy of potential ex situ sediment management alternatives and refine full-scale design assumptions. **C STREET SLIP.** AECOM identified data gaps throughout the Slip and collaborated with WDNR and USEPA to perform a supplemental site investigation in July 2022. Delineated the nature and extent of mercury and PAHs across the entire C Street Slip area as well as VOCs at the head of the Slip.



Development of Remedial Action Objectives

Beneficial uses that were impaired in the St. Louis River Area of Concern (SLRAOC)

SLR BUI No.	Beneficial Use Impairment	Status	Linked to Contaminated Sediment
1	Fish consumption advisories	Impaired	Yes
2	Degraded fish and wildlife populations	Removed in 2023	No
3	Fish tumors and other deformities (Removed in 2018 – no longer impaired)	Removed	No
4	Degradation of benthos	Impaired	Yes
5	Restrictions on dredging	Impaired	Yes
6	Excessive loading of sediment and nutrients (Removed in 2020 – no longer impaired)	Removed	No
7	Beach closings and body contact restrictions	Impaired	Yes
8	Degradation of aesthetics (Removed in 2014 – no longer impaired)	Removed	No
9	Loss of fish and wildlife habitat	Impaired	Yes

Slip Remedial Action Objectives (RAOs) and Contaminants of Concern (COCs) with hazard quotients (HQs) exceeding one for the MEC

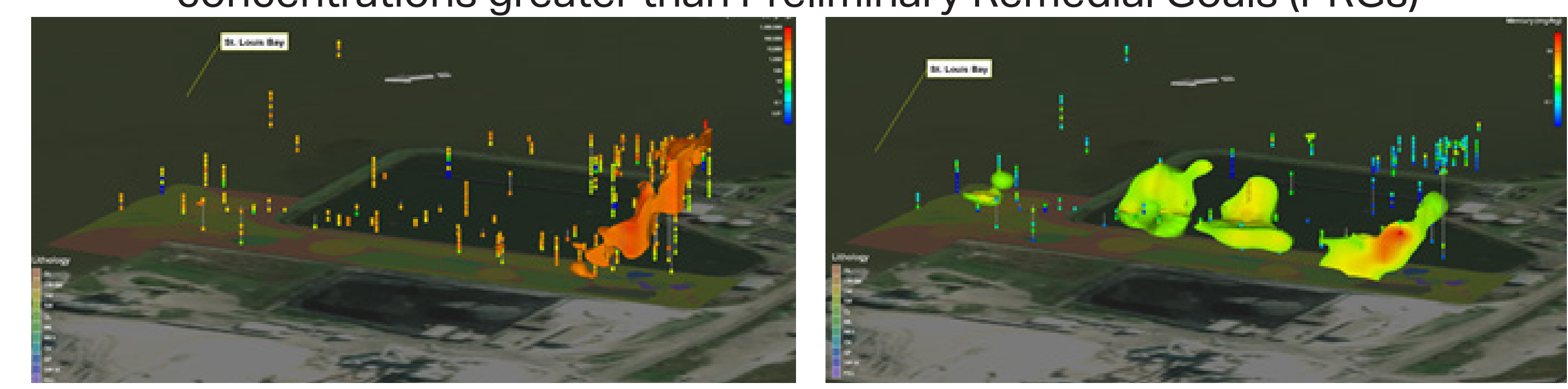
	RAOs	COCs
C Street	BUI No. 1, 4, & 5	Total PAH mercury (Hg)
General Mills	BUI No. 4 & 5	Total PAH Lead (Pb)
Oil Barge Dock	BUI No. 4 & 5	1,2-dichlorobenzene 1,4-dichlorobenzene total xylenes
Tower Avenue	BUI No. 1, 4, & 5	total PAH Hg Pb

Summary of RI/FS results, remedial alternative recommendations and engineered costs

	Units	C Street	General Mills	Oil Barge Dock	Tower Avenue
Contaminants of Concern (COCs)		Hg, tPAHs	Pb, tPAHs	1,2-dichlorobenzene, 1,4-dichlorobenzene, total xylenes	Hg, Pb, tPAHs
Impacted Material	CY	16,500	27,000	15,703	108,940
Dredge Prism Volume	CY	31,012	65,000	mechanical: 8,105 - diver: 7,598	mechanical: 70,574 - capping: 38,366
Recommended Alternative		Mechanical Dredging	Mechanical Dredging	Mechanical Dredging/ Diver Dredging	Mechanical Dredging/Amended Sediment Cap
Cost Estimate	\$	\$10,353,000	\$14,688,000	\$5,399,000	\$20,310,000

C Street Slip

Earth Volumetric Studio (EVS) Model Plumes of total PAHs and Hg concentrations greater than Preliminary Remedial Goals (PRGs)



A primary goal of the dredge prism* design was to make the project constructable or "contractor friendly". Some overlap, smoothing of prisms thus estimate is conservative.

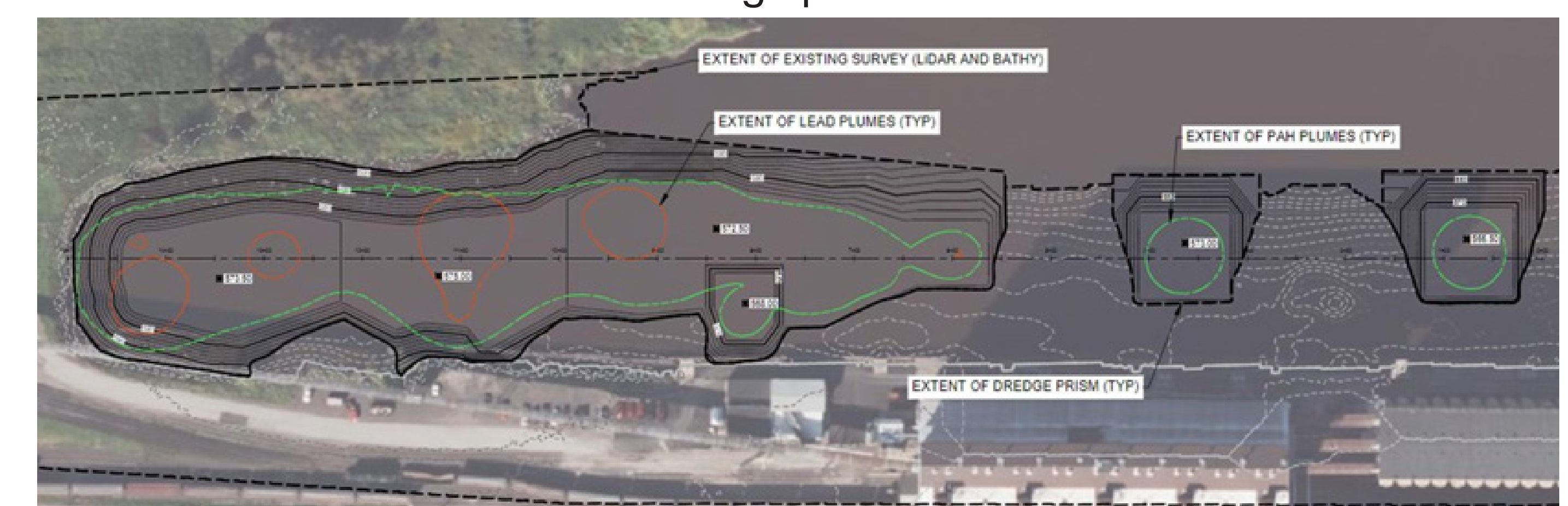


General Mills Slip

EVS Model Plumes of total PAHs and Pb concentrations greater than PRGs

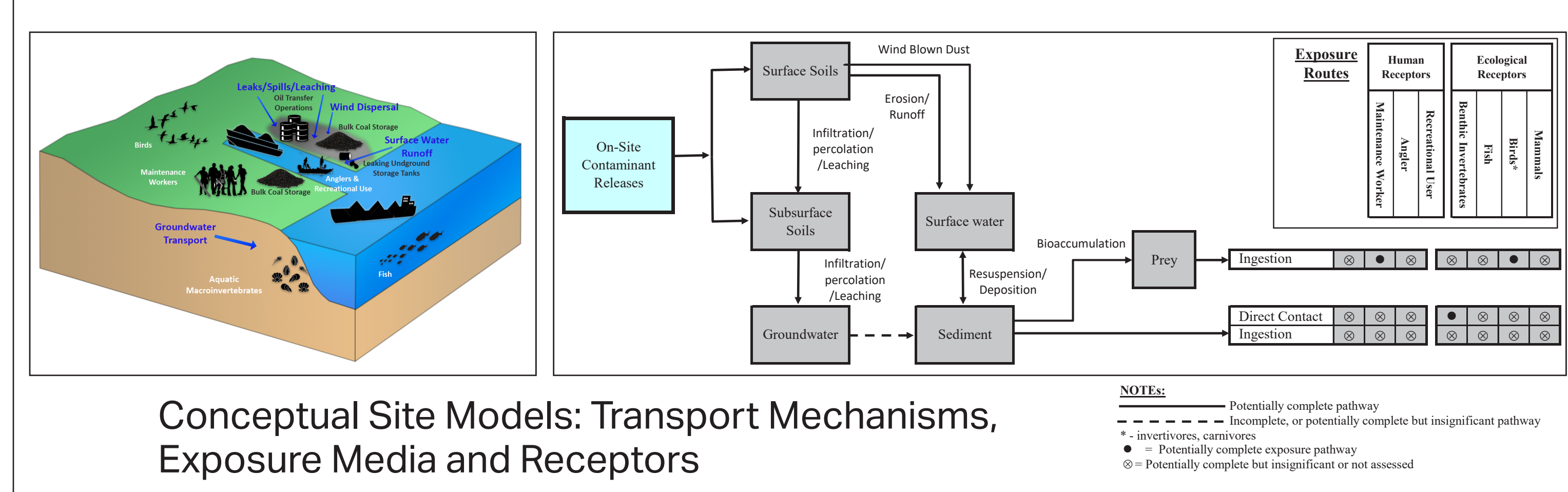
EVALUATION CRITERIA	ALT. 1	ALT. 4	ALT. 5	ALT. 6	ALT. 7	ALT. 9
	No Action	Unamended Sediment Cap	Amended Sediment Cap	Mechanical Dredge	Hydraulic Dredge	Mechanical Dredge and Amended Cap
THRESHOLD CRITERIA						
Overall Protectiveness of Public Health and the Environment	●	YES	YES	YES	YES	YES
Compliance with RAOs	●	YES	YES	YES	YES	YES
EVALUATION CRITERIA						
Long-term Effectiveness and Permanence	1	6	12	18	16	16
Short-term Effectiveness and Potential Impacts During Remediation	1	12	14	16	12	18
Implementability	1	14	14	17	14	16
Restoration Time Frame	1	9	10	17	15	16
State Acceptance	1	7	8	16	12	13
Community Acceptance	1	7	8	16	14	16
Reduction in Toxicity, Mobility & Volume of Contamination Through Treatment	1	5	7	18	16	15
COST						
	20	15	15	14	11	18
TOTAL	27	75	88	132	110	127

Dredge prisms*



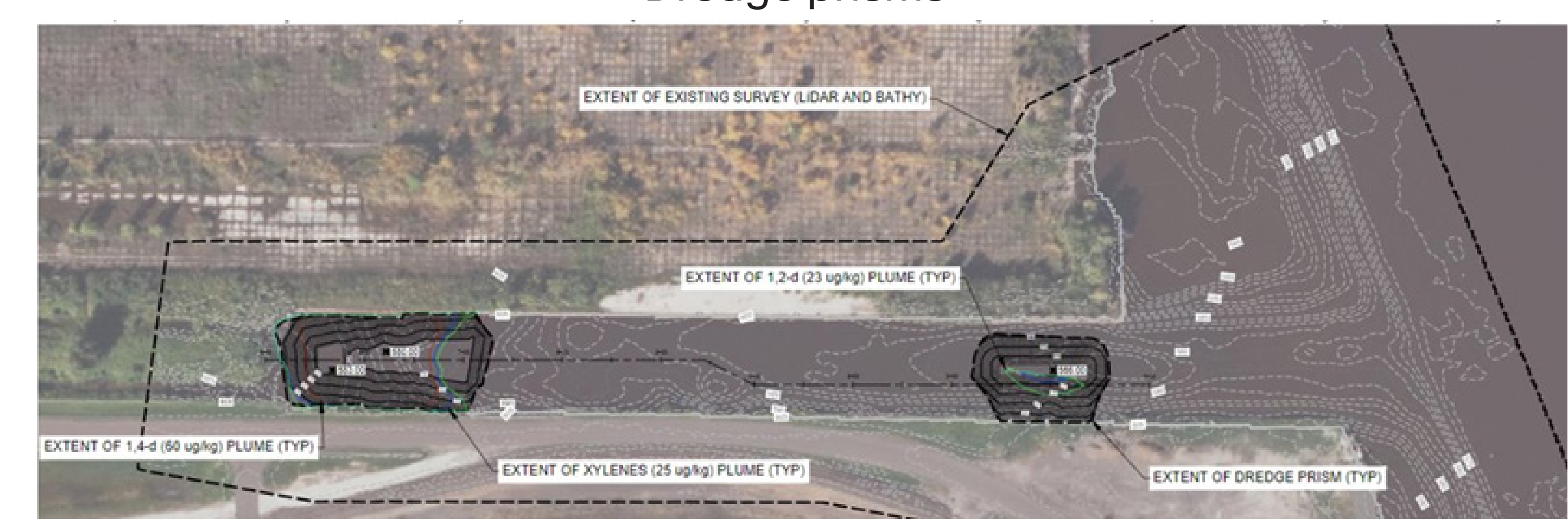
Oil Barge Dock Slip

EVS Model Plumes of 1,2-dichlorobenzene, 1,4-dichlorobenzene and total xylenes concentrations greater than PRGs

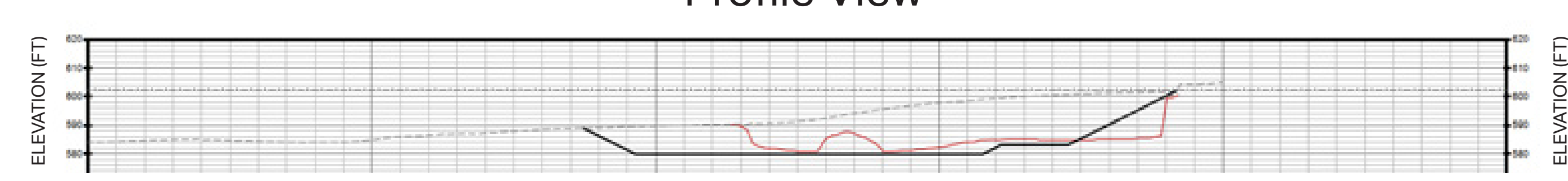


Conceptual Site Models: Transport Mechanisms, Exposure Media and Receptors

Dredge prisms*

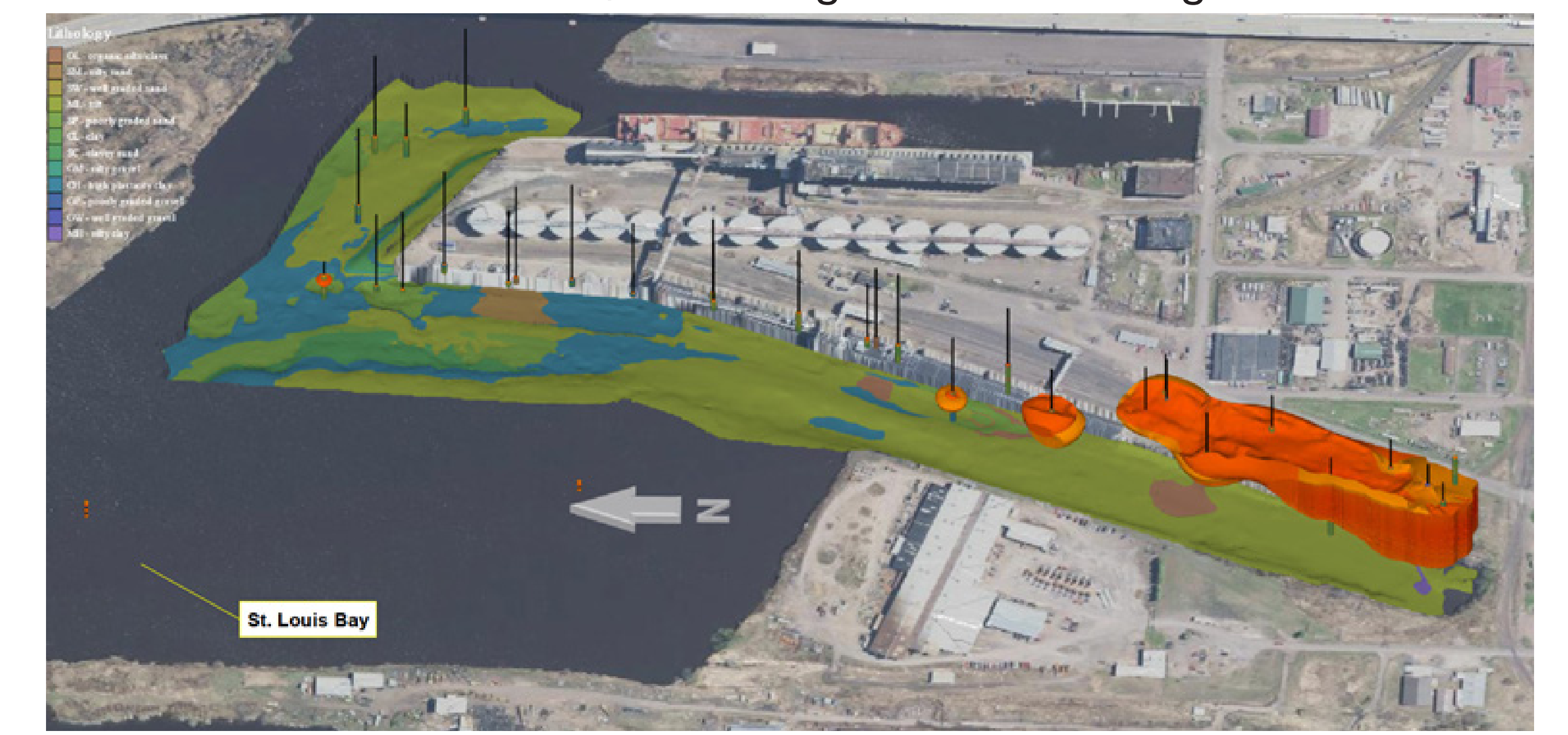


Profile View

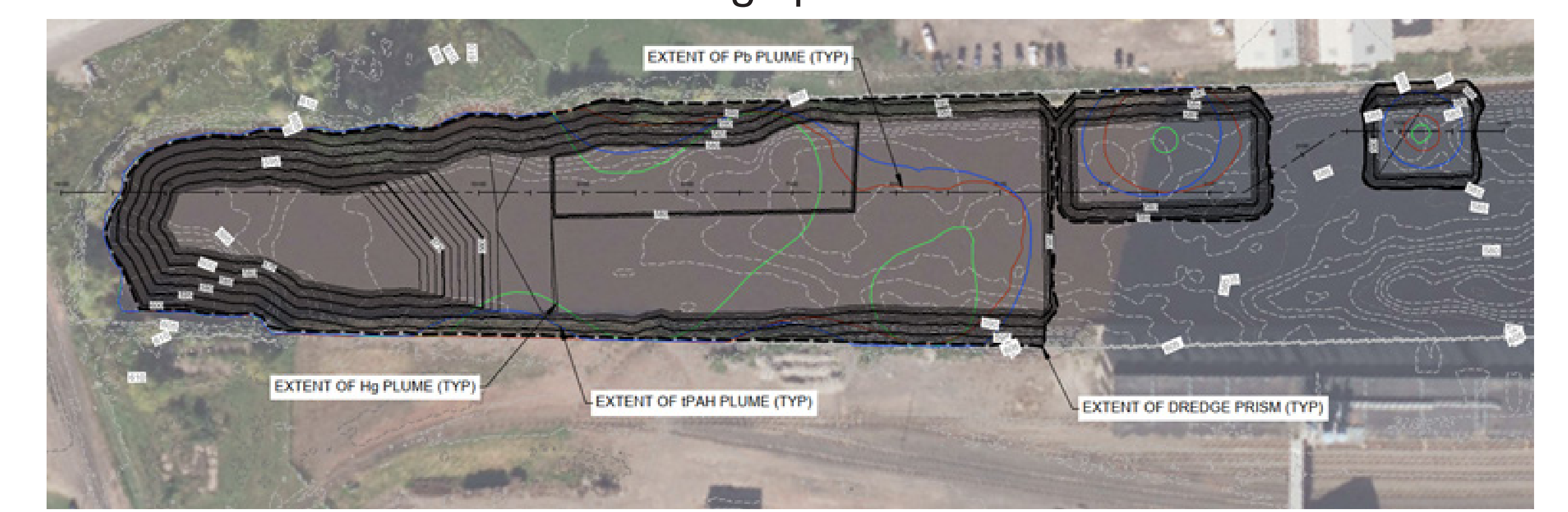


Tower Avenue Slip

EVS Model Plumes of tPAHs, Pb and Hg concentrations greater than PRGs



Dredge prisms*



***NOTES:**
 The dredge prisms were developed with:
 • 2:1 slopes.
 • 6" over-dredge applied in areas where the clay layer is NOT the base.
 • Clay surface was used as the "base of excavation" wherever applicable.
 • If plume extends below the clay, the clay layer will supersede the COC plume.
 • 6" over-dredge applied in areas where the clay layer is NOT the base.
 • No over-dredging into the clay layer.