Memorandum

To: Randy Anhorn, Nine Mile Creek Watershed District
From: Janna Kieffer
Subject: 2020 screening-level flood vulnerability analysis for land-locked lakes— scope of work
Date: February 12, 2020

2019 was the wettest year on record in the Twin Cities metro area, with 44.17 inches of precipitation at the Minneapolis International Airport gaging station, breaking the record previously set in 2016 (40.32 inches). Not only has 2019 been a wet year, but the Twin Cities metro area has been in a wet cycle over the past decade. The last five years (2014-2018) have been the wettest five years on record in the area. And the last ten years (2009-2018) have been the wettest 10 years on record. This wet period has resulted in high water levels for many land-locked lakes, with historic high water levels reached in several lakes within the Nine Mile Creek watershed in 2019. Groundwater levels are also higher than average throughout the watershed.

With higher-than-normal lake levels and groundwater levels, there is an increased risk of flooding around land-locked lakes from spring snowmelt/runoff and rainfall throughout the 2020 growing season. This memo summarizes our proposed scope of work to conduct a screening-level analysis to better understand the potential for flooding of structures and/or infrastructure adjacent to land-locked lakes as a result of spring snowmelt/runoff and precipitation throughout the 2020 growing season.

Proposed Scope of Work

The tasks described below will be completed for the following land-locked lakes within the Nine Mile Creek watershed:

- Shady Oak Lake (Minnetonka)
- Lone Lake (Minnetonka)
- Birch Island Lake (Eden Prairie)
- Bush Lake (Bloomington)
- Arrowhead Lake (Edina)
- Indianhead Lake (Edina)

Task 1. Review current lake levels and associated inundation areas.

Data from the early-February, 2020 lake level measurements will be used to map current inundation areas for each of the land-locked lakes.

Task 2. Identify approximate elevations of existing structures and other infrastructure (e.g., roads, trails, parking lots)

DNR LiDAR elevation data will be used to determine approximate elevations of existing structures and other infrastructure adjacent to or near the land-locked lakes.

Task 3. Screening-level flood vulnerability assessment from spring snowmelt

When evaluating snowmelt scenarios, it is often assumed that snowmelt will occur prior to ground thaw, in which little or no infiltration occurs and all of the snowmelt (and any rainfall) reaches the downstream lake in the form of runoff. A screening-level analysis is recommended to 1) approximate how much runoff, from snowmelt or rainfall on frozen ground, it will take for lake levels to reach the lowest homes/infrastructure, and 2) evaluate how that amount of runoff compares to low-, medium- and high snowmelt scenarios (based on water equivalency). The screening-level analysis will include calculating watershed areas for each land-locked lake and using stage/storage information and recent lake level readings to estimate runoff.

Task 4. Screening-level flood vulnerability assessment throughout 2020 growing season

Measured water levels in many of the land-locked lakes within the Nine Mile Creek watershed are higher than they were at this time last year. Without intervention (e.g., pumping), lake levels could continue to rise throughout 2020, depending on the amount of precipitation that occurs (among other factors such as groundwater influence and evaporation). A screening-level analysis is recommended to help assess the potential for water levels to reach elevations that could impact structures or other infrastructure throughout the growing season. The screening-level analysis will consist of developing a spreadsheet model to roughly estimate watershed runoff and corresponding increases in water levels throughout the 2020 growing season based on average- and above-average monthly precipitation. Results will be provided in the form of graphs of potential lake level increases throughout the growing season.

Estimated Cost & Schedule

The total estimated cost to complete Tasks 1-4 is $10,000. Table 1 summarizes the estimated costs associated with each task described in the scope of work.

Table 1. Estimated costs and schedule, by task

Task	Description of Task	Estimated completion date	Amount
1	Review current lake levels and associated inundation areas.	March 10, 2020	$1,000
2	Identify approximate elevations of existing structures and other infrastructure (e.g., roads, trails, parking lots)	March 10, 2020	$1,000
3	Screening-level flood vulnerability assessment from spring snowmelt	March 10, 2020	$3,000
4	Screening-level flood vulnerability assessment throughout 2020 growing season	April 15, 2020	$5,000
Total Estimated Cost			**$ 10,000**