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June 30, 2025

Mound City Council
Mound City Hall
2415 Wilshire Blvd
Mound, MN 55364

Re: DNR Advisory Report on the Formation of the Harrisons Bay Improvement District in The City of Mound, Hennepin County

Dear City Councilors:

I am writing to inform you that the Minnesota Department of Natural Resources (DNR) has reviewed the petition submitted to create the Harrisons Bay Improvement District and prepared this Advisory Report in accordance with Minnesota Rules, part 6115.0970, subp. 5. We conclude that:

we approve of the proposed boundary for the Harrisons Bay LID for the purposes of:

- managing existing Aquatic Invasive Species (AIS) and preventing the introduction and establishment of new ones
- maintaining the health of the native plant community
- reducing the common carp population
- monitoring water quality
- identifying potential sources of phosphorus inputs to the bay, developing a phosphorus budget, and devising and undertaking phosphorus reduction projects

Goals of the Proposed Lake Improvement District

The primary goals of the proposed Lake Improvement District for Harrisons Bay are to:

- manage existing and possible future AIS in the bay;
- improve the lake's water quality by reducing phosphorus and sediment entering the bay, and reducing phosphorus concentrations in the bay; and
- reduce the density of common carp (*Cyprinus carpio*).

Additional goals include:

- preserve and enhance native vegetation;
- improve aquatic and shoreline habitat;
- conduct studies to understand these and additional lake problems; and
- develop information and education programs for landowners.

Background Information on Harrisons Bay

1. Harrisons Bay is a partially enclosed bay off Lake Minnetonka-West Arm (DOW Lake Number 27013314). This in turn flows into Crystal Bay and then the Lower Lake[1].
2. This LID would include all parcels having direct, deeded or channel access to Harrisons Bay. This includes commercially owned marinas and associations.
3. Lake Minnetonka, and Harrisons Bay, is classified as General Development (GD). In Mound, GD lakes have structure setbacks of 50 feet above the Ordinary High Water Level (OWHL).
4. Harrisons Bay is approximately 225 acres in size, with 88% (198 acres) considered to be littoral (15 feet deep or less per M.R. part 6280.0100, sub 9). Generally, the littoral zone is the part of a lake where rooted aquatic plants can grow, though the maximum depth at which plants can grow depends on water clarity and so varies from lake to lake and even from year to year within the same lake.
5. The bay's immediate catchment has an area of approximately 460 acres[2], yielding a bay:catchment ratio of approximately 2:1. Harrisons Bay is in the upstream portion of Crystal Bay's catchment, which has an area of approximately 7600 acres, [3].
6. The bays' catchment basin is heavily urbanized. More than 90% of the land cover in the bay's catchment basin is developed land. Wetland, native vegetation (both herbaceous and forest), and non-native vegetation collectively covers less than 10%[4] of the catchment area.
7. Curlyleaf pondweed (*Potamogeton crispu*s, CLP) and Eurasian watermilfoil *(Myriophyllum spicatum,* EWM) have both been present in the lake for several years. The Harrisons Bay Association (HBA) has been treating CLP since 2021, and EWM since 2024. Herbicides have been used for treatment of both plants.
8. The Minnesota Pollution Control Agency (MPCA) lists the bay as impaired due to excessive nutrients. The impairment results in nuisance algae growth that limits recreational use of the bay[5].
9. Flowering rush (*Butomus umbellatus*) and starry stonewort (*Nitellopsis obtusa*) are found in nearby waterbodies and could be introduced into the bay.
10. There is a large population of common carp in the bay.
11. Zebra mussels (*Dreissena polymorpha*) are present in the bay.
12. The proposed method of the LID formation is by citizen petition.

1. MN DNR Lakefinder (https://www.dnr.state.mn.us/lakefind/index.html)
2. USGS StreamStats (StreamStats | U.S. Geological Survey)
3. MNDNR - Division of Ecological and Water Resources - Watershed Delineation Project
4. 2019 Land Cover Dataset, U.S. Geological Survey
5. MPCA impaired waters list

Issue Analysis

Carp Reduction

Common carp are present in high numbers in Harrisons Bay. A population assessment conducted in September 2022 estimated the population to be about 10,300 individuals, with a biomass density of 437 kg/hectare; this is over four times the recommended level. The average age of the fish was 22 years, with the oldest being 62 years; although the sampled fish were distributed across several age classes, no juvenile fish were captured. The LID proposes to adopt actions to reduce this population. Possible actions include winter seining and nocturnal bow fishing.

Common carp can have a serious detrimental effect on both water quality and the aquatic vegetation in the bay. As benthivores, their foraging behavior stirs up sediments and reintroduces nutrients into the water column, thus contributing to the bay's phosphorus problem. They also eat and uproot aquatic plants, and cover aquatic plants with disturbed sediment, thus harming the aquatic plant community. In addition, the sediment that they stir up can cover fish eggs, so if any fish spawn in Harrisons Bay they are also negatively impacted by the carp population. Because of all these negative impacts, reduction of the carp population would improve Harrisons Bay and it is an appropriate project for the LID to pursue.

Carp removed from the bay could simply be replaced by carp migrating from the rest of Lake Minnetonka and connected water bodies. To mitigate this, the LID is proposing to work with the MCWD, the University of Minnesota AIS Research Center, and the Lake Minnetonka Conservation District (LMCD) to increase awareness of the problem and explore the feasibility of larger scale carp reduction actions in collaboration with these groups. These actions should include identifying the areas where the carp spawn to identify carp migration routes within the system, target these migration routes for harvesting, and reduce spawning efficacy. The DNR strongly encourages both of these steps, because migration and reproduction could easily overwhelm any purely local carp removal projects.

The LID should work with DNR-Fisheries to get further guidance on carp management. Jason Harris (Jason.harris@state.mn.us) and Kristan Maccaroni (kristan.maccaroni@state.mn.us) are the DNR Fisheries specialists for the West Metro area.

Phosphorus Reduction

Harrisons Bay (considered by MPCA as part of Minnetonka-West Arm), has elevated phosphorus concentrations, leading to algae blooms and impairment of aquatic recreation. A TMDL plan for West Arm was approved in 2014. Currently, nutrient budgets have been developed for Jennings Bay and West Arm, but not for Harrisons Bay alone. Most of the phosphorus input into West Arm comes primarily from Jennings Bay and secondarily from Forest Lake (DOW Lake ID number 27013900). In order for West Arm to meet water quality standards, the external phosphorus load from Jennings Bay and Forest Lake needs to be reduced by 706 lbs/year, and internal load reduction by 669 lbs/year[6]. Harrisons Bay does not receive inflow from either Jennings Bay or Forest Lake, so whatever influence these two water bodies have on Harrisons Bay's water quality is mediated through the rest of West Arm. Because of this, the LID's opportunities to directly reduce external phosphorus input are limited to a minority of the total input into this part of Lake Minnetonka.

6. Brian Beck, Minnehaha Creek Watershed District, personal communication to Sheri Wallace

The proposal states that the LID would, with the assistance of the MWCD, develop plans and programs to reduce the amount of phosphorus running directly into Harrisons Bay, and to work with MWCD on existing rehabilitation projects on Painters Creek, which flows into Jennings Bay. They also propose to conduct water quality studies on the bay to identify the factors contributing to high phosphorus concentrations, promote shoreline restoration projects to intercept runoff, and address internal phosphorus loading in the bay.

The proposal does not discuss any detailed plans for pursuing these goals, but at present the data necessary to devise such plans specifically for Harrisons Bay does not exist. This will be made more difficult by the fact that the bay has a very broad connection to the rest of West Arm, facilitating circulation of water and dissolved phosphorus from the rest of the system. Finally, phosphorus concentrations are affected both by external and internal loading, and in the case of Harrisons Bay this latter is likely promoted by the presence of CLP and common carp in the basin. The DNR suggests that the LID prioritize its projects to reduce CLP and common carp abundance before developing plans to reduce internal phosphorus loading.

The catchment basin for Harrisons Bay is almost entirely developed land, often with a high percent of impervious surface coverage. This landscape can result in large amounts of surface water runoff, containing high concentrations of phosphorus and sediment, into the bay. Data on the phosphorus and sediment concentrations entering the bay directly from this runoff has not been provided and may not be available currently, but this is important to know because this runoff is the only source of external phosphorus input that the proposed LID would have any capacity to reduce. The DNR recommends that the LID work with the Minnehaha Creek Watershed District (MCWD) and MPCA to develop a water quality monitoring program to identify point discharge sources and paths of stormwater runoff, and collect water quality samples at these locations following storm events to determine the concentrations of phosphorus and sediment running directly into Harrisons Bay. These data would enable the LID to identify locations where measures (i.e, stormwater Best Management Practices, or BMPs) designed to capture and reduce phosphorus and sediment into the bay would be efficacious. Every landowner can reduce the amount of sediment and nutrients running off their land by establishing a buffer strip of native vegetation at the shoreline.
Such measures, which could include installation of swales, native vegetation buffer strips, and created wetlands, are within the ability of the LID to pursue, and the DNR encourages the LID to work with its members to establish such BMPs in locations where monitoring data indicate they would be helpful. In addition, if the bay receives any stormwater discharge from city drains or other city structures, the LID should consider working with the city to reduce inputs from these sources.

Phosphorus concentrations in Harrisons Bay are also likely influenced by both CLP and common carp. The life history of CLP is characterized by growth in late winter-early spring and dieback of the visible parts of the plant in the summer. The early dieback releases nutrients back into the water column as these parts of the plant decompose, thus increasing dissolved phosphorus concentrations and promoting algae blooms. Phosphorus is also released from the substrate into the water column via bioturbation by common carp. Reduction of both species would likely have some impact on internal phosphorus loading and should make any phosphorus reduction efforts easier.

The DNR encourages the LID to pursue monitoring programs to enable them to develop feasible projects to reduce phosphorus concentrations in the bay; however, given the size of the proposed LID and the open connection to West Arm, there may be little that the LID could do directly to reduce phosphorus concentrations. Therefore, the DNR suggests that the LID pursue partnerships with the MCWD, MPCA, and the LMCD to collaborate on larger scale projects. The proposal includes collaboration on existing rehabilitation projects to reduce phosphorus on Painters Creek, which flows into Jennings Bay and will indirectly improve water quality in Harrisons Bay by improving the

overall water quality in West Arm. The LID may also consider working with landowners on Jennings Bay and West Arm to expand the borders of the LID to include both these parts of Lake Minnetonka.

Aquatic Invasive Species Management

Harrisons Bay currently has two aquatic invasive plants: curlyleaf pondweed (CLP) and Eurasian watermilfoil (EWM). The HBA has been managing these with herbicide treatments, with four years of CLP management and one year of EWM management, and the LID would assume these treatment programs, with annual surveying and herbicide treatment. They also plan on working with the DNR to develop a lake vegetation management plan to guide future management actions.

Purple loosestrife (*Lythrum salicaria*), an invasive emergent wetland plant, is also found around the bay. The LID proposal does not propose any actions to manage this species.

Large areas of the bay are covered in CLP and/or EWM. In 2024, after four years of treatment, a delineation survey found that CLP was present in 62.5 acres of the 225-acre bay (28%). After the first year of treatment, EWM was found in 13.5 acres (6%).

The LID should contact the local Aquatic Invasive Species specialist April Londo (April.Londo@state.mn.us) for further guidance on aquatic plant management in general and AIS management in particular, and the local AIS prevention specialist Rafael Contreras-Rangel (Rafael.Contreras-Rangel@state.mn.us) for further guidance on preventing AIS. All management actions, including herbicide applications, must be carried out in accordance with Minnesota regulations and guidance from MN DNR aquatic invasive species specialists.

The DNR also suggests that the LID contact Habitattitude (https://www.habitattitude.net) for further information on the proper handling of unwanted aquarium pets and to conduct workshops for LID residents on the proper surrender of unwanted pets and disposal of aquarium water and plant trimmings.

Maintaining the Health of the Native Plant Community

The proposal mentions this as one of its possible projects and programs but does not offer any specifics on how to implement it. The 2024 aquatic plant survey identified nine native submersed aquatic plants, four native floating plants, and two native emergent plants. As the LID's efforts to reduce the carp population and reduce AIS abundance in the bay yield positive results, more of the littoral zone would become available for growth of native plants. These areas could become colonized naturally, or the LID could pursue planting efforts. The DNR encourages the LID to consult with the DNR's Aquatic Plant Management staff for further guidance on any active measures the LID should take to further this goal. Continued regular aquatic vegetation management surveys will provide the data necessary to guide these decisions.

Nearly all of Harrisons Bay is considered to be littoral (<= 15 feet in depth), so increased water clarity as a benefit of the projects pursued by the LID could result in greatly expanded aquatic plant coverage. This is a feature of a healthy shallow water aquatic ecosystem, and could also result in a more diverse and abundant local fish community.

Natural shoreland restoration

The proposal mentions improving aquatic and shoreline habitat as one of the LID's possible objectives, and states the intention of working with the DNR to improve aquatic and shoreline native habitat. This would be an appropriate project for the LID to pursue and it would help reduce phosphorus originating from shoreline runoff. Phosphorus adhering to sediment running off from riparian properties is a common source of phosphorus contamination in lakes, and replacement of turfgrass at the water's edge with a buffer composed of native grasses, shrubs, and trees would both intercept runoff from the lot and enhance wildlife habitat. The LID could host workshops and provide educational materials for property owners on the ecology of natural shorelines and could initiate pilot projects on the shorelines of willing property owners to demonstrate the concept and benefits.

Factors and conditions that improve shoreline buffer effectiveness include:

- Width of buffer (as width increases effectiveness increases; buffers > 50 feet preferred)
- Slope to water (slopes less than 3:1 increase effectiveness)
- Soil type (sandier soils encourage infiltration)
- Type and amount of land-disturbing activities and impervious surfaces near the buffer
- Use of pesticides and fertilizers
- Presence of pet wastes
- Trees and shrubs with extensive roots within the buffer (a healthy, naturally vegetated buffer is preferred)
- Presence of organic matter within the buffer
- Runoff velocity (lawns have higher runoff rates and volume)

DNR strongly encourages the LID to include natural shoreland restoration and installation of buffers as a component of its phosphorus reduction strategy. DNR also strongly encourages the LID to consider working with BWSR's Lawns to Legumes program, which encourages native plantings for pollinator habitat, and Blue Thumb, which promotes native plantings to improve water quality. Both organizations host workshops, provide advice on plantings, and have grant programs.

Impact of Climate Change

Climate change could impact the environmental health of Harrisons Bay in several ways. These include shifts in the viable living zones of species; increased precipitation and increased intensity of precipitation events; and expected increase in water temperatures. Shifting living zones for species may result in additional AIS being introduced into the bay. Water temperatures have already risen approximately 3-4 degrees Fahrenheit since 1970, and are expected to increase further; this will result in longer growing seasons and accelerated and more abundant growth of both plants and algae. Finally, increased precipitation and increased intensity of precipitation events would increase the amount of storm-event runoff reaching the bay, resulting in increased sediment and nutrient inputs; this may be especially problematic for Harrisons Bay since so much of the surrounding land is developed and covered with a large amount of impervious surface.

Recommendations/Conclusions

Proposed LID Boundaries

The boundaries of the proposed LID include all properties with direct, deeded, or channel access to the bay, including associations and commercially owned marinas. MR Part 6115.0920 subpart 5 requires that the boundaries include all lands and waters within the direct drainage basin of the lake (shown on the attached map). However, this rule also allows the County Board or City Council to create a boundary less than the entire drainage basin with written Commissioner approval if the boundary selected includes a sufficient amount of the lake's watershed to develop and implement feasible solutions to the problems the LID intends to address. The proposed boundaries are sufficient to address the in-lake problems of AIS management, phosphorus input into the bay from the surrounding land, carp management in the bay, and proposed shoreline restoration projects. Because this bay has a very broad connection to West Arm, some of the projects and programs for which the LID is being proposed (e.g, phosphorus and carp reduction) are significantly affected by the larger system and any success that the LID is likely to have on these problems solely by actions carried out within the bay would be partial and limited; however, in these cases, the proposers are also laying the foundations for productive collaboration with other organizations, which would increase the scale and magnitude of the impact of these efforts beyond the boundaries of the proposed LID. Restriction of the district's boundary to these properties is sufficient to address the in-lake activities for which the LID is being proposed. Therefore, in accordance with these rules, the DNR approves the proposed boundaries identified in the resolution.

Advisory Comments & Recommendations

Thank you for consideration of these comments. Please contact Kathy Metzker, DNR Land Use Hydrologist at 651-259-5694, if you have any questions. If approved, please provide the name and address of the primary contact of the Board of Directors for the LID and remind the LID of its obligation to provide DNR notice of annual meetings and copies of annual reports per MS § 103B.571.

Sincerely,
DIVISION OF ECOLOGICAL AND WATER RESOURCES

Randall Doneen
Digitally signed by Randall Doneen
Date: 2025.06.30 15:01:52 -05'00'

Randall Doneen
Manager, Conservation Assistance and Regulations (CAR) Section

Attachment

c: Emily Javens, DNR Land Use Programs Supervisor
Dan Petrik, Land Use Specialist
Ricky Hoffman, Shoreland and Floodplain Planner
Jesse Dickson, City Manager, City of Mound
Lee Engel, MPCA-Lake protection and restoration
April Londo, DNR Aquatic Invasive Species Specialist
Rafael Contreras-Rangel, AIS Prevention Planner
Dennis Wasley, MPCA In-lake treatment questions
Sheri Wallace, Harrisons Bay Association