

NOKOMIS AREA GROUNDWATER & SURFACE WATER EVALUATIONS FAQS

Photo credit: Saar Hodne

WHAT IS THE CONCERN?

Property owners near Lake Nokomis have noted higher levels of groundwater and standing water in previously dry areas, such as Solomon Park and Lake Nokomis Park. Additionally, the City of Minneapolis has heard concerns about deteriorating private sewer laterals (the lines that run from the street to a house) and groundwater impacts to basements and foundations. The Minneapolis Park and Recreation Board has also observed high water levels in Lake Nokomis, which have impacted beaches and shorelines.

WHAT ARE WE WORKING TO UNDERSTAND?

In response to these concerns, we are working to understand the following:

- Are surface water and groundwater levels near Lake Nokomis, particularly south and west of the lake, rising?
- To what extent do groundwater levels interact with surface water levels in this area?
- What are potential impacts to public and private infrastructure from rising water levels?
- If groundwater and/or surface water levels are rising, why and what can be done about it?

WHO IS WORKING TO UNDERSTAND THE CONCERNS?

Because groundwater and surface water management in Minneapolis falls under several jurisdictions, a group of agencies is working in partnership to evaluate and understand what's happening and how to address observed problems. Agencies participating in this effort include the MN Department of Natural Resources (DNR), the city of Minneapolis, the Minneapolis Park and Recreation Board (MPRB), the Minnehaha Creek Watershed District (MCWD), and Hennepin County. These agencies are also coordinating with the MN Department of Transportation (MnDOT), the Metropolitan Airports Commission (MAC), the city of Richfield, and the U.S. Geological Survey (USGS).

HOW ARE THESE AGENCIES WORKING TOGETHER?

Staff from DNR, the city of Minneapolis, MPRB, MCWD, and Hennepin County are working together in a technical team to understand the questions noted above, while coordinating with other technical partners (noted above) as needed.

The work of the technical team has included installing new shallow groundwater wells, reviewing groundwater elevation data from existing monitoring wells, understanding soil characteristics and geology underlying the area, summarizing precipitation data, modeling groundwater recharge rates, looking at the Lake Nokomis water levels, and reviewing the operation of the Nokomis weir.



WHAT HAS THE TECHNICAL TEAM LEARNED SO FAR?

General Location of Affected Properties:

- There is a cluster of properties southwest of Lake Nokomis that have experienced impacts to basements and another cluster near Solomon Park which have experienced impacts to backyards.
- Most of the properties in this area that have impacts to basements are located more than 10-30 feet above the Lake Nokomis water level, which suggests that groundwater levels are likely the issue, rather than the Lake Nokomis water level.

Precipitation:

The Twin Cities area is currently on track to have the wettest decade on record with the highest average annual precipitation and the most daily rainfalls of 1-inch or more. This includes an increase of precipitation in the month of April, when soils are usually thawed, but vegetation is not growing and cannot take up additional water. This has led to increasing groundwater recharge rates and primes the area for flooding.

- 2013 – 2018 will finish as the wettest six-year period on record (since the 1870s) with an extra year's worth of precipitation falling during that time
- 2014 had the wettest Jan. 1 – Jun. 30 on record; Jun. 2014 was the wettest month ever on record for the state
- 2016 was the wettest year on record
- 2016 – 2018 had more 1-inch daily rains than any other 3-year period on record
- April 2018 was the snowiest month on record

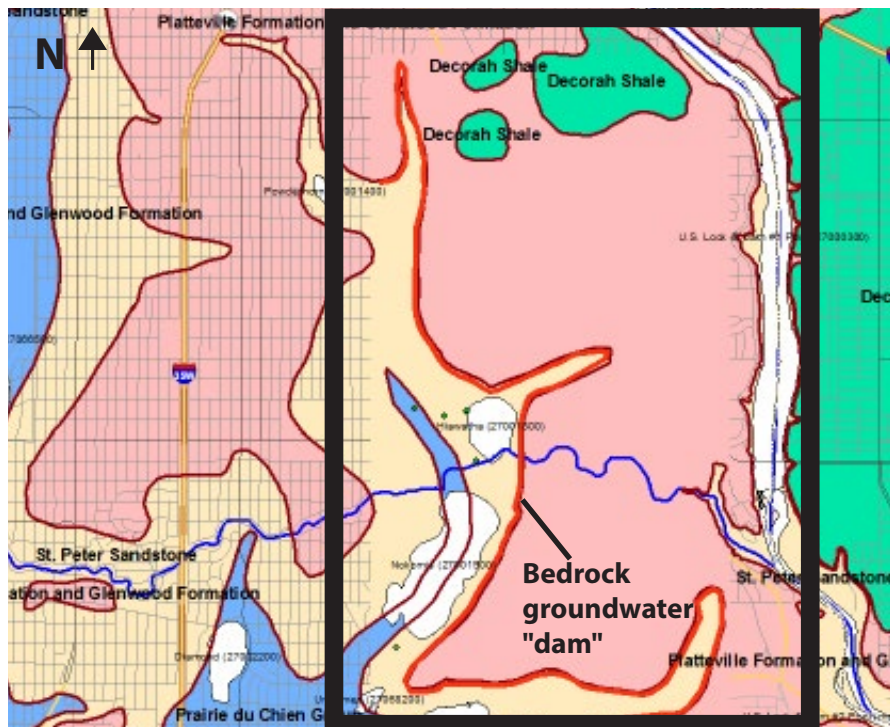
Underlying Soil and Geology:

The geology of the shallow water table aquifer underneath this area varies and includes karst and peat features. The bedrock elevation rises at the north and east end of Lake Nokomis and along Minnehaha Creek. The water table enters the bedrock aquifer east of Lakes Hiawatha and Nokomis, but before Minnehaha Falls. It is possible that the rise in the bedrock may be acting like a dam to the groundwater (*see map, noted in red*), causing it to flow up and over the bedrock dam. This could be causing higher groundwater levels near Lake Nokomis.

Groundwater Modeling & Recharge Rates:

Preliminary findings show that across the Twin Cities metro, including around Lake Nokomis, groundwater recharge rates have increased 3-4 inches per year in the past four years when compared to the last 25 years:

- Average recharge in 1988 - 2011: 10.1 - 12.0 inches per year
- Average recharge in 2012 - 2016: 14.1 - 16.0 inches per year



Bedrock geology by Lake Nokomis. The red line shows the bedrock "dam." Groundwater flows west to east toward the Mississippi River.

Monitoring Wells:

To better understand surface and groundwater interactions in the area, the interagency partners installed six groundwater monitoring wells in the area (*figure reference*). Two shallow wells were constructed in 2017 in Solomon Park and Nokomis Park, that monitor the level of the local water table. Four additional wells built in 2018 and 2019 monitor levels of deeper aquifers.

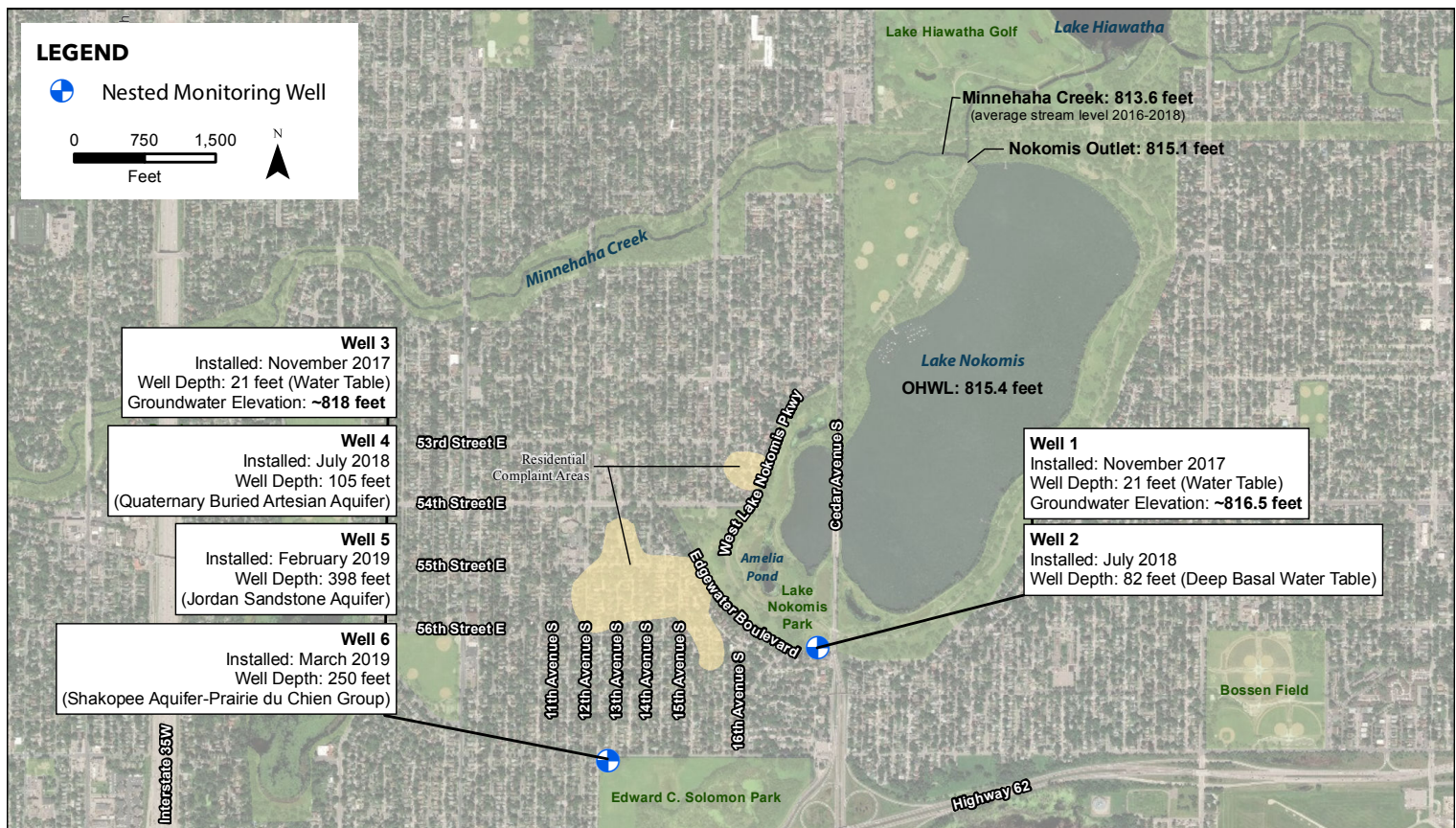
Concern has been raised that Minnehaha Creek is responsible for high groundwater in this area. To assess this concern, groundwater elevations were assessed against lake and creek elevations.

Data from the shallow wells reveals average elevations in Solomon Park of 818 feet, and in Nokomis Park of 816.5 feet. The DNR established Ordinary High Water Level (OHWL) of Lake Nokomis is 815.4 feet. The low “runout” elevation of the Lake Nokomis outlet is a 1931 concrete spillway located at 815.1 feet.

For Minnehaha Creek to impede groundwater flow in this area, the Creek would need to remain consistently higher than the Lake Nokomis low outlet elevation of 815.1 feet. 2016 – 2018 monitoring data for Minnehaha Creek shows that the Creek remained below 815.1 feet 97.4% of the time, and only exceeded 815.1 feet 28 days during this time period.

This demonstrates that Minnehaha Creek is not impeding the groundwater gradient in the area.

Moreover, a significant number of impacted basements west of Lake Nokomis are estimated to be at elevations between 825 and 835 feet, up to 18 feet above local water table elevations. This is evidence of a potentially perched water table, that is separate from shallow groundwater connected to Lake Nokomis.



Locations of monitoring wells

WORK TO DATE



Shallow water table well installed 2017



Information sharing open house, October 2018

Since November 2017, work that has been completed includes:

Interagency Coordination:

- 12 leadership team meetings
- 7 technical team meetings
- Over 70 studies and resources reviewed

Investments:

- Six wells installed (*see previous*)
- \$159,259 invested
 - \$8,400: two shallow water table wells
 - \$34,000: two basal water table wells
 - \$100,000: two bedrock wells (in progress)
 - \$16,859: independent third-party review

Outreach:

- 5 public meetings
- 4 email updates
- Dedicated webpage and email address

NEXT STEPS

The University of Minnesota (UMN) Water Resources faculty will conduct an independent third-party review of the work completed to date by the interagency partners.

This assessment and any resulting recommendations are anticipated to be completed in 2019.

CONTACT

To view technical data, technical team meeting notes, and presentations, please visit the City of Minneapolis' website: www.ci.minneapolis.mn.us/publicworks/stormwater/nokomisgroundwater.

For updates, please sign up for the Nokomis Area Groundwater and Surface Water emails at <https://bit.ly/20gg02R>. For additional questions or concerns, please email nokomisgroundwater@minneapolismn.gov.