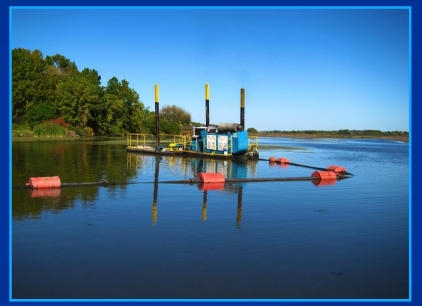
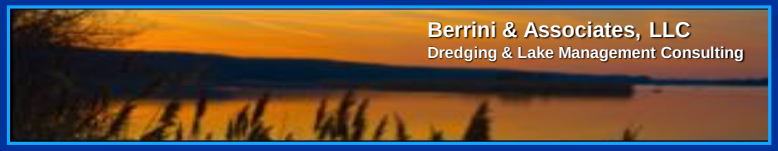
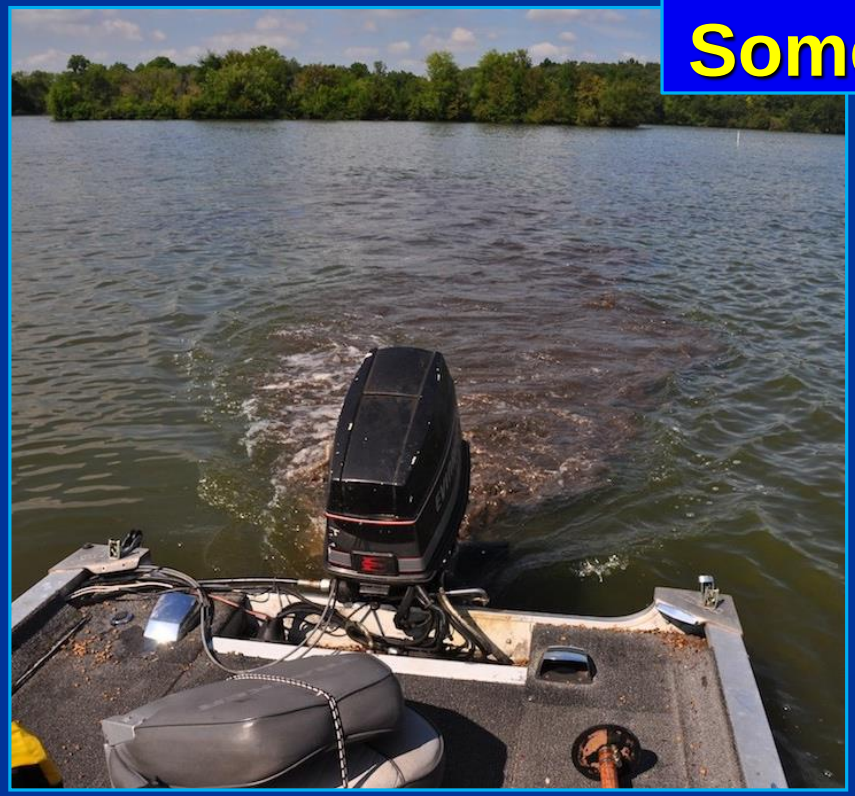
Does My Lake Need Dredging?

by Peter Berrini, PG, CLP







Sometimes it seems Easy to Tell!

A closer look is usually needed!

So Many Questions!

It's very important to gather the right information:

1) Where are the sediment impaired area(s) of the lake?
2) How much sediment has accumulated?
3) What are the physical & chemical characteristics?
4) How much sediment should we remove?
5) How do we remove the sediment?
5) Where can we put it and what can we do with it?
6) How much will the dredging work likely cost?
7) If dredging is needed, how can we pay for it?

The Benefits of Lake Dredging

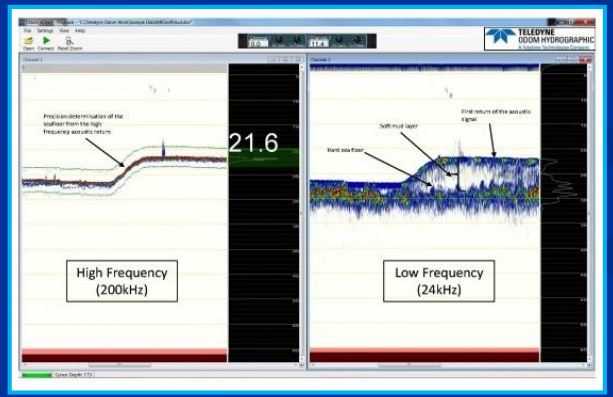
1) Increased water depths and storage capacity that had been lost to sediment deposition
2) Improved and expanded recreational opportunities for safe boating and access
3) Expanded aquatic habitat and deeper overwintering conditions for fish
4) Improved water quality and clarity, and reduced internal nutrient recycling from sediment re-suspension
5) Water supply reservoirs can increase storage volume to help prevent shortages during drought
6) Increased property values and local economic benefits

Typical Project Requirements

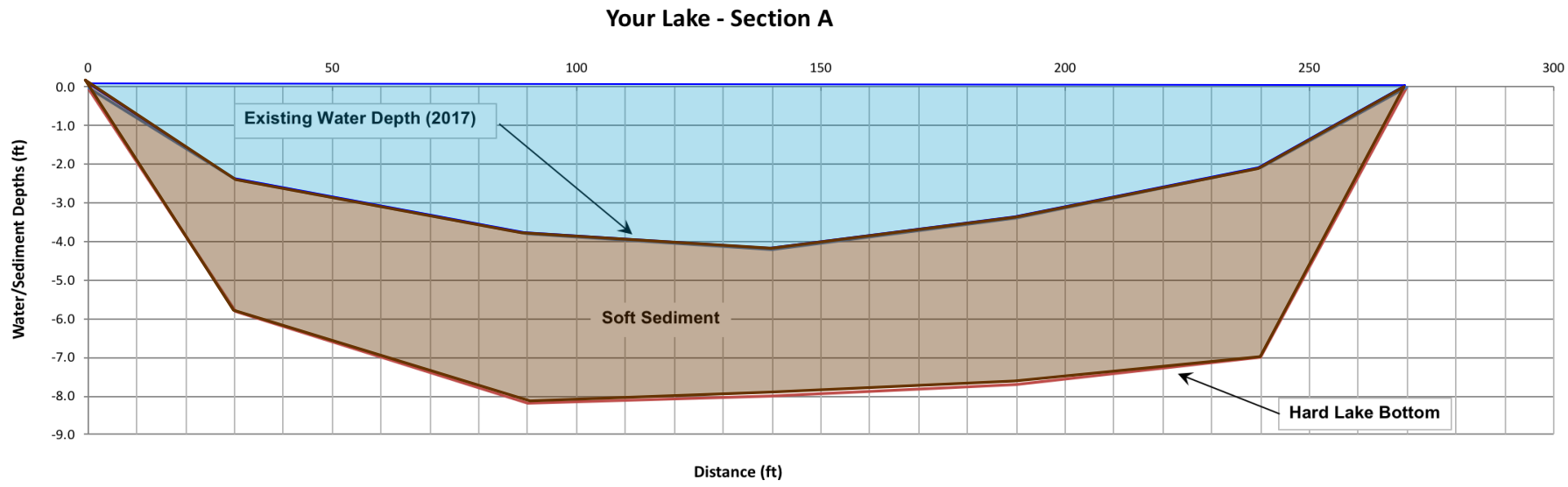
- Complete a Sedimentation Survey that includes water depth and sediment thickness measurements
- Determine optimum dredging limits, target depths and total quantity of sediment to be removed
- Characterize physical & chemical properties of sediment
- Determine dredging method(s) - Hydraulic or Mechanical
- Locate site(s) for Sediment Storage and/or Dewatering
- Obtain Regulatory Permits from Corps of Engineers, Illinois DNR, Illinois EPA and Local Agencies

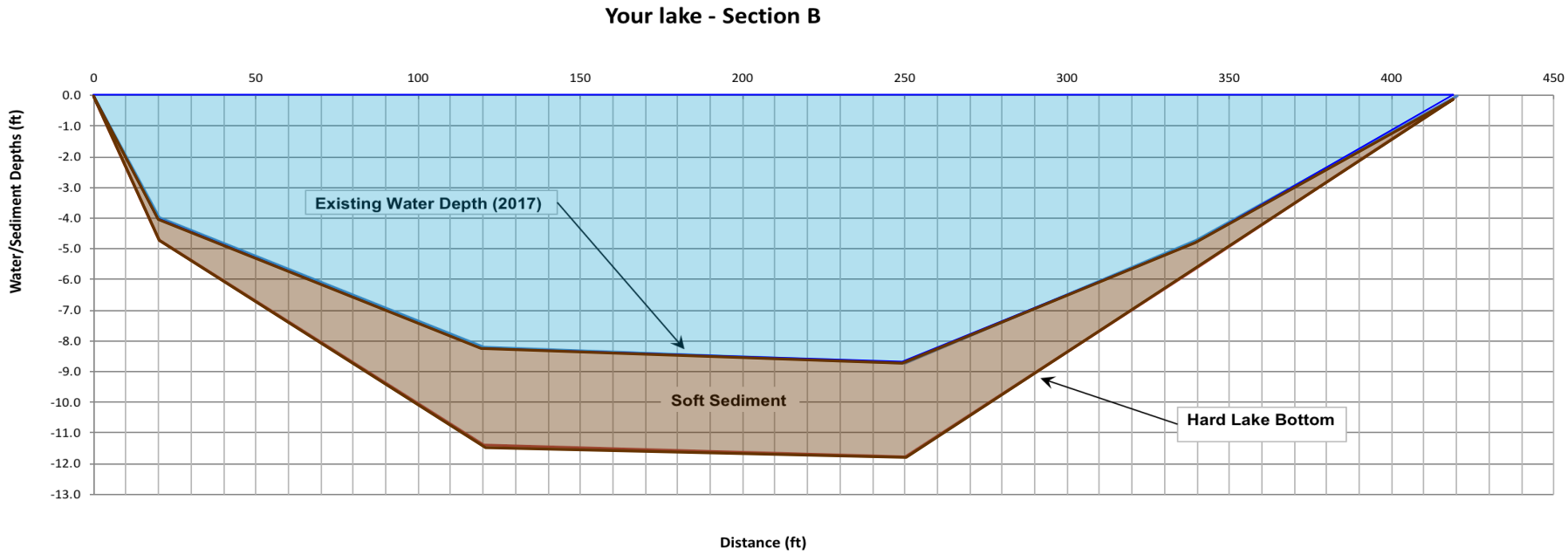
The Sedimentation Survey

Sediment Measurement Options



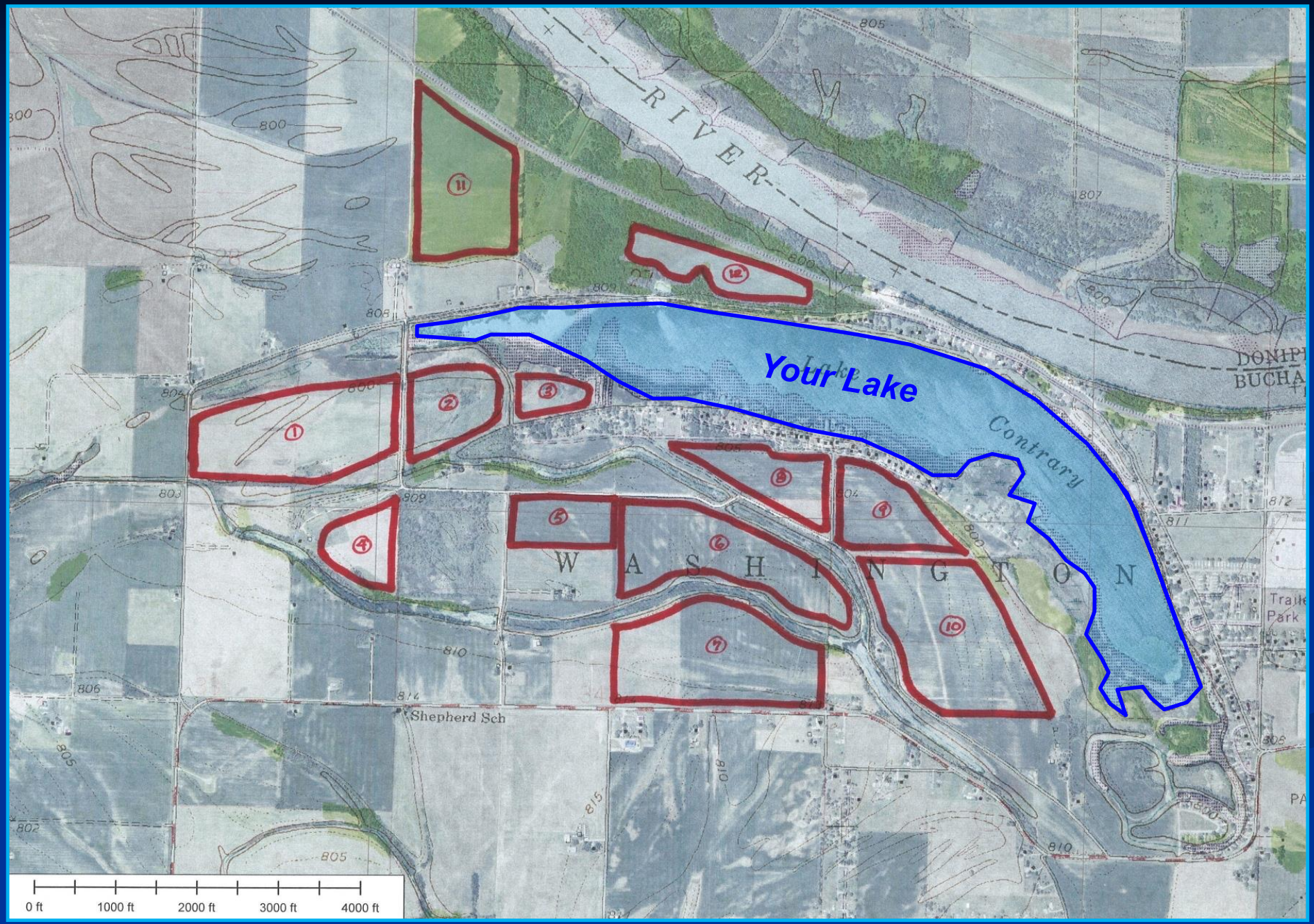
Typical Lake Cross Sections





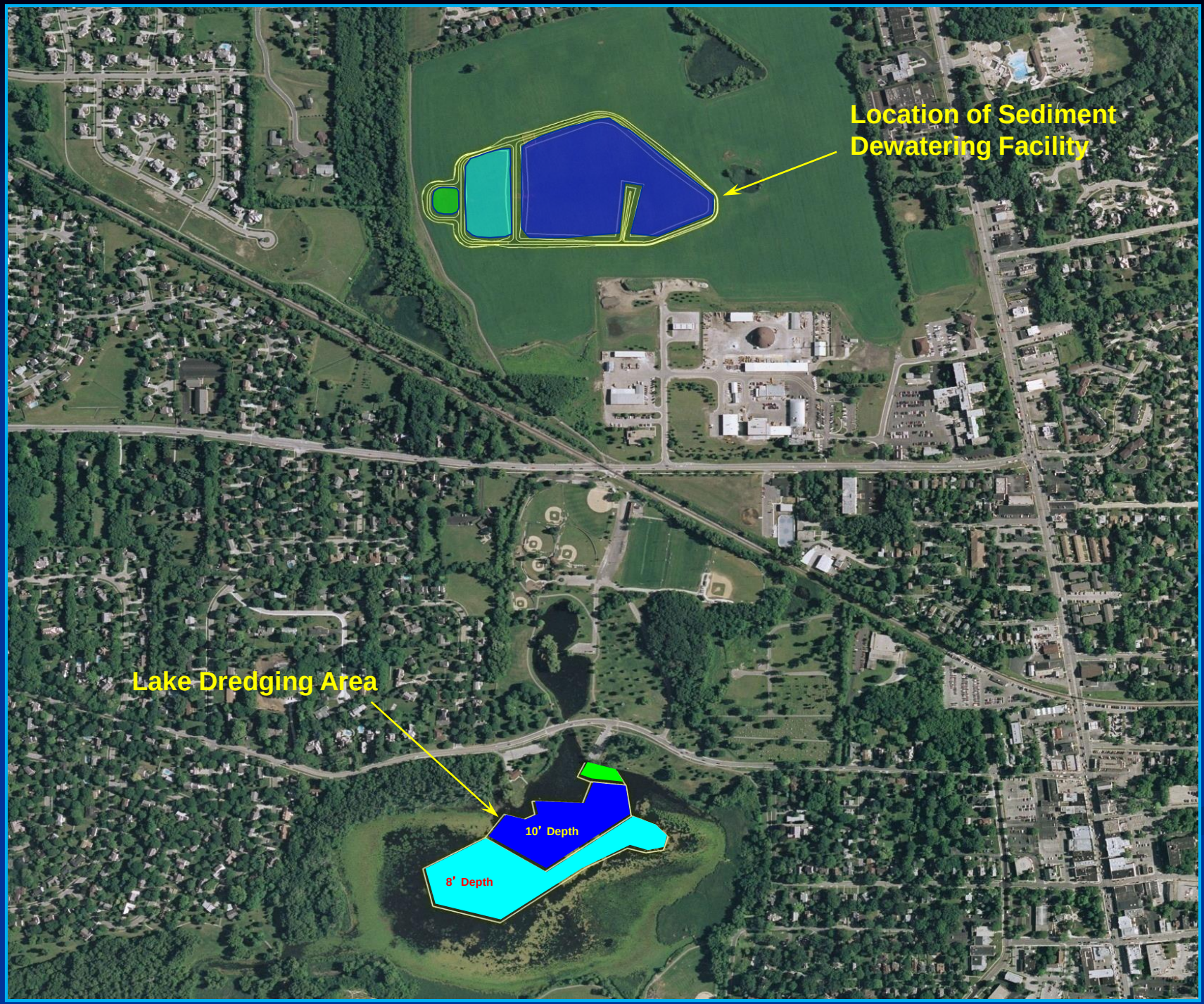
Obtain Core Samples to Characterize Sediment

Identify Potential Sediment Storage and Dewatering Sites



Typical Site Selection Matrix

Site Evaluation Criteria	West	East	NW	SW	NE	South
Total Site Acreage	48.0	8.0	3.0	16.0	18.0	49.0
Usable Acreage (assume 80% of site)	38.4	6.4	2.4	12.8	14.4	39.2
Type of Storage Site	Upland Dikes	Geotubes	Geotubes	Upland Dikes	Upland Dikes	Upland Dikes
Storage Capacity in CY **	495,615	82,602	30,976	165,205	185,856	505,940
Total Length of Perimeter Embankment (ft.)						
Estimated Earthwork Quantity (cy)						
Dist. - Lake to Storage Site	800	700	300	2,300	2,400	2,300
Dist. - Lake to Farthest Pt.	11,000	10,000	9,000	9,000	9,000	5,500
Min. Dredging Dist. (ft.)	800	700	300	2,300	2,400	2,300
Max. Dredging Dist. (ft.)	11,800	10,700	9,300	11,300	11,400	7,800
Avg. Dredging Dist. (ft.)	5,900	5,350	4,650	5,650	5,700	3,900
Average Site Elevation	800.0	800.0	800.0	805.0	810.0	810.0
Lake Surface Elevation (avg.)	798.0	798.0	798.0	798.0	798.0	798.0
Avg. Elev. above Lake	2.0	2.0	2.0	7.0	12.0	12.0
Terminal (Pumping) Elev.	12.0	12.0	12.0	17.0	22.0	22.0
Booster Pump (s) for dredged sediment	Yes	Yes	Yes	Yes	Yes	No
Return Water back to Lake	Gravity	Gravity	Gravity	Gravity	Gravity	Gravity
Adj. Homes/Buildings	Low	Low	Low	Low	Low	Low
Land Cost (if applicable)	N/A	N/A	N/A	N/A	N/A	N/A
Road or RR Crossings for Pipeline	1	0	0	1	2	2
Suitability of Topography	Good	Partial Wetland	Partial Wetland	Good	Good	Good
Suitability of Soils	Good	Good	Good	Good	Good	Good
Impact to Habitat	None	Low	Low	None	None	None
Aesthetic Impact	Low	Low	Low	Low	Moderate	Moderate
Amt. of Timber to Clear	None	Low	Low	None	Low	None


Location of Sediment Dewatering Facility
Lake Dredging Area
10' Depth
8' Depth

Various site characteristics and obstacles may be encountered for the dredge pipeline access, sediment storage and dewatering requirements

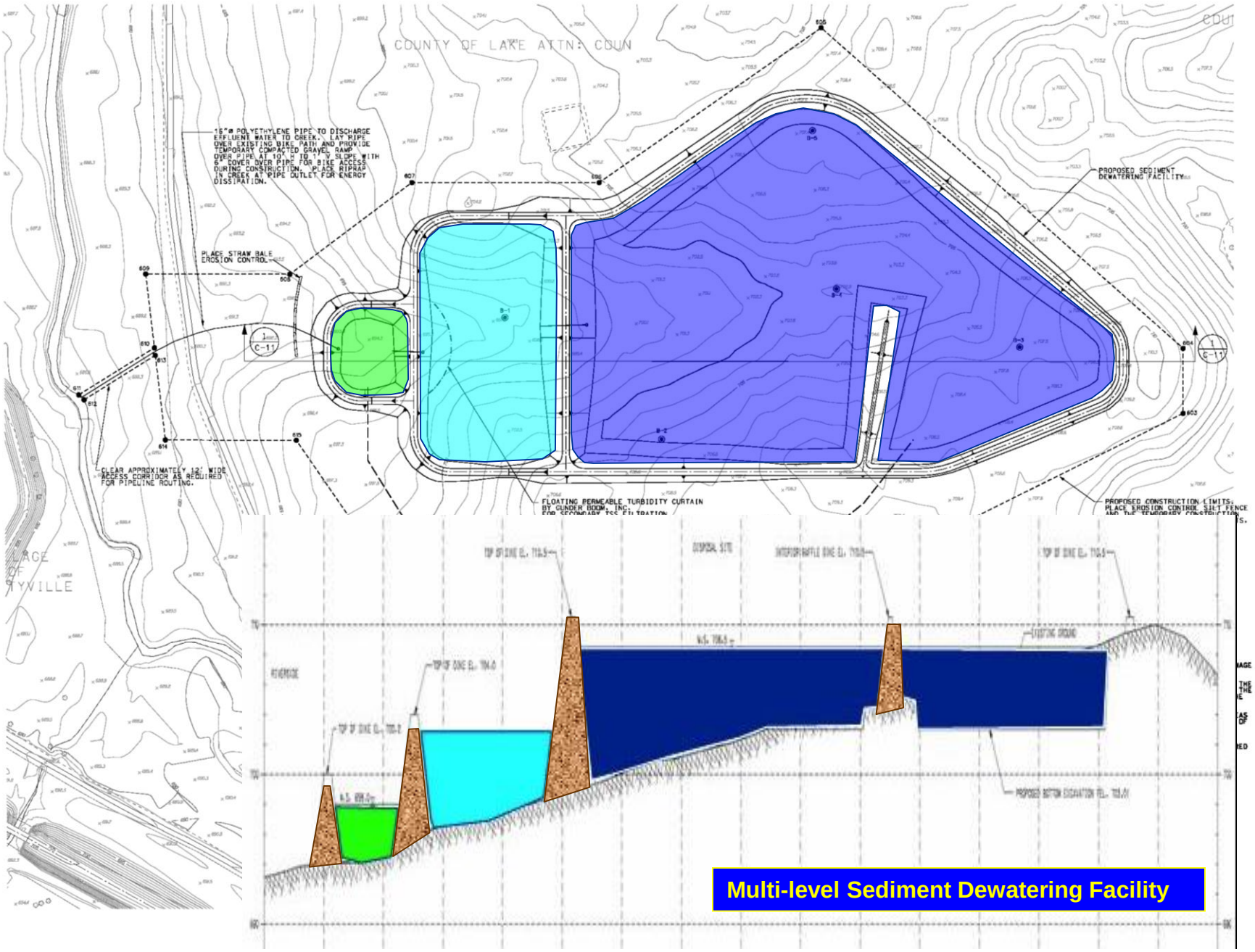
Permitting Requirements

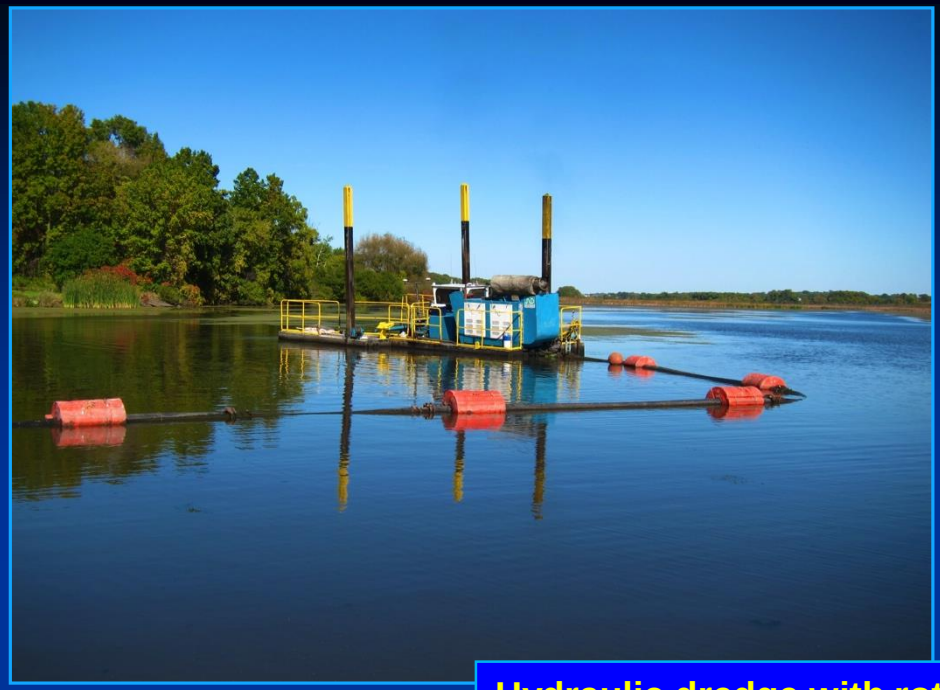
(depending on state, location, size and complexity of project)

- Joint Permit Application to be completed and submitted to Corps, IEPA and IDNR as required
- Section 401 Water Quality Cert. (Illinois EPA)
- Permit to Construct & Operate a Treatment Facility
- Threatened or Endangered Species (IDNR)
- IDNR/OWR Dam Permit may be required for sediment dewatering impoundment
- IEPA/County Storm Water Permit
- Other Local and County Permits as Required

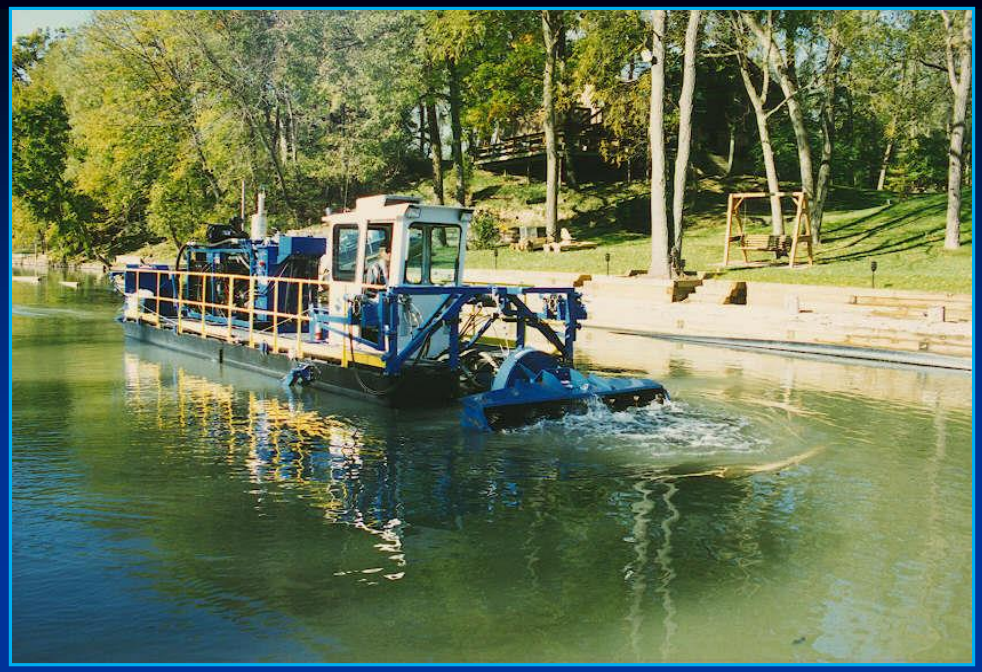
Dredging & Dewatering Options

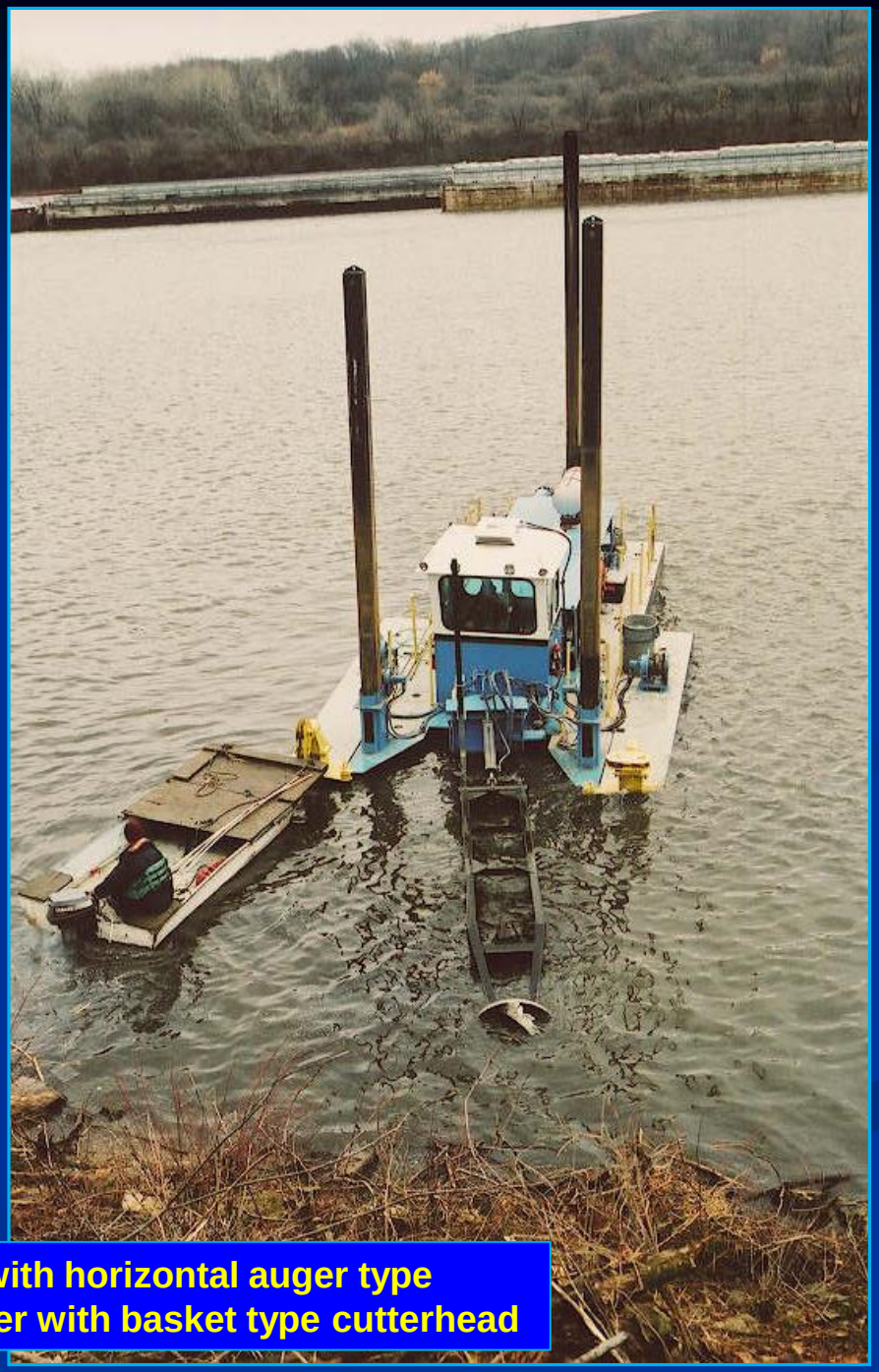
- Hydraulic Dredging: Cutterhead, Swinging Ladder, Horizontal Auger, Low Turbidity, High Solids, Diver Operated
- Mechanical Dredging: Wet and Dry Excavation
- Conventional Upland Containment Area Designs to store sediment and allow clear effluent water to flow back to lake
- Geotextile Tubes (Geotubes) both in-lake and upland
- Treatment Options such as Polymers, Flocculants, etc.
- Mobile On-Site Mechanical Dewatering Systems


COUNTY OF LAKE ATTN: COUN
16"ø POLYETHYLENE PIPE TO DISCHARGE EFFLUENT WATER TO CREEK. LAY PIPE OVER EXISTING BIKE PATH AND PROVIDE TEMPORARY COMPACTED GRAVEL RAMP OVER PIPE AT 10V : 1H SLOPE WITH 6" COVER OVER PIPE FOR BIKE ACCESS DURING CONSTRUCTION. PLACE RIPRAP IN CREEK AT PIPE OUTLET FOR ENERGY DISSIPATION.
PLACE STRAW BALE EROSION CONTROL
PROPOSED SEDIMENT DEWATERING FACILITY
CLEAR APPROXIMATELY 12' WIDE ACCESS CORRIDOR AS REQUIRED FOR PIPELINE ROUTING.
FLOATING PERMEABLE TURBIDITY CURTAIN BY CUNDER BOOM, INC.
PROPOSED CONSTRUCTION LIMITS. PLACE EROSION CONTROL SILT FENCE AND THE TEMPORARY CONSTRUCTION
C-11
B-1
B-2
B-3
B-4
B-5
LAKE OF TYVILLE
DISPOSAL SITE
EXISTING GROUND
PROPOSED BOTTOM EXCAVATION EL. 708.0
Multi-level Sediment Dewatering Facility
US Army Corps of Engineers Chicago District
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CHICAGO, ILLINOIS
HDR Engineering, Inc.
BUTLER LAKE LIBERTYVILLE, ILLINOIS DREDGING AND ENVIRONMENTAL RESTORATION
SDF SITE
SHEET REFERENCE NUMBER:
C-05



Hydraulic dredge with rotating basket type cutterhead





Hydraulic dredge equipment with horizontal auger type cutterhead and swinging ladder with basket type cutterhead

Hydraulic dredge equipment with upland sediment dewatering facilities.

Hydraulic dredge mobilization and pipeline assembly.

Video of hydraulic dredging

Hydraulic dredge slurry discharge from pipeline into dewatering facilities.

Video of slurry discharge

Clarified effluent return water being discharged from sediment dewatering facilities must be compliant with State permit requirements.

Video of effluent discharge

Video of effluent discharge

Fine grained sediment that does not settle within a 24 hour period may require a polymer or flocculent

Geotextile tubes can provide an effective sediment dewatering option depending on specific project conditions

Mechanical Dewatering Systems can provide an effective dewatering option for small spaces

From Wet Lake Sediment to Recovered Soil

Coarse Material Separator and Hydrocyclone

Clarifier, Polymers and Clear Return Water

Loading Trucks for Transport to Placement Site

Recovered Soil for Future Beneficial Use

Wet Mechanical Dredging with Barge Mounted Excavators

Mechanical Dredging with Long Reach Excavators

Sediment drying and consolidation allows for rapid establishment of vegetation due to soil fertility. The options for Beneficial Use vary depending on the type of sediment. Dredged lake sediment should be viewed as a resource!

A successfully dredged lake can provide numerous benefits such as increased water depths and volume, enhanced recreational access, improved water quality, expanded aquatic habitat, and various economic benefits such as increased property values!

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Peter is a Geologist and Certified Lake Professional with significant project experience in all aspects of lake and reservoir restoration and has specialized in planning and implementing lake dredging projects through out the United States for more than 30 years. He has planned, designed, permitted and completed more than 50 dredging and dewatering projects ranging in size from 300 cubic yards to 3,000,000 cubic yards.