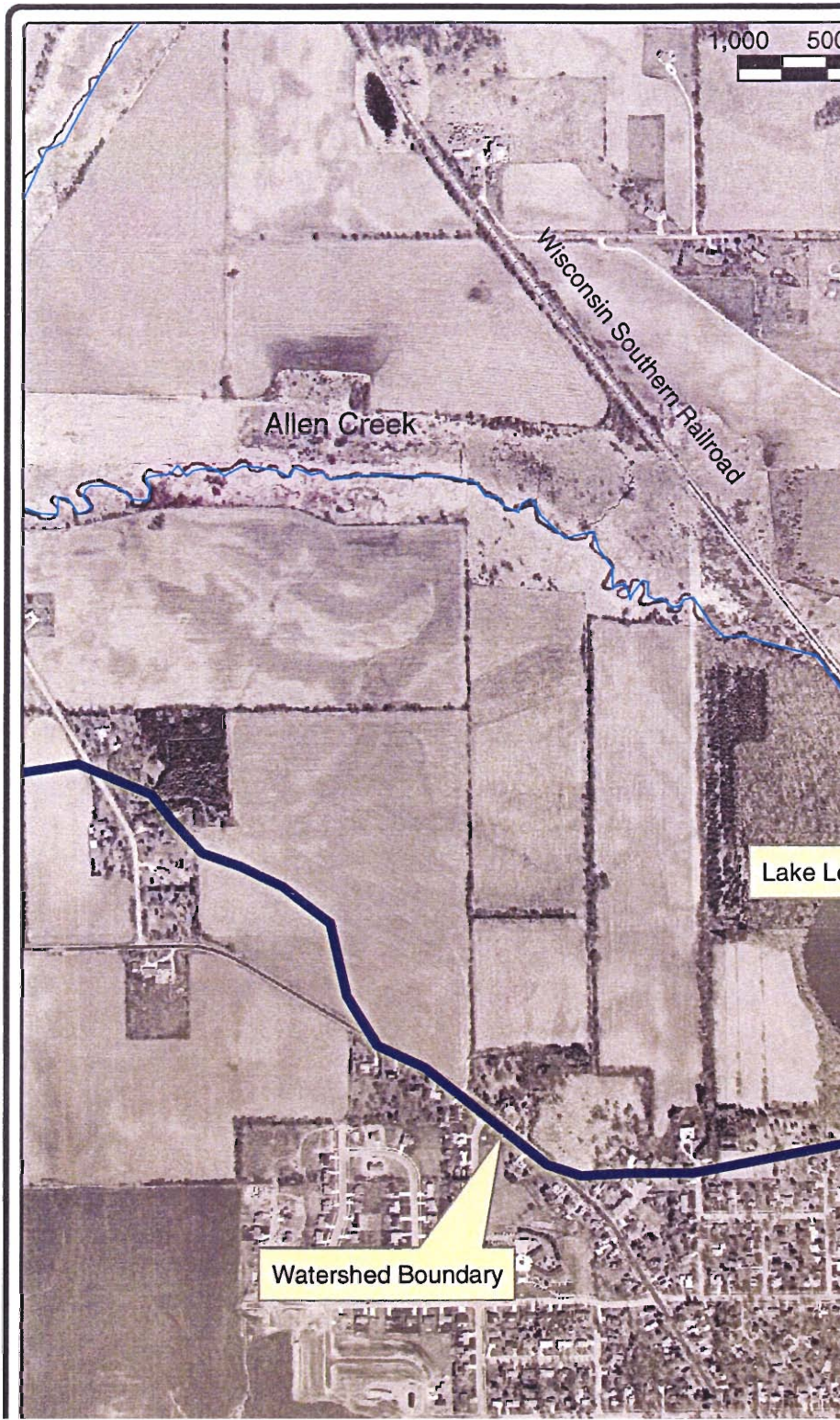

1,000
Wisconsin Southern Railroad
Allen Creek
Lake L
Watershed Boundary

Lake Leota is an impoundment first constructed in 1847 as a mill pond; w drained in the late 1800's after the mill closed. As a result of public support recreation, the lake was dug out again in 1923. Since its re-creation, the experienced a number of lake management challenges including sediment turbidity, rough fish, high nutrient input and aquatic weeds, and stream bank e Allen Creek.

B Erosion, Sedimentation Rates, and Sediment Quality

Approximately 18.9 square miles, or 90 percent, of the watershed is zoned ag and consists of gradual slopes of 0 percent in the east and 1 to 3 percent in the v DNR calculated the average soil loss for the watershed to be 44,000 tons/yea sedimentation rates from the DNR 1979 report, approximately 2,900 cubic year (97 percent) from sheet and rill erosion and 100 cubic yards per year (3 from stream bank erosion accumulate in Lake Leota. The 1979 DNR rate was acre lake; Owen Ayres 1980 report adjusted this calculation for a 26.6-acre lake cubic yards/year.

Seventeen sites of severely eroded stream bank areas were identified by the 1979. Stabilization of these areas would help prevent some sedimentation an loading.

The average depth of water to the top of the sediment bed for the lower porti lake was 1.5 feet in 2001. In 1979 the average lake depth to the top of the sedi 3 feet. The UW-Platteville students calculated a sediment accumulation 0.8 inches per year based on the accumulation from 1979 to 2001. In 1979 reported the sedimentation rate from 1964 to 1977 from an average of the rate inlet and near the dam. The calculated rate was 0.9 inches per year. Data fro 1964 showed a sedimentation rate of 0.6 inches per year. Data for these sedi rates were collected by the U.S. Department of Agriculture, Agricultural Service in 1977. The USDA collected sediment cores for radiometric determine sedimentation rates.

dredging plans and that the analysis fulfilled requirements of NR 347 for analysis.

C. Water Quality

Turbidity continues to be a problem in Lake Leota and is contributing to the p of rough fish (mostly carp) and bullheads in the lake. DNR explained in t report that if the lake were dredged to the bottom, turbid water would co prevent light penetration to the lake bottom and prevent excessive weed grow lake were dredged and the fish were eradicated, turbidity would be reduced, but weed growth would return in 5 to 10 years. The lake would fill in and light wo the lake floor producing aquatic plants. A 10-foot dredging depth appears desi depths in excess of 8 feet will limit rooted aquatic weed growth according to Ayres 1980 report.

Nutrient levels in the lake are related to the highly fertile soils in the watershe erosion of soils from the dominant agricultural land use noted in the 1979 DN The DNR determined that nutrient runoff was mostly due to nonpoint cropland well as excessive wildlife populations and other natural causes. The average ph concentrations in milligrams/liter measured by the DNR are shown in Table 1.

	Lake Leota Outlet	North Branch Allen Creek	West Bran Allen Cre
Average (1977)	0.18	0.21	0.12

Table 1 Phosphorous Concentrations (mg/l) 1979 DNR

The phosphorus concentrations in Table 1 reflect the relationship to the agricultural land use as compared to other similar watersheds shown in Platteville report.

D. Hydrology

Allen Creek drains over 21 square miles of the watershed before draining i
Leota. Allen Creek above Lake Leota has a history of manipulation and reditch
creek flows along the railway as a drainage ditch before discharging into the l
natural path of the creek flowed to the upper lake first and then to the lower p
the lake. The railway and drainage ditch altered the original stream course.

E. Fish

The fish population in Leota consists mostly of rough fish, including carp, and b
which contribute to the turbidity problem of the lake. The fish keep the bot
material stirred up, eat plant debris and aquatic organisms attached to aquatic pl
aid in controlling in-lake weed problems. According to the UW-Plattevile re
highly turbid waters are unsuitable conditions for game fish.

Upstream Watershed Study Needs Assessment

According to conversations with Mike Halsted, the DNR water quality spe
watershed study would not be required prior to dredging Lake Leota, but it wo
advantageous step to extend the success of the project because the study woul
the high sedimentation rates. He also made another recommendation of simpli
project as much as possible to allow the goals of the project to be achieved. Alt
such as rerouting the creek to the upper lake and building a berm on the upper l
discussed. These ideas would involve an extensive floodplain and hydrologic
be completed to assess the downstream effects of the modified stream h
Further, these ideas may not provide much benefit, in terms of the City's goals
Leota, compared to the difficulty and added cost.

A watershed study may help to identify the existing physical environment fea
secondary and cumulative effects of the project, the significance of the project,
components required for the dredging environmental assessment (EA). The

Permit Requirements

The following permit requirements were identified for a Lake Leota dredgin
These components would need to be completed during the design phase of this

1. DNR permits will be required under Chapter 30.20 for dredging
long-term maintenance plan for future dredging. This permit a
would also be submitted to the Army Corp of Engineers. A blank c
Chapter 30 permit application is included in Appendix C. The DN
for this project is Cami Peterson.

2. An EA is required by the DNR to assess the effects of the dredgin
Dredging projects over 3,000 cubic yards require the completion of
blank copy of the EA form is included in Appendix D. Compone
EA include:

   a. Project Summary

      Project summary, purpose and need, permits, estimated
      funding sources

   b. Proposed Physical Changes

      (1) The quantity of material removed
      (2) Manipulation of aquatic resources
      (3) Any buildings, structures, or roads constructed
      (4) Emissions and discharges

   c. Affected Environment

      (1) Description of the existing physical and biological en
      including threatened and endangered species, and wetlar

e. Alternatives

Describe feasible project alternatives

f. Significance of Project

(1) Significance of environmental effects
(2) Significance of cumulative effects
(3) Significance of risk
(4) Significance of precedent

g. Issue Identification

(1) Summarize citizen and agency involvement activities
(2) List agencies, groups, and individuals contacted rega
project.

Russ Anderson or Cathy Bleser of the DNR's South Central
office would assist with the EA process for this project. As
EA process, a public notice would be issued and a 30-day per
follow for public comment. If substantial public comment was
a public meeting would be held.

3. A WPDES permit (Dredging Operations – Carriage and Intersti
[WI-0046558-3]) would be needed for the return water from
dredging to surface waters. Bob Liska is the contact at the DN
permit. The limit for TSS in the permit is in the range of 40-80
blank copy of the WPDES permit application is included in Appenc

4. NR 216 Construction Site Stormwater Discharge Permit – A Notic
(NOI) for Stormwater Discharges Associated with Land
Construction Activities is required because the area of land disturb

Dredging Cost Review

The dredging volumes calculated for the UW-Platteville report were ch
accuracy using a planimeter to manually check the estimated dredging volu
manual check indicated that the UW-Platteville quantity appears to be reason
on the existing and proposed contours in the report. The UW-Platteville dre
includes a 12-foot-deep sedimentation basin and the rest of the lower lake is p
be between 6 and 10 feet deep. If dredging took place in 2005, it is esti
10,000 cubic yards more would have accumulated since the UW-Plattevi
Therefore, the UW-Platteville estimate of about 276,000 cubic yards of n
dredge was increased by 10,000 cubic yards for cost estimating purposes in
(290,000 cubic yards is used).

Three lake dredging alternatives were developed for review and analysis. Pla
opinions were developed for different management alternatives. Costs for com
items on SOLE's "Wish List" (besides dredging and restoration of disturbed
described in the Analysis of Needs section for the last grant submittal, are nc
in these cost opinions. The "Wish List" is attached in Appendix G.

The summary of the opinion of construction cost for each alternative is in
Table 2. The components of the cost opinion for each alternative are in
Appendix H.

Dredging Alternative	Opinion of cost
Hydraulic Dredging (IDD System) based on conversation with Brennan	$7,200,000
Hydraulic Dredging (Conventional) based on conversation with Brennan	$3,200,000
Hydraulic Dredging (Conventional) based on conversation with Inland Dredge	$3,500,000

A. Hydraulic Dredge

Our review of the UW-Platteville report indicates that the unit costs used for dredging of $3 per cubic yard is low. Calls to hydraulic dredging contr Brennan and Inland Dredge) indicate the cost for hydraulic dredging an approximately 2.65 miles away would be in the range of $5 to $8 per cubic conventional hydraulic dredging technology. Using the IDD technology wit 2.65 miles away, JF Brennan indicates the cost is in the range of $15 to $19 yard, which makes use of this technology cost prohibitive. This substantially cost from the UW-Platteville report. Other costs not included in the Platte include costs for the return water line to Allen Creek from the disposal sit layout to the disposal site, pipeline road crossings, technical services, and con These costs are included in the costs in this report.

The City should be aware that the per cubic yard cost for hydraulic dredg decrease if the disposal site was closer to the lake. A disposal site located 1 or less would be ideal.

Inland Dredge shared other design issues:

- The dredge disposal area must have a berm capable of containi dredged quantity plus 50 to 75 percent more volume for water sto maintaining a 2-foot freeboard from berm overtopping.

- The pumps will pump a mix consisting of 10 percent sediment and water.

- Dredged materials disposed of on agricultural lands should be no approximately 10 to 12 inches deep to allow the farmer to till th materials into the underlying topsoil.

- Dredged materials could be sold to a local business that cou

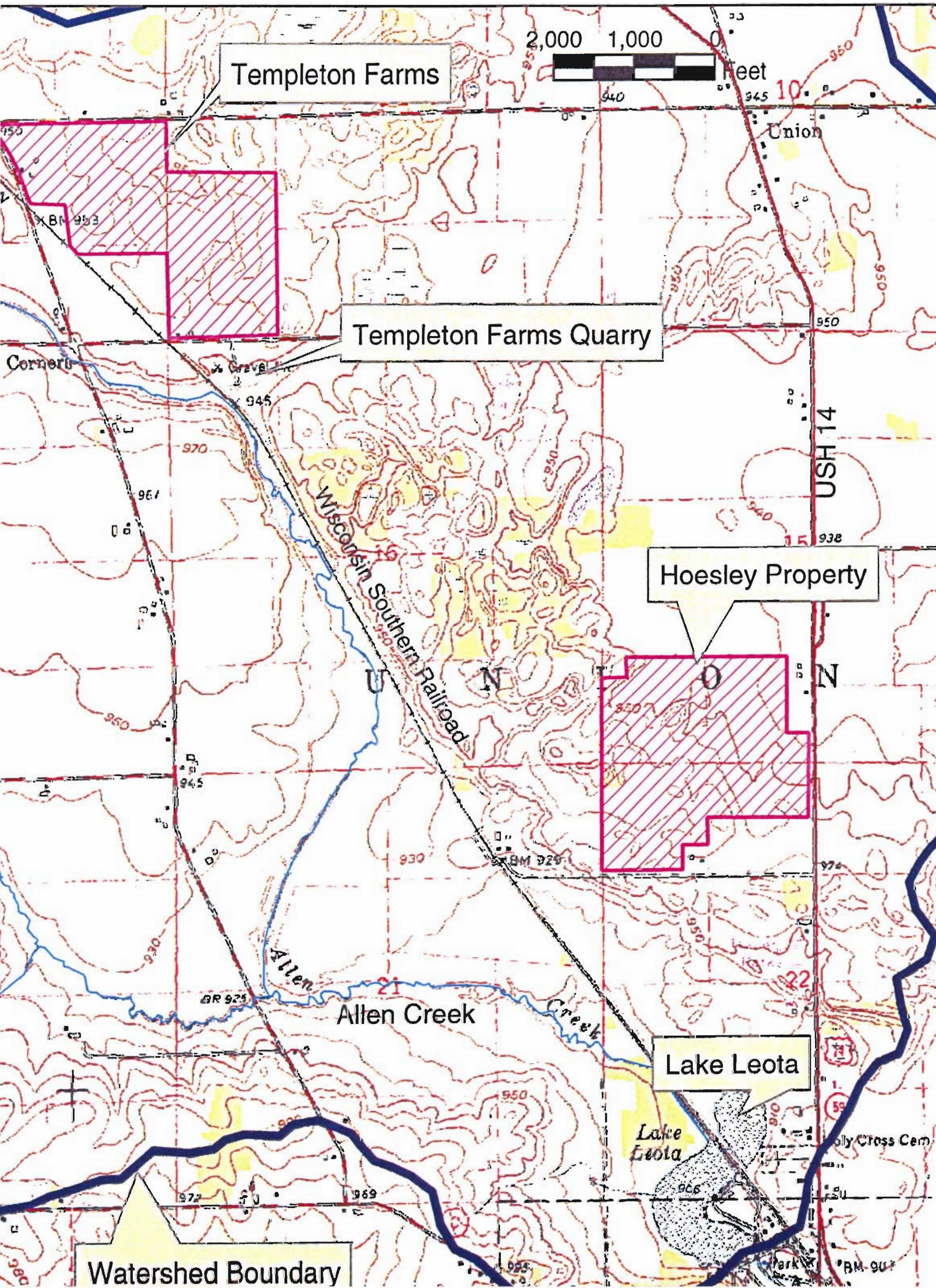
Platteville report indicates that the materials for the site access road consti readily available at the construction site, so materials will not need to be purch unlikely this will be the case. Costs in this report reflect more realistic numbe items. The UW-Platteville report also doesn't include costs for technical se contingencies.

C. Drawdown and Limited Hydraulic Dredge

One alternative suggested by the DNR is a focus on habitat creation. This would be planned to be significantly less expensive than dredging the entire lake would be drawn down for a season, and lake sediments would be dredge areas to create some pools. Some areas would be filled with dredged sedi planted with aquatic and wetland plantings. A drawdown would involve dra of the water from the lake, which would kill most of the undesirable fish, recolonization or rejuvenation of native aquatic plants, and help solidify soft The lake would become a restored habitat area to support a variety of wildli trails or boardwalks could also be constructed later to view wildlife. Aesth would still increase with this alternative as well as creation of wetland habitat, both goals of the SOLE committee. Canoeing, kayaking, and fishing wou possible. The cost for this alternative includes dredging half of the sedimen lake and planting the other half with wetland plantings. The sedimentation b be constructed as one of the dredged areas.

Preliminary Identification of Disposal Sites

Members of the SOLE committee were asked to investigate proposed spoi sites. The SOLE committee obtained verbal permission for disposal of spoil owner of Templeton Farms with a combination of filling in an old quarry spreading on agricultural land. These agricultural fields total approximately and are about 2.65 miles northwest of Lake Leota. The quarry has an a volume of around 50,000 cubic yards in which dredged materials migl deposited. These locations are in T4N R10E Sections 8 and 9. The elevat



2,000 1,000 0
Feet
Templeton Farms
Union
Templeton Farms Quarry
Corners
Wisconsin Southern Railroad
USH 14
Hoesley Property
U N I O N
Allen Creek
Lake Leota
Lake Leota
Holy Cross Cem
Watershed Boundary

Depth of Sediment (inches)	Area Require (acres)
3 in	650
6 in	325
10 in	195
1 ft	165

Table 3 Acres Required for Land Disposal for Sediment Depths (assuming 10% reduction in sediment volume after dewaterin

The DNR (Mike Halsted) has indicated that solid waste program will identify v not any solid waste regulations will apply to the selected disposal site.

Disposal site sediment depths are calculated in Appendix I and shown below assuming an estimated dredged sediment quantity of 290,000 cubic yards.

Typical land spreading applications would deposit approximately 10 to 12 dredged spoils on top of agricultural land to allow for chisel plowing of the inches of material into the native topsoil. However, we recommend applicatio 5 to 6 inches maximum based on the available nitrogen in the sediments (Ap and crop agronomic rates for Nitrogen.

Engineering Design Documents Needs Assessment

In order to go forward with completion of the dredging project, it is our recom that the City of Evansville enter into a contractual agreement with a design en firm to complete the final design and contract documents (specifications and for this project. This recommendation is based on the following:

2. The UW-Platteville drawings and designed dredging plan can se basis for the final contract plans. If the Drawdown and Limited Dredge option is chosen, then the dredging plan would need to be re

3. Since the DNR doesn't require a watershed study (althoug recommended to protect your investment), we feel that the study/monitoring can proceed separately from the dredging projec proceed at a pace as funds are available. The dredging project ca prior to and/or in conjunction with the watershed study.

As part of the final design and contract document preparation, the following in may need to be addressed. Costs for addressing these issues are included in the services and contingencies portion of the cost.

1. Topographical survey of the dredged materials disposal site. Th needed to design and assess the feasibility of a dewatering are dredged materials and a restoration plan. If adequate topo information is available from the county or other sources, it may b to use this instead.

2. Topographical survey of the pumping route to the disposal site needed to assist in determining the conflicts and other issues assoc the selected route.

3. Topographical survey check of the UW-Platteville survey and d have obtained the digital survey and design drawings from Platteville and have received permission from Professor Max An use of these documents for construction. In lieu of this check, the Documents could be written to require that the bidders satisfy ther to the existing topographic conditions prior to bidding.

4. Construction Easements will likely be needed for the pumping

7. Soils testing at the disposal site areas may be necessary to determining a stable berm cross section and depth to underlying gravel soils. This was also a recommendation of the Owen Ayres r

During construction, we recommend that the City hire an engineering co observe the construction for conformance with the specifications and dra assist in the administering of the construction contract.

Funding Sources

Potential sources of funding for future Lake Leota efforts are listed below:

- River Management Grant (for watershed study)
- Lake Management Grant (for watershed study)
- Army Corp of Engineers Section 206 Program (Aquatic restoration)
- State and Tribal Assistance Grant (STAG) or other special federal f
- City Referendum

A funding source table is included in Appendix J.

Conclusions, Recommendations, and Schedule

This report has presented several alternatives for the City of Evansville to r decide if they will address the committee's goals. Below is a summary of a for Lake Leota:

A. <u>Summary of Dredging Alternatives</u>

- Mechanical dredging and long-term maintenance
- Hydraulic dredging and long-term maintenance
- Limited hydraulic dredging, drawdown, habitat creation, and

Hydraulic dredging would be the desired method if the City chose to complete dredging option. Hydraulic dredging would eliminate the need t hauling roads and trucking on city streets.

The second option of limited dredging, drawdown, and habitat creation woul dredging key areas along with habitat creation for Lake Leota. The City's r use goals and swimming and fishing uses can still be achieved with this op adds aesthetic value to the lake and community. Smaller beautification pr wetland boardwalks could be coupled with this alternative or implemented l option was recommended by the DNR as a more economical option with wildlife. This type of project may be more suited for potential funding from Corp of Engineers Section 206 program for aquatic ecosystem restoration.

Understanding the dynamics of the watershed, non-point source poll sedimentation rates are key to developing a plan to improve the water qua provide for a successful dredging project. For either option, a watershe recommended to protect the City's substantial investment in improving Lake L

The "do nothing" alternative was not seriously considered in this report beca to meet the City's and SOLE's dredging goals. However, if costs of dr considered prohibitive and/or grants cannot be obtained, it may be advisa community to reassess their goals and consider either a shallow lake with lim creation, or dam removal and stream restoration, or simply continuing to do no

B. Additional Recommendations

1. The City should approve the writing of two Lake Manager applications for the watershed study to meet the August 1, 2 application deadline. If these grant(s) are awarded, the August 1, cycle would have a grant award notification date in mid-Septer money available in mid-November 2004, and the watershed st need to be completed approximately a year after work on the

3. The City should discuss the two recommended dredging option determine which option is most desirable to the City. Cost opinions refined as the focus to one plan is developed.

4. The City should investigate finding a dredged materials disposal closer to the lake. This will bring the cost of dredging down.

5. The City should submit the locations of the disposal sites to the evaluation to determine if any solid waste regulations apply t disposal site.

6. The City should investigate the existence of local businesses th interested in buying and utilizing the dredged materials in the pro sell (i.e.: potting soil, etc.)

C. Additional Conclusions

According to Mike Halsted of the DNR, use of the upper lake through rer creek and building a berm around the upper lake would add undue complexi to the dredging project. We therefore conclude that use of the upper l considered a feasible option.

D. Schedule

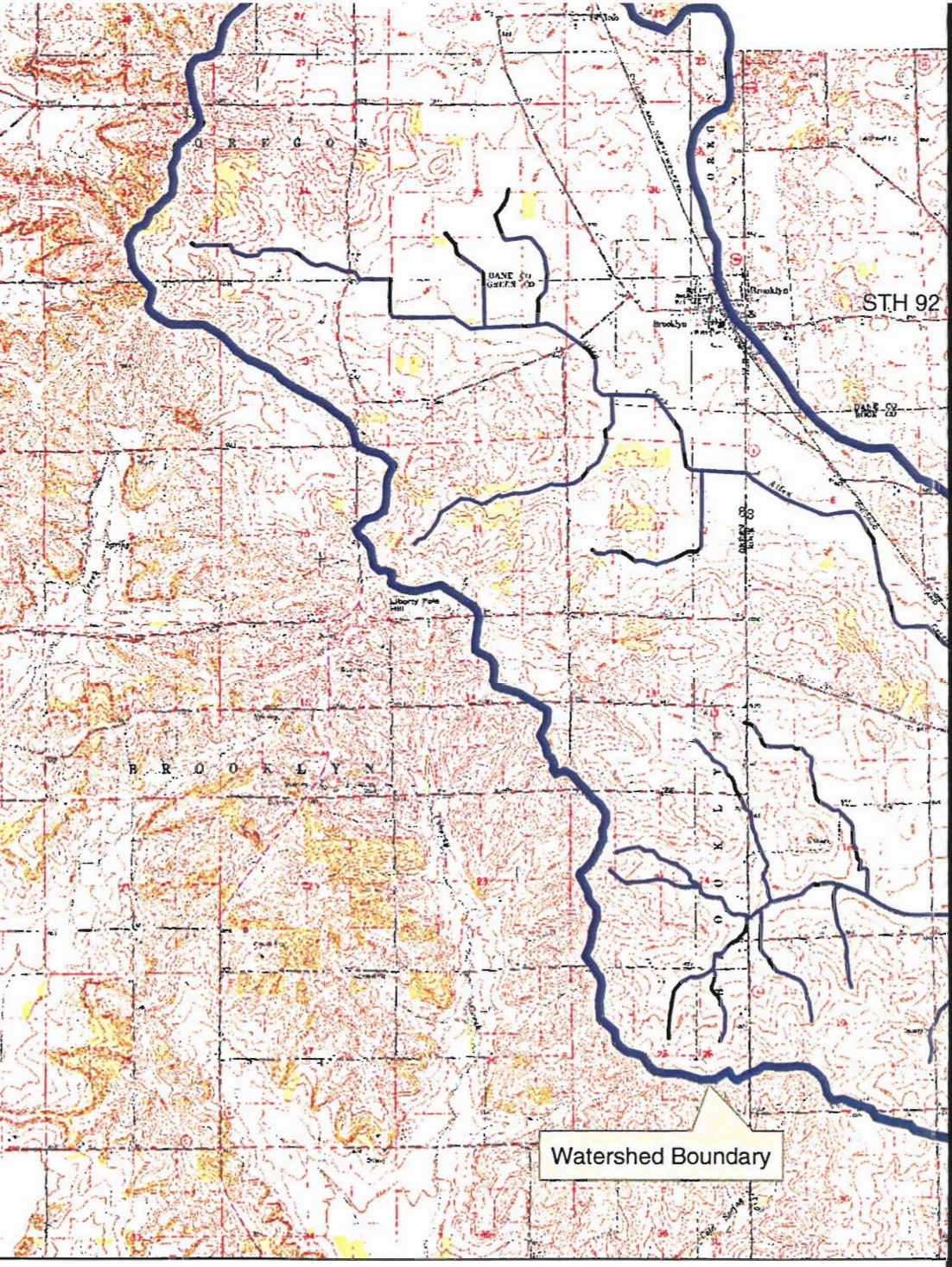
Table 4 presents a planning timeline that can be used by the City of Evansv future efforts and track progress on this project.

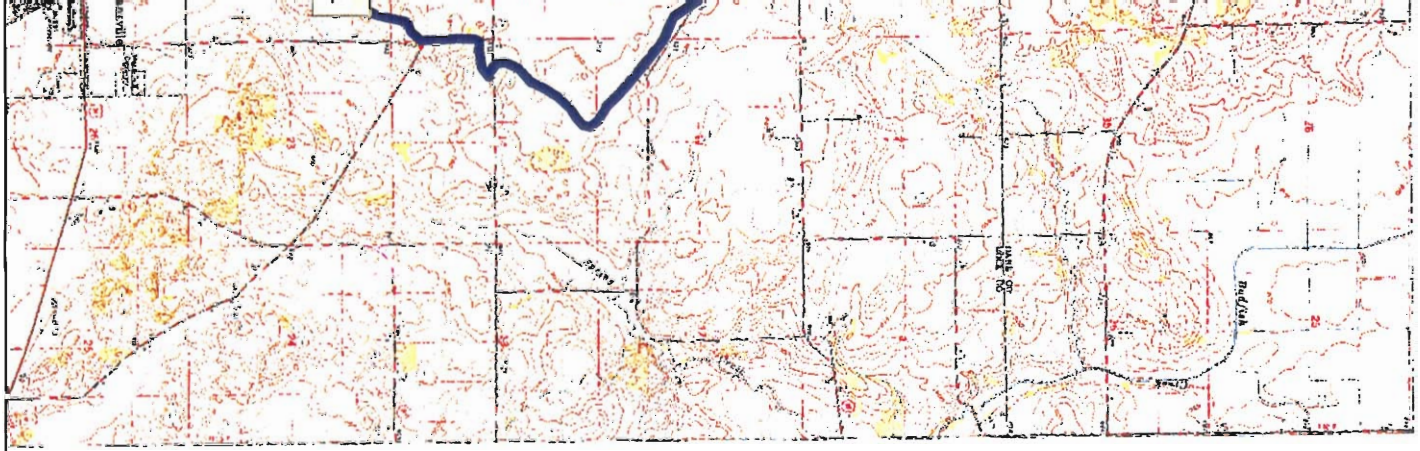
Timeframe	Action
June – Sept. 2004	Determine desired alternative to meet the City's g
June and July 2004	Determine if the City will pursue a watershed stu
By August 1, 2004	Apply for two lake management grants for wa study.
Fall 2004	Public meetings to gain further input and suppo the City. Key if a referendum is planned.
November 2004	Begin watershed study if grants awarded.
November 2005	Complete watershed study if grants awarded
May 2005	Secure dredging project funding. Begin design. EA.
July 2005	Determine and finalize spoil site location and pla land owner.
October 2005	Complete design documents. Apply for permits.
January 2006	Permits issued.
January 2006	Advertise for bids.
February 2006	Open Bids.
March 2006	Begin Dredging Construction Project.
September 2006	End Dredging Construction Project.
Long Term	Maintenance of Sedimentation Basin Implementation of watershed study recommendat

Table 4 Planning Timeline

Please call if you have any questions.

Sincerely,


O R E G O N
B R O O K L Y N
STH 92
Watershed Boundary



LAKE LEOTA WATERSHED MAP

LAKE LEOTA-LAKE DREDGING PLAN
CITY OF EVANSVILLE
EVANSVILLE, WISCONSIN

FIGURE 1
1-354.003

STRAND ASSOCIATES, INC.® ENGINEERS