

From: [Glenn Doyle](#)
To: [Laurel Evans](#)
Subject: South Bar Lake Drainage District April 14 "Scope Meeting"
Date: Thursday, March 31, 2022 9:49:18 AM
Attachments: [The South Bar Lake Outlet.odt](#)

Subject: South Bar Lake Drainage District "Scope Meeting"

Date: March 31, 2022

To whom it may concern:

After receiving a post card marked 3/23/2022 stating a meeting would be held in the government center in Suttons Bay on Thursday, April 14, 2022, I had questions. No phone number to call. Drain Commissioner reportedly "out of town" when I called the County number. No Drain Commission staff to which to refer inquiries according to the person who answered the phone.

So I checked the County's website → Departments → Drain Commission → Drainage Districts → South Bar Lake and find nothing posted there except the original petition; notice of meeting; and order of establishment with a map of the new district.

The card states comments may be made in two ways. Either attend in person or email comments before the meeting. The majority of potentially affected property owners are in or near Empire – about a 35 mile drive each way from Suttons Bay. Worth while under some scenarios – not in others.

Pre-meeting Comments:

- 1 . Post the "Scope" proposed at an appropriate location on the County's website. Interested parties could then better judge whether personal or online attendance (or comments in advance) is warranted for them. The card says nothing about the proposed "scope" so how can anyone comment intelligently on it in advance?
2. Same with the link for the upcoming meeting. If posted online it could be clicked on rather than laboriously typed in.
3. Consider allowing for public comment online during the meeting and, in any case, accept online comment afterwards. Listeners on YouTube may hear something new and/or important to them while having no chance to respond.

When this first came up about two years ago, I was asked to look into the background and did so. I wrote up what I found and shared the results with a couple of Village Council members as I recall.

Copy attached for what it may be worth. My particular interest is largely theoretical: Is South Bar Lake navigable or not? If so, how can the present dam be allowed to remain blocking, as it does, public access via the outlet – itself necessarily navigable? If not, why don't the boundaries of properties bordering South Bar extend to the center of the lake as the Parcel viewer shows?

Yours,

Glenn F. Doyle

11858 S. Lake St.

Empire, Mich. 49630

(1-231-326-5629)

The South Bar Lake Outlet – Past, Present and Future

Introduction

Current high water levels in Lake Michigan have repeatedly caused sand blockage of the South Bar Lake "outlet" to Lake Michigan. When this happens the water level in South Bar Lake rises causing water to overflow docks; swampy shore lines on the east side and erosion in some places.

The "outlet" consists of a culvert/"stream" on the boundary line between two private properties and beneath a private road - Lake Michigan Drive.

It is described in a 1986 analysis paper prepared for the Village of Empire by the Traverse Group Inc.¹ as being..."58 inches high by 36 inches wide by 44 feet long.." through which a "small stream" serves as the surface water connection between South Bar and Lake Michigan. Oddly, the analysis makes no reference to the fact that the intake mouth of the culvert is partially covered by a "level block" - a piece of poured concrete the top of which is reportedly at an elevation of 582.1' above sea level.

The effect of this "level block" is to maintain the water level of South Bar Lake at 582.1'. It is, for all intents and purposes, a dam and South Bar Lake at that level is an impoundment.

Material presented to the Village Council on February 13, 2020 asserted that "minimum South Bar Lake levels had long been controlled" by this block.

Old photos and documents suggest a dam or block has been in place there since at least 1902. A government survey in 1949 references a "low dam" at the outlet. The outlet may have been "moved" in 1918 and modified in some fashion in the 1950-60 time frame. Multiple residents recall the outlet in place circa 1950 with development on Lake Michigan Drive largely occurring thereafter.

Removal of sand blockage has been done by the DPW of the Village of Empire with backhoe, fire hose, etc. on more than 60 occasions in the past 18 months. Similar blockages occurred in 1986. In both 1986 and 2019-2020, the level of Lake Michigan reached a height of 582' which it has only done in one other year (1883) since records began.

The Empire Village council resolved in June 2020 to petition the County Drain Commissioner to do two things. First, establish a drainage district to include South Bar Lake. Second, once the district was duly established, to undertake a "project" to address the South Bar Lake outlet. The first part

(establishment) is well underway. Boundaries have been surveyed and land parcels within those boundaries identified. Public notice was made on August 11, 2020. The next step will be a Board of Determination hearing to formally approve the district itself. After that, the



"project" process will move forward.

Issues: What can be done physically to prevent the outlet being blocked in the future?

If total success is not assured, how best to deal with such blockages as may still occur?

Who will bear the costs of whatever steps are taken?

Lake Michigan History – Geologic

¹ No longer in business so far as could be found.

The landscape of Michigan and the Great Lakes area is the result of the advance and retreat of glaciers over millions of years. The last such glacier advance covered most of Michigan for most of the past 100,000 years. It finally retreated beginning about 15,000 years ago leaving this area free of ice cover about 4500-5000 years ago in what geologists call the Nipissing stage. Toward the end of that withdrawal the water level in Lake Michigan was some 605' above sea level and the lake emptied in three different directions.

By about 4000 years ago, the lake level had declined to about 585' and has fluctuated between 576' and 583' (more or less) ever since so far as is known.

Lake Michigan History – Modern

Lake level records exist from 1860 to the present. They are measured in feet of elevation above a point at sea level in the Atlantic Ocean near the mouth of the St. Lawrence River in Canada which is where the Great Lakes system empties into the ocean.

The records maintained by the Army Corps of Engineers date from 1918 and are considered more comprehensive and precise. Since 1860 records indicate the lake level has fluctuated between about 576' and 582' feet above sea level. *On average*, the lake level is lowest in February, increases until July or August and then declines again over the fall and winter rising again in April. The Corps of Engineers, while providing a regular six month forecast (within a range), is careful to caution that longer term forecasting is by no means an exact science although experimental models exist.

The level of Lake Michigan, as of August 7, 2020, was 582.1' having averaged only slightly less in 2019. It has reached 582' only three times since 1860 – once in 1883, again in 1986 and then in 2019. *On average*, the lake level between 1918 – 2020 has been about 578.8' or about three feet lower than at present.

South Bar Lake History – Geologic

South Bar Lake is so named because it was once just a bay, an indentation in the shoreline of Lake Michigan across which a sand bar formed. It is a type of lake formed by the deposition of a sand bar across a preexisting bay. The Empire Village beach park and much of Lake Michigan Drive lie on this sand bar. North Bar Lake, Bar Lake in Manistee county, and many others formed in the same way over the past 4000 years. (The point in this process when a bay stops being a *bay* and becomes a *bar lake* is nowhere defined).

South Bar Lake History – Modern

From about 1853 until 1921, the history of South Bar Lake was directly connected with that of the lumbering industry in Michigan. According to *Remembering Empire through Pictures*², the first mill and dock was built by George Aylsworth in 1873 and in 1885 Struthers and Porter built a mill "on the Lake Michigan shore." In December 1887, the T. Wilce Co. of Chicago, doing business as the Empire Lumber Company, purchased the mill from Struthers and Porter and expanded it. This mill burnt in 1906; was rebuilt; burned again in 1917 and was not rebuilt. The mill property included all of the present Village Park and Lake Michigan Drive north to the outlet and beyond. The company also owned timberland in the area totally some 35,000 acres.

Land records indicate that the T. Wilce Company ceased doing business in Empire around 1921 and sold its lands in various parcels to multiple buyers into the 1930s. As to the property along Lake Michigan where Lake Michigan Drive now is located, there appears to have been only one land use restriction – all parcels along the shore of Lake Michigan were subject to a "right of way" across the others. This allowed for the eventual development of Lake Michigan Drive as a private road with each parcel owner able to cross land of other parcel owners to reach his/her own, but with no general right of

² Taghon, Dave and Diane, *Remembering Empire through Pictures* (1978), revised 1997, 2012.

public access as would be the case with a public road. There was no plat and no compulsory "neighborhood association" (as, for example, there is in the New Neighborhood and Storm Hill) and no restrictive covenants running with the land.

The earliest picture in *Remembering Empire* dates from the period 1873-1883 and shows the "pre-Wilce" mill and a low sand bar along Lake Michigan at the approximate location of the present Village park. The *location* of the present outlet, but not clearly the outlet itself, appears in the distance with the levels of Lake Michigan and South Bar Lake seemingly about the same. (Photo 1, p.9)

In 1898, a railroad spur on pilings was added across South Bar Lake by the Wilce interests in support of the mill. Photo 13, p 12 shows this spur in relation to the mill. Two buildings, one smaller and one larger, are situated north of the spur line. The current outlet is at this location – just north of the line of pilings which supported the spur line. The remnants of these are now under water, but visible on Google Earth. These buildings were reportedly a *shingle mill*. Such mills were usually powered by a water turbine deriving the force needed to power a saw from water overflowing an adjustable dam. The top of the dam would be raised to impound more water (should the natural overflow prove inadequate) and then lowered again when enough additional water had been impounded to serve the desired purpose. The presence of such a mill thus implies the presence around 1898 of some type of adjustable dam at the outlet.

In April, 1902, the geologist Frank Leverette, as part of the extensive surveys he did in Michigan, recorded the fact that the level of water in the "mill pond" (i.e. South Bar) was 17 inches higher than that of Lake Michigan. This further suggests some type of level block was in place at the South Bar outlet at the time. In 1902 the level of Lake Michigan was recorded at about 579.5' + 1.4". Adding 17 inches to this number gives a level for South Bar Lake of 581'. How exact either Leverette's measurement or the per-1918 Michigan Lake level are may be debatable, but the result, and especially the 17 inch difference, are consistent with the presence in 1902 of a "dam" of some sort keeping South Bar Lake at or near the 582' level.

The United States Congressional Serial Set, U.S. Government Printing Office, 1910 contains a detailed report concerning efforts by the "Empire Land and Improvement Association" (Wilce/Dailey/Empire Lumber interests) to have a harbor established at South Bar Lake.³ A government survey was done in Oct-Nov 1909 according to which South Bar Lake was found to be about 4 feet higher than Lake Michigan which, in turn, was below 579' in the fall of 1909. This is consistent with Everett's observation of 1902 and the presence of some type of "level block" in place in 1909.

Lastly, the Michigan Institute for Fisheries Research surveyed South Bar in March 1949 and recorded a "low dam" at the outlet. The survey did not record water levels.

In summary, a "level block" in some form appears to have been in place since about 1900. It was probably first installed by Empire Lumber Company. Its immediate surroundings have been modified over time (road improvement, side walls on the Lake Michigan side, etc). Absent such a block, the level of South Bar should have dropped during low lake water periods in the 1930s, 1960s, and 2000-2015 – of which there is no evidence.

Development on the shores of South Bar Lake has proceeded for over a century in a context where South Bar Lake remained at a near constant level. This has been the case except in 1986 and again in 2019-2020 when Lake Michigan reached levels approximating that of the level block thus facilitating blockage of the outlet. There may have been other instances caused by storms rather than continuing high water.

The presence of, removal, or modification of the "level block" may give rise to a number of legal and jurisdictional issues moving forward.

³ No harbor was ever built at Empire. One was later built at Leland. The Wilce interests were concerned, correctly at the time, that the timber was about gone and a harbor would be useful for the shipment of agricultural products etc.

South Bar Lake – Basic Hydrology

South Bar Lake is about a mile long and averages about 300 feet in width. Overall it is about 80 Acres in extent. One acre contains 43,560 square feet for a total surface area of $(80 \times 43,560) = 3,484,800$ square feet. Maximum depth is about 13 feet.

Basically, water enters the lake from rain, snow melt, streams, springs and ground water seepage. It leaves through evaporation or via the outlet. More water enters from all sources than is lost by evaporation. The excess either flows through the outlet into Lake Michigan or the water level rises.

One cubic foot of water will cover 12 square *feet* to a depth of one inch. So to raise the lake level one inch requires about $(3,484,800/12) = 290,400$ cubic feet of water.

Few records have been found of actual measurements of the amount of outflow from South Bar through the existing outlet. There may be more, but those at hand give a good general idea of what is happens at the outlet.

One source, the 1986 analysis by TGL, suggests an average outflow of 20 cubic feet per *second* (cfs). As one cubic foot equals 7.48 US gallons, this equates to an outflow of 8976 gallons per *minute* to maintain a "steady state" level of about 582' in South Bar Lake. No actual measurements are reported in that analysis.

A second source⁴, reports a *lower* average outflow of 9.5 cfs (4263 gallons per minute) with a highest noted outflow of 17 cfs (7629 gallons per minute). This study included six separate measurements on different occasions between 2013 and 2019.

The Village DPW has reported "the lake rises 10-14" when the culvert is blocked. This was a general observation on the effect of *no* outflow. There was no reference as to how much time may elapse between the occurrence of a blockage and its removal.

Assuming the TGL outflow figure of 20 cubic feet per second, it would take $290,400/20 = 14,520$ seconds, or 242 minutes, or about 4 hours to drain one inch of water from South Bar Lake. The actual number will vary depending on conditions, but whatever the specific average, the lake level rises on the order of 3 – 6 inches per day when the outlet is blocked.

The normal outflow fills only a small part of the opening of the culvert in place. It does not "fill" the culvert. So when a blockage is removed, outflow can and does increase above average until the level returns to "normal" at the top of the level block.

Absent removal of the blockage, the water level of South Bar would continue to rise until it overflowed the "bar" somewhere along the Village Park or Lake Michigan Drive frontage.

The Level Block
and Culvert Mouth
in South Bar Lake --->

On examination Sunday, August 23, 2020, the outlet was again blocked at the Lake Michigan end. The South Bar opening (pictured at an earlier date) looked much as in the photo. The "open" area

⁴ South Bar Lake Water Quality Report (Draft) August 2020. Christopher P Grobbel, PhD, Grobbel Environmental & Planning Associates

was 15" high at the center-line above 18" of water down to the top of the level block. The top of the culvert mouth is thus about 33" above the level block. The elevation of the top of the block is reportedly 582'.

The block itself is 48" wide across the mouth of the metal culvert and is about 24" front to back. Its thickness could not be determined. Note the straight edge across the culvert mouth compared to the irregular "front" edge.

These numbers are consistent with those in the 1986 analysis paper (38" high, 58" wide) if a) the level block is about 6" thick and b) the metal culvert is not round, but rather arch shaped and essentially flat bottomed. Open question remains as to the amount of slope of the culvert between inlet and outlet. The top of the culvert outlet at Lake Michigan *appears* to be roughly at the current water level of Lake Michigan (~582"). This suggests the culvert slopes down about 33 inches over about 45 feet or 3/4s inch to the foot which would not be an unusual amount of slope for a culvert.

Potential Legal Issues

There is a great deal of law, both case law and statute, addressing the question of what rights owners of land have in, or with respect to, bodies of water which abut their property.

In general, owners of property abutting the sea or the Great Lakes are called "littoral" owners. Owners of land abutting an inland lake or a stream are called "riparian" owners. In Michigan, littoral owners have absolute title and control of their property to the "normal" high water mark. Beyond that point, the land beneath the water of the lake, the *bottomland*, is owned by the State and held in trust for the public. The general public can swim, boat, fish *in the water* in front of say, Storm Hill, but have no right to trespass on abutting private land above the normal high water mark. By case decision in Michigan the public may walk across exposed beach between the "normal" high and the actual water's edge.

Riparian owners have a different situation. On an *inland* lake, they, not the State, also own the bottomlands of the lake. Imagine a round lake with eight owners, each with an identical 45 degree slice of the shoreline – like a pie. Each owns an identical wedge of the bottom land to a point in the center of the lake. (This can get very complicated as most lakes are not round, but that is the basic idea).

Then there is the question of navigable waters. The Great Lakes are navigable. So are connecting waters – such as the Detroit River. So are some, but not every, stream entering the Great Lakes. In general, adjoining property owners, littoral or riparian, cannot obstruct the public's right of use of the surface or passage upon the bottomland of a *navigable* stream. As a member of the public, I can wade up a navigable stream to fish, or canoe or run a tug boat if the stream is deep enough. I have no such right with respect to a non-navigable stream.

Now the Corps of Engineers has classified both South Bar and North Bar Lakes as "navigable throughout."⁵ as of December 2018. (The cited paper describes the effect of this).

Is South Bar "navigable" now? Is the outlet stream? It surely was at some point in the past, however distant, when South Bar Lake was just a bay without a sand bar. To complicate matters further, the Michigan Supreme Court long ago held that a stream was "navigable" if it was capable of floating a log – even if only part of the time – or had been so capable in the past.

So if the outlet should be held to be a navigable stream, then blocking that stream was (and arguably remains) an impermissible infringement of the rights of the general public to use it. Again, arguably, if South Bar Lake is navigable its abutting owners own to the water's edge and not to the "center" of the lake.

⁵https://www.lre.usace.army.mil/Portals/69/docs/regulatory/PDFs/Navigable_Waters_List_Dec2018.pdf

On the other hand, if the outlet stream is *not* navigable, the owners of the abutting properties (there are currently two – from 1888 to 1917 there was only the mill company) can do with it pretty much as they wish.

Which is where the drainage district comes in.

Establishing a Drainage District

Michigan has a Drain Code law some 100 pages in length.⁶ Among other things it creates the elected position of County Drain Commissioner. Upon petition to this official, a *drainage district* can be created if one does not already exist. Thereafter drainage *projects* may be undertaken within the now established district.

A drainage district is a separate governmental entity – like a village, city, township or county. In its name the drain commissioner may, if need be, acquire land by gift, purchase, or even condemnation in furtherance of a project. He/she may also assess taxes without a popular vote. The current Leelanau County Drain Commissioner, Steve Christensen, has held the position since January 2000.

The first step in establishing a drainage district is a petition asking that one be established. The Village did this in June 2020. The second is for the Commissioner to establish by professional survey what the boundary of the district shall be. Essentially, this means determining what lands drain to a particular outlet and hence to Lake Michigan. The outlet here is South Bar lake. Its watershed (or "drainage basin") will determine the boundaries of the new drainage district.⁷ (There is only one other drainage district established in Leelanau County). This has been done and the results published in the Leelanau Enterprise on August 11, 2020 as required by law.

Based on examination of topographic maps; the known boundaries of the Glen Lakes watershed⁸; and the published results, the South Bar lake watershed will constitute a roughly elliptical area two miles high north and south and about three miles wide to the east measured from the present outlet. The boundary is physical, not political. It includes the Village of Empire and parts of Empire Township. It lies entirely within Leelanau County. It contains about 5.5 square miles and over 400⁹ taxable land parcels. The Glen Lake/Crystal River watershed, by comparison, is about 46 square miles in area.

A Board of Determination will next be established to formally approve (or not approve) the proposed new district.

A Drainage District Project

Once the drainage district has been formally established, the drain commissioner may then undertake specific projects within the boundaries of the district. Here, as noted, the Empire Village Council petitioned for *both* formation of a district *and* a specific project.

The District will almost certainly be approved and the project process go forward. Cost of the "establishment" process (surveying etc.) has been advanced by the county according to report and will

⁶ Michigan Drain Code, Act 40 of 1956. Earlier drain laws date from 1899 and 1926.
[http://www.legislature.mi.gov/\(S\(2za031v410hhqwzcq3kp3kaq\)\)/mileg.aspx?page=getObject&objectName=mcl-40-1956-2](http://www.legislature.mi.gov/(S(2za031v410hhqwzcq3kp3kaq))/mileg.aspx?page=getObject&objectName=mcl-40-1956-2).

⁷ "A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel". https://www.usgs.gov/special-topic/water-science-school/science/watersheds-and-drainage-basins?qt-science_center_objects=0#qt-science_center_objects

⁸ The Glen Lake-Crystal River watershed has been defined in detail. It lies north and east of Empire.
<https://glenlake.files.wordpress.com/2010/08/november-2009-glen-lake-crystal-river-hydrologic-assessment-final-report-august-2010.pdf> .

⁹ There are 411 identified parcels in the published notice. Others have various claimed there are 800 -900 involved.

eventually be assessed back against the properties in the district. As and when the *project* is completed, the costs thereof, including future maintenance, will also be assessed among properties in the district in proportion to the amount of "benefit" they receive from the project.

As I interpret the request made, the Village is asking the Drain Commissioner to devise a way to keep the outlet open and, *although this is not expressly stated*, maintain the level of South Bar Lake as it has been for the last 70 to 120 years.

The outlet lies on private property, but was installed at some point in the past by other owners. No one is currently legally or financially responsible for its maintenance. It "just happened". Yet when it is blocked by wave action during periods of high water, the level of South Bar Lake rises rather quickly until the blockage is removed. The Village of Empire has been bearing the costs of such removals.

Costs and Benefits of a Drainage District

The establishment of a district will determine legal authority and responsibility for maintenance and possible necessary improvements of the outlet. It will also apportion and assign liability for costs. In short, it will provide clarity which does not now exist. It will also minimize the potential for conflict over legal issues as working relationships between drain commissioners and other agencies such as EGLE/EPA/ Corps of Engineers already exist.

The apportionment of costs, whatever they turn out to be, will displease some. Currently the Village has borne the costs of removing sand blockage – time, equipment, and materials - from its general fund. I've seen no official estimate of these costs in the past 18 months or so, but have heard "best guesses" in the \$20,000+ range. Recall such effort has been required only twice in the last century and *might* be no greater nor more frequent in the foreseeable future.

On the other hand, the possible cost of a "project" could turn out to be large especially if it involves significant new construction. Some part of these costs will continue to be assessed to the Village (as a property owner at the Village Park), some on village residents based on benefit to their particular property, and some on township residents on the same basis. Which properties "benefit" and to what degree seems impossible to determine objectively in advance and appears to ultimately depend upon the equitable judgment of the Drain Commissioner's chosen engineer(s).

What a Drainage Project Might Accomplish?

Recall that the root of the problem is not the design or performance of the outlet itself. It has "performed adequately" in the sense of keeping South Bar Lake at a near constant level for all but two of the last 100 years or more. The problem is sand blockage in the other two years.

An engineering study will be done by professionals selected by the drain commissioner. Their report and recommendations (included an allocation of cost to properties based on benefits) will be submitted to a Board of Review for approval. An opportunity for public input will be provided.

Suggestions for modifications from various sources have included:

1. Repair of the outer wooden wall. (Feasible. Low cost and probably necessary).
2. Seawall or groins lake-ward of the outlet mouth. (Expert opinion will hopefully address).
3. Install an adjustable gate in lieu of the level block. (Expert opinion will hopefully address).
4. Relocation of the outlet to Village Beach property. (High cost and would not, alone, address the blockage problem).
5. Use of pumps. To drain lake and/or to blast out sand blockage (Multiple high volume pumps would be required to achieve the same amount of outflow as the existing culvert provides when not blocked. Cost in the range of \$45,000 each. Water jet pumps to remove blockages reportedly not permitted and do not work for that purpose anyway).
6. Wide open channel/ Complete redesign? (Expert opinion will hopefully address).

What A Drainage Project Cannot Accomplish

A drainage project does not formally establish a "*legal lake level*". There is, however, a legal process in Michigan to do that.

If two-thirds of the owners of property abutting South Bar Lake should chose to do so, they could turn to the Inland Lake Level Act.¹⁰

A petition is filed with the County Board of Commissioners; they pass a resolution; an engineering study is done and legal counsel is directed to proceed to apply to the circuit court. The court, after hearings, can enter an order setting a legal level (such as 582') for South Bar Lake. Such an order delegates an authority (usually the Drain Commissioner) to establish and maintain the particular level. Such a level may be seasonally adjustable and need *not* be that sought by the petitioning owners. However, abutting owners alone become assessable for *all* costs rather than all those "benefited" within a drainage district by a project. And this includes all abutting owners, not just the petitioning two-thirds.

"Inland lake", under the act, "means a natural or artificial lake, pond, impoundment, or a part of 1 of those bodies of water. Inland lake does not include the Great Lakes or Lake St. Clair." [Which reopens the question: Is South Bar an inland lake or part of the Great Lakes?]

In this case, most owners on Lake Michigan Drive (west side of the lake) have immediate water access for swimming, dockage and the like. Conversely, most owners on the east side of the lake have lake frontage usually described as "cedar swamp". The number of owners on the two sides is about equal, but their interests/preferences may not coincide.

Interested/Potentially Affected Parties

This is mostly a question of who will foot the bill(s) in future.

Long term costs are currently relatively "low" and borne by the Village and thus its taxpayers. Future costs are prospectively higher and likely to affect some township residents not currently impacted at all. Costs are likely to impact abutting owners more heavily than at present due to their (presumably) greater proportional benefit.

This, it now appears, will happen as a necessary and natural result of the drainage district's creation. The *degree* of financial impact will largely depend on how expensive the project turns out to be and the way that the "benefit" of the costs is allocated among:

1. Village of Empire as a whole.
2. Taxpayers in the Village of Empire. (Some of whom already find property taxes a financial burden).
3. Taxpayers in Empire Township. (Some of whom see potential costs and no benefit).
4. Property owners along South Bar Lake in particular. (Most, but not all, of whom are Village taxpayers).
5. Environmental interests (to the extent that modifications may or may not affect water quality)
6. Commercial interests vs Quality of life. This is an unavoidable source of conflicting interests reflected in the current Village Master Plan. However, it does not seem to bear on who might favor or oppose any particular approach to the outlet issue. Lowest cost and continuation of pleasant and accessible Beach park would seem to be a common interest of both "groups".

What May the Future Hold?

There are three possibilities as respects the future level of water in Lake Michigan:

1. Lake Michigan level rises above 582' - worst case scenario.

Result: No apparent solution. Severe erosion on Lake Michigan side. South Bar level rises to that of Lake Michigan. Possible overflow of some part of the sand bar underlying park/Lake Michigan Drive.

¹⁰ Natural Resources and Environmental Protection Act 451 of 1994 part 307 Inland Lake levels

Roughly speaking, the elevation of the Village Beach Park is about 585' from its south end and continuing north at that elevation to the present location of the outlet. Higher ground in both directions otherwise.

Historical probability: Very, very low.

2. Lake Michigan level remains at or about 582' - rare case

Result: Blockages continue, possibly alleviated by the anticipated project (groins, gate?). No obvious method of complete elimination short of perhaps a large harbor. Removal of blockages continues as at present, but costs are reallocated to some extent by drainage project process. Some amount of project spending will occur. Large amount would appear unwarranted due to relative low probability of this occurring.

Historical probability: Low. Only at this level three times in over 150 years.

3. Lake Michigan level drops to historic averages – usual case

Result: Present situation improves. Small percentage of years with numerous blockages. Costs reallocated. No significant engineered changes or associated costs would appear warranted.

Historical probability: Very high. Below 582' about 98% of the time since 1860.

Climate change will be raised as a factor to consider. However it can only "do" one of the three things listed. Lake Michigan level goes up and little or nothing that can be done to stop it. *Or* lake level goes down and the blockage problem recedes or even disappears.. *Or* lake level stays as is at present and there appears to be no obvious solution aside for continuing to remove blockages as is now being done, but reallocate the cost. Engineering analysis may yet identify feasible and cost-effective improvements, but cannot definitively predict future lake levels

Recent high water levels in the Great Lakes have had significant negative impacts everywhere – loss of beaches, flooding, seawalls breached, houses lost due to dune erosion, etc. Multiple responses have been taken in various states and by local governments with many disagreements on ultimate causes, blame, and preferred course of remediation See for example¹¹, an extensive, well researched, and informative overview of a very large problem.

Open Questions

Potential Impact of a drainage district on currently ongoing drainage related matters. Such as:

1. Storm Hill efforts to install retaining wall and rip-rap.
2. Pending (granted?) permit to drain the "pond" opposite the Park Headquarters.

Will these come under the exclusive control of the Drain Commissioner or move forward without his involvement?

Effect of possible future project applications (which only require five property owning petitioners) to do something entirely within the Village. (More or fewer containment basins for example). Would these fall within the jurisdiction of the Village or that of the Drain Commissioner?

GFD

9/8/2020

¹¹ <https://www.mlive.com/news/2020/03/as-the-great-lakes-surge-to-record-heights-coastal-areas-face-a-time-of-reckoning.html> Updated Mar 28, 2020; Posted Mar 26, 2020, Garret Ellison