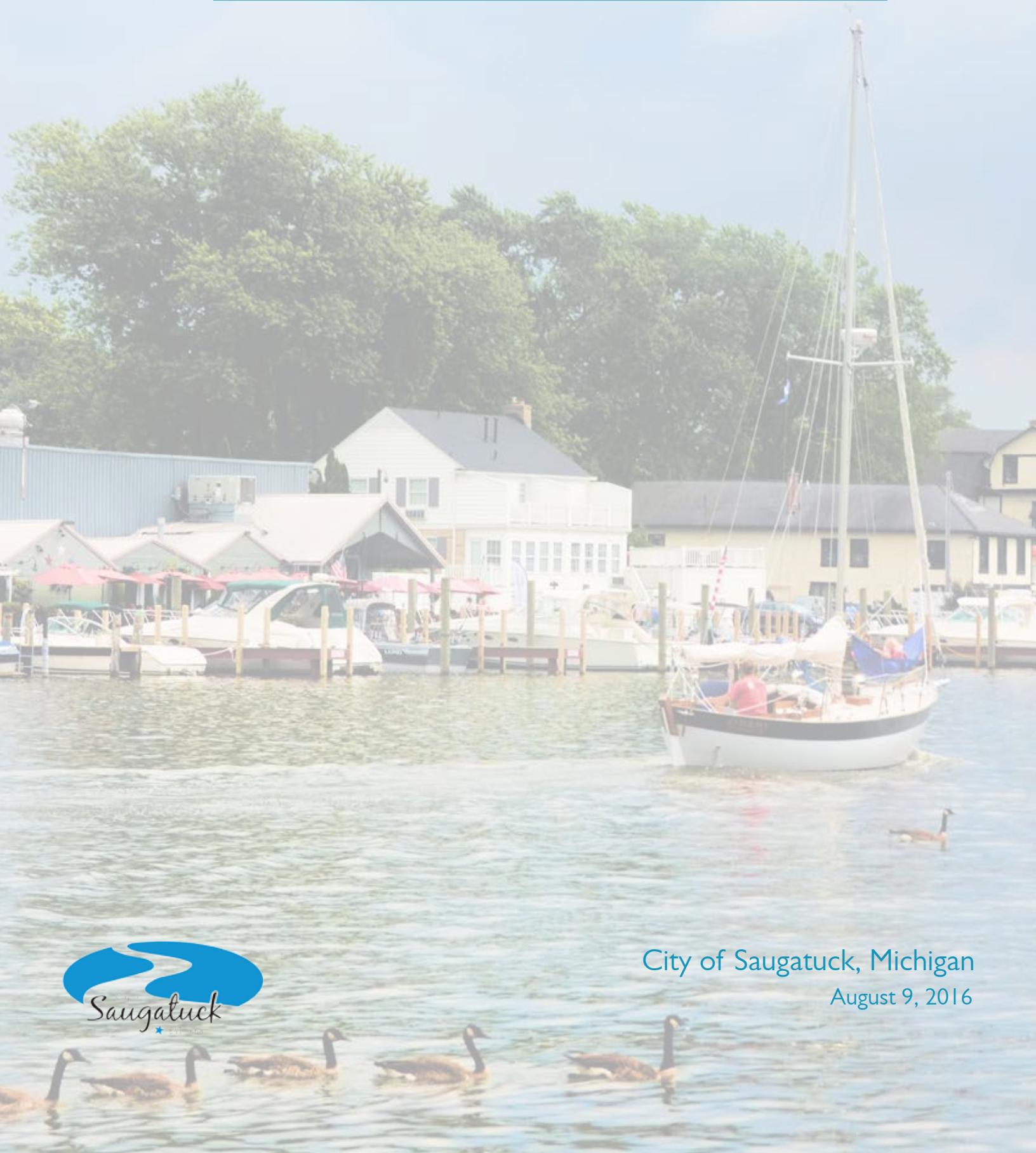


HARBOR MANAGEMENT PLAN



City of Saugatuck, Michigan

August 9, 2016



Prepared for the City of Saugatuck, Michigan

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table of contents

EXECUTIVE SUMMARY

01/ INTRODUCTION

- Plan Purpose
- Project Location
- Goals and Objectives
- Related Planning Efforts

02/ SITE ASSESSMENT 4

- Harbor Conditions
- Past Dredging Solutions
- Economic Impacts of Recreational Boating

03/ SEDIMENT MANAGEMENT 9

- Plan Process
- Strategies

04/ IMPLEMENTATION 22

- Funding Strategies
- Next Steps

APPENDICES 24

- Marina Economic Impact Calculator
- Summary of Agency Meetings

executive summary

Kalamazoo Lake has been a significant driver of the local economies of Saugatuck and surrounding communities ever since the area was first settled. Over the years, significant human intervention in the form of dredging has transformed Kalamazoo Lake from a wetland area to the more recreation-focused navigable lake that the communities have enjoyed for decades. Without ongoing human intervention, the lake will eventually revert to a shallow wetland area with a narrower river channel, which would bring significant change to the character of the community.

The result of the planning effort for the City of Saugatuck's Harbor Management Plan (the Plan) concludes that a layered approach to addressing long term sedimentation management is needed. The first step in the layered approach is to begin by reducing the number of upstream sources of non-point source sedimentation to significantly reduce the volume of sediments that settle in Kalamazoo Lake. This first step will reduce the total volume of dredging that will be required in the future, and directly addresses the cause of the problem rather than the symptoms.

Additional future layers to the plan focus on reducing the overall cost of the ongoing dredging that will be required in the future by identifying more cost effective locations for Contained Disposal Facilities (CDF), including the potential for in-water CDFs in Wade's Bayou, as well as consideration of sediment traps to further reduce the volume of sediment that reaches Kalamazoo Lake.

Other options were considered, including a proposed "Channelization" approach intended to convey sediments out into Lake Michigan. After extensive review and consideration with State permitting agencies, this alternative was determined to be infeasible, and would not be permitted due to the likely dispersion of contaminated sediments into Lake Michigan.

This Plan outlines a recommended "road map" to a successful implementation of the layered approach to sedimentation mitigation, with an emphasis on the critical first step of reducing upstream sedimentation sources. The planning team worked with various state representatives and considered existing research efforts to identify where and how efforts should be prioritized to address upstream sedimentation entering the Kalamazoo River, and the Plan defines proposed project steps, a team of partners and collaborators, and funding strategies.

01/introduction

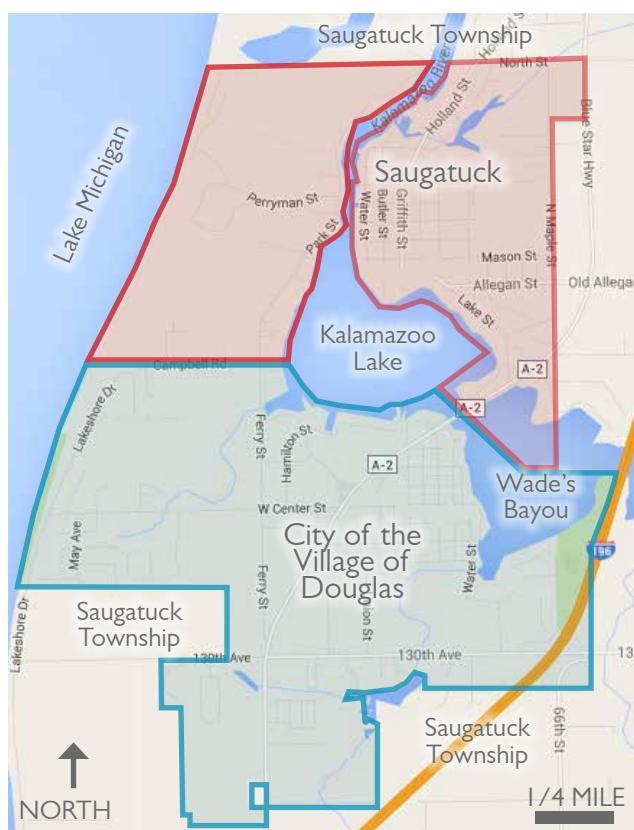
PLAN PURPOSE

The purpose of the Harbor Management Plan is to review all available alternatives to manage sedimentation in Kalamazoo Lake, evaluate the alternatives from both a feasibility and permitting standpoint, and identify the most cost effective solution to addressing long-term harbor maintenance.

Edgewater Resources has been working with the Kalamazoo Lake Harbor Authority and both communities of Saugatuck and Douglas since 2011 on identifying cost effective strategies for long-term harbor maintenance, and was asked to work with the City of Saugatuck to create this Harbor Management Plan.

PROJECT LOCATION

The City of Saugatuck, in Allegan County, Michigan, is located on the Lake Michigan shoreline. The city is surrounded by Saugatuck Township and is adjacent to the City of the Village of Douglas to the south. The population of Saugatuck is 925 full-time residents according to the 2010 census. The City has a tourism-based, seasonal economy and many summer homes are not counted as primary residences in current census data.



introduction

GOALS

The goal of the Plan is to identify a viable approach to address the sedimentation issues within Kalamazoo Lake. Specifically, the focus of the plan is to reduce the volume of sediments entering the Kalamazoo River upstream as a long-term approach in addressing this sedimentation, and identify strategies to reduce the cost of dredging. The Plan must be economically viable and outline initiatives that not only Saugatuck, but also upstream communities, will support.

The scope of the Plan is to identify a 'road map' that defines the stakeholders, communities, and partnerships that can contribute to a successful upstream management plan that will grant future generations the resources that the Kalamazoo Harbor has to offer. Future elements of the plan to reduce the cost of dredging and management of sediments that do reach Kalamazoo Lake are also identified.

OBJECTIVES

- Establish a community-supported vision for the maintenance of the harbor.
- Ensure consensus with permitting agencies.
- Provide a clear path to move forward in creating an upstream mitigation plan.
- Identify funding alternatives to support upstream sediment mitigation.
- Outline future steps and partnerships to reduce the cost of ongoing maintenance dredging.

RELATED PLANNING EFFORTS

In 2007, a plan titled the *Kalamazoo Harbor Master Plan Technical Report* was completed. Tasked by Saugatuck City Council with researching components of this report, a group called the 'Ad hoc Kalamazoo Harbor Master Plan Committee' was established. This group's objective was to make recommendations to the Saugatuck and Douglas municipalities based on research and outreach. The group held regular meetings and met with officials from regulatory agencies and state and federal elected officials. Their focus was on contamination issues and exploring options for funding dredging activities. The group found that because the harbor was listed as a US Environmental Protection Agency (EPA) Superfund site, the harbor area was disqualified for grant funds through other sources. After much discussion of the pros and cons of de-listing the area as a Superfund site and based on strong opposition to the idea from the EPA, it was determined that de-listing was not a recommended approach. The harbor is still on the EPA schedule for clean up; however, the possibility exists that Superfund monies may be depleted by the time this area is addressed.

With the cost of ongoing harbor maintenance continuing to be a significant concern to the local communities, the Ad hoc Committee was dissolved in 2011 and the Kalamazoo Lake Harbor Authority (KLHA) Harbor Committee was formed. Consisting of local community leaders and City staff from Saugatuck and neighboring Saugatuck Township and City of the Village of Douglas, the KLHA was formed to address the issue of low water levels and significant sediment in the Saugatuck-Douglas Harbor, including both Kalamazoo Lake and Wade's Bayou. The committee was initially charged with the task of reviewing, evaluating and making recommendations to each of the three municipalities regarding possible harbor dredging and maintenance issues as well as considering actions to fund these activities.

introduction

Tri-Community Comprehensive Plan (2005)

The first Tri-Community Plan was prepared in 1989. The Plan surveyed area leaders about local opportunities and challenges and administered a public opinion survey. This information helped direct planning decisions for Douglas, Saugatuck, and Saugatuck Township, with the goal of improving quality of life for all citizens. The 2005 update outlined key strategies for preserving the rural character of the area while planning carefully and appropriately for future development and growth.

Kalamazoo Harbor Master Plan (2007)

Created by the JJR, LLC with input gained through public community meetings and meetings with state and local officials to address sedimentation issues and low water levels in the harbor. The Plan was made possible through a Michigan Department of Environmental Quality (MDEQ) grant, and the communities of Saugatuck and Douglas each contributed required matching funds. The Plan provided dredging alternatives. Key recommendations/conclusions:

- More comprehensive dredging program for recreational use of Kalamazoo Lake.
- Initial Dredging of 1,000,000 cubic yards.
- More incentive for private development, day use of harbor, and economic stimulus for local economy.
- Initial Cost: \$35-\$45 Million.
- Dredging could be completed in stages.
- Annual maintenance dredging still required.
- “Creating an in-basin CDF is not likely to get MDEQ support, because it will fill existing lake bottom and shallow water habitat.”
- Channeling the river with stone structures does not have a substantial track record in Michigan and regulators and resource experts “were skeptical as to its feasibility.”
- Completion of the 2007 *Kalamazoo Harbor Master Plan Technical Report*.

MDNR Fisheries Division Response (February 2007)

- Supports development of a master plan.
- Not supportive of extensive dredging of shallow water habitats in Kalamazoo and Douglas Lakes.
- Future marina development and dredging should be limited downstream of Blue Star Highway with exception of maintenance dredging of current facilities.

Kalamazoo Lake Harbor Long Term Plan, Douglas and Saugatuck (2015)

The Kalamazoo Lake Harbor Long Term Plan includes two parallel efforts to identify the most cost effective strategies for dredging and harbor maintenance. Both the City of Saugatuck and City of the Village of Douglas engaged Edgewater Resources to prepare plans achieving this shared goal. It is important to note that both the Douglas Harbor Plan and the Saugatuck Harbor Plan have the same issues and contain consistent goals, and provide the same recommendations for addressing long term sediment management. The Plans differ only in their funding approach, which is appropriate to the specific needs of each community.

02/site assessment

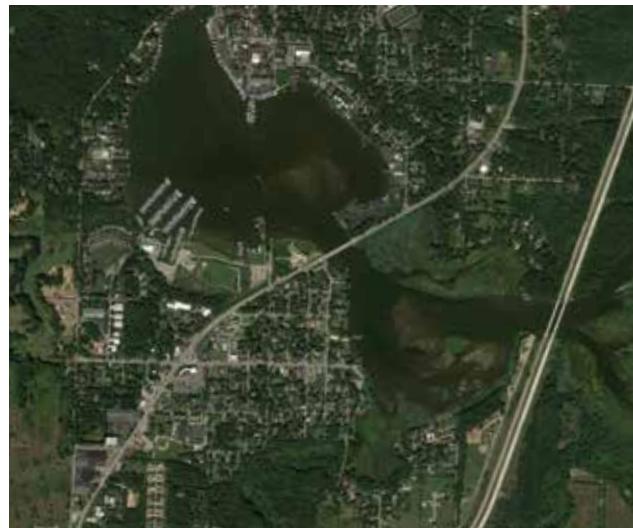
HARBOR CONDITIONS

The natural condition of the harbor is to function as a wetland and flood zone for the Kalamazoo River. Human intervention created a navigable lake between the 1880s and 1930s, with ongoing maintenance dredging required to maintain a navigable condition. The western portion of Douglas Harbor was dredged to navigable depths.



Aerial Photo Taken in 1997, GoogleEarth

Sedimentation occurs at roughly 36,000cy/year (roughly a football field 20' deep). The primary source is erosion from upstream farmlands. The effects of sedimentation are compounded by natural fluctuations in Lake Michigan: when water levels are low, dredging is even more critical.



Aerial Photo Taken in 2016, GoogleEarth

“Given the current physical constraints of the Kalamazoo watershed, it is likely that the deposition of sediment will continue to occur throughout Kalamazoo Lake, eventually reducing the lake to nothing more than a narrow river channel.”

Guy A. Meadows, PhD
Professor and Graduate Program Chair, University of Michigan Naval Architecture & Marine Engineering, 3/13/2007 Letter

site assessment

PAST DREDGING SOLUTIONS

In early 2013, Lake Michigan water levels reached historic lows, and the State of Michigan implemented a \$30 million emergency dredging program. Water levels in Kalamazoo Lake were so low that recreational boating was at risk, and very few deep draft vessels could use the Kalamazoo Lake. Unfortunately, as there were no public marinas within Kalamazoo Lake at that time, the harbor was not eligible for any State funding.

The Kalamazoo Lake Harbor Authority created an emergency dredging plan to maintain recreational boating at the lowest cost possible. According to the study, water depths were less than 18" in the central portion of Kalamazoo Lake and the plan proposed a main center channel and two channels around the perimeter. The proposed 75' wide channels were designed to depths of 6' to 10' to serve the majority of recreational boats and allow them to reach the Federally maintained navigation channel in the river. The emergency dredging plan proposed the excavation of approximately 115,000 cubic yards of material. In the pursuit of required permits from the US Army Corps and Michigan Department of Environmental Quality (MDEQ), extensive sediment sampling/testing resulted in the presence of PCBs with a maximum concentration of 3.8 parts per million (ppm) and a few arsenic samples above the acceptable dredge project background level of 10 ppm as established by the MDEQ.



site assessment

For the disposal of the potentially contaminated dredge spoils, a potential CDF was designed on the Kalamazoo Lake Sewer and Water Authority's (KLSWA) property and is included in both the USACE and MDEQ permits. The CDF design included the creation of a 10-acre site with a berm to allow dewatering of the spoils. The return water was proposed to be monitored before returning to the Kalamazoo River southeast of the I-196 bridge.

Preliminary construction costs of this plan were estimated at \$2.3M, which is driven mainly from the large dredge quantity, estimated at \$1.4M. The high cost of the plan and a lack of taxpayer funding prevented its implementation, but fortunately, private dredging efforts to remove the historic Kewatin ship from Red Dock created an 8' deep channel that served Tower Marine, and a historic rise in lake levels the following year reduced the urgency to implement the plan. To date, higher water levels have created the opportunity for KLHA and both communities to prepare and implement a longer term solution.

It is important to note that discussions with MDEQ staff in September 2015 indicate that KLSWA CDF site will likely not be a disposal option, as the material will need to be moved to a regulated landfill once

dewatered. The high cost of the transportation of the material to a landfill will add significant, unwanted costs. MDEQ staff has indicated that placing the dredge material near the waterbody may be the best option and the most "permissible," which should be considered during future planning phases of the dredging plan.

During a meeting with State agency representatives in February 2016, a strategic, collaborative approach to minimizing non-point source pollution and introduction of silt upstream was heavily discussed and recommended by all representatives who attended the meeting. Various funding sources were identified to assist in addressing upstream sediment entering the watershed and will be discussed in Chapter 04, Implementation.

In June of 2016, the MDEQ and Michigan Department of Natural Resources (MDNR) visited Saugatuck and determined that the Coghlin Park and Saugatuck dingy dock would qualify as a public facility, making the harbor eligible for State funding. Proposed improvements to this facility will be important not only to provide public boating access to the community, but to allow the City to be eligible for dredging funds.



Saugatuck Waterfront, Courtesy USACE Oblique Imagery

site assessment

ECONOMIC IMPACTS OF RECREATIONAL BOATING IN SAUGATUCK

Recreational boating is a critical component of the broader economy of Saugatuck, and a significant driver of the financial success of the downtown shopping and dining district. Further, access to recreational boating is a key driver in local real estate values, which translates into higher local business and tax revenues. It is important to recognize that investments in maintaining the navigable waterways of Kalamazoo Lake supports and enhances the economic viability of the entire Saugatuck community, and the loss of navigable waters on the local economy would be significant.

In order to estimate the existing economic impact of recreational boating on the local Saugatuck economy, we utilized the Marina Economic Impact Calculator tool created by the University of Florida, Virginia Institute of Marine Science, and Association of Marina Industries in the spring of 2016. This tool builds on the work of an earlier Boating Economic Impact Calculator created by Michigan State University, and has been updated over the past twelve months to provide the most accurate and independent estimate of economic impacts available. The tool utilizes the total revenues generated by marina facilities to estimate economic impacts across a wide range of categories across all local businesses to help local communities understand that boating revenues support many local businesses beyond those directly offering boating services such as marinas. Please refer to the appendix for an evaluation report of the local economic impacts to the City of Saugatuck for one million dollars in boating revenues, which serves as the baseline for the analysis provided below.

As the slips located within the City of Saugatuck are found across a range of private businesses and on privately owned homes or condominium facilities, it is not possible to quantify the precise revenue of all the existing slips. In order to generate a meaningful estimate, we counted the number of existing slips within City limits by size, utilized the standard Michigan Department of Natural Resources slip rates to establish a baseline, and then compared the MDNR standard rates with local slip prices. The estimated impact was increased by 25% to respond to higher rates at local facilities.

Our survey of the current slip inventory within Saugatuck City limits, performed by counting and measuring existing slips on recent aerial photography, identified an approximate total of 630 slips, ranging in size from less than 20'-70'. Approximately 313 of these slips are available for lease through entities such as yacht clubs or privately owned marinas. Approximately 317 are located on private property associated with residences or condominium associations. 234 of them are less than 30' in length, 269 are 31'-40' in length, 115 are 41'-50' in length, six are 51'-60' in length, and six are over 60' in length.

site assessment

At standard MDNR rates, the slips located within private residences would generate just over one million dollars annually, and the slips leased from private entities would generate just under one million dollars annually. After contacting local private entities offering slips for lease, we found that local prices exceed the standard MDNR rates by approximately 25%. We then applied an average occupancy of 90% to account for existing slips that are not currently occupied due to shallow waters. In total, the economic impact baseline for our analysis would then be \$1.125 million for private facilities, and \$1.125 million for residential facilities, so the numbers outlined below are 2.25 times the numbers identified in the economic impact report provided in the appendix of this document.

In summary, the total economic impact on the local Saugatuck economy directly attributable to navigable waters is approximately \$8,066,252, and the creation of nearly 84 jobs. Labor income is projected at \$2,881,269, and state/local taxes are estimated at \$428,537.

Beyond the direct, indirect, and induced impacts described above, there is a quantifiable impact on real estate values related to the presence of navigable waters. In general, an general analysis of residential properties in the Saugatuck harbor area that have a view of the water, but no direct access were selling for \$200sf. A similar property with access to water, but without predictable access to deeper navigable water (4'-6'+) was selling for \$400sf. Finally, a similar property with consistent and predictable access to navigable water was selling for \$800sf. In other words, all things being equal, properties with access to predictable navigable water were worth twice or four times properties with unpredictable or only visual access respectively. A similar ratio is present for vacant lots, with vacant lots with predictable access to navigable water selling for twice that of vacant lots with access to shallow waters. The direct value to the overall community is that increased property values generate higher property tax values for the City of Saugatuck.



Saugatuck Marina

03/sediment management

PLAN PROCESS

The necessary series of steps need to be identified to ensure a successful long-term sediment management strategy occurs. The “road map” contains the following steps:

1. Discovery

The consensus of the February 2016 agency meeting was to learn and study similar successful projects within the State of Michigan, such as Project Clarity, Van Buren County Drain Commissioner Pilot Study, Michigan/Indiana St. Joseph River Watershed Conservation Partnership. Project Clarity is a collaborative partnership that raised money to address the water quality issues within Lake Macatawa, including tackling the non-source pollution problem upstream. The Van Buren County Drain Commissioner Pilot Study rewards the implementation of Best Management Practices (BMPs), such as buffer zones/strips between land and drain, no mow strips, etc., with assessment breaks given by drain commissioner. St. Joseph River Watershed Conservation Partnership is a project with over 32 partners within Indiana and Michigan to implement BMPs to reduce non-source pollution of the St. Joseph River watershed.

The following is a list of contacts regarding each example project:

- Project Clarity
 - Travis Williams – Executive Director, Outdoor Discovery Center
 - Kelly Goward – Watershed Project Manager, Lake Macatawa Area Council
 - Dr. Graham Peaslee – Chemistry Professor, Hope College
- Van Buren County Drain Commissioner Pilot Study
 - Joe Parman – Van Buren County Drain Commissioner
 - AJ Brucks – Executive Director, Van Buren Conservation District
 - Nature Conservancy

- Michigan/Indiana St. Joseph River Watershed Conservation Partnership
 - Marcy Colclough – Senior Planner, Southwest Michigan Planning Commission
 - Jack Knorek – Environmental Program Manager, Michigan Department of Agriculture and Rural Development
 - Matt Meersman – President, Friends of the St. River Association

Through the discovery meetings with the program contacts listed above, we hope to discover: where and how the project first began, which team(s) were most helpful/influential, what existing data was collected and utilized during the project initiation, how community involvement and awareness was achieved, and the successful approach in project funding.

2. Research

The next step in the road map is to utilize the information provided from the meetings in step one to determine any existing data that could be relevant to subsequent steps in the plan. Preliminary research of similar projects show that US Geological Survey (USGS) river gage information, USDA's Natural Resources Conservation Service soil map data, USGS topographic maps, land use data, and other watershed relevant reports/studies will be useful.

The goal of this step is to determine the existing watershed information to be presented/discussed with the groups outlined in the later steps. Identifying the useful information that will need to be obtained at a later stage in the planning process will be the deliverable of this step.

sediment management

3. Collaboration & Public Outreach

Meeting with upstream watershed partners to gain support and solicit feedback regarding the development of an upstream management plan is a crucial step in the road map. Watershed sediment management is a regional collaborative effort that will include discussions with upstream community leaders, Allegan Conservation District, Allegan Country Drain Commissioner, Saugatuck Township, City of the Village of Douglas, and Kalamazoo River Watershed Council.

Discussions with the aforementioned groups will gauge the level of interest in the development of a regional sediment management strategy. The main goal of reaching out to the upstream public/partners is to discover any additional community resources, funding opportunities, pre-existing sediment issues/needs within the communities, and gain valuable feedback to keep the planning process moving forward.

4. Community Brainstorm

The feedback and information obtained in the previous steps need to be discussed with the City of Saugatuck. A plan along with alternatives should be brainstormed with the City of Saugatuck to determine a logical path.

The goal of brainstorming with the City will be to determine upstream management strategies/ideas supported by the City.

5. Agency Partnership Meeting

The next step in the road map is to meet with agencies to present the recent ideas and alternatives in the planning process. The idea is to have a clearer picture of upstream sedimentation strategies, upstream community support, and planning roadblocks to discuss with agency representatives.

The list of valuable agency contacts includes:

- MDEQ
 - Jon Allan – Director, Office of the Great Lakes
 - Kameron Jordan – Environmental Manager, Kalamazoo DEQ Office
 - Robert Day – Environmental Manager, Lansing DEQ Nonpoint Source Unit
 - Janelle Hohm – Environmental Quality Analyst, Kalamazoo DEQ Office
 - Ralph Reznick – Engineer Support, Lansing DEQ Office
 - Julia Kirkwood – 319 and CMI Grants Management, Lansing DEQ Office
- Michigan Agriculture Environmental Assurance Program (MAEAP)
 - Mike Ludlam – MAEAP Water Stewardship Technician
- Allegan Conservation District
 - Ana Hedberg – Executive Director
- Michigan DNR
- US Army Corps of Engineers

The goal of this step is to utilize the valuable agency feedback to develop a viable long-term sediment management plan for the Kalamazoo River.

sediment management

STRATEGIES

In order to establish the most viable solution for the long term maintenance of the harbor, the planning team and City of Saugatuck worked closely with representatives from the State of Michigan, including the Office of the Great Lakes, Michigan Department of Natural Resources, and Department of Environmental Quality, as well as local partners, including the City of Douglas, Kalamazoo Lake Harbor Authority, and Allegan County.

This process studied four potential strategies, including a “do nothing” approach; continuing with the current approach of dredging when necessary; and two more proactive strategies. One of the two proactive strategies includes the construction of sediment trap(s) and supporting confined disposal

sites (CDFs). The other strategy includes the use of structures to channelize the flow of the Kalamazoo River, thereby flushing sediment further downstream and eventually into Lake Michigan.

Meetings were held with state officials in September of 2015 to review these approaches and to solicit feedback regarding these strategies. More specifically, the meeting was intended to assess the likelihood of and the process for permitting each of these approaches. During these meetings, the idea of addressing the regional sediment issues within the Kalamazoo River Watershed was identified as a possibility to help reduce the sediment volumes entering Kalamazoo Harbor annually.



Saugatuck's Coghlin Park with Douglas harbor in the background

sediment management

Regional Sediment Discussion

Regardless of the approach selected, it was determined that a sediment management plan should be created as the first step in a long-term strategy for overall sediment reduction. Regional sedimentation issues, specifically sediment loading from agricultural and urban sediment runoff, should be the focus of the sediment management plan. An MDEQ Staff Report published October 2013 evaluated the sediment sources to the 58 harbors targeted for the Emergency Dredging Program. According to the MDEQ Report, Saugatuck Harbor has been placed in the category with 15 of the total 58 harbors identified as “Harbors that are impacted by shoreline transport of sediment, low water levels and may have significant upland sediment sources.” Specifically, the MDEQ Report estimates that approximately 50% of total watershed acreage is identified as agricultural and approximately 81 pounds of sediment per acre of the watershed enter the Kalamazoo River system. It is clear that the process of solving the Kalamazoo Lake sedimentation issues will require a cooperative effort with local and regional communities to address sedimentation issues due to adjacent runoff. This approach has been applied in other nearby watersheds such as the Lake Macatawa watershed, where Project Clarity is improving water quality through collaborative efforts with local public and private partnerships, members of the agricultural community, and local governmental entities.

The Rabbit River watershed is the first upstream watershed and contributes sediment into the Kalamazoo River watershed system. Stakeholders and local residents of the Rabbit River watershed have moved in the direction of addressing the sedimentation including studying the watershed characteristics, developing and eventually implementing long-term strategies. According to the Rabbit River Watershed Management Plan published in 2009, the 187,200-acre Rabbit River watershed is primary categorized as agricultural land use. According to the Rabbit River EPA Watershed Assessment of River Stability and Sediment Supply (WARSSS) published in 2008, recommendations included “encourage environmentally sensitive agricultural practices to reduce the potential for surface erosion and sediment delivery to streams, including conservation tillage and implementation of filter strips/riparian buffers.” The report also suggested implementing a stream monitoring plan to assess the impact of best management practices (BMPs) selected. Data found in existing studies such as the 2009 Rabbit River Watershed Management Plan and 2008 Kalamazoo River Watershed Hydrologic Study will be incorporated into the Sediment Management Plan. Through recent discussions with the MDEQ, Peach Orchard Creek has been identified as an area that should be targeted for watershed planning.

sediment management

The development of a sediment management plan will also include cooperative efforts from other Kalamazoo River stakeholders. Stakeholders that need to be included on future discussions are Allegan Conservation District, Kalamazoo River Watershed Council, Allegan County Drain Office, and other regional conservation districts. In a meeting with State of Michigan representatives in February of 2016, the consensus from all MDNR, MDEQ, and State of Michigan representatives present at the meeting concurred with the analysis described above and indicated that an upstream sedimentation management strategy will be one of the most effective strategies to address the sedimentation issues in Kalamazoo Lake, given the following considerations:

A strategic, collaborative approach to minimizing non-point source pollution and introduction of silt upstream was discussed and identified as a critical first step in managing the long term sediment issues in Kalamazoo Lake and Wade's Bayou.

Multiple programs that may be helpful were identified, including:

- MAEAP (Michigan Agriculture Environmental Assurance Program) – Certify farms to implement BMPs (Best Management Practices) that will reduce sediment runoff

- RCPP (Regional Conservation Partnership Program) – A great way to document collaborative effort between communities
 - Project examples: Tri-State Western Lake Erie Basin Phosphorus Reduction Initiative, Lake Michigan Fruitbelt Conservation Partnership, Saginaw Bay Watershed Conservation Partnership, and St. Joseph River Watershed Conservation Partnership
- Van Buren County Pilot Program:
 - Reduction in drain assessments are given to landowners who allow a buffer zone to grow between the drain and the farm field (Everyone wins with this approach because of lower maintenance costs – farmers, drain commissioners, downstream communities.)
 - Working with local farmers to implement BMPs – Buffer strips, no mow zones
 - Tax breaks have been considered
 - Two stage ditches are in the planning stage

Potential partners include:

- State of Michigan
- Allegan County
 - Drain Commissioner - Identify potential financial initiatives that can encourage/offset the cost to landowners to implement BMPs to reduce sediment loading
- Allegan County Conservation District
- Saugatuck Township
- Upstream Communities
- Individual Landowners

sediment management

“Do Nothing” Approach

According to the 2007 Kalamazoo Harbor Master Plan Technical Report, the current rate of sedimentation into Kalamazoo Lake is approximately 36,000 cubic yards per year. If this rate continues without control or dredging, it will eventually lead to the transformation of Kalamazoo Lake into a marshy area with a narrow meandering river channel. The result of this approach will be a loss of the valuable waterfront property within both communities and the loss of the harbor as it exists today. The community clearly and consistently rejected this approach due to the loss of scenic character and recreational boating opportunities.

Continue Current Approach

The current approach has been to complete maintenance dredging on an as-needed basis. While navigation depths within the lower Kalamazoo River and river mouth are maintained by the U.S. Army Corps of Engineers, access to the lower river from Kalamazoo Lake is currently left for local government (levied through taxes) and riparian owners to maintain. Regulatory processes, costs, and lack of available disposal sites make it difficult and expensive to complete dredging. During the recent 14-year period of below average Lake Michigan water levels, the need to dredge within Kalamazoo Lake became urgent. After nearly a year of permit application review, including sediment sampling/testing, surveys, and coordination with local, state, and federal agencies, permits were issued in late

2013 and early 2014 for over 100,000 cubic yards of dredging and a temporary disposal site within Kalamazoo Lake Sewer & Water Authority property (KLSWA). Shortly thereafter however, Lake Michigan water levels rose and the immediate dredging need subsided temporarily. Costs to complete the dredging were estimated to be well over two million dollars and funding for the work was not identified. In addition to the lack of funding, the identified disposal site has a high degree of challenges. Construction costs and the cost of pumping dredge spoils to the site is extremely cost-prohibitive and reduces the effectiveness of any dredge monies obtained.

This approach is a reactive strategy that is not financially viable for taxpayers and riparian owners over the long-term without a proactive funding mechanism. In addition, final authorization for temporary disposal on KLSWA property is pending and may not be gained due to environmental liability concerns. In addition, since the KLSWA disposal site is only temporary the material will need to be moved to a permanent location, which has not been identified. Recent feedback from the agencies has indicated that moving the contaminated dredge material is not ideal and will add additional costs. As described above, this approach is slow to react to conditions and could result in the loss of navigability within the harbor for extended periods of time. To implement this approach effectively, a funding mechanism must be put in place and a viable, permanent disposal site must be identified or constructed.

sediment management

Sediment Traps

The 2007 Kalamazoo Harbor Master Plan Technical Report determined that a potential solution to the long-term sedimentation issues facing the Kalamazoo Harbor is the construction of sediment traps along the Kalamazoo River upstream of the Saugatuck/Douglas Harbor area. The sediment traps would be designed to intercept and capture sediment at strategic locations intended to minimize downstream deposition, to separate clean material if possible, and to facilitate straightforward maintenance dredging. The capacity of the traps would be optimized to minimize construction costs and to maximize the length of time between required maintenance dredging cycles. Dredge spoils removed from the traps that contain regulated materials would be permanently placed in berms or other appropriate locations. Clean dredge spoils could qualify for beneficial reuse, if they can be efficiently separated from regulated materials.

In a meeting with State of Michigan representatives in February of 2016, the consensus from all MDNR, MDEQ, and State of Michigan representatives present at the meeting concurred with the analysis described below and indicate that sediment traps are a potentially feasible approach to the sedimentation issues in Kalamazoo Lake, given the following considerations:

- Sediment Traps have significantly less impacts than channelization and are considered more potentially viable by the permitting agencies.
- Location, quantity, and final design will affect the permit-ability and effectiveness of this approach.

- Significant upstream sediment mapping, testing, and modeling will need to be performed.
- The effectiveness of sediment traps in capturing silt is dependent on many factors, and will need to be modelled and tested.
- The total area/volume of the sediment trap is more important than the length of the sediment trap in capturing sediment.
- Cost of acquiring land within the river basin with enough area to effectively capture sediment can be prohibitive.
- Cost to engineer and construct the trap is likely in the \$10-15 Million dollar range based on research of Saugatuck City officials. Annual costs of approximately \$400,000-800,000 are required to maintain the traps.

In order to minimize the cost of dredging, a number of strategies were proposed and discussed at the February 2016 meeting, including the following dredge material disposal strategies:

In-Water Contained Disposal Facilities (CDF)

- Agencies recommend/prefer CDF facilities be located on lands adjacent to dredge source wherever possible
- Agencies do not encourage consideration of in-water CDF, but indicated they could potentially be allowed if regulatory issues are addressed.
 - Primary issues include filling within wetland areas and impacts to fish habitat.

Schultz Park was identified as a potentially viable site for a CDF and long term storage of dredge materials, possibly as a sound barrier along I-196. This proposal was raised in a public meeting with the Douglas Community, and was very well received.

sediment management

Channelization

Another approach identified in the 2007 report and subsequent efforts includes the construction of structures and/or islands to direct flow and channelize the flow of the Kalamazoo River. Channelization of the river is intended to keep the sediments moving through Kalamazoo Lake and eventually into Lake Michigan. Moving sediment through the Kalamazoo Harbor area would be locally beneficial; however, sediment would be flushed downstream into the federal navigation channel and into Lake Michigan. This approach could lead to an increase in the need for dredging downstream and to the deposition of regulated materials within the federal navigation channel and Lake Michigan. The gradient of the river is very shallow and will not likely support the velocity required to keep sediments in suspension. However, if channelization is technically feasible, the following issues regarding contamination of Lake Michigan would need to be addressed.

- If effective, more sediment will be deposited by channelization into the Corps channel downstream of Kalamazoo Lake, which will increase the frequency and cost of maintaining the channel.
- Deposition of additional silty sediments could change the character of the dredge materials in the Corps channel, potentially removing the option of using the dredged materials for beach nourishment and significantly increasing the cost of dredging the channel.
- PCB and arsenic remain above acceptable MDEQ criteria, and could contaminate Lake Michigan beaches, as well as further distribute contaminants into Lake Michigan where future cleanup efforts would be more expensive.

- Prevention of contamination of Lake Michigan and beaches by complete removal of PCB and arsenic contaminated sediments from Kalamazoo Lake is not possible, as additional contaminated sediments continue to enter Kalamazoo Lake from upstream sources. Additionally, the cost of removal of sediments would exceed tens of millions of dollars, and other alternatives of storing contaminated sediments along nearshore areas by relocating bulkhead lines would have significant impacts on adjacent private property owners.
- Channelization would require significant reconfiguration of the Kalamazoo Lake and Wade's Bayou shorelines, and/or construction of islands and/or fixed structures to create the channel. Multiple community meetings held in Douglas throughout 2015 for the Douglas Waterfront Master Plan reviewed the potential visual impacts of such a proposal with the public, and little to no support for this type of reconfiguration was offered by the public.
- While it has been suggested that the USACE Hydraulics section has indicated that channelization may be technically feasible, it is important to note that the Engineering / Hydraulics sections are separate from the Regulatory and Operations sections of USACE. Given the potential impacts described above, in particular permitting concerns certain to be raised by USEPA, we believe it is highly unlikely that the USACE would support or permit channelization.

sediment management

In a meeting with State of Michigan representatives in February of 2016, the consensus from all MDNR, MDEQ, and State of Michigan representatives present at the meeting concurred with the analysis described above and indicate that channelization is not a feasible approach to the sedimentation issues in Kalamazoo Lake. Further, there is very little support within the community for this approach, in particular the impacts on recreational boating opportunities and the aesthetic character of the Kalamazoo Lake that the necessary structures and/or islands would create. Furthermore, the proposed extension of

bulkhead lines and creation of new public lands between existing private lands and the water would create extensive legal challenges.

Based on these considerations, the channelization approach has been determined to be infeasible. This approach would be very unlikely to receive the support of any State or Federal permitting agencies, and would in fact likely be strongly opposed due to the likelihood of increasing maintenance costs and spreading contaminated sediments beyond their current location into Lake Michigan.



Consultant Meeting / Site Tour of Wade's Bayou and Kalamazoo Lake

sediment management

Dredge Material Management

Regardless of how effective the upstream sediment management strategies and potential sediment trap solutions are, they will not be 100% effective in eliminating all sediment accumulation in Kalamazoo Lake and the need for ongoing maintenance dredging of the navigable harbor channels will continue.

The plan recommends implementing a number of strategies for reducing the cost of this dredging by focusing on locating CDFs as close to the Kalamazoo Lake as possible, including the potential for in-water CDFs in both Wade's Bayou and potentially along the Douglas shoreline of Kalamazoo Lake. The US Army Corps of Engineers continues to provide ongoing maintenance of the Federal Navigation Channel by utilizing hydraulic dredging strategies to provide beach nourishment, which is an approach generally used only by USACE.

Should the USACE stop providing maintenance dredging for the City of Saugatuck, or additional dredging outside of the Federal Navigation Channel but within Saugatuck City limits be required in the future, the City of Saugatuck will need to either identify a CDF location within City limits or collaborate with one of the neighboring communities to create a shared facility by partnering in the funding of a nearby facility, potentially outside of the Saugatuck City Limits. This plan recommends the collaborative development of larger, more cost efficient shared facilities rather than more numerous smaller facilities.

The worst case solution would be to truck the spoils off site, which would likely be prohibitively expensive, easily double the cost of a local CDF facility serviced by hydraulic dredge methods.

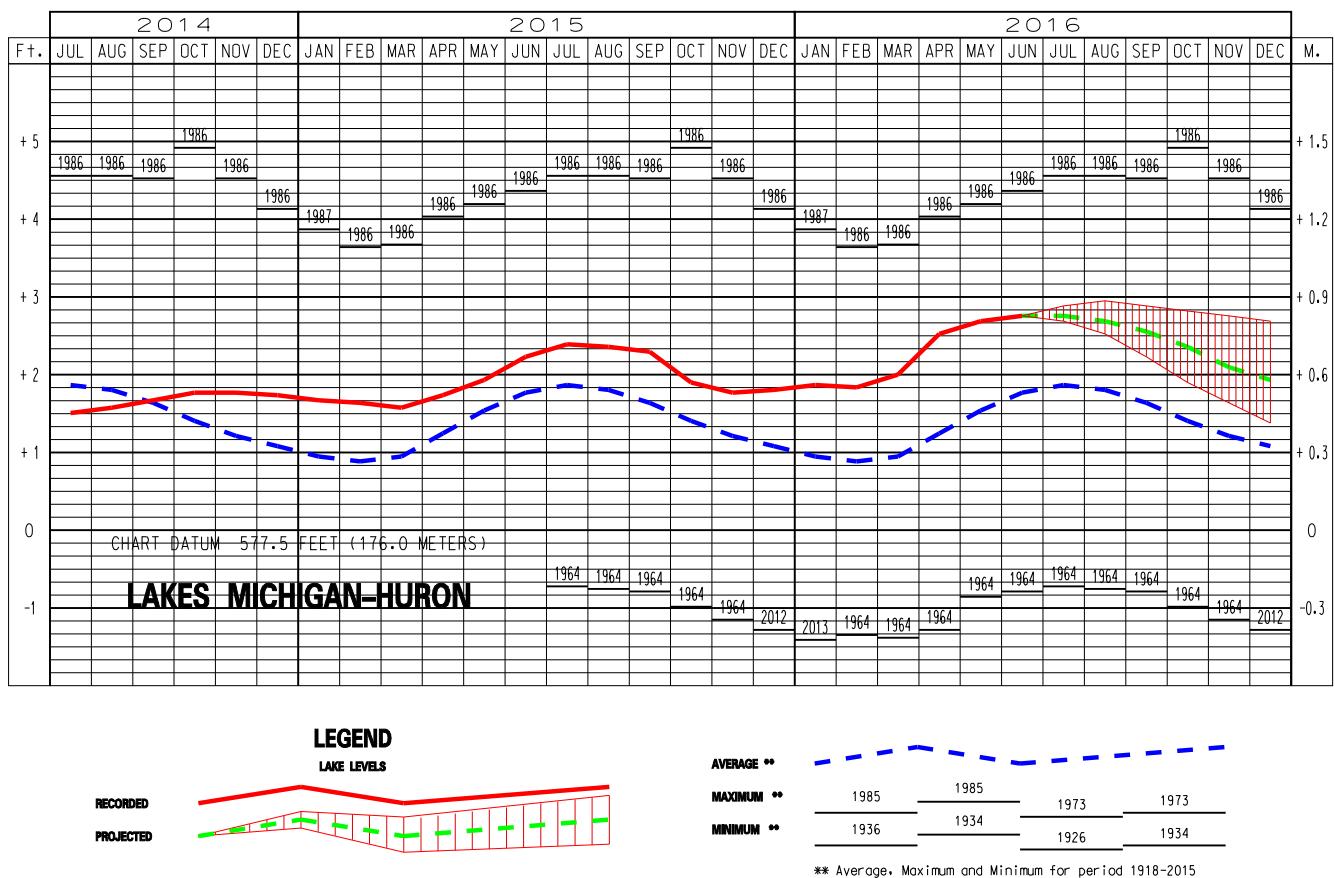
As with all elements of this plan, the best approach is a collaborative, multi-jurisdictional approach that leverages the strengths of each participating community and reduces the costs for all involved.

sediment management

Maintenance of Navigable Access to Kalamazoo Lake
 As outlined above, there is very clear community support for maintaining the current visual appearance of Kalamazoo Lake as well as maintaining and enhancing navigable waterways to support recreational boating activities. While current lake levels have reduced the immediate need for dredging within the City limits of Saugatuck, lake levels are cyclical and will inevitably return to lower levels – possibly as low or lower than the historic lows experienced in 2012.

The chart below documents recent water levels, as well as historic highs and lows over the last 100 years. The red line identifies actual measured levels from July of 2014 through today, as well as projected levels over the next six months. The blue dashed line represents that long term historic average water level during the month indicated along the top of the chart. The black lines along the top and bottom of the chart with years identified list the historic high and low levels, along with the year they occurred. Lake Michigan has a secondary typical yearly cycle, with water levels peaking in late summer and bottoming out in winter.

LAKES MICHIGAN-HURON WATER LEVELS – JULY 2016



sediment management

The chart indicates that water levels have ranged from +1.5 to +2.75 currently, and have been above the long term average since September of 2014. Water levels would need to rise an additional two feet to reach the historic all-time high, and they are currently nearly three feet above the historic low experienced in 2012. Long term (decades) predictions generally suggest lower water levels becoming more prevalent due to the impacts of climate change, with warmer temperatures increasing evaporation during the summer, and more importantly during winter due to reduced ice cover. However, these are hypothetical projections and there are no models that have been shown to accurately predict future water levels with any consistency.

It is safe to assume that water levels will continue to fluctuate within the historic highs and lows (-1.3 up to +4.8) for the foreseeable future, and therefore we will need to continue actively managing Kalamazoo Lake to maintain navigable waters. This will require active dredging to address accumulation that has occurred since the last major dredging effort. The 2007 study and 2012 emergency dredging study explored solutions for maintaining navigable waters, and indicate that there is little support at the State of Michigan permitting agencies for dredging all of Kalamazoo Lake to historic depths. In addition to being prohibitively expensive, dredging to that extent would have significant negative impacts on fish habitat.

sediment management

The 2012 emergency dredging study identified a series of channels along the east, center, and west sides of Kalamazoo Lake intended to provide maximum access to shoreline properties at the lowest dredging cost and minimum impact on habitat. This plan was submitted to the State of Michigan, and permits to complete the dredging identified were issued in 2013 and 2014. The plan below indicates the locations and proposed depths of the various channels.

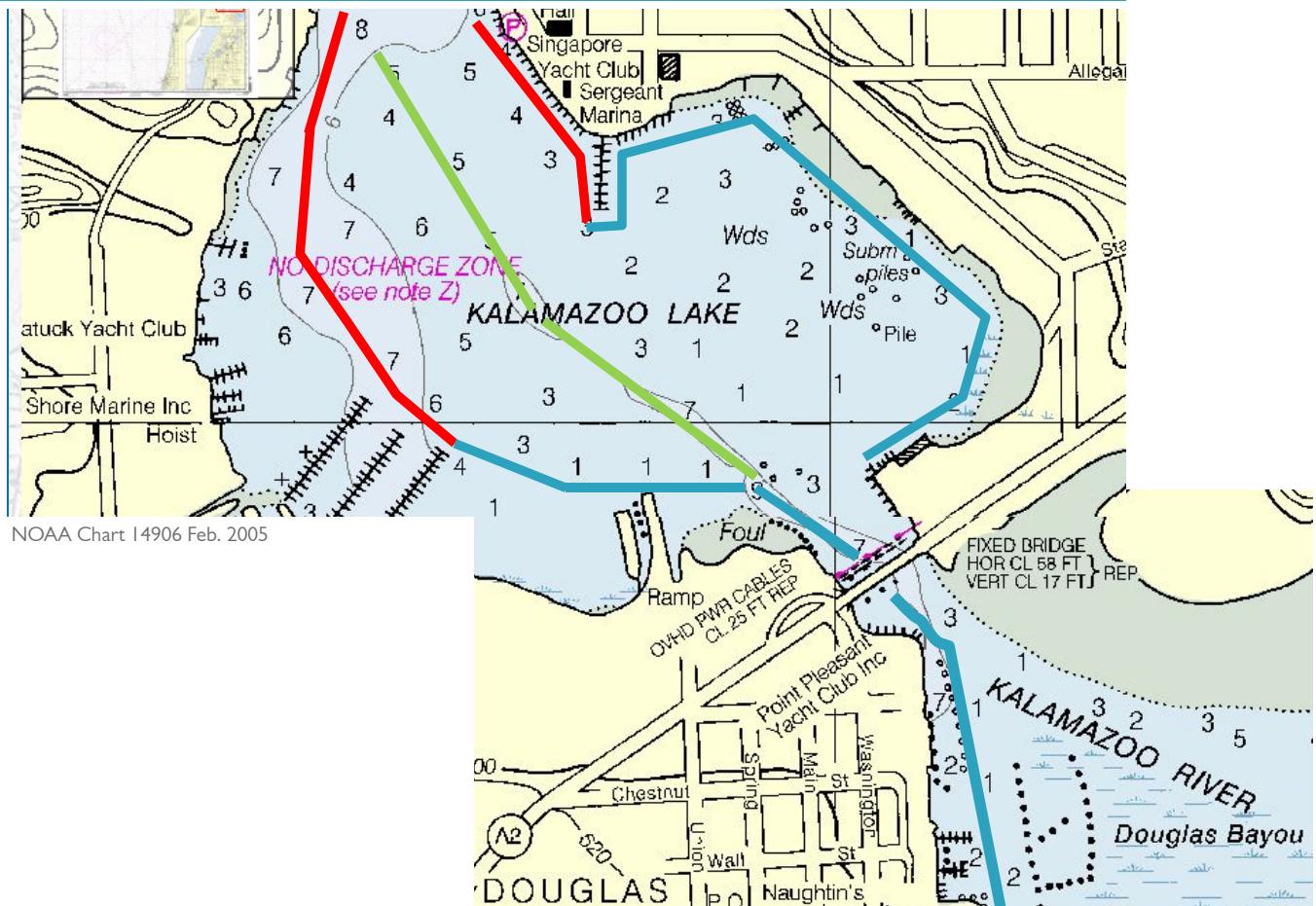
This plan recommends implementation of the 2012 dredging plan as needed to maintain navigable depths within the City of Saugatuck. We recommend that this dredging be coordinated with the City of the Village of Douglas if possible to achieve the most efficiency and lowest costs for all involved. It may be most effective for these projects to be managed through the Kalamazoo Lake Harbor Authority.

Phase 1 Plan

Red: 10' Deep, 75' Wide Channel

Blue: 6' Deep, 75' Wide Channel

Green: 6' Deep, 75' Wide Channel



04 / implementation

FUNDING STRATEGIES

Grant Funding / Public Partnerships

There are many State and Federal grant programs that could potentially contribute to funding portions of the Harbor Management Plan through Public Partnerships.

At the State of Michigan level, there may be funds available to support additional coordination and regional cooperation with the County to address upstream sedimentation, and additional funds through MDEQ Coastal Zone Management and the Great Lakes Legacy Act may be available, although there may be complications due to the Superfund designation, which unfortunately can limit some funding opportunities.

Also at the State level, there are a number of programs that may be complementary to the goals of the Harbor Management Plan. The Michigan Natural Resources Trust Fund (MNRTF) provides grants to acquire and protect public lands in perpetuity. MNRTF provides some funding for project development activities to construct improvements on public lands. The Michigan Waterways Commission oversees grants intended to support public recreational boating. The Michigan Economic Development Corporation provides funds through its Community Revitalization Program, which benefits projects associated with mixed use and residential components.

At the Federal level, the US Fish and Wildlife Service offers the Boating Infrastructure Grant Program, which is intended to expand transient boating infrastructure for transient vessels 26' and longer. Another Federal Program being explored is the RCCP program (See memo in Appendix for details) which may help fund coordinated upstream efforts to reduce sedimentation and indirectly help reduce the long-term cost of dredging.

While generally at the very end of the list, it is also possible to fund dredging or other improvements through general funds, taxes, or special assessment districts. We do not recommend special assessment districts related to docks or boaters, as they are very difficult to collect and/or enforce, and they reinforce the misconception that navigable water depths only benefit boaters, where the truth is that the long term economic viability of the entire community of Saugatuck relies in large part on an active recreational harbor.

Finally, many communities benefit from significant private and corporate philanthropy, and most communities are happy to recognize donors for their contributions through naming of public facilities in honor of donors. Challenge grants can engage donors at all levels, down to individual donation of trees, benches, or bricks, and philanthropic donations communicate solid public support for projects that can help secure additional grant funding.

Should the strategies outlined above provide insufficient funding to achieve the necessary dredging efforts to maintain the navigable waterways the community relies on, the most likely source of funding would then be revenues generated through some form of millage or tax increase. It is important to recognize that the aesthetic character of the harbor has been identified as a key driver in Saugatuck's tourism-based economy, and the presence of navigable waters creates significant economic benefits to the community from visiting and local boaters, as well as substantial increases in property values that also generate increased revenues for the City of Saugatuck.

implementation

NEXT STEPS

Following adoption of this Harbor Management Plan, we recommend the following actions be taken to begin implementing the plan:

- Work with Local and State partners to begin implementation of an upstream sediment management plan
- Work with the State of Michigan on:
 - Broader Sedimentation Issues
 - Regional Sedimentation Strategies
 - Permitting Considerations
 - Functional Considerations

- Expand public docking on Kalamazoo Lake
 - The lack of publicly owned recreational boating facilities within Kalamazoo Lake has prevented State of Michigan funds from being invested in the harbor in the past. The creation of a new publicly owned facility could potentially allow the City to qualify for Michigan Department of Natural Resources grants for both construction and ongoing maintenance, including dredging.
 - Coghlin Park has recently been identified as the site of a potential docking facility for dinghies and recreational vessels up to 30' in length, and the site has been reviewed with officials from MDNR who have indicated that it could potentially qualify for grant funding.
 - Investment in this under-utilized waterfront site by the City of Saugatuck to expand public boating opportunities has the potential to facilitate funding and broader implementation of this harbor management plan.



View of Saugatuck Waterfront from Mt. Baldhead

appendix



page 1 of 3

Marina Economic Impact Calculator

This calculator tool estimates the economic impacts of marinas using regional economic multipliers.

State: Michigan

Region: Central

Year: 2016

Revenue: \$1,000,000

Total Economic Impacts by Effect and Type of Impact

Impact Effect/Type	Output	Employment (Jobs)	Value Added	Labor Income	Tax on Prod. & Imports
Direct	\$1,000,000	16.6	\$415,866	\$349,188	\$66,678
Indirect	\$685,454	5.8	\$373,019	\$237,668	\$31,708
Induced	\$1,899,547	14.9	\$1,113,140	\$693,708	\$79,477
Total Impact	\$3,585,001	37.3	\$1,902,025	\$1,280,564	\$177,862

Economic Impacts by 2-digit NAICS sectors

2-Digit NAICS Sector Impacts	Output	Employment (Jobs)	Value Added	Labor Income	Tax on Prod. & Imports
Agriculture, Forestry, Fisheries	\$19,781	0.1	\$9,372	\$5,348	\$271
Mining	\$39,744	0.1	\$26,843	\$13,810	\$3,417
Utilities	\$68,119	0.1	\$25,142	\$8,142	\$5,457
Construction	\$174,911	1	\$66,392	\$59,210	\$1,159
Manufacturing	\$208,992	0.3	\$47,467	\$23,204	\$1,739
Wholesale Trade	\$89,991	0.4	\$57,214	\$29,746	\$11,340
Retail Trade	\$214,062	2.9	\$133,055	\$88,486	\$27,998
Transportation	\$81,053	0.6	\$42,739	\$31,330	\$2,197

appendix

page 2 of 3

Information and Communications	\$101,863	0.3	\$49,613	\$20,236	\$3,708
Finance and Insurance	\$240,425	1.3	\$116,453	\$67,906	\$5,738
Real Estate and Rentals	\$335,063	1.2	\$247,481	\$25,097	\$24,263
Professional and Technical Services	\$153,364	1.2	\$91,732	\$77,419	\$1,917
Management of Companies	\$38,332	0.2	\$22,164	\$18,609	\$615
Administrative and Waste Services	\$102,139	1.5	\$72,087	\$61,581	\$1,282
Education	\$19,289	0.3	\$11,295	\$10,395	\$552
Health Care and Social Services	\$193,602	2.1	\$118,511	\$111,372	\$2,810
Arts, Entertainment and Recreation	\$1,093,810	18.1	\$457,551	\$381,533	\$73,605
Accommodation and Food Services	\$81,294	1.5	\$44,493	\$32,176	\$5,731
Other Services	\$92,899	1.4	\$58,805	\$52,963	\$6,277
Government and non-NAICS	\$236,258	2.7	\$203,619	\$162,000	\$-2,212

Jobs represents both full and part-time jobs

Total State and Local Tax Impacts

Description	Amount
Dividends	\$296
Social Ins Tax- Employee Contribution	\$720
Social Ins Tax- Employer Contribution	\$1,393
Tax on Production and Imports: Sales Tax	\$86,611
Tax on Production and Imports: Property Tax	\$54,197
Tax on Production and Imports: Motor Vehicle Lic	\$1,666
Tax on Production and Imports: Severance Tax	\$6,532
Tax on Production and Imports: Other Taxes	\$6,943
Tax on Production and Imports: S/L NonTaxes	\$1,086
Corporate Profits Tax	\$3,793

appendix

page 3 of 3

Personal Tax: Income Tax	\$19,808
Personal Tax: NonTaxes (Fines- Fees)	\$4,511
Personal Tax: Motor Vehicle License	\$1,428
Personal Tax: Property Taxes	\$440
Personal Tax: Other Tax (Fish/Hunt)	\$1,037
Total State and Local Tax	\$190,461

Total Federal Tax Impacts

Description	Amount
Social Ins Tax- Employee Contribution	\$71,120
Social Ins Tax- Employer Contribution	\$55,940
Tax on Production and Imports: Excise Taxes	\$13,708
Tax on Production and Imports: Custom Duty	\$5,676
Tax on Production and Imports: Fed NonTaxes	\$1,443
Corporate Profits Tax	\$31,670
Personal Tax: Income Tax	\$84,381
Total Federal Tax	\$263,938

appendix



518 Broad Street, Suite 200
St Joseph, Michigan 49085
269 932 4502

Meeting Summary

Date: 9/22/2015
To: City of Saugatuck City Council
From: Greg Weykamp
Subject: KLHA Harbor Planning – State Agency Meeting Memo

Distribution: Kirk Harrier, City of Saugatuck Council members, KLHA board members

This memo is intended to summarize the key points discussed during our state agency meeting for the KLHA Harbor Planning Project on 9/15/2015 in Lansing, MI:

- **Project background:**

The communities of Saugatuck and Douglas are defined by their access to the navigable waters of Kalamazoo Lake. The Lake is constantly undergoing the natural process of sedimentation, both from upstream sources and from sand of Lake Michigan washing upstream, and requires human intervention to maintain channels with navigable depths. USACE is responsible for dredging only to the mouth of the Kalamazoo River.

- **Ongoing upstream projects:**

Kalamazoo River EPA Superfund site and Area of Concern near Otsego and Allegan City due to high levels of PCBs. Calkins Dam and Allegan City Dam are currently undergoing improvements and sediment clean-up. Multiple other dams within Allegan County (Trowbridge, Otsego Township, Otsego City) are currently outdated and due for removal, and these dams are holding back significant amounts of contaminated sediment. If the DNR can fund the dam removal, it is likely the EPA will prioritize clean-up of sediments at these sites. However, these dams are not planned for immediate removal, but sometime in the next 10 years. The superfund clean-up will work downstream, so Kalamazoo Lake is at the tail-end of these efforts.

- **Previous planning studies for Kalamazoo Lake:**

Options studied include channelization of Kalamazoo Lake by constructing islands to direct flow, and creating an upstream sediment trap that would limit the area requiring dredging.

appendix



2

- Channelization discussion:

Positives

- Channelization would keep sediments moving downstream (as naturally happens with rivers emptying into Lake Michigan) and reduce the need for dredging.
- Would potentially reduce dredging costs.
- Dredging spoils could be used to form the islands, reducing need for confined disposal facilities (CDFs).
- Islands could serve as recreation sites.

Negatives

- Sediment testing in Kalamazoo Lake continues to show PCB contamination. Although there is evidence to show that levels are falling due to upstream clean-up efforts, contaminated sediments cannot be used for beach nourishment, which could increase the cost of disposal.
- Moving sediments will shift the burden of removal and clean-up to USACE.

General Consensus

The State indicated that a highly engineered system to move sediment downstream will be challenging to obtain support/approval, especially from the US Army Corps (USACE). DEQ would not be likely to approve a plan that shifts dredging and clean-up responsibilities and moves contamination into Lake Michigan.

- Sediment trap discussion:

Positives

- DEQ acknowledges that a short-term plan for sediment removal is necessary, and dealing with dredging on site is preferable to moving it downstream.
- This plan would require less disruption of Kalamazoo Lake habitat.
- A sediment trap and CDF near Schultz Park, upstream of I-196 would be a potentially suitable location. This is where sediments are shown to accumulate historically.

Negatives

- DEQ mentioned that sediment traps in past projects have seen limited results. More research would be needed.
- Future CDFs for the sediment dredged from the sediment trap solution were discussed, specifically; CDFs located in water are not an ideal solution. These tend to
- Who pays for regular dredging of the sediment trap?

General Consensus

The State indicated that removal of sediment on-site is preferable to shifting the burden elsewhere, so this strategy has merit. It was also indicated that a short-term plan for sediment removal would have better success if paired with a long-term plan for upstream sediment reduction.

appendix



3

- Sediment reduction discussion:

Positives

- Reduction of sediment upstream would benefit the entire watershed by preserving topsoil, reducing non-point source contamination, and would reduce the need for dredging in the future.
- State and Federal programs exist that may be able to assist in remediation of the contaminated soil upstream or within the KLHA area.
- Drain Commissioner implemented tax savings or lower assessments to upstream farmers who implement best management practices (BMPs) to reduce sediment transport into the watershed would encourage participation.
- The Regional Conservation Partnership Program (RCPP) is a potential funding source to assist efforts in reducing sediment runoff from farms.

Negatives

- It can be difficult convincing farmers upstream to change behavior.
- Incentives don't always work if extra paperwork is required.
- Partnerships would be necessary between various groups, complicating efforts.

General Consensus

The State indicated that this solution should be paired with short-term sediment removal plans as a more holistic approach. Looking at the big-picture of the entire Kalamazoo River watershed would deal with the source of the problem, instead of dealing with the symptoms.

- Next steps:

1. Initiate discussions with the USACE to obtain feedback of both options
2. Initiate discussions with the EPA regarding the project and potential solution options.
3. Provide letter identifying the potential steps to providing a solution to the sediment issue at Kalamazoo Lake
4. Meet with state agencies at a later date to discuss findings/research
5. Contact Bob Day for Rabbit River data
6. Follow up loop w USACE, both RJ's civil guy and Reg. Start w regulators we talked to back in 2013
7. 3 tease out process to eventually do channels
8. 4 tease out process to do traps and CDF
9. 5 incl cost est's
10. 6 talk to wagner about epa input
11. 7 research BMP - Minnesota/other
12. 8 NECS grant app
13. 9 how much does state and fed fund dredge here
14. 10 how often does corps dredge inner harbor - pull report

appendix



15. 11 MI - how do drain commishes handle
- 16.

- Potential Partnerships:

Local

1. Kalamazoo River Watershed Council – efforts to deal with PCB contamination at dams
2. Tower Marine – funding strategies
3. Fishing organizations
4. USACE, Center for Contaminated Sediments Department. They likely will not accept a plan that increases their dredging costs/responsibilities, what options would they support?
5. Allegan County and City of Allegan: currently have two dam improvement projects on Kalamazoo River, and Trowbridge Dam which requires removal
6. Otsego Township, City of Otsego – prioritize two dam removals
7. Holland's 'Project Clarity' group

Regional/State

8. DNR – dam removal and habitat restoration efforts.
9. Regional Conservation Partnership Program (RCPP) through the Natural Resources Conservation Service (USDA) – provides conservation assistance, encourages partners to increase restoration and sustainable use of soil, water, wildlife and related natural resources on regional or watershed scales. Successful grant obtained for St. Joseph River.
10. Western Michigan University
11. Farming organizations
12. EPA – Michigan Nonpoint Source Program, give them a plan with PCB control component
13. Nature Conservancy

- Conclusions:

The best course of action would be to propose a multi-tiered approach with short-term strategies for dredging and disposal, and long-term strategies for overall sediment reduction. It was suggested that the long-term strategy could be in the form of a Sediment Management Plan.

appendix



518 Broad Street, Suite 200
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Date: 12/9/2015
To: Kirk Harrier/Bill LeFevere
From: Greg Weykamp
Subject: Draft Report – Strategies for Addressing Sedimentation of Kalamazoo Harbor

Distribution: City of Saugatuck, City of the Village of Douglas, Kameron Jordan

The harbor communities of Saugatuck and Douglas are vibrant waterfront communities that thrive on Kalamazoo Lake. Collectively referred to as Kalamazoo Harbor, both water bodies experience severe sedimentation issues due to the size of the Kalamazoo River watershed. The Harbor is part of the Superfund Site contaminated with PCBs, complicating the future planning of long-term sedimentation management. The communities have invested considerable effort over the last ten years to help create a master plan for the harbors that will lead to a viable long-term solution.

Four primary approaches have been discussed, including a “do nothing” approach; continuing with the current approach of dredging when necessary; and two more proactive strategies. One of the two proactive strategies includes the construction of sediment trap(s) and supporting confined disposal sites (CDFS). The other strategy includes the use of structures to channelize the flow of the Kalamazoo River, thereby flushing sediment further downstream and eventually into Lake Michigan.

A meeting was held with state officials on 9/15/15 to review these approaches and to solicit feedback regarding these strategies. More specifically, the meeting was intended to assess the likelihood of and the process for permitting each of these approaches. During the 9/15/15 meeting, the idea of addressing the regional sediment issues within the Kalamazoo River Watershed was identified as a possibility to help alleviate the high sediment volumes entering Kalamazoo Harbor annually.

REGIONAL SEDIMENT DISCUSSION

Regardless of the approach selected, a sediment management plan should be created as a long-term strategy for overall sediment reduction. Regional sedimentation issues, specifically sediment loading from agricultural and urban sediment runoff, should be the focus of the sediment management plan. A MDEQ Staff Report published October 2013 evaluated the sediment sources to the 58 harbors targeted for the Emergency Dredging Program. According to the MDEQ Report, Saugatuck Harbor has been placed in the category with 15 of the total 58 harbors identified as “Harbors that are impacted by shoreline transport of sediment, low water levels and may have significant upland sediment sources.” Specifically, the MDEQ Report estimates that approximately 50% of total watershed acreage is identified as agricultural and approximately 81 pounds of sediment per acre of the watershed enter the Kalamazoo River system. It is clear that the process of solving the Kalamazoo Lake sedimentation issues will require a cooperative effort with local and regional communities to address sedimentation issues due to adjacent runoff. This approach has been applied in other nearby watersheds such as

appendix

2

the Lake Macatawa watershed, where Project Clarity is improving water quality through collaborative efforts with local public and private partnerships, members of the agricultural community, and local governmental entities.

The Rabbit River watershed is the first upstream watershed and contributes sediment into the Kalamazoo River watershed system. Stakeholders and local residents of the Rabbit River watershed have moved in the direction of addressing the sedimentation including studying the watershed characteristics, developing and eventually implementing long-term strategies. According to the Rabbit River Watershed Management Plan published in 2009, the 187,200-acre Rabbit River watershed is primarily categorized as agricultural land use. According to the Rabbit River EPA Watershed Assessment of River Stability and Sediment Supply (WARSSS) published in 2008, recommendations included “encourage environmentally sensitive agricultural practices to reduce the potential for surface erosion and sediment delivery to streams, including conservation tillage and implementation of filter strips/riparian buffers.” The report also suggested implementing a stream monitoring plan to assess the impact of best management practices (BMPs) selected. Data found in existing studies such as the 2009 Rabbit River Watershed Management Plan and 2008 Kalamazoo River Watershed Hydrologic Study will be incorporated into the Sediment Management Plan. Through recent discussions with the MDEQ, the Peach Orchard Creek has been identified as an area that should be targeted for watershed planning.

The development of a sediment management plan will also include cooperative efforts from other Kalamazoo River stakeholders. Stakeholders that need to be included on future discussions are Allegan Conservation District, Kalamazoo River Watershed Council, Allegan County Drain Office, and other regional conservation districts.

I. “DO NOTHING” APPROACH

According to 2007 Kalamazoo Harbor Master Plan Technical Report, the current rate of sedimentation into Kalamazoo Lake is approximately 36,000 cubic yards per year. If this rate continues without control or dredging, it will eventually lead to the transformation of Kalamazoo Lake into a marshy area with a narrow meandering river channel. The result of this approach will be a loss of the valuable waterfront property within both communities and the loss of the harbor as it exists today.

II. CONTINUE CURRENT APPROACH

The current approach has been to complete maintenance dredging on an as-needed basis. While navigation depths within the lower Kalamazoo River and river mouth are maintained by the U.S. Army Corps of Engineers, access to the lower river from Kalamazoo Lake is currently left for local government and riparian owners to maintain. Regulatory processes, costs, and lack of available disposal sites make it difficult to complete dredging. During the recent 14-year period of below average Lake Michigan water levels, the need to dredge within Kalamazoo Lake became urgent. After nearly a year of permit application review, including sediment sampling/testing, surveys, and coordination with local, state, and federal agencies, permits were issued in late 2013 and early 2014 for over 100,000 cubic yards of dredging and a temporary disposal site within Kalamazoo Lake Sewer & Water Authority property (KLSWA). Shortly thereafter however, Lake Michigan water levels rose and the immediate dredging need subsided temporarily. Costs to complete the dredging were estimated to be well over two million dollars and funding for the work was not identified.

appendix



3

This approach is a reactive strategy that is not financially viable for local government and riparian owners over the long-term, without a proactive funding mechanism. In addition, final authorization for temporary disposal on KLSWA property is pending and may not be gained due to environmental liability concerns. In addition, since the KLSWA disposal site is only temporary the material will need to be moved to a permanent location, which has not been identified. Recent feedback from the agencies has indicated that moving the contaminated dredge material is not ideal and will add additional costs. As described above, this approach is slow to react to conditions and could result in the loss of navigability within the harbor for extended periods of time. To implement this approach effectively, a funding mechanism must be put in place and a viable, permanent disposal site must be identified or constructed.

III. SEDIMENT TRAP(S)

The 2007 Kalamazoo Harbor Master Plan Technical Report determined that a potential solution to the long-term sedimentation issues facing the Kalamazoo Harbor is the construction of sediment trap(s) along the Kalamazoo River upstream of the Saugatuck/Douglas Harbor area. The sediment traps would be designed to intercept and capture sediment at strategic locations intended to minimize downstream deposition, to separate clean material if possible, and to facilitate straightforward maintenance dredging. The capacity of the trap(s) would be optimized to minimize construction costs and to maximize the length of time between required maintenance dredging cycles. Dredge spoils removed from the trap(s) that contain regulated materials would be placed in confined disposal areas (CDFs). Clean dredge spoils could qualify for beneficial reuse, if they can be efficiently separated from regulated materials.

Process

This approach will require several intermediate steps including planning, studies/surveys, land acquisition, engineering design, and permitting. The following is a general outline of steps from initiation to implementation and the order may change to address comments/obstacles as they arise.

1. Review Available Data

All available data, including the 2007 report, 2013 bathymetric survey, 2013 sediment testing results, and other existing studies such as the Rabbit River Watershed Management Plan would be reviewed to ensure that subsequent efforts maximize the use of previously completed work.

2. Preliminary Engineering

The preliminary engineering study will first identify potential sediment trap & CDF locations. Potential sediment trap locations include areas adjacent to the I-196 bridge or upstream along the Kalamazoo River. Three potential areas for placement of upland confined disposal facilities (CDF) of the “trapped” sediments include City of Saugatuck “airport” site (northeast of Kalamazoo Lake Sewer & Water Authority property), Schultz Park property, and land adjacent to the I-196 Bridge. Another option under consideration is the “in-water CDF” concept, which would require significant additional study and permitting, but could potentially be most cost effective over time.

appendix



4

The result of this step would be several potential sediment trap locations/sizes and several potential CDF locations/sizes.

3. Community Approvals

Planning efforts currently underway are establishing the level of community support for each of the various options. To implement any solution, ongoing community outreach will be required. When the community gets behind one or more approaches, the project can move forward collectively and effectively.

4. Agency Coordination

Before permit applications, the next step would be coordination with the Michigan Department of Environmental Quality (MDEQ), U.S. Corps of Engineers (USACE), Michigan Department of Natural Resources (MDNR), the Environmental Protection Agency (EPA) and local agencies to identify the best available strategy/design and the most likely to be permitted. The Kalamazoo River is a navigable waterway regulated by Section 10 of the Rivers & Harbors Act of 1899 and Section 404 of the Clean Water Act. Coordination with MDEQ/USACE/EPA will be essential to ensure the future success of the project. In addition, a list of permit requirements would be developed, to ensure that all required studies, modeling, and other needs are addressed prior to submittal of a joint application.

5. Special Studies & Modeling

After meeting with the agencies, special studies and modeling would be completed. These special studies might include performing detailed survey(s), sediment sampling/testing, threatened and endangered species studies, modeling, archaeological studies, floodway/floodplain studies, wetland delineation, among others. If needed, some of this task might be completed during preliminary engineering.

6. Permit Application & Process

The next step in the permitting process will include preparing and submitting the Joint Permit Application to the agencies containing project quantities, project vicinity map, existing site plan, proposed plan view and cross-section drawings. Depending upon the final proposed plan and CDF location(s), the MDEQ Water Resources Division will review the permit application with respect to Part 301, Inland Lakes and Streams; Part 303, Wetlands Protection; Part 201, Environmental Remediation; and Floodplain Regulatory Authority found in Part 31, Water Resources Protection. While working with the MDEQ, the USACE will need to issue a 404 permit for the project.

7. Land Acquisition

The trapped contaminated sediment will require dredging on a regular basis and will be placed at the identified CDF(s), which will require additional agency permits/approvals. If selected CDF locations are not on city owned property, acquisition of the land will be required, likely before permits are issued by the MDEQ and USACE. The location of the CDFs may require additional coordination with adjacent landowners, land use covenants, use agreements, or other steps.

appendix



5

8. Final Design & Bid Set

Preparation of the project bid set and final design should be advanced only after permits are received or, in some cases, when the permit process is close to completion. In many cases, the permit process results in modification to the design and when final design is completed prior to permit issuance, there is a risk that redesign could be required.

9. Construction & Maintenance Plan

Once the project has been awarded, construction of the project can occur. By this time, the maintenance plan will have been developed and the mechanisms to ensure the sediment traps are properly monitored and maintained must be implemented, as well.

The project process/approach listed above will occur in parallel with state and federal funding opportunities such as NCFS Farm Bill, MDEQ Coastal Zone Management Program grants, and others mentioned below.

Challenges

The complexity and potential impacts of the project will result in challenges. During the review process, the agencies will likely require a number of special studies, as identified above. The special studies required to support the sediment trap approach are relatively straightforward, but will likely need to cover significant geographic areas. For instance, if 3-4 sediment trap locations are identified, each may need to be studied in order to identify the best locations.

The success rate of a sediment trap is difficult to determine without a detailed study of the flow conditions and sediment transport within the region. The Saginaw River was the source of a 2001 USACE study to determine sediment trap efficiencies of varying sizes and locations. In the 2001 study, the USACE proclaimed that the success rate of a sediment trap is based primarily on trap dimensions and incoming grain sizes. The study identified two trap locations, one for capturing coarse and medium silt and the other for capturing sand.

Government financing and bonding of sediment trap construction projects has been identified as a significant obstacle to overcome. Until precise and detailed modeling of the Kalamazoo River is completed, it is difficult to determine if the implementation of sediment traps would be not only successful, but also feasible.

*Estimated Costs - Sediment Trap(s)

The estimated costs of this project approach are:

1. Preliminary Engineering	\$ 25,000 – 50,000
2. Permit Process	\$ 75,000 – 100,000+
3. Special Studies:	\$ 50,000 – 200,000+
	\$ 150,000 – 350,000+
4. Land Acquisition	\$ 500,000 – 1,000,000+
5. Construction – Dredging, Disposal, CDF	\$ 5,000,000 – 15,000,000+
	\$ 5,500,000 – 16,000,000+

appendix



6

6. Long-term Maintenance Dredging (20 years) \$5,000,000-12,000,000+

**Please note that these are conceptual cost estimates for general information only.*

IV. CHANNELIZATION

Another approach identified in the 2007 report and subsequent efforts includes the construction of structures and/or islands to direct flow and channelize the flow of the Kalamazoo River. Channelization of the river is intended to keep the sediments moving through Kalamazoo Lake and eventually into Lake Michigan. Moving sediment through the Kalamazoo Harbor area would be locally beneficial; however, sediment would be flushed downstream into the federal navigation channel and into Lake Michigan. This approach could lead to an increase in the need for dredging downstream and to the deposition of regulated materials within the federal navigation channel and Lake Michigan.

Process

Like the sediment trap approach, channelization will require several intermediate steps including planning, studies/surveys, land acquisition, engineering design, and permitting. The following is a general outline of steps from initiation to implementation and the order may change to address comments/obstacles as they arise.

1. *Review Available Data*

All available data, including the 2007 report, 2013 bathymetric survey, 2013 sediment testing results, and other existing studies such as the Rabbit River Watershed Management Plan would be reviewed to ensure that subsequent efforts maximize the use of previously completed work.

2. *Preliminary Engineering*

The channelization approach would rely upon accurate, extensive modeling of the Kalamazoo River. Preliminary engineering would include technical studies such as hydraulic computer modeling, hydrologic modeling, and initial geotechnical investigations. The process would allow the preliminary design of several channelization alternatives to maximize flow and minimize cost. Channel structure alternatives would be evaluated to determine which designs would optimize cost, design life, maintenance needs, and function. Due to the potential downstream impacts of channelization, early coordination with the USACE and MDEQ must determine if the approach will be allowable before costly studies and modeling are undertaken.

This step would result in several channel design alternatives and one recommended plan. Modeling results and reports would serve as valuable background information once permit applications are assembled.

appendix



7

3. Community Approvals

Planning efforts currently underway are establishing the level of community support for each of the various options. To implement any solution, ongoing community outreach will be required. When the community gets behind one or more approaches, the project can move forward collectively and effectively.

4. Agency Coordination

Before permit applications, the next step would be to coordination with the Michigan Department of Environmental Quality (MDEQ), U.S. Corps of Engineers (USACE), Michigan Department of Natural Resources (MDNR), the Environmental Protection Agency (EPA) and local agencies to identify the best available strategy/design and the most likely to be permitted. The Kalamazoo River is a navigable waterway regulated by Section 10 of the Rivers & Harbors Act of 1899 and Section 404 of the Clean Water Act. Coordination with MDEQ/USACE/EPA will be essential to ensure the future success of the project. Because channelization could affect the maintenance of the federal navigation channel, coordination with the USACE is critical to determining if the approach will be viable. In addition, a list of permit requirements would be developed, to ensure that all required studies, modeling, and other needs are addressed prior to submittal of a joint application.

5. Special Studies & Modeling

After meeting with the agencies, special studies and modeling would be completed. These special studies might include performing detailed survey(s), sediment sampling/testing, threatened and endangered species studies, modeling, archaeological studies, floodway/floodplain studies, wetland delineation, among others. While some of this work might be completed during preliminary engineering, it's likely that additional efforts will be identified after agency coordination. Because channelization will modify portions of the Kalamazoo River watershed, fully evaluating all impacts will be required.

6. Permit Application & Process

The next step in the permitting process will include preparing and submitting the Joint Permit Application to the agencies containing project quantities, project vicinity map, existing site plan, proposed plan view and cross-section drawings. Depending on the final proposed plan, the MDEQ Water Resources Division will review the permit application with respect to Part 301, Inland Lakes and Streams; Part 303, Wetlands Protection; Part 201, Environmental Remediation; and Floodplain Regulatory Authority found in Part 31, Water Resources Protection. While working with the MDEQ, the USACE will need to issue a 404 permit for the project.

7. Land Acquisition

While minimal land acquisition is anticipated for channelization, staging areas, bottomland rights, land use covenants, use agreements and other variables will need to be addressed before the project can be implemented.

appendix



8. Final Design & Bid Set

Preparation of the project bid set and final design should be advanced only after permits are received or, in some cases, when the permit process is close to completion. In many cases, the permit process results in modification to the design and when final design is completed prior to permit issuance, there is a risk that redesign could be required.

9. Construction & Maintenance Plan

Once the project has been awarded, construction of the project can occur. A maintenance plan for the channelization structures and for access to the channel from shore (dredging) will need to be identified prior to this stage.

Challenges

The complexity and potential impacts of the project will result in challenges. During the review process, the agencies will likely require a number of special studies, as identified above. The special studies required to support the channelization approach are complex and will likely need to cover significant geographic areas.

Initial feedback during the September 15, 2015 agency meeting indicated that the USACE and MDEQ might contest the idea of moving contaminated sediment into the navigation channel downstream of Kalamazoo Lake. In addition, while the USACE was not represented at the meeting, channelization would likely result in an increased dredging burden on the agency and therefore, would likely result in opposition. Lastly, by pushing regulated materials downstream into the federal navigation channel, the USACE may need to diverge from its current practice of using dredge spoils as beach nourishment, resulting in additional costs to maintain the channel.

Lastly, after channelization is complete, the communities and riparian owners will still be left to determine how to maintain navigation from the shorelines to the high-flow channel, likely by additional dredging. So, while the approach may solve some problems, the need for dredging will not be completely eliminated.

According to the 2007 Kalamazoo Harbor Master Plan Technical Report, the success of this approach is difficult to determine without a comprehensive sedimentation model. MDEQ initial feedback questions whether channelization through Kalamazoo Lake will be worthwhile as the channel may represent a giant sediment trap, thus requiring significant maintenance dredging. As stated below, the required hydraulic and sedimentation modeling will be a significant cost to determine the effectiveness of the channelization approach. Long-term maintenance dredging of the channel will need to occur to ensure safe navigation within the channel.

As with the sediment trap approach, government financing and bonding of a channelization approach will be a significant obstacle to overcome.

appendix



9

*Anticipated Costs - Channelization

The estimated costs of this project approach are:

1. Preliminary Engineering	\$ 50,000 – 75,000
2. Hydraulic/Hydrologic Modeling	\$ 50,000 – 150,000
3. Geotechnical Investigation	\$ 25,000 – 50,000
4. Permit Process	\$ 75,000 – 100,000+
5. <u>Special Studies:</u>	\$ 50,000 – 150,000+
	\$ 250,000 – 525,000+
6. Land Acquisition	\$ 100,000 – 500,000+
7. <u>Construction</u>	\$15,000,000 – 30,000,000+
	\$15,100,000 – 30,500,000+
8. Long Term Maintenance Dredging (20 years)	\$ 2,000,000 – 5,000,000+

**Please note that these are conceptual cost estimates for general information only.*

FUNDING OPPORTUNITIES

In addition to previously identified sources, the following potential funding sources have been recently identified as funding opportunities:

Great Lakes Restoration Initiative (GLRI)

State and Federal grants exist to help with the sediment management efforts. Recently, in an effort assist Saugatuck/Douglas with the sedimentation issue the Delta Institute and Public Sector Consultants (PSC) has applied for a \$410,000 grant through the Great Lakes Restoration Initiative to help remediate upstream agricultural runoff. The plan now underway will address the sedimentation issues facing marinas and harbors to implement a policy framework addressing best management practices throughout the regional watershed. According to the Delta Institute, the proposed plan focuses on a mechanism that allocates a small portion of funds to reduce sedimentation at its source, similar to the Federal Moving Ahead of Progress in the 21st Century Act (MAP-21) which allocates funds to “transportation alternatives” such as environmental mitigation, recreational trails, and historic preservation. An infographic published by Delta Institute and PSC indicates that through the implementation of BMPs within several upstream watersheds could reduce the annual sediment by 13.3% in Saugatuck/Douglas Harbor.

Coastal Zone Management Program (CZM)

The MDEQ Coastal Zone Management Program (CZM) is offering grants to qualified projects within one of the five focus areas: public access, coastal habitat, coastal hazards, coastal water quality, and coastal community development. According to the CZM Request for Proposals announcement, examples of projects eligible for support include the development of ordinances, policies, and/or plans addressing the management of coastal

appendix



10

nonpoint source pollution. This program is applicable due to the ongoing problem of nonpoint pollution (agriculture and urban runoff) within the Kalamazoo River watershed. CZM grant amounts range from \$10K to \$100K and require a 1-to-1 non-federal match. The deadline to apply is December 18, 2015 for an anticipated project start date of October 1, 2016.

USDA Environmental Quality Incentives Program

The U.S. Department of Agriculture NRCS 2014 Farm Bill offers the Environmental Quality Incentives Program (EQIP), which participants receive financial and technical assistance to implement conservation practices. Another funding source provided by the NCFS is the Regional Conservation Partnership Program (RCPP), which is a cooperative opportunity to identify and address natural resources objectives to benefit soil, water, wildlife and related natural resources locally, regionally, and nationally. The Sediment Management Plan for the Kalamazoo River will implement these programs as an incentive for farmers and other residents within the watershed area to implement BMPs to reduce sediment loads entering the watershed.

NOAA Great Lakes Regional Habitat Restoration Partnerships

The National Oceanic and Atmospheric Administration (NOAA) recently released a federal funding opportunity for habitat restoration in Great Lakes Areas of Concern. NOAA seeks to award funding for multi-year Great Lakes Regional Habitat Restoration Partnerships. These Partnerships will result in the implementation of a wide-range of engineering, design, and on the ground implementation of individual habitat restoration projects. The Great Lakes Initiative will provide typical Partnership awards ranging from \$1,000,000 to \$5,000,000 per year for up to three years. The Kalamazoo River is listed as a Great Lakes Area of Concern, thus projects involving habitat restoration will be eligible for the funding.

appendix



518 Broad Street, Suite 200
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Meeting Summary

Date: March 31, 2016
To: Greg Weykamp
From: Lindsey Mathus
Subject: KLHA Harbor Planning – RCPP Discussion Summary

Distribution:

This memo is intended to summarize the key points discussed during the meeting with Allegan Conservation District, MDEQ Representatives, and MDARD representative for the Kalamazoo Lake Harbor project on March 25, 2016 in Allegan, MI:

I. Allegan Conservation District

- Does not have a lot of funding – Ana Hedberg only works part-time (20 hrs/wk)

II. MAEAP (Michigan Agriculture Environmental Assurance Program)

- A voluntary program that helps farms of all commodities voluntarily prevent or minimize agricultural pollution risks
- MAEAP Technician (Mike Ludlam) at the meeting discussed:
 - Farms get certified by program though the implementation of Best Management Practices (BMPs) such as buffer strips, cover crops, and other environmentally friendly practices
 - MAEAP certified farms can receive discounts on fertilizers, etc.
 - Program employs technicians and could be used to leverage RCPP funding – Need to clarify this

III. RCPP Program

- Federal funds available and awarded annually
- Requested funds must be matched
- Funding is not available for administration – Biggest problem
 - Who will put together application without funding?

appendix



2

- Who will continue the future monitoring and reporting that is required without funding?

IV. Key Comments/Questions Raised by MDEQ staff:

- Need to determine critical areas of watershed to possibly include these in scope of the project
- Allegan County is one of the top agricultural counties in Michigan – should leverage on how much BMPs could impact the Kalamazoo River
- Contact DNR to ask whether wildlife habitat restoration could be a part of the project
- Contact Allegan County Drain Commissioner

V. Next Steps

- Lisa Greenwood to setup meeting with Travis from Outdoor Discovery Center to discuss Project Clarity
- Kirk Harrier to contact Van Buren County to learn about pilot program with communities and the reduction of drain assessments due to the use of BMPs
- Review the Pre-Proposal submitted for the St. Joseph River Watershed Conservation Partnership that was forwarded by Jack Knorek from MDARD

appendix



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Meeting Summary

Date: April 21, 2016
To: Kirk Harrier, Bill LeFevere
From: Greg Weykamp
Subject: KLHA Harbor Planning – Follow-Up State Agency Meeting Memo

Distribution:

This memo is intended to summarize the key points discussed during our state agency meeting for the Kalamazoo Lake Harbor project on February 19, 2016 in Douglas, MI:

I. Review Draft Report Dated December 9, 2015

- Channelization Approach
 - The gradient of the river is very shallow and will not likely support the velocity required to keep sediments in suspension. However, if channelization is technically feasible, the following issues regarding contamination of Lake Michigan would need to be addressed.
 - If effective, more sediment will be deposited by channelization into the Corps channel downstream of Kalamazoo Lake, which will increase the frequency and cost of maintaining the channel.
 - Deposition of additional silty sediments could change the character of the dredge materials in the Corps channel, potentially removing the option of using the dredged materials for beach nourishment and significantly increasing the cost of dredging the channel.
 - PCB and arsenic remain above acceptable MDEQ criteria, and could contaminate Lake Michigan beaches, as well as further distribute contaminants into Lake Michigan where future cleanup efforts would be more expensive.
 - Prevention of contamination of Lake Michigan and beaches by complete removal of PCB and arsenic contaminated sediments from Kalamazoo Lake is not possible, as additional contaminated sediments continue to enter Kalamazoo Lake from upstream sources. Additionally, the cost of removal of sediments would exceed tens of millions of dollars, and other alternatives of

appendix

2



storing contaminated sediments along nearshore areas by relocating bulkhead lines would have significant impacts on adjacent private property owners.

- Channelization would require significant reconfiguration of the Kalamazoo Lake and Wade's Bayou shorelines, and/or construction of islands and/or fixed structures to create the channel. Multiple community meetings held in Douglas throughout 2015 for the Douglas Waterfront Master Plan reviewed the potential visual impacts of such a proposal with the public, and little to no support for this type of reconfiguration was offered by the public.
- While it has been suggested that the USACE Hydraulics section has indicated that channelization may be technically feasible, it is important to note that the Engineering / Hydraulics sections are separate from the Regulatory and Operations sections of USACE. Given the potential impacts described above, in particular permitting concerns certain to be raised by USEPA, we believe it is highly unlikely that the USACE would support or permit channelization.
- The consensus from all MDNR, MDEQ, and State of Michigan representatives present at the meeting concurred with the analysis described above and indicate that channelization is not a feasible approach to the sedimentation issues in Kalamazoo Lake.
- Sediment Trap Approach
 - Sediment Traps have significantly less impacts than channelization and are considered more potentially viable by the permitting agencies.
 - Location quantity, and final design will affect the permit-ability and effectiveness of this approach
 - Significant upstream sediment mapping, testing, and modeling will need to be performed
 - The effectiveness of sediment traps in capturing silt is dependent on many factors, and will need to be modelled and tested
 - The total area/volume of the sediment trap is more important than the length of the sediment trap in capturing sediment

appendix



3

II. Upstream Sedimentation Mitigation Strategies

- A strategic, collaborative approach to minimizing non-point source pollution and introduction of silt upstream was discussed and identified as a critical first step in managing the long term sediment issues in Kalamazoo Lake and Wade's Bayou
- Multiple programs that may be helpful were identified, including:
 - MAEAP (Michigan Agriculture Environmental Assurance Program) – Certify farms to implement BMPs (Best Management Practices) that will reduce sediment runoff
 - RCPP (Regional Conservation Partnership Program) – A great way to document collaborative effort between communities
 - Project examples: Tri-State Western Lake Erie Basin Phosphorus Reduction Initiative, Lake Michigan Fruitbelt Conservation Partnership, Saginaw Bay Watershed Conservation Partnership, and St. Joseph River Watershed Conservation Partnership
 - Van Buren County Pilot Program:
 - Reduction in drain assessments are given to landowners who allow a buffer zone to grow between the drain and the farm field
 - Everyone wins with this approach because of lower maintenance costs – farmers, drain commissioners, downstream communities
 - Working with local farmers to implement BMPs – Buffer strips, no mow zones
 - Tax breaks have been considered
 - Two stage ditches are in the planning stage
- Potential partners include:
 - State of Michigan
 - Allegan County
 - Drain Commissioner - Identify potential financial initiatives that can encourage/offset the cost to landowners to implement BMPs to reduce sediment loading
 - Allegan County Conservation District
 - Saugatuck Township
 - Upstream Communities
 - Individual Landowners

III. Dredge Material Disposal Strategies

- In-Water Contained Disposal Facilities (CDF)
 - Agencies recommend/prefer CDF facilities be located on lands adjacent to dredge source wherever possible

appendix

4



- Agencies do not encourage consideration of in-water CDF, but indicated they could potentially be allowed if regulatory issues are addressed.
 - Primary issues include filling within wetland areas and impacts to fish habitat
- Schultz Park was identified as a potentially viable site for a CDF and long term storage of dredge materials, possibly as a sound barrier along I-196.

IV. Opportunities for Funding/Partnerships

- A number of potential funding sources were discussed, including:
 - RCCP – Significant funds potentially available through USDA
 - EPA 319 Grants – Less funds potentially available, but is an option to address non-point source pollution (sediment)
 - MAEAP – Michigan Agriculture Environmental Assistance Program
 - Great Lakes Protection Fund

V. Other Community Issues

- Why is Saugatuck Douglas Harbor not recognized by DNR Waterways Program?
 - No publicly owned marina exists
 - A publicly owned marina of any size that meets a demonstrated unmet demand for transient boating could potentially qualify the Harbor for additional support from the State of Michigan

VI. Other Agency Comments

- Development of a “Roadmap” to assist in gaining regional support and applying for grant funding to address sedimentation issues would be very helpful
- Work with regional agencies such as Allegan County, Allegan County Conservation District, Allegan County Drain Commissioner, Saugatuck Township, and other non-for-profit organizations
- Contact other successful programs within the state to understand how to move forward with a successful collaborative effort

VII. Next Steps

- Create “Roadmap” to initiate regional collaborative strategy
- Meet with Allegan County Conservation District
- Obtain feedback regarding GLRI Grant denial – identify reasons why
- Explore beneficial reuses of dredge material and if it is viable
- Identify next steps in upstream sediment testing and mapping of sources

