Lake Altoona Protection and Rehabilitation District

Lake Management Planning Grant Final Report
LPL-297, LPL-298, LPL-299

Eau Claire County, Wisconsin

November 1996

SEH

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Prepared for Lake Altoona Protection and Rehabilitation District

1.0 Introduction

The Lake Altoona Protection and Rehabilitation District (LAD) received three Lake Management Planning Grants from the Wisconsin Department of Natural Resources (WDNR) to assist in the planning and design of a sediment dredging project. The grants were obtained for the following components of the project:

1. LPL-297 Delta Dredging
2. LPL-298 Dewatering Basin
3. LPL-299 Sediment Trap

The LAD has been evaluating ways of reducing the inflow of sediment into Lake Altoona, and improving the recreational boating opportunities in the lake for many years. To reduce sediment inflows to Lake Altoona the LAD decided to create a sediment trap 1.5 miles upstream from the mouth of the Eau Claire River. A sediment trap created and maintained with hydraulic dredging equipment requires the construction of a dewatering basin, or disposal area, for the slurry of sediment and carriage water. The creation of a dewatering basin requires significant amounts of materials to build dikes and berms.

One way of improving the recreational boating opportunities within Lake Altoona was to obtain the materials needed for the creation of those berms from the lake itself where sediment has accumulated to a point where it adversely impacts boating. In December 1994 the LAD decided to study the feasibility of obtaining the material needed for creating the berms from

the mouth of the lake and thereby creating channels in the mouth which would improve access between the lake and the Eau Claire River. This concept was subsequently incorporated into the project.

The entire project encompasses a number of different elements and the Lake Management Planning Grants supported planning efforts for all elements. Another program, the Recreational Boating Facilities Program supported elements which will improve the quality of recreational boating (the boat channels).

The Lake Altoona Sediment Reduction Program feasibility studies included the following tasks which were supported by the three Lake Management Planning Grants:

1. Detailed bathymetric mapping of the mouth of Lake Altoona.
2. Develop delta dredge cut design.
3. Final design of the dewatering basin.
4. Final design of the sediment trap.
5. Specifications for hydraulic dredging.
6. Complete an environmental assessment.
7. WPDES permit application.
8. Obtain other permits and approvals.
9. Complete lake drawdown.
10. Final Report.

The following is the final report on the status of these tasks. Each task outcome is briefly described in the following sections. In summary, the environmental reviews are complete, necessary permits have been obtained, final design is complete, bids have been received, and construction of the project is well on the way.

2.0 Summary of Task Progress

2.1 Detailed Bathymetric Mapping of the Mouth of Lake Altoona

Field surveys and detailed bathymetric mapping of the mouth of Lake Altoona was completed in March 1995. It was used to design the dredge cut and estimate dredging quantities and was included in the plan portion of the bid package sent to interested contractors in April 1996. The map was also used to select locations for sediment sampling and analysis.

2.2 Delta Dredge Cut Design

Final design of the delta and boat channel dredge areas began in August 1995 and completed in April 1996. Plans and specifications for the delta and boat channel dredge areas were included in the bid package sent to interested contractors.

2.3 Final Design of the Dewatering Basin

Final design of the dewatering basin began in January 1996 and completed in April 1996. Plans and specifications for the dewatering basin were included in the bid package sent to interested contractors.

2.4 Final Design of the Sediment Trap

Final design of the sediment trap began in January 1996 and completed in April 1996. The sediment trap will be constructed in 1997. Plans and specifications for the sediment trap were included in the bid packages.

2.5 Specifications for Hydraulic Dredging

Specifications for procedures to be followed for hydraulic dredging have been completed and included in the bid documents sent to interested contractors in April 1996.

2.6 Complete An Environmental Assessment

Information that the Lake Altoona District needed to provide for the environmental assessment has been submitted to the Wisconsin Department of Natural Resources. The environmental assessment was completed in 1995 as part of the permit review process.

2.7 Complete Permit Applications for Delta Dredging

WDNR Chapter 30 permit, WDNR WPDES permit, Army Corps of Engineers Section 404 permit and Eau Claire County Parks and Recreation permit applications have all been submitted. All permits necessary for the project have been received.

2.8 Obtain Other Permits and Approvals

Agreements to allow work on several private properties and Eau Claire County Lands (dewatering basin) have been finalized. Agreement with NSP and Eau Claire Electric Cooperative are also complete.

2.9 Complete Lake Drawdown

The planning and design work required for a lake drawdown has been completed. Plans and specifications for mechanical dredging, which would require a lake drawdown, were included in the bid package sent to interested contractors. Since the bid that was accepted was for hydraulic dredging a lake drawdown will not be necessary.

2.10 Final Report

This document is intended to serve as the final report for the project for the planning and design stages of the Lake Altoona Sediment Reduction Project. Presently planning and final design are complete, bid packages have been sent to contractors and bids received. A bid for hydraulic dredging has subsequently been excepted and construction was begun in September 1996.

3.0 Summary of Invoices

The following table summarizes invoices submitted and the associated cost attributable to each grant.

Table 1
Summary of Invoices

Period Ending	Ineligible Amount	RBF 392	Delta Dredging LPL 297	Dewatering Basin LPL 298	Sediment Trap LPL 299	Total
January 1995	$2,617	$3,801	$2,700	--	--	$9,118
February 1995	--	--	--	--	--	--
March 1995	--	4,000	1,400	1,200	1,169	7,769
April 1995	--	4,900	1,300	1,100	1,047	8,347
May 1995	2,400	13,811	--	--	--	16,211
June 1995	--	4,500	1,700	1,300	1,385	8,885
July 1995	--	3,500	4,200	4,200	3,817	15,717
August 1995	--	--	5,500	4,800	3,056	13,356
September 1995	--	--	845	844	--	1,689
October 1995	--	288	--	--	--	288
November 1995	--	298	--	--	--	298
December 1995	--	4,740	--	--	--	4,740
January 1996	--	4,650	--	--	3,075	7,725
March 1996	68,634	--	--	--	--	68,634
Total	**$73,651**	**$44,488**	**$17,645**	**$13,444**	**$13,549**	**$162,777**

EXHIBIT D

PROJECT WORK PLAN

TASK 1.00 - Field Investigations

Estimated Completion Date: October 1992

Subtask 1.00 - River Cross-Sections

Sufficient hydrographic survey information will be gathered for detailed analysis and design of the sediment trap and boat channel. It is recommended that at a minimum 20 to 25 bank-to-bank cross-sections be surveyed, at intervals of approximately 500 feet upstream and downstream of the trap area, and at closer intervals in the immediate vicinity of the trap itself. Bench marks will be established at the time of the survey to allow for future monitoring as may be required. The hydrographic survey data is an important component in the setup of the sediment transport modeling.

Subtask 1.20 - River Core Sampling (Physical Characteristics)

Sediment samples will be obtained from the Lake Altoona inlet delta for analysis to determine the particle size distribution of sediments to be trapped by the facility. This will provide confirmation of the minimum "target" sediment sizes required for the project to be effective in achieving its objective. Gradation tests will be conducted to determine settling time.

Subtask 1.21 - River Core Sampling (Pollutant Characteristics)

Sediment core sampling will be undertaken within the Eau Claire River to the head of Lake Altoona (sediment trap and boat channel) to assess any pollutant characteristics and chemical composition of existing sediments proposed to be dredged. The actual number of core samples retrieved, sub-samples taken from each core and the analytical parameters will be determined with the concurrence of the Wisconsin Department of Natural Resources (WDNR) and in accordance with NR 347.05(2). The bottom sediments proposed for dredging would be analyzed for pollutant characteristics which could violate water quality standards from the disposal site discharge. The information gathered in this effort is necessary in the design of the dredge spoil disposal site and any subsequent treatment technologies which may be required to meet a WPDES permit. Analytical costs will be based upon quotes from independent laboratories certified in Wisconsin following concurrance from DNR on number of samples and required tests.

TASK 2.0 - Feasibility Studies and Concept Plans

Subtask 2.10 - HEC-2/SETTLE Modelling Study

Estimated Completion Date: April 1993

A detailed HEC-2 (Water Surface Profiles Program, US Army Corps of Engineers) model will be developed of the Eau Claire River both upstream and downstream of the proposed sediment trap.

Utilizing the SETTLE model, the preliminary dimensions of the required sediment trap will be determined considering sediment sizes and hydraulic conditions identified from HEC-2 computations. The volume of material expected to be deposited in the sediment trap for both specific flood events and on an average-annual basis will be determined by application of the HEC-6 sediment routing model.

Subtask 2.20 - Conceptual Plans

Estimated Completion Date: April 1993

Boat Channel/Sediment Trap

The preliminary location of the sediment trap area has been identified by the Lake Altoona Protection and Rehabilitation District approximately two miles upstream of the inlet of the Eau Claire River into Lake Altoona, between Sixmile and Sevenmile Creeks. This location takes advantage of an existing road and boat ramp which can be used to relocate the sediments removed by dredging to the disposal area. This location is upstream of the influent of backwater from the water level and will therefore require analysis of trapping efficiency using fluvial process techniques.

The proposed sediment trap will be an in-stream facility; therefore, to create favorable conditions for settling, the trap must provide a local area of reduced flow velocity such that the majority of particles can settle within a prescribed length and depth. The flow rate upon which the sediment trap design is based must be carefully selected. Considering that infrequently-occurring flood events can move large amounts of sediment, and that more frequent flow carry less sediment for longer periods, it is proposed that a probability-weighted approach be used for design based on existing hydrologic data. In this manner, the range of potential flows is taken into consideration and the frequency of maintenance dredging required to remove accumulated sediments can be reliably estimated for the long-term planning and budgeting purposes of the District.

We will estimate the volume of material to be dredged for construction and annual maintenance (consisting primarily of the removal of accumulated volume of sediment) using sediment transport models.

Subtask 2.30

Estimated Completion Date: August 1993

Dredge Spoil Disposal Site Evaluation

Based on discussion and comments during the site visit and interview, we propose to evaluate three alternative sites for consideration as a disposal area. The level of effort will be sufficient to determine the feasibility, the environmental constraints and availability. Feasibility will be determined by available area versus minimum requirements for disposal of the anticipated volume of dredged materials and proximity to the river. Environmental constraints will be determined based on review with DNR. Availability will be determined through preliminary discussions with the land owner(s). A maximum of three (3) potential dredge spoil disposal sites will be evaluated.

Any site that is feasible (large enough to contain the volume to be dredged and close enough to be economically usable), not restricted for use environmentally, and available will be further evaluated for costs of development.

Final selection of the site, or multiple sites, will be made with the Lake District.

Subtask 2.40 - Disposal Site Survey

Estimated Completion Date: September 1993

The selected disposal site(s) will require the acquisition of topographic survey information. The topographic survey will also be needed in conjunction with the soil borings survey conducted under Subtask 3.50. The primary use of the information will be in the preliminary dike design and discharge outfall structure.

Subtask 2.50 - Disposal Site Soil Borings

Estimated Completion Date: September 1993

Soil borings will be necessary in the selected dredge spoil disposal site. It is generally most cost-effective to construct disposal site dike structures from existing suitable soils onsite. Four to six borings should be sufficient to identify general soil types in the area and the materials available for dike construction. In addition, the soil borings would permit the determination of preliminary design parameters as they relate to embankment slope stability. Additional borings may likely be required for final design of the disposal facility.

Subtask 2.60 - Disposal Site(s) Design

Estimated Completion Date: November 1993

With the use of hydraulic dredging techniques, the site or sites would be considered a "Treatment Facility" (NR 347) and therefore be expected to function to remove both the solids and dissolved materials from the interstitial or carriage water. The removal capability of the proposed disposal site is a function of its volume created by the diked area and its hydraulic retention time as defined by the size of the proposed dredge and its operating time. Applicable discharge standards for the disposal site overflow (carriage water return flow) will have to be met prior to return to the Eau Claire Rive or Lake Altoona.

The potential reuse of the dredged materials is also an important factor which is incumbent on proper design of the disposal facility. Consideration will be given to segmenting the facility into two or more cells which would allow adequate dewatering and consolidation of the dredge materials.

TASK 3.00 - Value Engineering Study

Estimated Completion Date: December 1993

Value engineering is a proven methodology in reducing cost and at the same time improving quality.We proposing that a value engineering study be undertaken which would address various sizing alternatives proposed for the sediment trap and dredging equipment. The sediment trap size directly relates to its sediment removal ability and design life which must be evaluated in terms of the dredge spoil basin sizing and dredging alternatives. This study would address the cost-effectiveness (capital cost and life cycle cost), maintainability, constructability, and reliability of the various alternatives and the degree to which the project goals can be achieved. In addition, our analysis will address the location of the dredging sites with respect to the disposal site and dredge pumping cost and efficiency of various sized machines versus the use of more than one disposal site. The effectiveness of the sediment trap will be evaluated based on the HEC-6 results. A total of three alternative sediment trap locations will be evaluated.

TASK 4.00 - Final Plan Design

Estimated Completion Date: January 1994

Final design of the boat channel/sediment trap and disposal site(s) will be completed in accordance with currently accepted engineering design criteria and specifications. The company has extensive experience in the preparation of construction plans and specifications for local, state and federal agencies.

The final design of the sediment trap will be verified from the sediment transport component of the "Value Engineering Study" described under Task 3.00 using HEC-6. The volume of sediment collected by trap and its location will significantly influence all other project facilities.

TASK 5.00 -Permit Applications and Approvals

Subtask 5.10 - Ch. 30.20 Permit Application

Estimated Completion Date: February 1994

A permit application will be prepared in accordance with Wisconsin Statutes, Section 30.20 and NR 347, as applicable.

Subtask 5.20 - WPDES Permit Application

Estimated Completion Date: March 1994

A Wisconsin Pollutant Discharge Elimination System Permit (WPDES) application will be prepared for the carriage water return flow discharge into the Eau Claire River in accordance with Wisconsin Statutes, Chapter 147. The application will address the treatment methodology(s) necessary to meet the discharge standards imposed by WDNR as part of WPDES issuance.

Subtask 5.30 - Environmental Assessment

Estimated Completion Date: April 1994

The proposed dredging project will be reviewed under Wisconsin Statutes, Section 1.11 and 23.22(5) and NR 150 for compliance with the Wisconsin environmental policy act. It appears that at a minimum, this project will require the preparation of an environmental assessment.

Subtask 5.40 - Other Permits and Approvals

Estimated Completion Date: April 1994

This project will require a determination by the US Army Corps of Engineers as to the applicability of Section 404 of the Clean Water Act through a Nationwide Permit [Title 40, Code of Federal Regulations, Section 30.6 (16)]. Section 330.6(16) relates to "Return Water From Upland Contained disposal Areas". Water quality certification under Section 401 of the Nationwide Permit by WDNR may also be necessary.

TASK 6.00 - Construction Bidding and Equipment Purchase

Estimated Completion Date: May 1994

The recommended approach for implementation of the project will be an outcome of the value engineering study (Task 3.00). Option one includes hiring a private dredging contractor. Construction bidding services will include preparation and distribution of contract documents (plans and specifications), advertisement for bids, questions during bidding, bid opening and recommendations for retaining a contractor for the work.

Option 2 involves specifications for dredging equipment purchase or leasing to be operated by the Lake District in lieu of hiring a private dredging contractor.

TASK 7.00 - Construction Phase

Estimated Completion Date: June-September 1994

A "constructability review" will be held with the client and SEH to review the construction activities. A pre-construction meeting(s) will be held with the contractor, permit agencies, utilities and other regulatory agencies as necessary on both the dredging portion and disposal site construction phases of the project. Construction site observation will be performed at the minimum of once per week and more frequently during disposal site dike construction. The Company's Project Representative will be responsible for all communications between contractor and the Project Manager.