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UPPER LONG LAKE CANAL DREDGING

ENGINEERING EVALUATION AND ASSESSMENT

Upper Long Lake Estates and Mallard Court Canals

**Section 7, Bloomfield Township &
Section 12 West Bloomfield Township
Oakland County, Michigan**

**Prepared For The:
Charter Township of Bloomfield
Lake Board for Upper Long Lake
Upper Long Lake Estates Association
Upper Long Woods Association**

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Notice

This report was prepared utilizing information from the Long Lake Shores Association Canal report to the Lake Board for Upper Long Lake, written by Hubbell, Roth & Clark, Inc. (HRC), and issued February 27, 2006. As these canals are all located on Upper Long Lake, they are similar in many ways, and in an effort to avoid duplication of efforts and additional costs to the Lake Board, HRC used some of the same information and sections where appropriate from the previous report herein.

However, this report should be considered independent of the previously issued report.

Chapter 1 - Introduction

The Charter Township of Bloomfield in conjunction with the Lake Board for Upper Long Lake, the Upper Long Lake Estates Association and the Upper Long Woods Association authorized Hubbell, Roth, and Clark, Inc. (HRC) to prepare this Engineering Evaluation and Assessment of the proposed dredging of the Upper Long Lake Estates and Mallard Court canals located on Upper Long Lake in Bloomfield and West Bloomfield Townships. The specifics of HRC's scope of services were outlined in our proposal dated November 22, 2005 and approved by the Lake Board on April 12, 2006. During the preparation of this report, input was received from the Lake Board Attorney, Township Officials, the Township Engineer, and the Township Assessor.

Part 309 of Public Act (PA) 451 of 1994, as amended, "Inland Lake Improvements of the Natural Resources and Environmental Protection Act", governs lake improvements such as the proposed canal dredging and sets forth the preliminary engineering investigation requirements.

An excerpt of Part 309, Section 30909 states:

- (1) The lake board shall retain a licensed professional engineer to prepare an engineering feasibility report, an economic study report, and an estimate of cost. The report shall include, when applicable, recommendations for normal lake levels and the methods for maintaining those levels.
- (2) The engineering feasibility report shall include the methods proposed to implement the recommended improvements, such as dredging, removal, disposal, and disposal areas for undesirable materials from the lake. The report shall include an investigation of the groundwater conditions and possible effects on lake levels from removal of bottom

materials. A study of existing nutrients and an estimate of possible future conditions shall be included. Estimate of costs of right-of-way shall be included.

(3) The estimate of cost prepared under subsection (1) shall show probable assessments for the project. The economic report shall analyze the existing local tax structure and the effects of the proposed assessments on the local units of government involved. A copy of the report shall be furnished to each member of the lake board.

The following report is issued in accordance with Part 309 of PA 451 and our proposal for Professional Engineering Services dated November 22, 2005.

A short version of Part 309 of PA 451 is included as Appendix A.

A copy of our proposal for Professional Engineering Services is attached as Appendix B.

Chapter 2 - Project Location

The Upper Long Lake Estates Canal is located in the Upper Long Lake Estates Subdivision(s) lying in Section 7, Bloomfield Township, Oakland County, Michigan. More specifically, the canal is located on the northern side of Upper Long Lake, east of Middlebelt Road and south of Square Lake Road. The canal is bordered by homes that front Long Pointe Drive. The Canal is also referred to as the C-Beach Canal or the ULLE Canal.

The Mallard Court Canal is located in the Upper Long Woods Subdivision(s) lying in Section 12, West Bloomfield Township, Oakland County, Michigan. More specifically, the canal is located in the northwest corner of Upper Long Lake, immediately east of Middlebelt Road and south of Square Lake Road. The canal is bordered by homes that front Middlebelt Road, Oakway Drive, and Mallard Court.

A location map for the Upper Long Lake Estates canal is attached as Appendix C-1.

A location map for the Mallard Court Canal is attached as Appendix C-2

The Subdivision Plats are attached as Appendix D.

The Subdivision Deed Restrictions are attached as Appendix E.

Please note that the Deed Restrictions included are only the most recent amendment and we have not attached the numerous signature pages.

Chapter 3 - Project Background

Natural or manmade canal systems are common on the larger lakes around southeast Michigan, specifically in Oakland County where “all sport” lakes are abundant. These canals expand the riparian rights of the associated lake through the adjacent land areas. Thus, these areas become more desirable and profitable for residential development boasting lake frontage or lake access. Most of these canals are now situated within developed and mature subdivisions.

Over time, the canals gradually begin to fill in and lose navigational cross section. The primary causes of this are:

- Erosion from adjacent properties
- Sediment loading from construction sites
- Dirt and dust wash off from roads
- Decomposing leaf litter
- Illegal dumping
- Natural vegetative encroachment
- Stream bank sloughing
- Propeller wash and erosion
- Wind and water erosion

Due to these activities, the use, enjoyment, and benefit (property market value) of the canal diminishes. The impacted property owners often seek canal dredging as a means to restore their riparian rights. However, the Michigan Department of Environmental Quality (MDEQ) no longer permits the dredging of lake bottom lands to create new navigational waterways. Therefore, the dredging of any canal is typically regulated to the restoration of the pre-existing cross section and depth through the limited removal of the sediment that has accumulated in the canal. In addition, vegetative overgrowth may now be determined to be regulated under the

State's wetland definition. Dredging in wetland areas, whether pre-existing or naturally created over recent years, is generally prohibited.

Due to the potential project costs, inability to form a consensus among property owners, complexities of the permit process, and/or inexperience with construction projects, property owners who desire to dredge their canals seek assistance from their local municipality, Lake Board/Association, or Subdivision Association. These governing bodies usually have the mechanism to assist in a project of this nature and more importantly, the authority to spread the associated costs across the benefiting property owners in some equitable fashion. In the cases of the Upper Long Lake Estates ("ULLE") and Mallard Court ("Mallard") canals, a legally established Lake Board appears to have jurisdiction in this matter.

For the Lake Board to move this project forward and eventually levy assessments to fund the project, an Engineering Evaluation and Assessment is required as provided herein.

Chapter 4 - Feasibility

Current Conditions

Representatives from our office have visited the canal sites on several occasions to evaluate the current conditions of the canals, islands, and shorelines. In general, the canals appear to be in good condition from an aesthetic perspective, except at the southwestern opening on the ULLE Canal where sedimentation has choked off the canal entrance.

Much of the shoreline of the canals adjacent to the existing homes has been improved. Many residents have installed plastic, timber, or steel sheet piling walls, others have poured concrete seawalls, and a few have built break walls out of modular retaining wall blocks, broken concrete, or larger rocks. Some of the residents, however, have left the natural shoreline and have grass up to the edge of the canal. Some of the seawalls appear to be in disrepair or are falling into the canal. This could be due to the poor stability of the underlying soils or in the case of the steel sheet piling walls, from corrosion due to increased oxidation as a result of fluctuating lake levels compounded by the salt-like corrosion effects of copper sulfate weed treatments performed in the lake. The rear yards of the homes on the canal consist of predominately manicured lawn areas to the edge of the canal or to the seawalls.

It appears many of the residents leave their docks, boat hoists, personal watercraft floats, and boats in the canal even over the winter months. Most of the residents have installed a pump system to draw canal water for lawn irrigation purposes. It is likely there are other irrigation systems that are not in the open or have intakes that are not visible. No aerators were noticeable in either canal.

There are no road crossings on either of the canals. Based on readily available utility data, there are no utility crossings present either.

During our site visit, samples of the canal bottom sediments were visually inspected. The material throughout the canals was found to be dark brown to black in color, very sticky, and organic in nature. This is consistent with the sediment found in most canals. The color and texture suggest that the material is formed primarily by the natural decay of vegetative material such as leaves, branches, and fallen trees which supplement the fine silty sediment that washes into the canal. Some of the canal bottom materials were sandy in nature but these soils were found along the shoreline and suggest either homeowners had placed this soil for a beachfront effect, or it had washed into the canal from adjacent homes during construction, improvements, or landscaping operations. In front of both boat launches, hard pan was found close to the bottom of the canal suggesting a historical shallow point in the canal, possible compaction due to the launching and loading of boats, or an accumulation of sandy gravelly soil materials.

Based on the water marks on the existing seawalls and docks and from insight provided by a few residents on the lake, the water level is currently higher than normal by five to twelve inches (5"-12"). We will use the normal water elevation watermarks as a reference elevation when discussing all proposed dredging depths and clearances.

The ULLE canal width varies but averages close to 60 feet wide except at the two bays which are 125 and 150 feet wide. The canal is approximately 1,400 feet long including the stretch

between the launch and lake through the small Association marina. The canal centerline channel averages close to 5 feet in depth before noticeable sediment accumulation and consolidation is present based on the higher water elevation, except at the southwest mouth of the canal where the water depth varies seasonally between less than 3 feet and 18 inches. Therefore, the water depth throughout the year is likely to be between 4 and 5 feet. The canal appears to have a normal curved cross section with the water depth averaging two to three feet on the property sides of the canal and transitioning into the island on that side of the canal as shown in Appendix F-1.

The Mallard Court canal width varies but averages close to 50 feet wide and is approximately 3,200 feet long measured around the horseshoe shaped canal from lake to lake. The canal width is narrower along the northern leg parallel to Square Lake Road near the launch site. The canal centerline channel averages about 4.5 feet in depth before noticeable sediment accumulation and consolidation is present based on the higher water elevation. Therefore, the water depth throughout the year is likely to be between 3.5 and 4.5 feet. The canal appears to have a normal curved cross section with the water depth averaging two to three feet on the property sides of the canal and transitioning into the island on that side of the canal as shown in Appendix F-2.

We found the depth of sediment in both canals from the existing canal bottom to the bottom of the sediment varied between two feet and five feet. Please note that our survey rod could not penetrate the sediment much deeper than ten feet from the water surface and in most circumstances the sediment consistency prohibited us from probing further, although additional dredge depth would likely be possible.

There are three improved boat launch sites on Upper Long Lake. Each of the canals discussed have launches within the project limits. The launch sites on each of the canals consist of one of the platted lots of the subdivisions. The ULLE launch site contains significant area; however, it is divided into smaller terraced levels by steel sheet piling retaining walls due to the steep topography of the site. The Mallard launch site is split into several smaller areas restricted by several mature trees and the existing cul-de-sac. Both launch sites appear to be the only staging/dewatering areas available unless backyards are utilized and/or easements purchased. Using backyards would be very disruptive and is not advised. The dredging equipment would likely be launched from either of the sites or from elsewhere on the lake should the grade down to the launch at ULLE or the site constraints at Mallard not be suitable for the launching of the dredge.

Adjacent to the ULLE launch is a small marina, apparently for the use of the inland subdivision properties. Most of the boat wells have sufficient depth at the end of the docks out in the canal. However, they are quite shallow near the seawall. Several of the residents indicated that the two slips closest to the launch become unusable when the lake level drops to its lowest summer elevation.

Both canals surround or border large outlots or un-described islands. These islands appear to be very marshy and are mostly reeds and accumulated sediment. The shorelines have dense vegetation up to the canal edge. These islands appear to be expanding into the canals and new wetlands are forming around the island perimeters. Our limited visual inspection revealed that

much of the island surface is near the normal water elevation. Wet zones, consistent with emergent, forested, or scrub-shrub wetlands, are located throughout the Mallard island. The islands in both canals are wholly situated below the base flood elevation (100 year floodplain) according to FEMA Flood Insurance Rate Maps, Appendix G.

In addition to the normal inflows into the canal from the adjacent properties such as sump pump and downspout outlets, patio drains, etc. each of the canals has at least one major storm sewer inlet from the upstream subdivision properties. While we did not test the discharges from these outfalls, we are confident that testing would confirm the significant presence of nutrients that are feeding the vegetative and algae growth in the canals.

Project Warrants

Typically, dredging is proposed to restore a canal cross section to its historic dimensions when the sediment accumulation reaches a point where it obstructs the normal use of watercraft on the canal. This means dredging becomes an issue when the water depths through the center channel are three feet or less and the canal edge depths, where boats are docked, are less than two to three feet. As mentioned previously, the center channel on both canals is deeper than three feet except at the southwest mouth of the ULLE canal. However, there are isolated areas where the canal edges are quite shallow restricting the use of these areas for normal pass through boating or for docking watercraft. It would appear from probing the canal bottom that dredging is warranted if the residents wish to restore the navigational dimensions of the canal.

In addition to the dimensional warrants as discussed above, canal dredging is warranted when the perceived market value of the homes on the canal or of those homes who use the canal for lake access, declines or remains stagnant due to the conditions of the canal. Residents will propose to dredge the canal when they consider the diminished cross section or access to be such that their property's market value or ability to sell their lake front or lake access property is impacted. This consideration has more to do with the current housing market conditions and people's perceptions of the canal than engineering criteria. Based on the interest shown thus far, it appears that some residents on this canal feel that the current canal situation warrants dredging.

Residents on one of the canals have inquired into the effects dredging will have on algae and aquatic weed growth. Dredging will have little impact on algae problems within the lake or canals. Opening the canal entrance way on the ULLE canal will improve the flow of water through the canal. Moving water will help keep the algae under control. However, both canals are pretty isolated by the islands and we question whether there is any significant current through the canals or wind action in these areas of the lake to push water through the canals.

The best way to reduce algae blooms and aquatic weed growth is to enact a comprehensive nutrient reduction program, lake wide or at minimum in these affected subdivisions. The combination of landscape/lawn runoff that is rich in nutrients such as fertilizers, failing septic system effluent, animal waste, etc. with a stagnant watercourse greatly enhances the growth of nuisance aquatic vegetation. As mentioned, the canals are fed by several storm sewer outfalls

that are likely the primary point source of nutrient loading into the canal. These outlets drain much of the upland subdivision areas.

Dredging will remove some of the existing canal bottom vegetation. Also, by making the canal deeper throughout the center channel, dredging will reduce the amount of light that reaches the canal bottom, thus reducing the aquatic weed growth. Vegetation on the sides of the canal will generally not be affected.

There is no way to quantify the potential aquatic weed or algae reduction. Vegetation and algae are affected by seasonal temperatures, nutrients, water currents, harvesting/chemical treatments, etc. There is no way a percentage reduction could be estimated without guessing how these unknown and other natural events will contribute/alleviate this problem.

Minimum Requirements

Based on our experience and dredging equipment limitations, any dredging project should create the cross sections as shown in Appendices H-1 and H-2. The center channel should be dredged to provide a minimum water depth of eight feet from the normal water elevation. Please note that in some areas, the historic canal bottom (hard pan) is shallower than this. In these instances, we would recommend only dredging down to this soil stratum regardless of the shallower depth. Going below this elevation will be very difficult from a dredging standpoint and will become cost prohibitive. Similarly, where utility conflicts exist, a shallower/narrower dredge depth may be required. Due to the nature of hydraulic dredge operations and equipment, the proposed cross section is stepped from the center channel up to the shore lines. We would

propose a five foot depth to within five feet of any seawalls or shoreline structures. Once the dredging stops and normal use of the canal resumes, natural slumping will occur and the stepped cross section will gradually transform back into the typically curved section (Appendices I-1 and I-2)

Necessity

While the normal use and enjoyment of the canals is not obstructed at the present time, it appears that it is somewhat hindered, especially along the canal edges and through the southwestern opening on the ULLE canal.

To increase the flow of water, accessibility, and restore navigation, the mouth of the ULLE canal needs to be dredged immediately. It is our opinion that there is a need to dredge the entire canal within the next five to seven (5-7) years based on the depth and maneuverability along the outside of the canal where the residents dock their watercraft. It appears to our office that the area from the launch to the lake is relatively open except right at the bottom of the launch. The boat slips could use some cleaning up. Based on their use, this may need to be done within the next few years. Due to fixed costs, impacts to the lake and to the residents, and disruption to the launch area, we recommend combining all dredging work into one project which will be the least expensive and most cost effective way to proceed. However, it may be more appropriate to dredge the boat slip area later as part of the Associations ongoing marina maintenance program.

It is our opinion that there is a need to dredge the entire Mallard canal within the next five to seven (5-7) years based on the depth and maneuverability along the outside of the canal where the residents dock their watercraft. To realize any potential economy of scale savings this canal should be coupled with the ULLE canal to save on fixed costs, timing, disruption to the lake, etc.

Dredging Ability

There are two primary methods to dredge a canal, mechanical and hydraulic. Mechanical dredging uses normal excavation equipment located on the shoreline or on barges in the canal to dig the sediment out of the canal. The wet spoils are then placed on the barge or deposited on the adjacent upland shore areas. Due to the limited launch facilities and restricted site access behind the homes, mechanical dredging would have numerous logistical problems and is not considered cost effective, except to dredge within the ULLE marina where a small backhoe or excavator could easily reach into the boat slips and possibly out to the end of the launch to remove the accumulated material. This would be a better and more cost effective way to dredge these areas.

Hydraulic dredging equipment utilizes a cutter head that breaks through the sediment and suspends the soils into the water column where they are vacuumed through a large pumping system. The sediment laden water is then pumped through a network of pipes floating in the canal to the disposal area. Filter bags at the outlet pipe are the most common way to collect the sediment and release the water back into the canal. Earthen embankment or impoundment areas are another way to dewater the dredged slurry.

Based on our canal survey, the sediment composition, and the canal layouts, this project is ideal for hydraulic dredging, except as noted above. Hydraulic dredging is the practical way to proceed for the vast majority of the canal dredging discussed herein.

General Restrictions

All dredging projects rely heavily on the availability of staging, dewatering, and disposal sites. The launch areas would be the obvious staging areas available to the contractor. There has also been talk in the past about using the islands as dewatering and disposal sites.

From the equipment storage and staging perspective, the launch areas would be suitable for use during this project. For staging purposes, the contractor would likely place an equipment or tool storage trailer on-site and stockpile pipes, pipe fittings, filter bags, etc. The contractor may want to temporarily fence these areas to secure their construction equipment.

Our office has evaluated the potential of utilizing both canal islands as disposal sites and we do not recommend either island be considered. To provide a dewatering/disposal area, all of the trees and brush would need to be removed in a relatively large area (preferably over one acre). Just clearing a landing/access point on the islands would involve hand clearing and grading that would be very expensive. Further, to mitigate the re-suspension of the sediment into the water and flowing back into the canal or lake, geotextile bags would be required. These are unsightly if left in place. They also present the danger of ripping during or after pumping and releasing the sediment back into the canal or lake. Also, due to the island hydrology, if the dredged soils

were to become saturated soon after dewatering, they could give off a noxious odor. Furthermore, HRC does not believe that the Michigan Department of Environmental Quality (MDEQ) will permit island disposal for the dredging operations. It is our opinion that the dewatering and disposal of the dredged sediment would substantially disrupt the islands and permanently alter their natural ecosystem including the regulated floodplain that overlays each island. *From a project logistics, cost, and environmental standpoint, the islands are not the best option for sediment dewatering and disposal.*

Therefore, the launch sites become the only practical locations for dewatering the spoils for eventual disposal off-site, likely at a Type II landfill. As previously mentioned, the ULLE launch site is terraced. Geotextile bags would have to be placed on each level of the terrace, up near the cul-de-sac, and possibly along the access road. There are a total of three (3) 50' by 14' areas, one (1) 50' by 80' area, and one (1) 100' by 8' strip or approximately 6,900 square feet (0.16 acre) to place the dredged sediment while maintaining some site access. Drainage out of the bags and down the slope may cause erosion issues that will require very detailed plans and specification provisions. Depending on the volume of material to be removed from the canal, multiple stages may be required to dredge the ULLE canal.

The square footage of Mallard canal launch area available is also restrictive, only about 7,000 square feet or (0.16 acres). Two potential locations exist without the removal of site trees and bushes. One is on the southwest side of the cul-de-sac and is 50 feet by 50 feet. The other area is north of the cul-de-sac and is about 50 feet by 90 feet. A small amount of additional area may be available with the removal of some of the site vegetation or if geotextile bags are placed on

one half of the cul-de-sac. An easement may be required for the area north of the cul-de-sac. To utilize this area, multiple project stages will be required. The dredging operation will consist of multiple cycles of dredging, dewatering, transportation off site, and preparation for the next cycle. This will be time consuming for the remobilization efforts of the contractor. Drainage during the dewatering operation will be of concern and special provisions must be added to the dredging contract to protect adjacent properties.

Environmental Impacts

This project could have several significant environmental impacts, including;

- No testing of the dredged material has been completed to date that we are aware of. Should contaminants be found in the sediment to be dredged, the requirements, provisions, and restrictions for the disposal of this material increase dramatically. Stirring this sediment up during the dredging process should not create any long term environmental issues. In the short term, the sediment suspended in the water column may impact water quality by possibly releasing nutrients or decreasing the water's dissolved oxygen and turbidity (cloudiness) will affect the canal appearance for several weeks. Any contaminants found in the dredged soil taken to a nearby disposal site must be dealt with appropriately.
- Based on the known utility locations around the canals, utility conflicts should be minimal. Occasionally, unmapped or undisclosed utilities are found in close proximity to the dredging operations. These utilities must be protected and may result in a less than desirable cross section being created at these locations. These areas should be identified and warning signs installed accordingly.

- Dredged spoils are typically high in organic material. Therefore, during the dredging and dewatering process, this soil material may give off a noxious odor. However, we would propose to use geotextile filter bags to dewater the spoils in lieu of an open air containment area. Filter bags significantly reduce any odors that exist during dewatering.
- The shorelines of outlots/islands are densely vegetated and the root structure serves to naturally stabilize the existing banks. The dredging operations would not directly impact any of the shoreline vegetation. However, small sections of the shorelines may slump off as the sediment left in the canals settles into the channel after the dredging is completed.
- The outer canal edges are generally residential lawn area, dock, seawall, rock lined or typical lake shore. The dredging operations would not directly impact any of the shoreline features. However, small sections of the shorelines may slump off as the sediment left in the canals settles into the channel, affecting these features.
- Dredging operations will temporarily disrupt the aquatic vegetation, fisheries, and wildlife living in the canals. However, they typically rebound very quickly once dredging is completed or the dredging operation moves to another portion of the canal.

Residential Impacts

If this project is to proceed, the residents along the canals and those residents with launch and use rights on the canal will be impacted in several ways. These include:

- During construction, residents will be subjected to the noise, inconvenience, dust, etc. that is normally associated with a construction project. These nuisances will be the most

noticeable during the removal of the dewatered sediment if an on-site disposal area is not available (as believed to be the case).

- Whether this project is hydraulically or mechanically dredged, the contractor's equipment, piping, sediment control measures, etc. will be in the canals. Therefore, during the dredging operations, the residents would experience the loss of their boating access on a temporary basis.
- To adequately dredge the canals and provide the recommended cross section, the contractor must be given the proper working space. Thus, we would recommend that all removable docks, watercraft, boat hoists, irrigation pumps, aerators, etc. be removed for the duration of the construction project.
- To dredge the canals to the recommended cross section, the dredging operation may be in close proximity to existing seawalls or permanent docks. The soil against the seawall or near the dock foundations may be removed or slough off into the new deeper center channel. This could affect the stability of these structures. The contractor, Lake Board, Townships, or the engineer will not be held responsible should this occur and will not pay for any repairs.
- The riparian rights of the canal front owners or those with deeded access and use rights should not be impacted by the proposed project. The dredging project will not create any new canal frontage or provide access for any property that does not already have this right through deed restrictions or private agreements with the Subdivision Associations. Further, any minor sloughing or bank failures should not extend into the adjacent properties and should not result in a loss of usable property.

- It appears from the plats that the properties that front on the ULLE canal actually own to the center of the canal. The Mallard canal front properties own to the edge of the canal. The actual canal ownership is not defined but likely left to the benefit of the plat properties. Each of the subdivision(s) Declaration(s) of Restrictions do not speak to the access rights to the canals. Generally, the dredging operations will stay within the current canal limits. Based on this information, our knowledge of riparian laws, and Part 309 of PA 451, the Lake Board appears to have the authority to enter onto the canal front properties to perform the proposed activities. However, a legal opinion may be required regarding this matter and permission may be requested from the affected property owners prior to the start of construction to enter upon their property. The remaining easement and property rights will not be affected by the proposed dredging operation.

Viability

Based on the above comments, the proposed canal dredging project is viable. However, consideration must be given to the restrictions and impacts the construction will cause.

Schedule

Special Assessment projects through Lake Boards typically involve a lengthy process. In this circumstance, the process is further complicated by the MDEQ permitting process and restrictions. The following is a list of the process steps in accordance with Part 309 of PA 451 and Township requirements, milestone tasks, and anticipated project timing:

<u>Step, Task, or Milestone (Part 309 reference)*</u>	<u>Anticipated Timing</u>
Engineering Evaluation and Assessment Complete (324.30909).....	July 2006
Schedule and Notice the Public Hearing of Practicability (324.30910).....	July 2006
Public Hearing of Practicability (324.30910).....	August 2006
<i>Lake Board Decision to Move Forward</i>	August 2006
Engineering and Permitting	August 2006 - February 2007
Bidding.....	March 2007
Schedule and Notice the Public Hearing on Assessment Roll (324.30913).....	March 2007
Public Hearing on Assessment Roll (324.30913).....	April 2007
<i>Lake Board Decision to Move Forward</i>	April 2007
Construction **	Spring 2007 – Fall 2007

* Please note that this schedule is heavily dependant on the Lake Board Approval Process and Public Hearings occurring in a prompt and timely manner.

** During construction boating access will be restricted and all boats, hoists, floats, irrigation lines, etc. must be removed from the canal for the project duration.

*** The residents may wish to delay the project to Fall of 2007 into Spring 2008 to avoid impacts throughout the 2007 boating season.

**** This schedule is highly dependant on an MDEQ permit being issued within 90-120 days from submittal.

As the Lake Board is aware, the Long Lake Shores Subdivision dredging project is in the design and permitting phase and moving forward to the next public hearing. The ULLE and Mallard projects, if they are to occur, are substantially behind the Long Lake Shores Association project in terms of permitting and other necessary approvals. It is doubtful that they will be able to catch up to that project and will likely have to proceed on their own. However, this project may catch the tail end of the Long Lake Shores Association project and previously selected contractors may bid low on this project as their equipment and materials are on the lake already.

However, in the unlikely event that these projects proceed faster than anticipated or the Long Lake Shores project is delayed, it may be in the best interest of all parties to merge the projects into one construction project to take advantage of the potential project cost savings realized due to economies of scale. Should this occur, the Lake Board should inform all residents within the canal projects of the changes to the above mentioned process and anticipated schedule.

Feasibility Summary

As with all dredging projects, this project is very complicated and requires consideration of the numerous impacts to the environment and local residents. A properly designed, specified, and administered project will limit most of these impacts. In our opinion, with the proper requirements put in place, this project appears necessary, viable, and feasible.

Chapter 5 - Upper Long Lake Impacts

Part 309 of PA 451 requires the evaluation of possible effects on lake levels from the removal of bottom materials. Further, a study of existing nutrients and an estimate of possible future conditions shall be included in the analysis presented to the Lake Board.

Upper Long Lake has an approximate water surface area of 121 acres at an average depth of ten (10') feet. Ignoring, for a moment, any water inputs to Upper Long Lake, the canal systems, the interconnection to Lower Long Lake, and the fact that many of the area lakes are lower than historical levels, dredging approximately 22,000 cubic yards of solid material would theoretically result in a water level drop of less than one inch. However, given the added volume of water in the various canal systems, the inputs from area drainage facilities or other lakes, the interconnection with Lower Long Lake, and the fact that the dredged material is usually more than 40% water by volume, dredging the ULLE and Mallard canals will not result in any noticeable drop in water surface elevation in Upper or Lower Long Lake. Any water loss due to the dredging process and water needed to fill the dredged material void would be quickly supplemented by any precipitation, runoff, or by the local groundwater table.

Canal dredging projects may impact adjacent water courses, water bodies, or wetlands if proper soil erosion and sedimentation control measures are not installed or utilized correctly. As with any construction project, the migration of sediment from the construction site can negatively impact downstream properties. First, the dredging operation will stir up the sediment proposed to be dredged. The canal water will temporarily look very murky until the suspended sediment settles out of the water column. Second, as the dredged spoils dewater for transportation off site

or for eventual grading in place, drainage from the filter bags can re-suspend the dredged sediment or may cause erosion and sedimentation of native soil material and transport that sediment back to the canals or downstream lake. Proper soil erosion control measures such as turbidity curtains at the mouth of the canals, silt fence and check dams around the spoil containment areas, and filter bags or geotextile tubes/bags, etc. must be included in any project specifications. Installed correctly by the contractor and adequately maintained throughout the project duration, these measures will reduce the downstream sedimentation potential. Furthermore, project performance guarantees must be in place to ensure the contractor fulfills their obligations in this regard.

Our office is not aware of any detailed scientific study on the impacts of canal dredging projects to the long term plant and animal ecosystem in a canal. However, due to the spawning season of the fisheries typically found in Oakland County, dredging operations are typically not permitted during the spring months. This type of restriction is usually found in the MDEQ permit. In our experience, dredging operations will temporarily disrupt the aquatic vegetation, fisheries, and wildlife living in the canal. However, they typically rebound very quickly once dredging is completed or the operation moves to another portion of the canal. Submergent plant life growing in the canal bottom material to be dredged will be removed with the dredged spoils. Due to the seed stock that is present in the underlying soils and in the water, these plant species should return quickly.

Water flowing into the canals from point and non-point sources, storm runoff, on adjacent properties is typically nutrient rich. Dredging the canals will not correct this situation.

However, nutrients such as phosphorus and nitrogen typically bind to soil particles found in the canal bottom. These nutrients promote weed and plant growth in the canals and lake which may then require weed harvesting or chemical treatment. Removing the existing sediment in the canals will remove much of the accumulated canal bottom nutrients. In addition, dredging this material will create capacity within the canals for sediment to precipitate out of the water column before flowing into the lake. Finally, by protecting any existing wetland areas during dredging, which act as nutrient uptake areas, the project will improve the current nutrient loading in Upper Long Lake.

It may be in the Lake Board's or the respective Subdivision Associations' best interest to inventory and monitor the point source inputs to the canals to determine a base line assessment of the nutrient loading into the canal, and thus the lake. The Lake Board or Subdivision Associations should also consider fertilizer regulations for adjacent lawn areas to reduce the nutrient load in the canals and lake.

Chapter 6 - Recommendations

Throughout the previous project discussion, we have identified most of our recommendations should this project proceed forward. These recommendations as well as some additional thoughts are presented in summary form as follows:

- Hydraulic dredging is recommended, except as noted below, based on the canal surveys performed by this office, the sediment composition, and the canal layouts. Geotextile filter bags should be utilized at the hydraulic dredge discharge point for a variety of reasons.
- Mechanical dredging of the marina at the ULLE canal may be cost effective and the most appropriate way to dredge that area. As this seems more of an Association issue, we recommend deferring this work until after the main canal dredging is complete.
- We would recommend a dredged cross section as shown in Appendices H-1 and H-2. The center channels should be dredged to provide a minimum water depth of eight feet.
- In some areas, the historic canal bottom (hard pan) is less than eight feet. In these instances, we would recommend only dredging down to this soil stratum regardless of the shallower depth.
- We would propose a five foot dredge depth to within five feet of any seawalls or shoreline structures.
- It is our opinion that the dewatering and disposal of the dredged sediment would substantially disrupt the reed islands and permanently alter the islands' natural ecosystem. From a project logistics, cost, and environmental standpoint, the islands are not the best option for sediment dewatering and disposal.

- The launch sites should be utilized as staging areas for the contractor's operations and dewatering areas for the eventual hauling and disposal of the dredged materials off-site.
- The dredging and dewatering process will likely have to be completed in cycles because space is limited at both launch sites.
- We recommend looking for an MDEQ suitable off-site disposal area. However, for cost estimating purposes, we have assumed disposal at a Type II landfill.
- We recommend that all removable docks, watercraft, boat hoists, irrigation pumps, aerators, etc. be removed from the canals for the duration of the construction project.
- The contractor, Lake Board, Townships, or the engineer will not be held responsible for any damage to or settlement in any of the existing seawalls and will not pay for any repairs.

Chapter 7 - Estimates of Project Costs

Upper Long Lake Estates (ULLE or C-Beach) Canal

<u>No.</u>	<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Mobilization	2	ea @	\$ 5,000.00 =	\$ 10,000.00
2	Preconstruction Video Survey	1	lsum @	\$ 2,000.00 =	\$ 2,000.00
3	Dewatering Location Preparation	1	lsum @	\$ 6,000.00 =	\$ 6,000.00
4	Soil Erosion & Sedimentation Control	1	lsum @	\$ 3,500.00 =	\$ 3,500.00
5	Filter Bags	1	lsum @	\$ 20,000.00 =	\$ 20,000.00
6	Turbidity Curtain	250	lft @	\$ 10.00 =	\$ 2,500.00
7	Hydraulic Dredging	6,500	cyd @	\$ 16.00 =	\$ 104,000.00
8	Trucking to Type II Landfill	3,200	cyd @	\$ 7.50 =	\$ 24,000.00
9	Type II Landfill Disposal Fees	3,200	cyd @	\$ 7.50 =	\$ 24,000.00
10	Restoration of Dewatering Areas	1	lsum @	\$ 10,000.00 =	\$ 10,000.00
Sub Total - Estimated Construction Costs					\$ 206,000.00
1	Engineering Evaluation and Assessment				\$ 1,620.00
2	Engineering, Survey, Layout, Administration (~20%)				\$ 41,380.00
3	Soil Sampling				\$ 4,500.00
4	SAD, Legal, Bonding Expenses (~5%)				\$ 10,000.00
5	Contingencies (~10%)				\$ 21,000.00
TOTAL ESTIMATED PROJECT COSTS					\$ 284,500.00

Mallard Court Canal

<u>No.</u>	<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Mobilization	5	ea @	\$ 5,000.00 =	\$ 25,000.00
2	Preconstruction Video Survey	1	lsum @	\$ 2,000.00 =	\$ 2,000.00
3	Dewatering Location Preparation	1	lsum @	\$ 9,000.00 =	\$ 9,000.00
4	Soil Erosion & Sedimentation Control	1	lsum @	\$ 3,500.00 =	\$ 3,500.00
5	Filter Bags	1	lsum @	\$ 42,000.00 =	\$ 42,000.00
6	Turbidity Curtain	500	lft @	\$ 10.00 =	\$ 5,000.00
7	Hydraulic Dredging	15,000	cyd @	\$ 14.00 =	\$ 210,000.00
8	Trucking to Type II Landfill	7,500	cyd @	\$ 7.50 =	\$ 56,250.00
9	Type II Landfill Disposal Fees	7,500	cyd @	\$ 7.50 =	\$ 56,250.00
10	Restoration of Dewatering Areas	1	lsum @	\$ 15,000.00 =	\$ 15,000.00
Sub Total - Estimated Construction Costs					\$ 424,000.00
1	Engineering Evaluation and Assessment				\$ 1,620.00
2	Engineering, Survey, Layout, Administration (~20%)				\$ 85,380.00
3	Soil Sampling				\$ 6,500.00
4	SAD, Legal, Bonding Expenses (~5%)				\$ 21,000.00
5	Contingencies (~10%)				\$ 42,000.00
TOTAL ESTIMATED PROJECT COSTS					\$ 580,500.00

Chapter 8 - Special Assessment Considerations

It is our understanding that the scope/authority of the current Lake Board is established to include this project and possibly others like it. No new special assessment districts are to be created.

In accordance with Part 309 of PA 451, the Lake Board must make a determination as to the appropriate Special Assessments to be levied on the properties within its current jurisdiction. All properties in the current Lake Board District are included in the Special Assessment District. However, the Lake Board must decide which of these parcels of land and local units will be benefited by this specific improvement of the lake (section 324.30908).

By Part 309, PA 451 definition, “benefit” or “benefits” means advantages resulting from a project to public corporations, the inhabitants of public corporations, the inhabitants of this state, and property within public corporations. Benefit includes benefits that result from elimination of pollution and elimination of flood damage, elimination of water conditions that jeopardize the public health or safety; increase of the value or use of lands and property arising from improving a lake or lakes as a result of the lake project and the improvement or development of a lake for conservation of fish and wildlife and the use, improvement, or development of a lake for fishing, wildlife, boating, swimming, or any other recreational, agricultural, or conservation uses (section 324.30901).

Numerous Michigan Tax Tribunal cases and recent case law provides that for an improvement to have conferred a special benefit upon the properties subject to a special assessment, it must

have caused an increase in the market value of the land specially assessed. This assessment must not create a substantial or unreasonable “disproportionality” between the amount assessed and the value that accrues to the land as a result of the improvements.

Therefore, the Lake Board must answer the following questions and be able to defend their answers in the event of a challenge to the Special Assessment:

1. Which properties would be specially benefited by the proposed improvements?
2. To what extent are these properties benefited by the proposed improvements?
3. Is the proposed assessment per unit of benefit reasonably proportionate to the anticipated increase in market value of the property?

HRC’s opinion of the appropriate answers and supporting rationale are hereby presented for the Lake Board’s consideration in accordance with PA 451. It is very important to note that the first public hearing is on the practicability of this project and not the individual assessments. The second public hearing is the appropriate forum to debate the assessments. Our engineering perspective of the assessments is required by Part 309, PA 451 and therefore is included.

Which properties would be specially benefited by the proposed improvements?

There are no public access points on Upper Long Lake. It is our understanding that the various private boat launch facilities are tightly controlled by Subdivision restrictions and covenants in which the launch/access sites are located. Therefore, the current Lake Board District represents

the limits of all properties that may receive a special benefit by a proposed canal dredging project, i.e. there is no at large public benefit to this project.

Therefore, dredging the canal would be advantageous to the following categories of property owners within the established Lake Board District:

1. Canal Front Property Owners
 - a. ULLE – 12 Property Owners plus the marina property (see below)
 - b. Mallard – 38 Property Owners plus 4 outlot/park properties and the launch site (see below)
2. All Property Owners that have deeded or purchased launch rights onto this canal including:
 - a. Lake Front Property Owners
 - i. ULLE – 16 Property Owners plus 1 outlot properties
 - ii. Mallard – 8 Property Owners plus 2 outlot/park property
 - b. Off Canal/Lake Property Owners
 - i. ULLE – 73 Property Owners
 - ii. Mallard – 17 Property Owners
3. The Subdivision Association Launches
 - a. ULLE – 1 Property
 - b. Mallard – 1 Property
4. Riparian Right/Privilege Property Owners in general (the entire Lake Board District minus the above properties)

The Subdivision Associations own one of the canal front lots on both canals. These lots are the launch facilities discussed previously. Based on other projects on Upper Long Lake we assume these lots have been included in previous Lake Board assessed projects, such as the weed harvesting project. Further, we understand that through private agreements, other area subdivisions such as Wabeek or Turtle Lake Farms, have obtained launch rights from the respective Associations with the boat launch ramps. These users must pay annual fees to the respective Subdivision Associations for this right. Therefore, there is some logic to include the Subdivision Association lot in the canal dredging special assessment. In the past, we have seen Associations individually assessed a small unit of benefit or more prevalent, the Association contributes a lump sum payment to the project.

Since the residents in the other categories listed above for the Mallard Court Canal also pay into the Subdivision Association and we are relatively confident that the sale of launch rights is not sufficient to cover the annual costs of an assessment levied onto this property, *we recommend that the Upper Long Woods Subdivision Association property be excluded from the special assessment roll for this project.* The Subdivision Association can elect to contribute in a lump sum manner at a later date, prior to the roll being set by the Lake Board. The Subdivision Association should consider their fee structure in the context of any contribution to the project.

As for the ULLE canal, the Association lot assessment is different. The canal from the launch to the lake, more specifically the marina, is relatively open and only a limited amount of dredging is recommended as part of this project. The boat slip dredging should be handled separately. Therefore, the lake front and upland subdivision properties will not receive a large

benefit from the proposed project. We would recommend including the ULLE association lot in the assessment district to establish a unit cost. Then the assessor can break this cost down into the individual lots in the subdivision, other than the canal front properties, for their individual assessment or the Association can address on their own.

Typically, Lake Boards which reside over the entire lake or canal contribute to a canal dredging project. Therefore, the riparian owners on the remaining portions of the lake, in effect, contribute to the project. As mentioned previously, there are ongoing projects with other canals, which evidently provide launch and access points to the lake, to undertake a similar dredging project as proposed. Since residents with launch or access rights on the other canals would be similarly assessed in the future, it stands to reason that everyone on the lake would eventually contribute their equitable share to improving their riparian rights. Therefore, this Special Assessment and any Special Assessment in the future for any of the canal dredging projects on Upper Long Lake should be limited to just those properties that are associated with each of the respective launch/access areas on the respective canals.

To what extent are these properties benefited by the proposed improvements?

ULLE Canal

Canal front property owners (Lot 26 Upper Long Lake Estates and Lots 53-64 Upper Long Lake Estates No.1)

These properties would receive the most benefit of the various stakeholders as the proposed improvements would be made directly to their properties or the frontage of these properties. We would recommend these property owners receive a full unit of benefit (1.00) in the assessment calculations.

There are a total of 13 properties in this category; 12 properties and the Subdivision Association launch site.

Lake front property owners (Lots 9-25 Upper Long Lake Estates)

These properties utilize the launch and marina site primarily for launching and removing their watercraft seasonally for use on the lake directly from their properties. Providing for an unobstructed route from the improved boat launch site to their lake front properties would undoubtedly affect/benefit this membership. As mentioned above, these properties should be included in the project through an indirect benefit assessment based on the launch site receiving a full unit of benefit. While there are 17 properties in this category, one of the lots is an Association park. Therefore, only 16 properties should be included in this category.

Off canal/lake property owners (Lots 1-8 and 27-46 Upper Long Lake Estates and Lots 47-52 and 65-103 Upper Long Lake Estates No.1)

These properties are within the subdivision(s) but not physically located on the canal or lake. The marina/launch site is their only way into and out of the Lake. It appears that they are only permitted to use the canal on a temporary basis, i.e. launch a watercraft for use that day and remove it that evening. Therefore, lake access is the foundation for their riparian rights and privileges.

Dredging the canal would improve the utility of the boat launch and would provide better access to the canal and lake. Thus their riparian rights, granted by Declaration of Restrictions, would be maintained and improved. This would then equate to a potential increase in market value. Specifically, these homes could be marketed as lake access properties. In our opinion, this potential increase would be less than the canal front. As mentioned above, these properties should be included in the project through a secondary assessment based on the launch site receiving a full unit of benefit.

Riparian Right/Privilege Property Owners in general (the entire Lake Board district minus the above properties)

As mentioned previously, we would recommend that the riparian owners on the lake, not otherwise described in the other categories above, not be assessed or included in the Upper Long Lake Estates Special Assessment.

Mallard Court Canal

Canal front property owners (Lots 5-30 Upper Long Woods Sub No.2, Lots 22-34, and 38 Upper Long Woods Sub No.1, Outlots A and B)

These properties would receive the most benefit of the various stakeholders as the proposed improvements would be made directly to their properties or the frontage of these properties. We would recommend these property owners receive a full unit of benefit (1.00) in the assessment calculations.

As mentioned above, we would recommend excluding the Subdivision Association properties (Outlots, Launch area and the park) from being assessed.

There are a total of 45 lots in this category; 38 properties, 2 outlots, 2 parks and the Subdivision Association launch site. As mentioned previously, the Subdivision Association launch, parks, and the island, Outlots A and B, should not be assigned an assessment for this project leaving 38 assessed properties.

Lake front property owners (Lots 1-4 Upper Long Woods Sub No.2, Lots 20-21 Upper Long Woods Sub No.1, Lots 12-14 Upper Long Woods)

These properties utilize the canal primarily for launching and removing their watercraft seasonally for use on the lake directly from their properties. Providing for an unobstructed route from the improved boat launch site to their lake front properties would undoubtedly

affect/benefit this membership. However, their respective unit of benefit should be less than those property owners on the canal as the actual lake frontage contributes more to their property value than the canal launch/access. We would recommend these property owners be assessed 40% of the canal frontage properties or 0.40 units of benefit.

Please note that there are 9 lots on the lake in these subdivisions. However, two of the lots are currently under one ownership and occupied by one residence. Therefore, only 8 properties are assessed in this category. Should this property split back into two properties, while the assessment roll is still in place, we would recommend that each of the newly created home sites be added to the assessment roll at the same cost as other properties with 0.40 unit of benefit, less any previous assessment paid.

Off canal/lake property owners (Lots 35-37 Upper Long Woods Sub No.2, Lots 15-19 Upper Long Woods Sub No.1, Lots 1-11 Upper Long Woods)

These properties are within the subdivision(s) but not physically located on the canal or lake. The canal is their only way into and out of the Lake. It appears that they are only permitted to use the canal on a temporary basis, i.e. launch a watercraft for use that day and remove it that evening. Therefore, canal access is the foundation for their riparian rights and privileges.

Dredging the canal would improve the utility of the boat launch and would provide better access to the canal and lake. Thus their riparian rights, granted by Declaration of Restrictions, would be maintained and improved. This would then equate to a potential increase in market value. Specifically, these homes could be marketed as lake access properties. In our opinion, this

potential increase would be less than the canal front or lake front owners. We would recommend that these property owners be assessed 20% of the canal frontage properties or 0.20 units of benefit as access to the canal features constitute a significant portion of the market value of their property.

Riparian Right/Privilege Property Owners in general (the entire Lake Board district minus the above properties)

As mentioned previously, we would recommend that the riparian owners on the lake, not otherwise described in the other categories above, not be assessed or included in the Mallard Court Special Assessment.

Is the proposed assessment per unit of benefit reasonably proportionate to the increase in market value of the property?

We have prepared a preliminary assessment roll for this project based on the estimated project costs discussed in Chapter 7 and per the Township's direction. A summary of the preliminary Assessment Roll is shown below for each canal. Please note that this information is subject to the Lake Board's approval and should only be considered preliminary for the purpose of estimating project costs for this report. The Assessment rolls will be updated with input from the Lake Board prior to moving forward and the final Special Assessment rolls will be discussed at the second public hearing.

Based on the total estimated project costs and total units of benefit, the above referenced property owner categories would have the following estimated assessments:

ULLE CANAL

Property Owner Category	Suggested Unit of Benefit	Estimated Assessment	Percentage of Project Costs by Category
Canal Front Property Owners (12 lots + Marina)	1.00	\$21,885	92.3%
Lake Front Property Owners (16 lots)	NA	\$246	1.4%
Off Canal/Lake Property Owners (73 lots)	NA	\$246	6.3%
Riparian Right/Privilege Property Owners, Subdivision Association Property	0.00	\$0.00	0%

MALLARD COURT CANAL

Property Owner Category	Suggested Unit of Benefit	Estimated Assessment	Percentage of Project Costs by Category
Canal Front Property Owners (38 lots)	1.00	\$13,016	85.2%
Lake Front Property Owners (8 lots)	0.40	\$5,206	7.2%
Off Canal/Lake Property Owners (17 lots)	0.20	\$2,603	7.6%
Riparian Right/Privilege Property Owners, Subdivision Association Property, Outlots, Parks	0.00	\$0.00	0%

From our engineering perspective and considering the higher market value of homes with lake or canal frontage or lake access, these assessments seem reasonable although they are higher

than other canal dredging SAD projects we have been involved with. Conversely, these assessments are minor when compared to the decrease in market value that may occur should the canal become obstructed with sediment and access is no longer available to the canal and lake.

Annual Assessments

The typical canal dredging Special Assessment is established with a 10 year term. Assessed property owners may pay off their assessment, including the principal balance and any accumulated interest, at any time during the Special Assessment without penalty. Using a 10 year term and an estimated 6% interest rate, annual payments per \$1,000 assessed are as follows:

<u>Year</u>	<u>Principal</u>	<u>Interest</u>	<u>Total Payment</u>	<u>Balance</u>
1	\$100	\$0	\$100	\$900
2	\$100	\$54	\$154	\$800
3	\$100	\$48	\$148	\$700
4	\$100	\$42	\$142	\$600
5	\$100	\$36	\$136	\$500
6	\$100	\$30	\$130	\$400
7	\$100	\$24	\$124	\$300
8	\$100	\$18	\$118	\$200
9	\$100	\$12	\$112	\$100
10	\$100	\$6	\$106	\$0
Totals	\$1,000	\$270	\$1,270	

Average Payment - \$127

Maximum Payment - \$154

Actual payments per the above estimated assessments can be determined by dividing the assessment by \$1,000 then multiplying the result by the numbers in the above chart.

Next Step

After receiving this Engineering Evaluation and Assessment, the Lake Board may proceed as identified in Section 324-30910 of Part 309 of PA 451, which reads:

“Within 60 days after his or her receipt of the reports, the chairperson shall hold a meeting of the lake board to review the reports required under section 30909 and to determine the practicability of the project. The hearing shall be public, and notice of the hearing shall be published twice in a newspaper of general circulation in each local unit of government to be affected. The first publication shall be not less than 20 days prior to the time of the hearing. The board shall determine the practicability of the project within 10 days after the hearing unless it is determined at the hearing that more information is needed before the determination can be made. Immediately upon receipt of the additional information, the board shall make its determination.”

Chapter 9 - Cost Analysis

The preceding chapters outline the preliminary estimates of project costs and the recommended means to assess the benefiting property owners. The average estimated assessment for the canal front properties in the ULLE district is approximately \$21,885 without any contribution to the project from the Long Lake Shores Association or the Lake Board. The assessments for the other properties in this project are relatively minor. On Mallard Court, the three categories of properties within the subdivision will pay approximately \$13,016, \$5,206, and \$2,603 for the canal dredging project. Based on our past dredging project experience, these assessments are slightly higher than most canal dredging projects, especially the ULLE canal front property owners. The higher costs may be attributed to the lack of a large staging and dewatering area for the dredging operations which will create multiple stages and mobilizations for the project and the limited number of properties on the canal available to spread the costs.

The property owners had received a quote from a reputable contractor for the dredging discussed herein, see Appendix J. At first glance, the costs herein appear significantly higher. But after reviewing the “fine print” and comparing similar items, our estimates are in line with these quotes.

While our office recommends dredging all areas in each of the canals while the equipment and contractor are on-site, the ULLE assessments would be reduced by approximately 50% if only the canal opening is dredged. We would need to investigate this option more, but the cost savings would be substantial, especially if the other canal proceeds or ULLE can be added to the Long Lake Shores project.

To offset the total project costs, our office explored currently available grant funding opportunities. We found very little or no grant monies available for canal dredging projects. Of the water quality grant programs available, canal dredging would be a stretch to meet the program requirements and unlikely to qualify. In addition, it is our experience that grant applications are expensive to prepare and the selection process is highly competitive and lengthy, particularly in the present economy. Further, administrating the grant is time consuming and costly, thus diminishing the value of the grant. Grant assistance for this project should not be considered viable.

Property value is primarily based on the current housing market conditions. Therefore, it is difficult to estimate the increase in property market values that will occur within the Special Assessment once this project is complete. However, without this project, the canals will continue to fill in and the use of the canals for lake access will eventually become more restrictive for the use and enjoyment of the properties on the canals and the properties with access rights. The inability to navigate the canals or to use the canals to access Upper Long Lake will negatively impact the value of all properties within this Special Assessment.

As stated previously herein, it is recommended that, at very least, the mouth of the ULLE canal be dredged as soon as possible. Due to mobilization, permitting, and contract administration expenses, it is cost effective to dredge the entire canal at one time instead of delaying the balance of the canal dredging for a few more years. We anticipate that without dredging, within five to seven years, other areas of the ULLE canal and the Mallard Court canal will require dredging to remain viable.

Based on the estimated project costs, weighing these costs against the potential impact to the property values in the district, and impacts to seasonal use and enjoyment of the canals, we believe that this proposed project has a positive cost to benefit ratio. Further, it would be in the residents' best interest to complete the entire project at one time. Construction costs have been increasing approximately five percent (5%) per year on average. Also, the construction industry is heavily dependant on gas prices. Therefore, we can state with reasonable assurance, based on recent spikes in fuel costs, that from a cost standpoint, it is advantageous to proceed with this project sooner rather than later. Further, if this project could be combined with the other canals on the lake, additional cost savings could be realized due to potential economies of scale.

The Upper Long Lake Estates and Upper Long Woods subdivisions were platted in the 1950s. We are not sure if any other canal maintenance dredging has occurred since that time. Therefore, we have assumed that the sediment that has accumulated has done so over the past 40+ years. Since construction in the area appears to be minimal and the surrounding areas are developed, it is reasonable to assume that future sediment loading into the canals will be minimal. The residents must be diligent about prohibiting the amount of leaf, tree, and lawn debris that is dumped into the canal. Further, the residents must limit the amount of nutrients from fertilizers and lawn care chemicals that are ultimately discharged to the canals. If these efforts are successful, this dredging project could give the canals another 30-40 years. However, due to wind, water, and boat erosion, we would estimate that the project life span of the proposed dredging will likely be closer to 20-25 years.

Chapter 10 - Summary

HRC has endeavored to discuss all relevant aspects of dredging the Upper Long Lake Estates and Mallard Court canals so the Lake Board may determine if it is practical to move the project forward and so the affected residents may be informed of the project benefits, restrictions, costs, and the means to implement the project. In summary we have identified the following:

- The navigational dimensions of the canal have become hindered and based on our observations the ULLE canal at the southwest mouth to the lake will need dredging immediately. The balance of the canal areas will need to be dredged within the next five to seven years.
- Based on the canal survey performed by this office, the sediment composition, and the canal layout, hydraulic dredging is viable and recommended.
- It is our opinion that the dewatering and disposal of the dredged sediment would substantially disrupt the islands and permanently alter their natural ecosystems. From a project logistics, cost, and environmental standpoint, the islands are not the best option for sediment dewatering and disposal.
- The launch sites should be utilized as a staging area for the contractor's operations and a dewatering area for the eventual hauling and disposal of the dredged materials off-site.
- The dredging and dewatering process will have to be completed in cycles because space is severely limited at the launch sites.
- The canal dredging operations may have environmental and residential impacts, such as:
 - In the short term, the sediment suspended in the water column may impact water quality by releasing nutrients and will affect the canal appearances for several

weeks. However, stirring this sediment up during the dredging process should not create any long term environmental issues.

- Based on the known utility locations around the canal, utility conflicts should be minimal. Any found utilities must be protected and may result in a less than desirable cross section being created at these locations.
- Geotextile filter bags should be specified to mitigate any noxious odors released from the dredging and dewatering operations.
- The dredging operations would not directly impact any of the shore line vegetation. However, small sections of the shoreline may slump off as the sediment left in the canals settles into the channel after the dredging is completed.
- Dredging operations will temporarily disrupt the aquatic vegetation, fisheries, and wildlife living in the canal. However, these typically rebound very quickly once dredging is completed or the operation moves to another portion of the canals.
- During construction residents will be subjected to the noise, inconvenience, dust, etc. that is normally associated with a construction project. These disturbances will be the most noticeable during the removal of the dewatered sediment if an on-site disposal area is not available, as believed to be the case.
- During the dredging operations, the residents will experience the loss of their boating rights on a temporary basis.
- All removable docks, watercraft, boat hoists, irrigation pumps, aerators, etc. must be removed from the canals for the duration of the construction project.

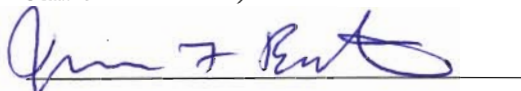
- The contractor, Lake Board, Townships, or the project engineer will not be held responsible for any seawall or shoreline structures that become unstable due to the removal of the canal sediment near these structures.
- The riparian rights of the canal front owners or those with deeded access and use rights should not be impacted by the proposed project.
- Canal assessments are recommended as follows:
 - ULLE Canal
 - Canal front property owners (Lot 26 Upper Long Lake Estates and Lots 53-64 Upper Long Lake Estates No.1) assessed at 1.0 unit of benefit for an estimated assessment of \$21,885.
 - Lake front property owners (Lots 9-25 Upper Long Lake Estates) and the Off canal/lake property owners (Lots 1-8 and 27-46 Upper Long Lake Estates and Lots 47-52 and 65-103 Upper Long Lake Estates No.1) should share the costs of 1.0 unit of benefit for the marina property for an estimated assessment of \$246.
 - Mallard Court Canal
 - Canal front property owners (Lots 5-30 Upper Long Woods Sub No.2, Lots 22-34, and 38 Upper Long Woods Sub No.1, Outlots A and B) assessed at 1.0 unit of benefit for an estimated assessment of \$13,016.
 - As mentioned above, we would recommend excluding the Subdivision Association properties (Outlots, Launch area and the park) from being assessed.

- Lake front property owners (Lots 1-4 Upper Long Woods Sub No.2, Lots 20-21 Upper Long Woods Sub No.1, Lots 12-14 Upper Long Woods) assessed at 0.40 unit of benefit for an estimated assessment of \$5,206.
- Off canal/lake property owners (Lots 35-37 Upper Long Woods Sub No.2, Lots 15-19 Upper Long Woods Sub No.1, Lots 1-11 Upper Long Woods) assessed at 0.20 unit of benefit for an estimated assessment of \$2,603.
- We would recommend that the Riparian Right/Privilege Property Owners in general (the entire Lake Board district minus the above properties) not otherwise described in the other categories above, not be assessed or included in the Upper Long Lake Estates or the Mallard Court Special Assessment.

HRC does believe that this project is warranted, feasible, viable, and should be given favorable consideration by the Lake Board to move forward. Based on the potential impacts a deficient canal cross section may have on property values for those homes in the district, proper maintenance of the canal, including dredging, should be a priority for the Lake Board, Subdivision Associations, and the residents in the Special Assessment.

This report was prepared by:

Hubbell, Roth & Clark, Inc.
James F. Burton, P.E.



Date: 7/19/06

APPENDIX

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