



April 2020

Main Stem Lagoon Dredging Project Feasibility Study

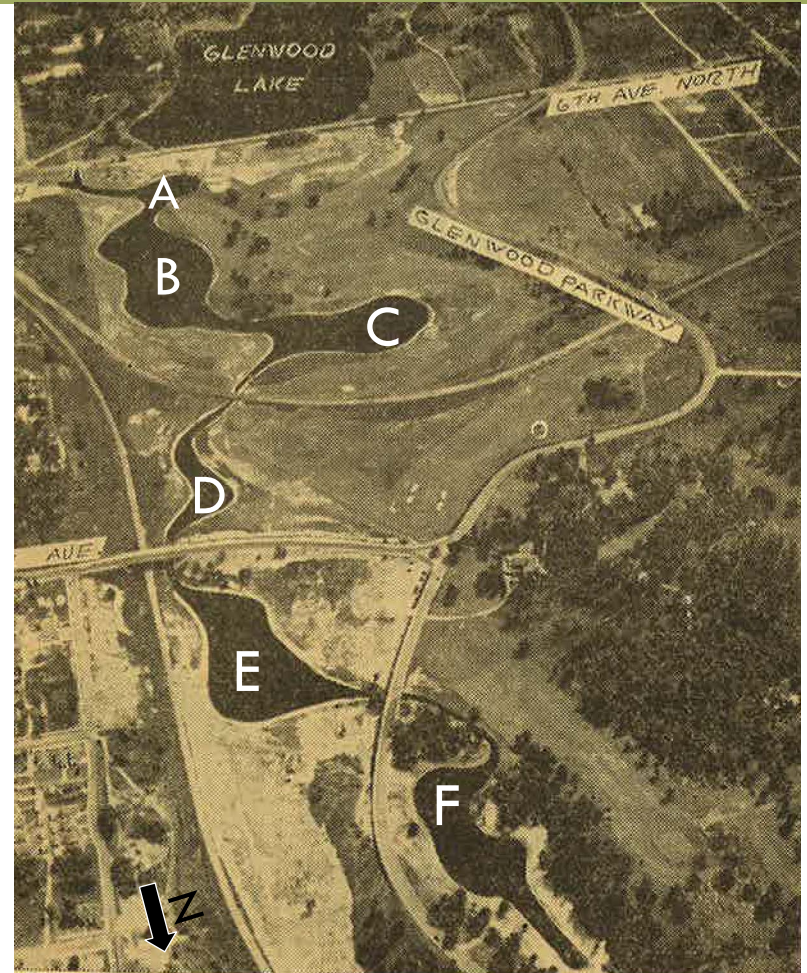


Prepared for Bassett Creek Watershed
Management Commission



Lagoon History

- Designed by Theodore Wirth
- Constructed 1937 by Civilian Conservation Corps (CCC)
- 7 lagoons – 405,000 CY excavated – 8-12 feet depth
- Created 27 acres open water, 36 acres of land for recreation
- Part of Grand Rounds - considered listed as Historic Place by US Dept. of Interior



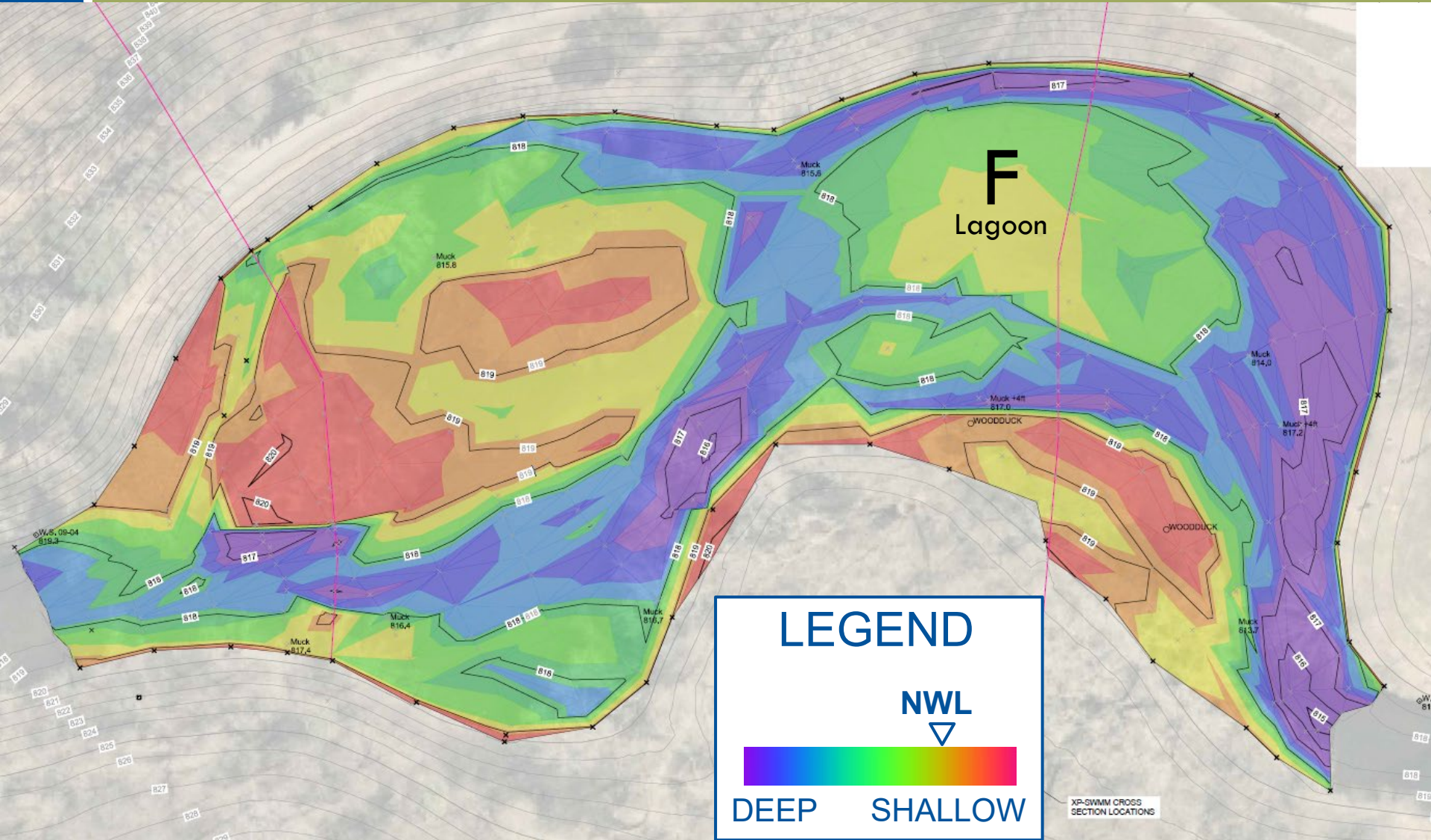
Main Stem Lagoon Dredging Project



Goals & Objectives

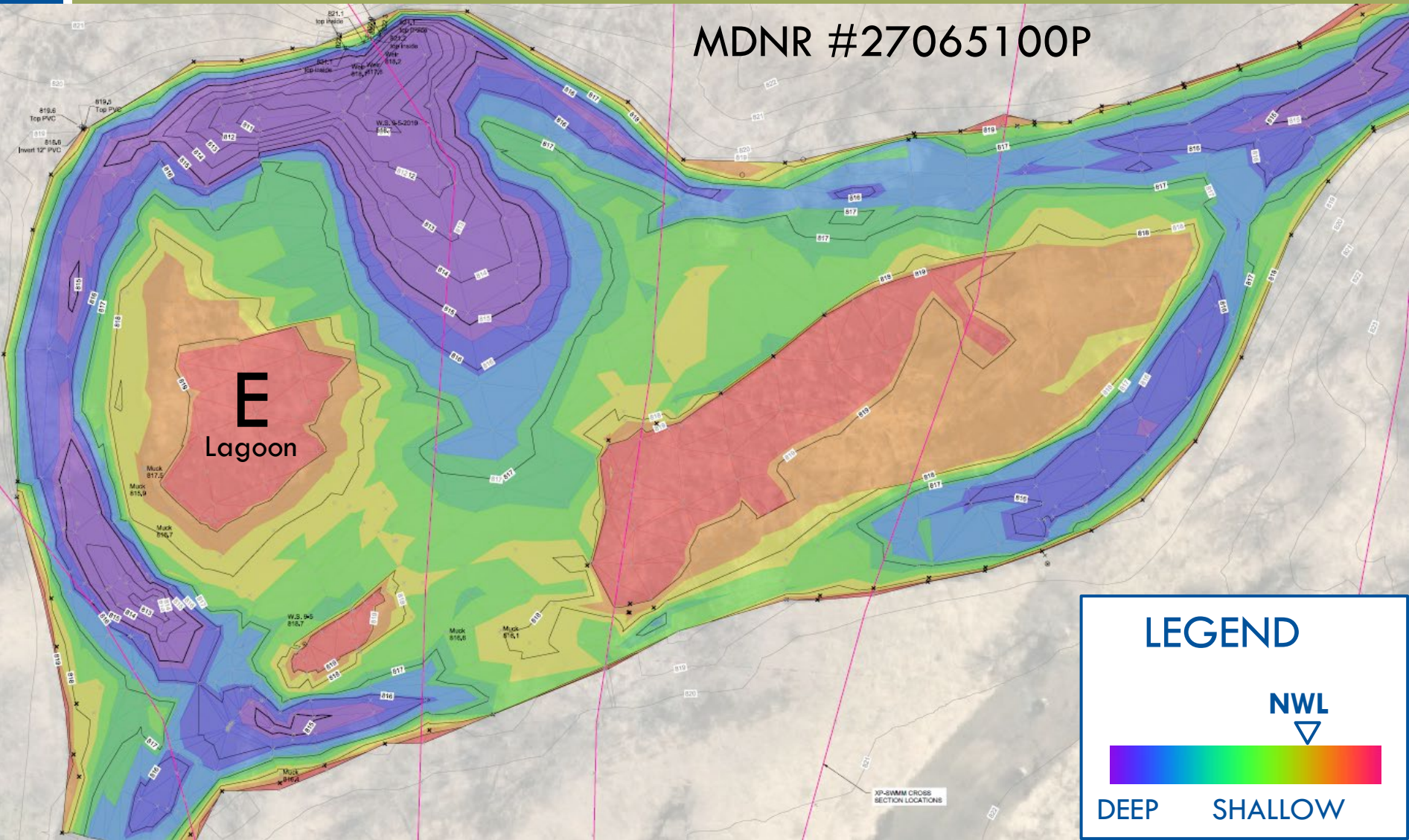
- Restore lagoons to original aesthetics and function (D, E, F)
- Remove accumulated sediment
- Restore permanent pool storage to reduce sediment loading and improve water quality
- Restore flood conveyance
- Improve fish habitat
- Preserve and contribute to natural beauty and habitat quality along the Main Stem of Bassett Creek

Site Conditions

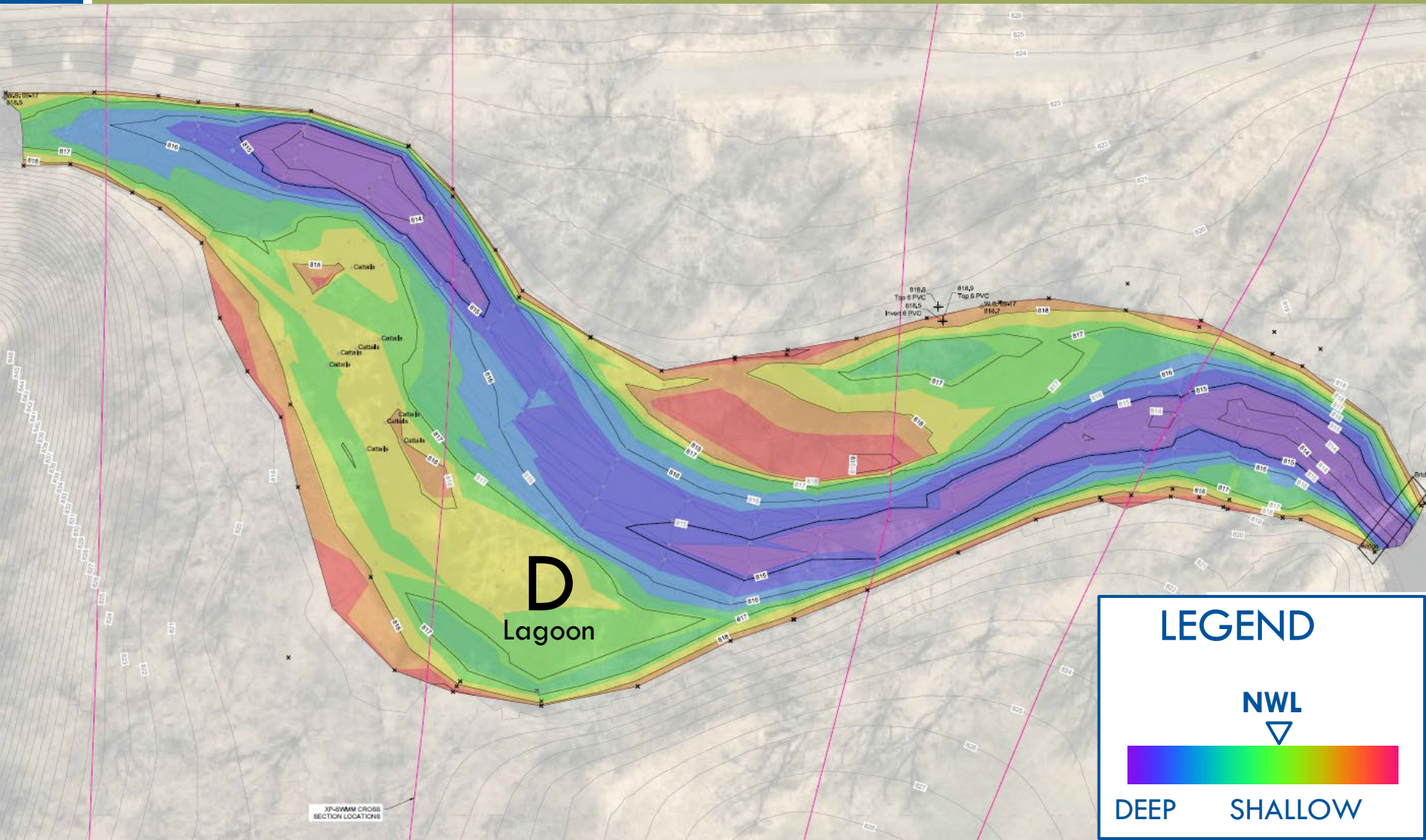


Site Conditions

MDNR #27065100P



Site Conditions



Site Conditions

- Sedimentation caused lagoons to become shallower and narrower
- 2015 Barr study identified sediment “pulse” in 1990’s – concluded as main cause for rapid filling
- Currently at steady state
- MDNR Public Waters

Open Water Area at Normal Water Level (NWL), (Acres)

Lagoon	Original	Current	Change
F	1.5	0.6	- 0.9
E	2.8	2.1	- 0.7
D	1.2	0.7	- 0.5

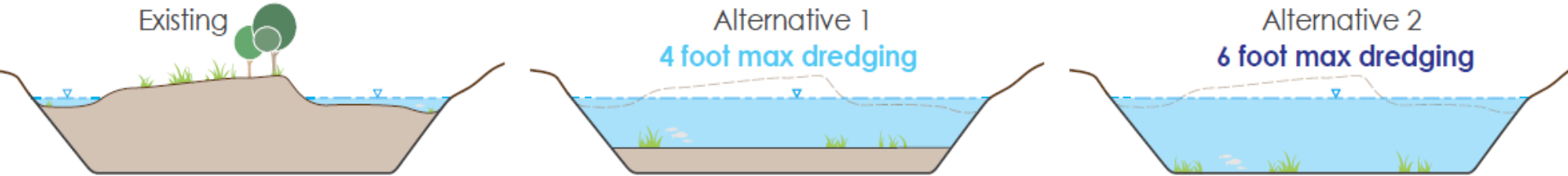
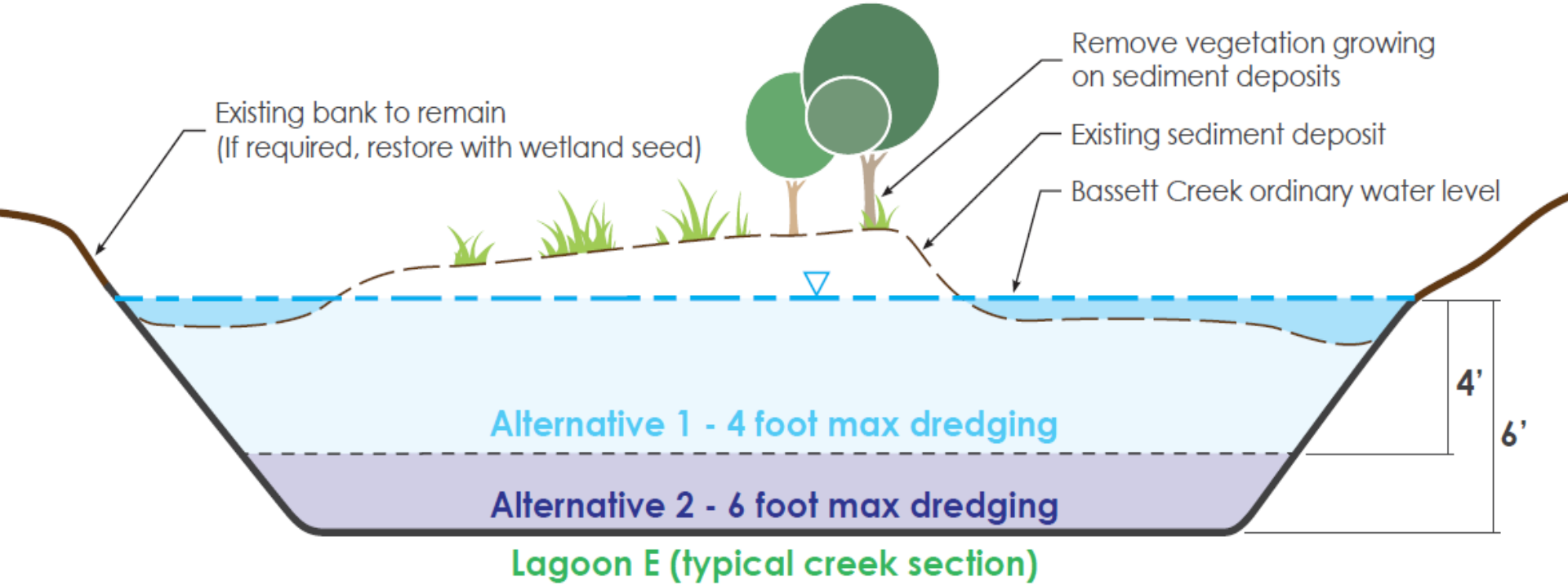
Sediment Sampling & Testing



		Lagoon D		Lagoon E				Lagoon F	
Parameter	Threshold	LD-01	LD-02	LE-01	LE-02	LE-03	LE-04	LF-01	LF-02
Benzo(a)pyrene (BaP equivalents)	2.0 mg/kg	2.6	4.9	5.1	9.0	5.1	3.9	1.6	1.6
Diesel Range Organics (DRO)	100 mg/kg	722	487	619	384	850	729	77.5	213

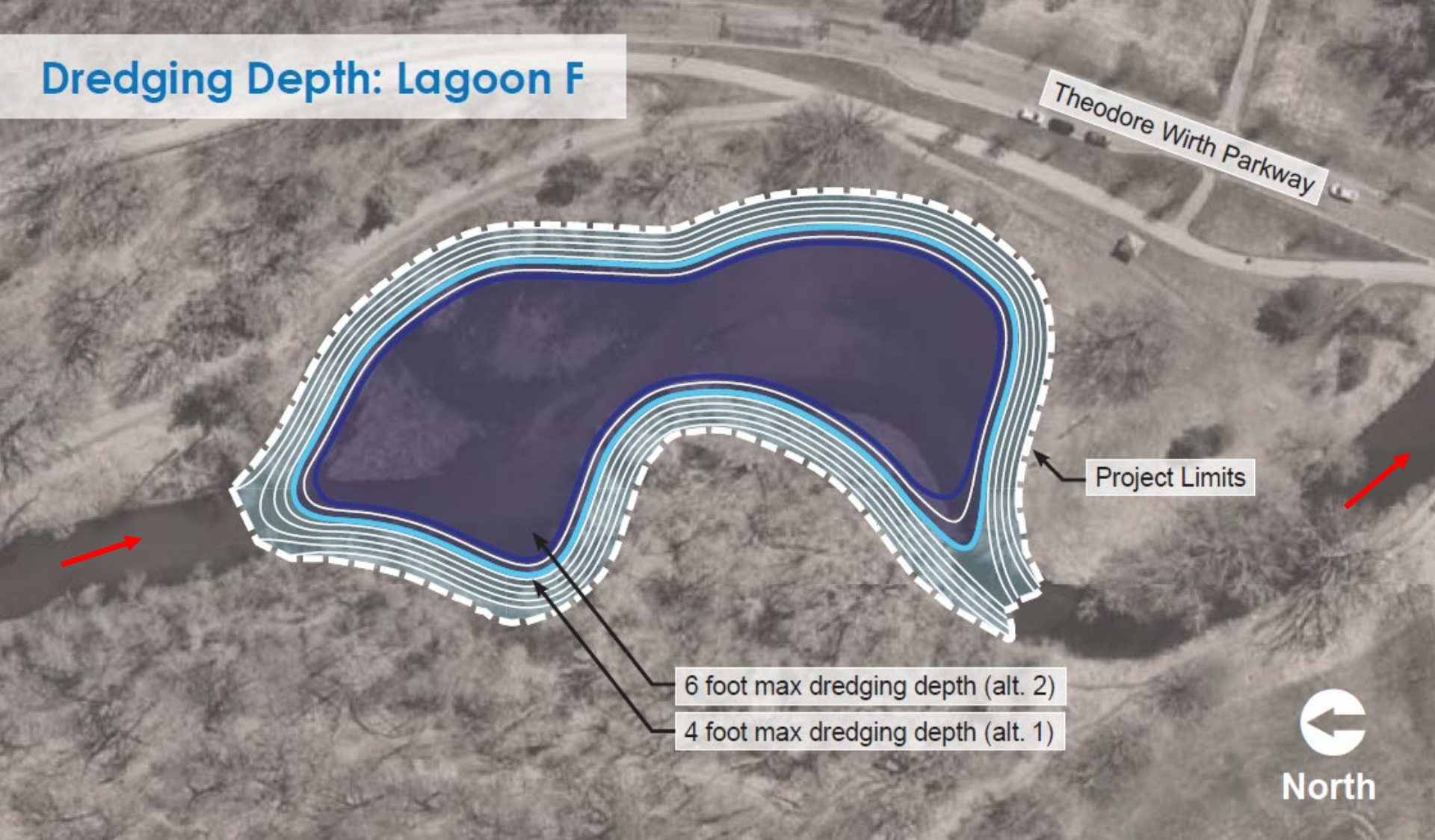
- Contaminant concentrations above MPCA criteria
- Benzo(a)pyrene (BaP equivalents) > 2.0 mg/kg
- Diesel Range Organics (DRO) > 100 mg/kg
- Dredged sediment requires landfill disposal

Dredging Alternatives



Dredging Alternatives

Dredging Depth: Lagoon F



Theodore Wirth Parkway

Project Limits

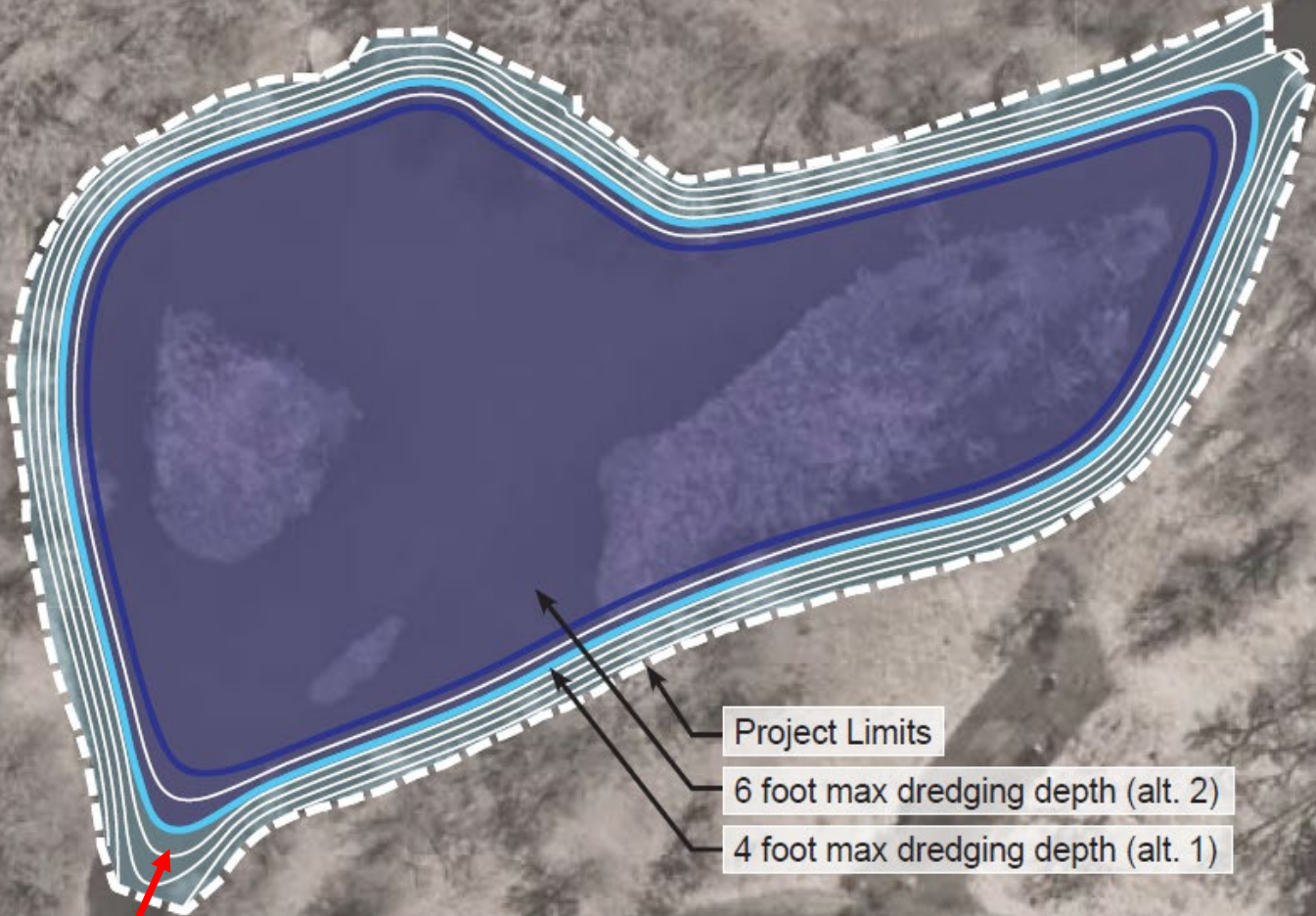
6 foot max dredging depth (alt. 2)

4 foot max dredging depth (alt. 1)



Dredging Alternatives

Dredging Depth: Lagoon E



Plymouth Ave North



North

Dredging Alternatives

Dredging Depth: Lagoon D

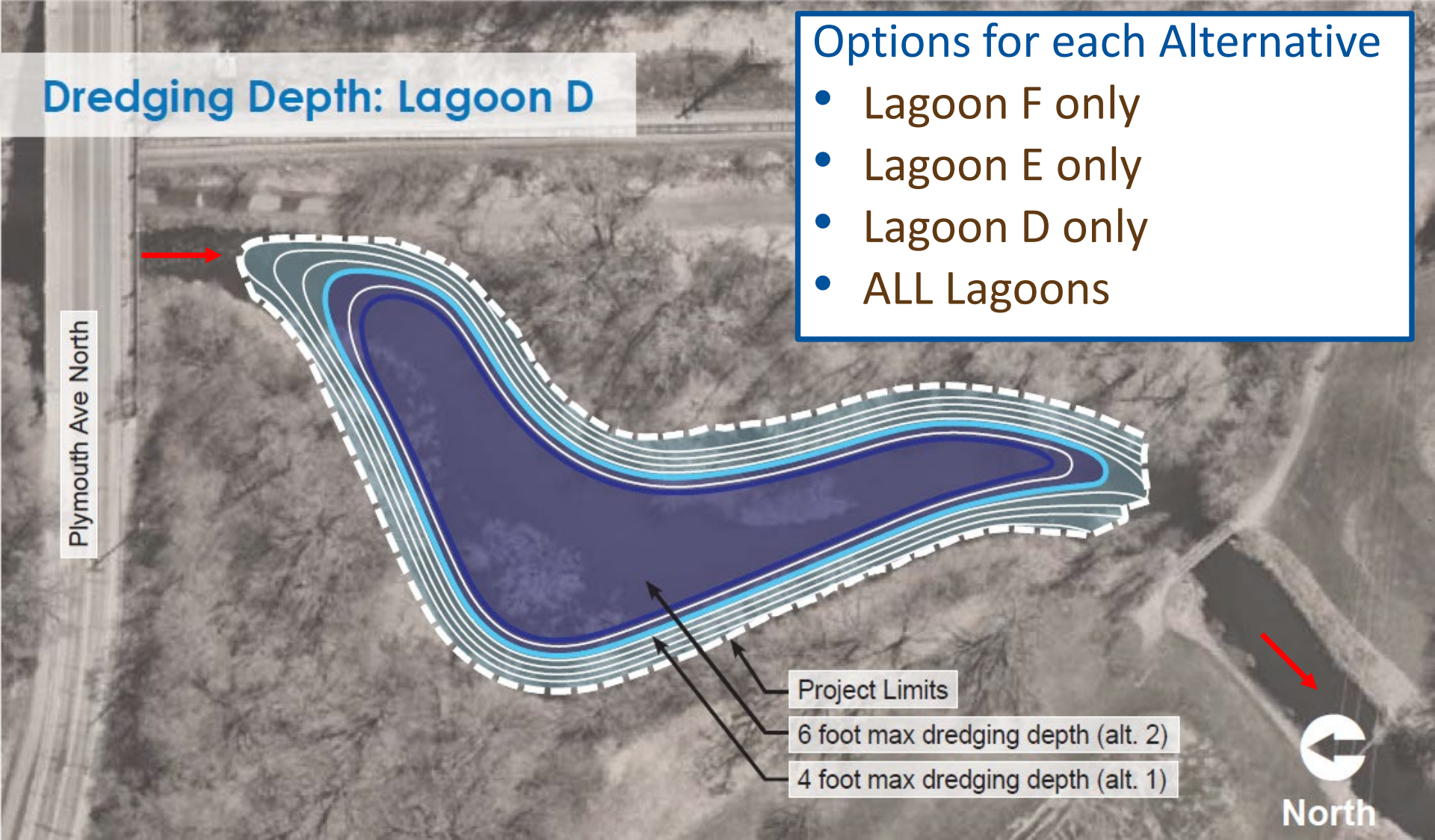
Plymouth Ave North

- Options for each Alternative
- Lagoon F only
 - Lagoon E only
 - Lagoon D only
 - ALL Lagoons

Project Limits
6 foot max dredging depth (alt. 2)
4 foot max dredging depth (alt. 1)



North



Flood Impacts

- Sediment islands & vegetation extending into floodplain
- XP-SWMM used to analyze flood impacts of proposed dredging
- For 1-yr to 100-yr events, reductions of 0 to 0.15 feet
- Difficult to quantify local parking lot flooding impacts

Design Considerations

- Minimize wetland impacts
- Preserve wetland type/depth (6 ft max)
- Minimize wildlife impacts (threatened & endangered species)
- Recognize site history (cultural resources)



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Duluth News Tribune



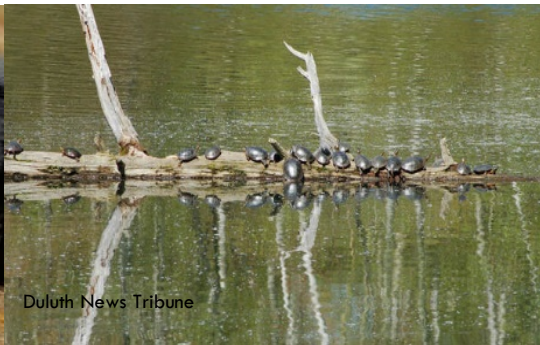
The Xerces Society



Rebecca Heisman

Permitting and Approvals

- USACE 404 Permit/ Section 401 Certification
- SHPO cultural resources review
- Wetland Conservation Act (WCA)
- MDNR Public Waters Work Permit
- Environmental Assessment Worksheet (EAW)
- MPRB Construction Permit
- City of Golden Valley Stormwater Management Permit
- MPCA Construction Stormwater Permit



Water Quality Improvements

Alternative	Lagoon	TSS Reduction (lb/year)	TSS Reduction (\$/lb/yr)	TP Reduction (lb/yr)	TP Reduction (\$/lb/yr)	Time to Refill w/Sediment (years)
1 4 Foot Max Depth	F	39,000	\$1.10	150	\$280	30
	E	52,000	\$1.20	200	\$290	41
	D	9,900	\$5.30	38	\$1,370	20
	ALL	101,000	\$1.20	390	\$300	91
2 6 Foot Max Depth	F	55,000	\$1.10	210	\$270	40
	E	83,000	\$1.10	320	\$270	63
	D	19,000	\$3.90	75	\$970	26
	ALL	156,000	\$1.10	600	\$270	129

Construction Costs

Alternative	Lagoon	Dredged Volume (cy)	Construction Cost Estimate	Construction Contingency	Engineering	Capital Cost Estimate
1 4 Foot Max Depth	F	9,100	\$487,000	\$146,000	\$190,000	\$823,000
	E	12,600	\$664,500	\$199,000	\$259,000	\$1,123,000
	D	6,100	\$344,000	\$103,000	\$134,000	\$581,000
	ALL	27,800	\$1,478,000	\$443,000	\$576,000	\$2,247,000
2 6 Foot Max Depth	F	12,200	\$641,500	\$192,000	\$250,000	\$1,084,000
	E	19,300	\$1,000,000	\$300,000	\$390,000	\$1,690,000
	D	8,100	\$444,000	\$133,000	\$173,000	\$750,000
	ALL	39,600	\$2,068,000	\$620,000	\$806,000	\$3,145,000

Stakeholder Input

- **Kickoff Meeting**

- August 2019 – BCWMC Engineers/Administrator, MPRB, City of Minneapolis

- **Technical Stakeholder Meeting**

- November 2019 – BCWMC Engineers/Administrator, MPRB, City of Minneapolis, City of Golden Valley, MDNR, MPCA, USACE

- **Public Open House**

- February 2020 – BCWMC Engineers/Administrator, MPRB, Commissioner Welch, 2 residents

Recommendations

Recommend Alternative 2 (6-foot dredging depth)

- Significantly longer project lifespan & increased project benefits

Options for Consideration

- Option 1 – ALL lagoons (D, E, & F)
 - Most cost-effective
 - Reduced impacts & design/permitting/construction efficiencies
- Option 2 – Lagoon E only
 - Largest individual benefits (lifespan & water quality)
- Option 3 – Lagoon D only
 - Lowest cost

Discussion/Questions?

Lagoon F



Lagoon E



Lagoon E



Lagoon D



Stream Stability Review

- 2012 Main Stem Restoration CIP Project functioning well
- Minor erosion areas noted
- Dredging not anticipated to impact prior restoration
- Repairs included with future dredging project

