

# Loch Lomond Long Term Lake Management Plan – A Reader’s Guide

(Written by D. Stroz, 5 November 2018)

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## **Background**

Greetings fellow Loch Lomond property owners! Like myself, you probably have an interest or at least a curiosity about the new Loch Lomond lake management plan you may have heard about, the one assembled by Hey and Associates (also referred to as the Hey Report). I was invited to review this plan and give comments during the draft stage given my technical background as a chemist which I was pleased to do. Now that the plan has been finalized and is available to all, I have volunteered to assemble this guide to help first-time readers understand the fundamentals of this plan.

The first thing to know is that this plan was assembled by Hey and Associates of Volo, Illinois as contractor under a grant from the Stormwater Management Commission (SMC) of Lake County, Illinois. The Commission is charged with planning and executing activities which are aimed at improving surface water quality in the Des Plaines River Valley, which includes the watersheds that feed that River. Thus the Plan emphasis is not only on Loch Lomond itself, but also the beginnings of our watershed, namely, lands to our West. Accordingly, the full title of the final report is: “Loch Lomond Long Term Lake and Watershed Management Plan.” The plan details upstream improvements as well as a potential “to do” list for our lake proper. This makes for good business sense from a funding agency standpoint – why spend money on improving a lake unless you have stopped the sources of pollution which feed into that lake first? Thus, this “upstream-watershed-first” philosophy is reflected in the report, namely, the upstream improvements are at the beginning pages and are quite detailed, the improvements to our lake recommendations are found on the following pages. You can think of this report as having two parts.

**LOCH LOMOND**  
**LONG TERM LAKE AND WATERSHED MANAGEMENT PLAN**  
FOR THE  
LOCH LOMOND PROPERTY OWNERS ASSOCIATION



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The second thing to know is that this plan has been also referred to as a “10-year Plan.” There is nothing that we know that mandates the Plan be executed in any particular time-frame, in fact to accomplish everything in 10 years would be fortuitous indeed. In my opinion, it is best to think of this plan as the most consolidated plan that we have to date which targets specific multiple activities designed to improve the quality of the lake water and habitat for our wildlife going forward. It can be called a cornerstone document, a starting point, of which other activities not presently identified might be added as appropriate – bricks to surround the cornerstone. Everything is in a constant state of development.

The third thing to know is that the Plan may give a concept, but not the details – they are for us to create. For example, the Plan introduces the concept of a Nutrient Management Plan (NMP) to be developed in a collaborative effort between the LLPOA and the neighboring agricultural interests. A “brick” we should consider adding here of our own would be a neighborhood NMP with our 601 property owners which would consist of education as to the avoidance of over-fertilization of plants and lawns. Soil chemistry monitoring to determine what the soil actually needs before making a chemical application would be a best practice.

For example, yes it is true that Mundelein merchants cannot sell lawn fertilizers which contain phosphorus (the middle number on the bag being zero in the N-P-K labeling system). But too much nitrogen (the first number) is detrimental causing high algae growth as well as phosphorus. Sometimes the soil just needs a pH adjustment with an application of lime for lawns to grow well and look healthy.

The fourth and final thing to know, is that there has been a simultaneous coordination effort through the SMC for detailing specific watershed projects given in the Hey report as a pre-engineering exercise to the point that cost estimates are given. These specifics were published in a report issued this year by SMC for the Illinois EPA which would be helpful to us for matching grant applications. The title of this report is: "Small Watershed Assessment and Action Plan (SWAAP)," 24 May 2018. Two Des Plaines watershed areas were the subject of this report: Loch Lomond area comprised of 469 acres and Buffalo Creek. Electronic copies of this report are available to you from the Association.

FAA# 3191506 Small Watershed Assessment and Action Plan Project


**Final Report**

**Small Watershed Assessment and Action Plan (SWAAP)**

**Financial Assistance Agreement: 3191506**

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STORMWATER MANAGEMENT COMMISSION

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## Reader's Guide

As a guide to the reader, I decided to construct a topic index table, (below), which has three column headers as follows: **Topic, Main Pages/Exhibits** (location where discussed in the Hey report), and **Narrative** where I describe in simple terms the essence of what is found the report plus additional information. The subjects are presented in the order they appear in the report. Hopefully you find this helpful.


Topic	Main Pages/ Exhibits	Narrative
Dredging	Pg 3, Exhibits 4 - 5	Hey does not recommend any dredging at this time. At the May 2018 association update, Vince Moska of Hey and Associates stated that since there was no hazard to navigation, there was no identified current need to dredge in their opinion. (For more discussion on dredging, see the text section after this table.)
Shoreline Erosion	Pg 3, 11, Exhibit 6	Self explanatory.
Priority pollution targets	Pg 4	Phosphorus (Total, TP), Total Suspended Solids (TSS), Nitrogen, and Chloride (Cl <sup>-</sup> ). Excess phosphorus and nitrogen are the nutrients which give rise to uncontrolled plant growth including algae blooms, TSS gives high turbidity (cloudiness) to our lake water and is a product of erosion, sediments, and algae growth.
Chloride	Pgs 4, 8, 14 - 15	Chloride has been increasing due to the widespread use of road salt (sodium chloride, same as table salt). However it should be noted that local agencies such as the Village of Mundelein and Lake County have received awards for their reduction in the application of road salt practices. It should also be noted that we have not detected specific, obvious deleterious effects to our ecosystem to date as a result of elevated chloride levels.
Chemistry test data	Pgs 5-8	The tables and graphs show that Inlet #3 (Bull Creek South Branch) is the most problematic in terms of TP and TSS load to our lake. It is also the largest tributary to our lake in terms of volumetric flow rate. Figure 1 shows that there is a seasonal influence to the phosphorus loading, July being the worst month. However Inlets 1, 2, and 4 have a consistently low phosphorus concentrations, often below the EPA recommended limit of 0.050 mg/L, (same as 50 ppb), which is very favorable. At times we are showing values as high as 0.3 mg/L or six times over the EPA limit for Inlet #3. As far as chloride goes, the worst inlet is #4 with the highest values purportedly from Route 45 runoff. (See Exhibit 7 for the exact inlet sampling locations described in this report.)

Topic	Main Pages/ Exhibits	Narrative
Hey recommended projects	Pgs 8-14, Exhibit 8	Hey and Associates list 12 recommended capital projects in the order of decreasing priority in their opinion, all of them upstream of our lake consistent with the “upstream-watershed-first” philosophy. Projects 2-6 are variations of the same target, namely, the reduction of pollutants from the agricultural land, (they overlap, so we would not do all of them). Exhibit 8 is a detailed map of these projects. Tables 3 and 4 (pages 13 and 14 respectively) give projected reductions from mathematical modeling. Interesting to note from Table 4, (reductions as a percent), is that even under the most rigorous project selections from the menu of choices, phosphorus reduction will only be about 10%. The report makes no claim about the origins of the remaining 90%, however one could assume in lieu of measured data and calculations, that the balance is runoff from residential (and park?) properties and from the lake sediment which can store nutrients among other things. This lake-stored and subsequent release is referred to as “internal loading.”
Phosphorus ban	Pg 14	The report mentions that even though there is a lawn fertilizer phosphorus ban, high phosphorus continues to be a problem for us. True enough, there are numerous reasons why this may be so. Best Management Practices (BMPs) need to be followed by farmers to reduce nutrient and silt runoff. Farmers are very cost conscious and do not want to waste their fertilizer dollars due to runoff and lose top soil for the same reason. Still the best practices should be encouraged such as no-till and deep placement of fertilizers rather than surface application. Soil should be chemically analyzed to determine exactly what is needed for the next crop. A plan to specifically address this is called a Nutrient Management Plan (NMP, page 15) that we can engage the farmers with is the recommendation. I would add that for the property owners and common properties we too could do some homework and compose a NMP as well. It goes without saying that we also should ask ourselves: “are we exercising BMPs in our local decision making?” The more we learn the more likely that will be the case.
The LLPOA and property owners should closely monitor the lake for quality	Pg 15 - 16	We are already doing that through an active and committed Lake Management committee, and our participation in the State of Illinois operated VLMP (Volunteer Lake Management Program) where trained individuals take monthly water samples for lab testing at three locations (yellow buoys seen in the lake) and biweekly measure turbidity (cloudiness, Seechi readings). We also work with LC Lake Management Division (also known as Eco Services) to monitor inlet stream waters, this effort is the source of data found in Table 2, pages 5 and 6 in the Hey Report. Also, interested lakefront owners will report on the presence of offensive, exotic aquatic plants or other unusual conditions to the Lake Management Committee. In addition, the Lake Management Committee has substantially reduced the amount of chemicals added to the lake for control.

Topic	Main Pages/ Exhibits	Narrative
		<p>Recall that years ago a product called Sonar was used to wipe out all vegetation? Recall the introduction of grass carp? Those days of mass vegetation removal are of the past. Today the Committee’s BMP is to encourage the growth of native aquatic plants and apply herbicides and copper sulfate only as needed at identified locations (spot applications). The lake is monitored frequently so that a problem can be addressed before it gets out of control. Including in the monitoring is the search for Hazardous Algae Blooms (HABs and also called Toxic Algae Blooms).</p>
Water clarity versus aquatic plants	Pg 15 - 17	<p>Most people want a clear water lake, that objective will not be achievable for Loch Lomond for several reasons. First, the bottom is not rock nor sand, and our lake is fed by runoff (storm) water as opposed to spring fed such as Gages Lake, Bangs Lake, and Lake Geneva which have clear water and are deeper than ours. The report states that “much of lake is only 4 -5 feet deep” and the North Bay is less than that. Being a soft bottom lake, wind and wave action can stir up the sediments along with spawning carp which will make the water cloudy along with algae (organic material) growth. Secondly, with clearer water, sunlight can penetrate to the bottom which will encourage plants to grow. Chemicals can be added to clarify our water, but the plant growth will explode due to our high nutrient level. Right now, we have a small but growing percentage of aquatic plants (maybe 5%). The Illinois DNR recommends a bottom coverage of 20 – 40 percent for a healthy fishery. However this becomes a balancing act because too much aquatic plant growth needs control not to mention the influx of invasive (exotic) species. This picture taken at the North Beach plant nursery gives you an idea on how well plants can proliferate in our lake given our nutrient situation. The fencing is a carp exclosure to avoid decimation by carp.</p>

Topic	Main Pages/ Exhibits	Narrative
		 <p data-bbox="737 690 1904 792">So it turns out to be a delicate balance <i>“acting in an environmentally conscious manner to foster a healthy lake for wildlife proliferation and membership enjoyment”</i> which is the mission statement of the Lake Management Committee.</p>
Aquatic Plant Management	Pgs 16-17	As called out by the report, the Lake Management Committee is on top of identifying lake aquatic plants, native and exotic (undesirable). Working with LC Eco Services, efforts are under way to populate our lake with desired species and through them we receive information on the aquatic plant situation in neighboring lakes for benchmarking purposes.
Floating Aquatic Plans	Pgs 17 - 18	The Hey Report recommends certain floating plants. Additionally, as our own plan expansion <i>“brick,”</i> we will be building a prototype floating island in 2019. This is method of establishing a plant ecosystem which is beneficial in at least three ways: a) the plants uptake nutrients from the lake water, b) the root system provides a beneficial environment for fish, and c) visual green space is created. Here is a picture of the dense root system that can develop from floating islands:



Topic	Main Pages/ Exhibits	Narrative
		 <p data-bbox="758 854 1686 907">Figure 5: View of the extensive subsurface root development in the flow-through mesocosms by the end of the trial ( FTWs temporarily raised out of the water).</p>
Healthy Fishery	Pg 18, Exhibit 9	The goals as outlined in the report are already under way and have been for some time. We enjoy a good working relationship with Mr. Frank Jakubicek of the Illinois DNR for a number of years. This veteran fishery biologist helps us understand where we are at and where we need to go with our fish population.
Carp Management	Pg 18, Exhibit 9	Working with the DNR, (Mr. Jakubicek), our carp population is monitored and is controlled by harvesting (electro-fishing). In addition, in the Spring of 2019 fishermen who specialize in carp hunting will be visiting our lake.
Funding	Pg 19	Several funding sources are listed. These would be matching grants, the exact percentages vary, but as a rule of thumb you can assume 50/50 to “ballpark” any cost estimates you might choose to make. LC SMC is very familiar and helpful towards securing this kind of funding. They were the ones who wrote the SWAAP report to the IL EPA which controls 319 grant monies.



## **Dredging**

*Reasons for dredging are as follows:*

1. To increase depth (driven by navigation issues)
2. To remove sediment that have filled up sediment traps near tributaries
3. To remove sediments that contain nutrients, improves water quality
4. To remove sediments that contain toxic substances such as copper
5. To provide deeper pockets to avoid Winter fish kills

*The main types of dredging are:*

1. Hydraulic – a cutter head chops up sediments and organic material in front of a suction hose or pipe. Water with solids creates a sludge which is pumped through the hose or pipe to a settling basin or silt bag on land for dewatering purposes. Over time, (months to a year), the solids settle out as the water rises to the top and drains out of the bag through pores in the bag fabric. The water is then pumped or flows by gravity back to the original source. The bag is opened and the solids are either placed nearby as fill or are carted away to be disposed of. This process is used currently to deepen the lake around the diving board and is performed every three years or so, the volume of dry solids isolated is low, so the captured dry material is spread around the South Beach area. Hydraulic dredging was performed on a larger scale in the North Bay many years ago, the slurry was pumped over to what is now the ball fields in Community Park. Hydraulic dredging can be anywhere from 10% to 30% efficient which is the percent of solids in the slurry on a dry basis. For any appreciable size of dredging project, we do not have any space for the large silt bags that would be needed. The North and South Beaches are not nearly large enough. Here is a picture of large scale dewatering bags in operation:



As you can see, large scale hydraulic dredging would not “fit” in our available spaces.

2. Drain and Scoop – the area to be deepened is drained and a bulldozer or backhoe is used to scoop the material into trucks and hauled away. The material probably has about 5 or 10% of water is my guessimate, the rest solids. No dewatering step is performed. This approach was used during the mid 1980's in the Firth Canal. A coffer dam using sheet piling was built, water pumped out, and a bulldozer went in to scoop out the muck. Drain and Scoop is often performed in winter when the likelihood of stream water flow is very low. Here is a picture of large scale lake bottom deepening in the Winter time:



The advantage here is that there is no cost associated with dewatering. Thus the cost per cubic yard removed is perhaps less than with hydraulic dredging, all things considered. The downside is that gone will be the fish and plants. However, the fish could be perhaps electro-harvested and moved to another body of water temporarily. This is what the Lindenhurst lakes just North of us did.

*What is required to start dredging?* If and when a decision to dredge is made, permits have to be obtained, typically three – one each from the Army Corps of Engineers, the IL EPA, and the DNR. The area to be dredged is divided up in a grid pattern, and sediment samples taken and analyzed to determine the toxic chemical levels. This is done to determine where the solids can be taken for disposal. Permitting can take one to two years. Next the funding needs to be in place, the cost could be \$100 per cubic yard of solids (possibly much more or significantly less), a substantial part of the cost determined by the distance the solids are hauled and disposal cost of the material which is unknown at this time. If we wanted to lower the main body of the lake bottom, say 60 acres by 3 feet to give us a depth of 8 feet, and create a pocket that was 1 acre in size and 12 feet deep to avoid fish kills (IL DNR recommends a depth of at least 10 feet in our area) – the cost could be in the tens of millions of dollars assuming a starting average depth of 5 feet.

Input Fields are in Yellow		
Item No.	Item	Value
1	Acres to be Dredged	60.00
	Depth to be Removed in Feet	3.00
2	Acres to be Dredged	1.00
	Depth to be Removed in Feet	7.00
	Square Feet per Acre	43,560
	Cost to Dredge per cubic yard, \$	\$100
	Number of Owners Sharing the Cost	541
	<b>% of Lake Surface Dredged</b>	<b>81.33</b>
	Cubic Yards from Item 1	290,400
	Cubic Yards from Item 2	11,293
	Total number of Cubic Yards Dredged	301,693
	Cost of Item 1, \$	\$29,040,000.00
	Cost of Item 2, \$	\$1,129,333.33
	<b>Total Cost (Item 1 plus 2), \$</b>	<b>\$30,169,333.33</b>
	Cost of Item 1 per foot depth Dredged, \$	\$9,680,000.00
	Cost of Item 2 per foot depth Dredged, \$	\$161,333.33
	Cost of Item 1 per owner, \$	\$53,678.37
	Cost of Item 2 per owner, \$	\$2,087.49
	<b>Total Cost per owner (Item 1 plus 2), \$</b>	<b>\$55,765.87</b>
	<b>Extra Assessment for each of 5 years, \$</b>	<b>\$11,153.17</b>

This would be the deluxe scenario. As you can see from this estimation, a complete renewal of our lake would be very expensive. The \$100 cost per cubic yard may or may not be near the actual true value, the Tower Lakes dredging program that was presented to our association a number of years ago cost \$175 per cubic yard, but they did hydraulic dredging and their dredge equipment was only 10% efficient. The point I am trying to make here is simply future dredging of our lake is an unknown right now and obviously due to the high cost, any decisions to dredge must be made very carefully. It is highly unlikely that we will ever be able to completely dredge the lake unless someone wins a huge lotto prize and wishes to help us out.

*How much of silt is in our lake now?* The Hey report essentially says our lake has two bottoms, one soft and one hard. The soft one is at the top of the silt/sediment layer and the hard one is the true lake bottom in perfect condition. Hey report Exhibit 4 lists the sediment in Inlet #1 (Firth Canal) as 1,234.55 cubic yards (CY) and North Beach as 1,199.43 CY. Exhibit 5 lists the sediment at the South Beach as 3,632.08 CY for a total of 6,066.06 CY. The volume of our lake is 376.08 acre-ft which is 606,741 CY. Therefore, the areas shown in Exhibits 4 and 5 if cleaned down to the hard bottom would be about 1% of the lake volume. By eyeball, I estimate that these areas are about 10% of the lake's total surface area, so the amount of sediment we have is 10 x 1% or about 10%. Now this is only a ballpark estimation, it assumes among other things that the sediment layer is uniform throughout the lake which it may or may not be and also we don't know how well the sediment was scooped out of the slough before damming which created our lake. Did Mr. McIntosh, the subdivision developer, scoop **all** the muck out originally? Perhaps not, maybe he scooped out very little, we just don't know. So we can say that worst-case within the ballpark is that we have picked

up 10% sediment in 60 years but it could be less. Also, the rate of silt addition to our lake is probably less now than what it was in earlier years since we are pretty well built up now and silt fences are required for new construction. Hey is pointing out to us that what counts the most is when there is a clear cut necessity to dredge - physical impediments. The periodic diving board dredging we do is an example of this.

The bottom line on dredging is that as an organization we need to monitor our lake bottom and develop a working knowledge towards any future dredging plans that might be necessary. Lake County Eco Services has offered to conduct a bottom sediment mapping survey for us, this is something we should move forward on.

End of Document