2024 Prior Lake Outlet System Annual Operations Report

PRIOR LAKE-SPRING LAKE WATERSHED DISTRICT

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ATTACHMENTS

INTRODUCTION

The Prior Lake Outlet Structure and Outlet Channel were constructed in 1983 under DNR permit 79-6016 to address high lake level issues on Prior Lake, which does not have a natural outlet. The Prior Lake Outlet Channel (PLOC) is utilized by the Prior Lake-Spring Lake Watershed District (District or PLSLWD) in managing lake levels on Prior Lake, as well as a trunk stormwater system for the Cities of Prior Lake and Shakopee, and the Shakopee Mdewakanton Sioux Community. The 7-mile long PLOC is divided into eight management segments. Segment 1 is on the southern end beginning at the Prior Lake Outlet Structure, while Segment 8 is on the northern end and flows into the Minnesota River in Shakopee.

To address current needs and plan for future development in the watershed, the District finalized a Memorandum of Agreement (MOA) in 2007 with the Cities of Prior Lake and Shakopee, and the Shakopee Mdewakanton Sioux Community for the operation, maintenance, and use of the Prior Lake Outlet Channel. The MOA is updated regularly and was last updated in 2019. This group of cooperators oversees the overall operation of the PLOC, while the District administers the day-to-day operations. In the early 2000's, the cooperators determined that the channel and outlet had worked well since their inception, but they could operate more efficiently if modified in several places, reducing long term maintenance, and enhancing the environment. Acknowledging that the PLOC is used as a stormwater conveyance system and is not solely a natural conveyance, the cooperators' focus is to manage the easements of the channel itself to maintain capacity, reduce maintenance needs, provide long-term stability, and improve water quality. Secondary benefits include increased aesthetics, improved habitat, and consistency with city and county plans for parks and greenways.

OUTLET STRUCTURE

HISTORY

The Prior Lake Outlet Structure was originally constructed in 1982 and has been operating since 1983. The original design of the structure required manual operation to open and close gates to regulate the flow. This design posed safety concerns for staff operating the structure during high water levels. Additionally, inefficiencies in the structure's design meant that the 36-inch outlet pipe connected to the structure did not reach its maximum flow of 65 cfs until lake levels had well surpassed the outlet elevation. Over the years, the structure had also developed wear and required minor maintenance.

Given conditions, a replacement structure was pursued by the District and installed in 2010 (Figure 1). The new design has increased the efficiency of discharging water by allowing the outlet pipe to reach capacity sooner. It also provides safer conditions for staff during inspections and maintenance and is self-operating, which reduces overall operations and maintenance costs. A schematic of the outlet structure is provided in Attachment A.

FIGURE 1 - OUTLET STRUCTURE

Maintenance and Operation

Operation of the Prior Lake Outlet Structure is governed by the DNR-approved Prior Lake Outlet Control Structure Management Policy and Operating Procedures (Operating Procedures) dated October 2004 and approved February 2005. This plan specifies a review procedure that is to be repeated every 5 years and last occurred in 2023. Changes primarily addressed additions and removals to the inspection crossings and updating water level monitoring capabilities based on open water seasons.

Additionally, an Operation, Inspection and Maintenance Manual was drafted and adopted in September 2011 for the Prior Lake Outlet Structure. The purpose of this secondary manual is to establish guidelines and practices to provide existing and future District staff with the knowledge of how to properly operate, inspect and maintain the structural and operational components of the outlet to maximize the life and effectiveness of the structure. The manual includes a table of recommended inspection items along with the recommended frequency of inspection. These recommendations will be reviewed periodically by District staff to determine if the frequency is appropriate based on findings in the field and the manual will be updated accordingly.

The new structure requires minimal maintenance to operate. Once Prior Lake reaches a water level elevation of 902.45 feet, water starts spilling over the accordion shaped weir located inside the trash rack. Maintenance includes visual inspections, greasing gates, and removing debris from the trash rack. Removing vegetation and other debris from the trash rack is the most time-consuming and labor-intensive task (Figure 2). When the structure is operating (Prior Lake is greater than 902.45'), the structure will be inspected no less than once a week, and as much as twice per day, depending on the lake level and amount of vegetation getting caught on the trash rack. Inspections and debris removal are typically conducted by PLSLWD staff. During times when water is high and substantial amounts of vegetation are getting caught on the track rack, the City of Prior Lake staff have helped remove vegetation to ensure the Outlet Structure was not blocked.

Figure 2 - Removing Vegetation from Outlet Structure

Excluding 2009, 2022 and 2023, the Prior Lake Outlet Structure has had flow, at least partially, every year since 1999. The year 2019 had the greatest volume of water flowing through the system since the structure's establishment in 1983. This was partially due to the more efficient design of the new Outlet Structure; however, the primary factor was the duration of continuous discharge which was significantly greater than in previous years.

Operations begun in 2024 with pre-snowmelt inspections. Ice out occurred on March 3 for both Upper and Lower Prior Lakes. The water level on Prior Lake was not affected with spring snowmelt as the upper watershed runoff first filled Spring Lake which was also several feet below historical average due to the previous year's drought. Springtime rains finally allowed water to flow into Upper Prior Lake from Spring Lake on March 30 resulting in a steady rise in water throughout the spring months. The wettest month on Minnesota record occurred in June 2024 leading to rapid water level rise from 900.29' to 902.42' during those 30 days. Concerns about lake capacity and flooding prompted the decision to open the low gate when the water level reached 902.5' on July 2 as permitted in the Outlet Structure

Management Policy and Operating Procedures. The low gate was open for 20 days and closed on July 20 when lake levels dropped near 902.5'. The highest water elevation for Prior Lake in 2024 was recorded on 7/10/24 at 902.70'.

FIGURE 3 - LOW-FLOW GATE IN OPERATION

The water level sensor installed at the outlet structure recorded elevation data between March 8 and November 26. The average lake level recorded in 2024 was 901.02', similar to years 1922, 1974, and 2010. According to the U.S. Drought Monitor, Scott County was categorized as experiencing abnormally dry conditions during the span of the year leading to less than average flows and dry channel conditions.

At certain lake levels, the low-flow gate allows more water through the outlet structure, resulting in the lake level lowering more quickly and creating more storage (see Attachment C). The low-flow gate was operated in 2024 due to rapid rise in water levels and consecutive rain events (Figure 3). The stage-discharge relationship curve is used to calculate flows and water quantities leaving Prior Lake.

There were 57 days of discharge during 2024. Total vertical volume of 1.10 feet was eliminated through the Prior Lake Outlet Structure seen in Attachment D. Attachment D also provides comparison between years on the overall usage of the Prior Lake Outlet Structure. The numbers shown are calculated based on the most accurate information available. They are not exact and are intended for yearly comparisons only. Attachments E and F show daily Prior Lake elevations. Attachment F also includes Pike Lake daily average water levels, which are highly correlated to Prior Lake water levels.

FIGURE 4 - THE "DAYLIGHT": BEGINNING OF THE OUTLET CHANNEL

OUTLET PIPE

The Outlet Pipe leads from the Outlet Structure to the beginning, or "daylight," of the outlet channel (Figure 4). It is buried underground for approximately 2075 feet, with 5 manholes and 7 access points (Figure 5).

MAINTENANCE

The entire length of the pipe is typically televised every two years to look for potential damage, areas in need of repair, blockages, and accumulated debris, and to assess whether the pipe is reaching full hydraulic capacity.

Chemical grouting was completed in 2018. 120 leaks were sealed, but it was originally estimated to only have 50. As the original leaks were sealed, it forced other leaks to start due to increased pressure. Visu-sewer documented all the seals with video.

In 2020, American Environmental televised the pipe revealing the lake outfall pipe is in good to fair condition, but multiple cracks and fractures were found in some segments. Several options were weighed to decide the best course of action. Some of the options include sealing the joints that fail pressure tests, lining the pipe, a combination of those two, or pipe bursting.

FIGURE 5 - MAP OF OUTLET PIPE

In 2022, American Environmental televised the pipe and found that the pipe is still in good to fair condition. However, many small longitudinal cracks, light to medium leaks, and light to medium mineral deposits around joints (sign of infiltration) were observed throughout entire length of the pipe. The contractor suggested cured-in-place-pipe (CIPP) lining as a suggested fix for the current observed issues. The pipe review summary is shown in Attachment H.

The current pipe is over 40 feet deep in some places, with narrow easements that would not allow a full pipe replacement. Throughout 2023 and 2024, watershed District staff, partners, and dedicated residents from across the watershed were determined to find funding to extend the life of Prior Lake's greatest line of defense against flooding. District staff and partners worked extensively to secure project funding, including lobbying for state bonding funds and applying for multiple grants. In August, the District was awarded a $850,000 MPCA "Stormwater Resiliency Implementation" grant that would cover approximately 90% of the estimated project cost. Construction of a CIPP project is expected to begin in the winter of 2025-2026, extending the lifespan of the pipe by another 50 years.

FIGURE 6 – CIPP DIAGRAM

OUTLET CHANNEL

FIGURE 7 - SEGMENT 4 RESTORATION IN 2022

The MOA cooperators' goals of the outlet channel include maintaining hydrologic capacity, reducing maintenance needs, providing long-term stability, improving water quality, increasing aesthetics, providing improved habitat, and providing consistency with city and county plans for parks and greenways. Several of these goals have been met, but the channel will always require maintenance. Between 2020 and 2022, several projects were performed along the channel to meet long-term goals including the FEMA funded restorations, removing driveway crossings, and cooperator led bank stabilization projects (Figures 7 & 8). In 2024, District staff created a GIS storymap highlighting many pieces of the outlet channel that can be found on the districts website and through this hyperlink:

https://storymaps.arcgis.com/stories/PriorLakeOutletChannel

MAINTENANCE

While the Outlet Structure is in full operation and discharging water, the District is required to perform regular inspections (at least once per week) of the Outlet Structure and the Outlet Channel in accordance with the Operating Procedures. Outlet Channel inspections were completed from March 8 to November 26 (Attachment B). Inspections look for debris or any other issues along the channel or at the structure. Debris, downed trees, and other materials are removed when they pose a risk, such as flooding or erosion. When debris is too difficult for PLSLWD staff to remove, the owner of that culvert, or land, will be contacted to address the issue.

FIGURE 8 - STRAUSS DRIVEWAY AND CULVERT REMOVAL IN 2021

A detailed report of this year's outlet channel inspections can be found in Attachment B, and an inventory of maintenance projects that have been completed in previous years can be found in Attachment I. The inventory provides a concise overview of PLOC activities while also providing information such as file names and locations within the District's electronic filing system that will allow for efficient retrieval of more detailed information, if needed. Please note there are 15 columns of data that summarize each project - these columns span two printed sheets of paper. For example, the first project listed on the inventory, Original Outlet Project 76-4, spans both sheet 1 of 6 and sheet 2 of 6.

Below is a summary of maintenance projects that have been completed in 2024:

- Deconstructed beaver dams in segments 5A and 8 to prevent bank erosion.
- Assessed sedimentation rates within the desiltation pond in segment 5C.

INSPECTIONS

The Outlet Channel was routinely inspected per the Prior Lake Outlet Channel Inspection Frequency Guidelines (Attachment K). Last updated in 2023, the PLOC Inspection Checklist and map are in Attachment J. Inspections were completed to identify and monitor erosion, blockages, construction activity or flooding problems and may result in adjustment of the low-flow gate or closure of the Outlet Structure main gate if maintenance is needed in the channel. Due to limited flows in 2024, a reduced inspection routine was implemented during spring and fall months. A summary of annual inspections and channel activities are available in Attachment B.

MONITORING

Monitoring along the outlet channel in 2024 consisted of water quantity (flow), water quality (chemistry), vegetation surveys, and erosion monitoring (Figure 9). A part of this monitoring is funded by the MOA cooperators, and some is done for other programs or entities. Figure 9 below shows the location and types of monitoring sites location along the channel.

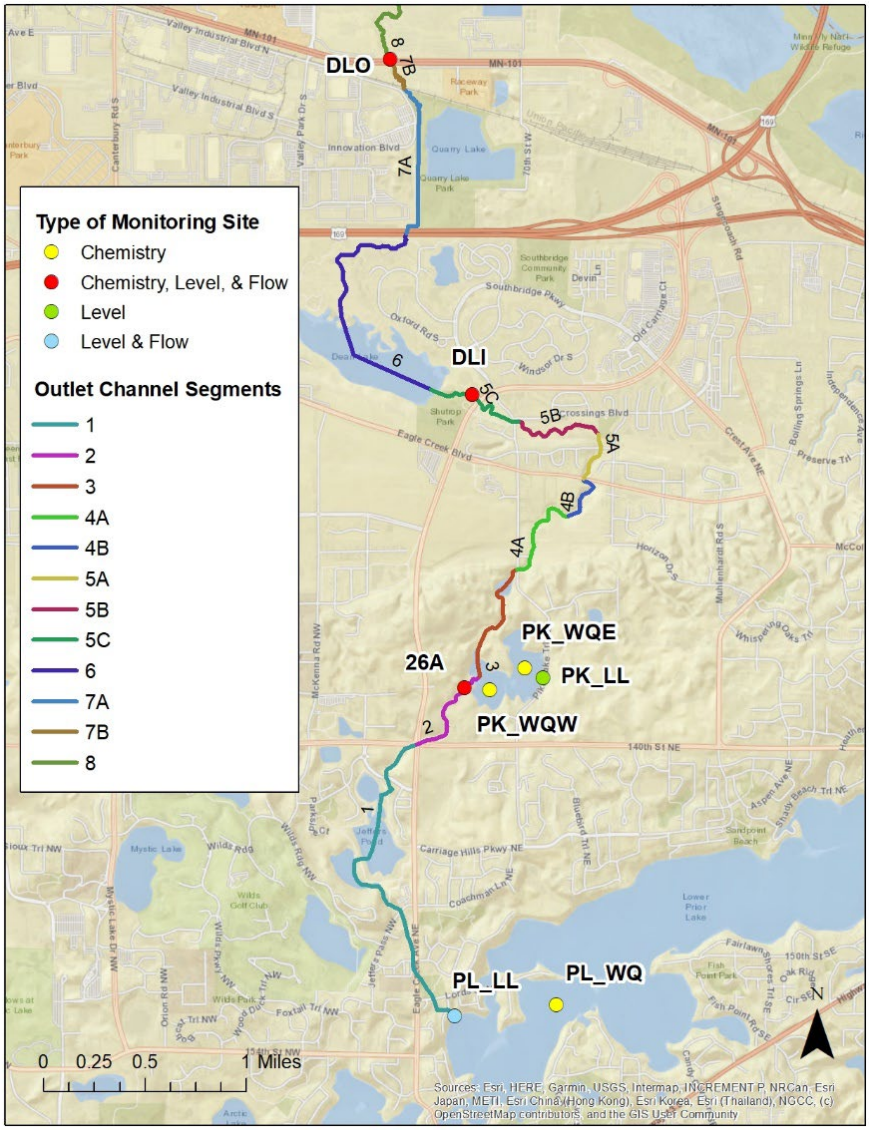


FIGURE 9 - PLOC MONITORING LOCATIONS

MONITORING SITES

From the beginning of the channel to the end, water quality, water level, and flow are collected by a collaboration of several organizations (Table 1).

LP_WQ: Water quality samples at this site are taken every two weeks by Three Rivers Park District which were contracted by PLSLWD. This water quality data represents the water quality at the very beginning of the channel. Samples are taken every 2 weeks for chlorophyll-A, total Kjeldahl nitrogen, total phosphorus, Secchi depth and several physical observations.

PL_LL: This site is located at the Prior Lake Outlet Structure. An automated level logger is connected to the structure and records water levels every 15 minutes. The data is then sent remotely to the PLSLWD website every 3 hours to update the hydrograph and discharge graph. Flow measurements are taken at the end of the outlet pipe, so by comparing flows to lake levels, we can calculate a relationship between lake level and flow. See Attachment F for the annual hydrograph and discharge graph.

26A, DLI, and DLO: These three sites are spaced evenly along the outlet channel. PLSLWD collected biweekly water quality samples at 26A, DLO. Scott SWCD collects water quality and flow data at DLI. Samples include temperature, dissolved oxygen, pH, conductivity, turbidity, Secchi tube, total phosphorus, orthophosphate, nitrite + nitrate, total Kjeldahl nitrogen, total suspended solids, total volatile suspended solids, and chloride data (Table 2).

PK_WQW and PK_WQE: Three Rivers Park District monitored lake water quality at two sites on Pike Lake, PK_WQW (west bay of Pike Lake) and PK_WQE (east bay of Pike Lake). Samples are collected bimonthly and analyzed at Three Rivers Park District's laboratory. Parameters that are sampled include temperature, dissolved oxygen, pH, conductivity, Secchi, Chlorophyll-a, total phosphorus, soluble reactive phosphorus, total nitrogen, and chlorides.

PK_LL: This site is located on the very east side of Pike Lake. An automated level logger was connected to a DNR-surveyed staff gauge. The level logger records water levels every 15 minutes and sends the data remotely to the PLSLWD website every 6 hours to update the hydrograph. Flow measurements are not taken at this site. See Attachment F for the annual hydrograph.

TABLE 1 DESCRIPTION OF MONITORING SITES

New Site Name	Old Site Name	Waterbody Type	Location	Monitored By	Type of Monitoring
LP_WQ	LP_CMP2	Lake	SW end of Lower Prior Lake in deep spot	Three Rivers Park District	Lake Water Quality
PL_LL	PL_OUT	Lake	Prior Lake Outlet Structure	PLSLWD Staff	Lake level and flow
26A	26A	Stream	Prior Lake Outlet Channel in Pike Lake Park	PLSLWD and SWCD Staff	Stream chemistry, water level, and flow
PK_WQW	PK_3RW	Lake	West bay of Pike Lake	Three Rivers Park District	Lake Water Quality
PK_WQE	PK_3RE	Lake	East bay of Pike Lake	Three Rivers Park District	Lake Water Quality

New Site Name	Old Site Name	Waterbody Type	Location	Monitored By	Type of Monitoring
PK_LL	PK_SG	Lake	Pike Lake Staff Gauge on east side of lake	PLSLWD	Lake Level
DLI	DLI	Stream	Prior Lake Outlet Channel at Hwy 21 before entering Dean Lake	Scott SWCD	Stream chemistry, water level, and flow
DLO	DLO	Stream	Prior Lake Outlet Channel at Hwy 101 near end of channel	PLSLWD and Scott SWCD	Stream chemistry, water level, and flow

Monitoring Data

Water level is recorded every 15 minutes at four points along the channel. Discharge is shown to increase as water travels downstream from the Outlet Structure to the end of the PLOC. This increase is due in part to runoff in the PLOC watershed, but it is also influenced by groundwater seeps mostly starting downstream of County Road 16.

Water chemistry samples are taken every two weeks at each of the stream monitoring sites when water is flowing in the channel. The following table shows the averages in 2024. The water quality is quite good along the channel, but it is clearest and best at the end. Chemistry data over the last three years was higher across many parameters compared to previous years; this may be explained by the lower volume of water, which can lead to higher concentrations in some parameters.

Table 2 – 2024 Water Quality of Stream Sites (annual average)

Site	CL mg/L	SPCOND uS/cm	DO mg/L	PH units	Nitrate/Nitrite mg/L	Temp C	TP mg/L	Turbidity FNU	TSS mg/L	SECCHI TUBE cm	TSVS mg/L
26A	95.19	591.30	9.07	8.15	0.09	16.74	0.07	2.48	5.19	100.00	1.87
DLO	58.90	449.10	6.94	7.55	0.04	16.31	0.07	0.67	1.78	97.86*	1.53

*average includes some Secchi tube readings that were >100cm. The >100cm was changed to 100cm for purposes of finding an average.

Precipitation

Precipitation can highly affect water quality and water levels. Precipitation was consistently recorded at the Prior Lake public works weather station, with 33.63” of recorded rainfall. Precipitation in 2024 was 0.5% below the 1991-2020 average of 33.8” provided by the National Climatic Data Center. 81.24% of the annual precipitation occurred from April through August. The precipitation data is summarized in Attachment G.

Vegetation and Erosion Monitoring

The Prior Lake Outlet Channel has been routinely inspected twice annually to document the channel condition, survey debris and log jams, and inspect culverts and road crossings for obstructions to flow. Starting in the fall of 2017, a vegetation assessment was conducted concurrently with the channel condition inspection to assess previously managed areas for invasive plant species and document any satellite populations of invasive species growing within the PLOC easements. Following the assessment, recommendations have been provided to address certain populations of invasive species growing along the channel.

Emmons and Olivier Resources, Inc is the contractor who has conducted vegetation surveys and channel condition inspections for segments 1 through 7 since 2011. Segment 8, which is under management by the United States Fish & Wildlife Service, was not assessed. For the spring and fall assessments, a series of photographs were taken in each segment to characterize the condition of the outlet channel, assess any new areas of bank erosion, and document any obstructions to flow such as fallen trees, debris piles, or culvert blockages.

These reports can be found on the PLSLWD website with a summary of recommendations for continued channel and vegetation management since 2014.

FIGURE 10 - BOULDER TOE BANK STABILIZATION IN SEGMENT 7A

Permits

In 2024 the District did not have any open permits along the PLOC. The following projects were reviewed or organized by the District but were not permitted by the District:

- Villas at Crest Woods – Preliminary Plat & Stormwater Management Plan review
- Stone Path – Preliminary Plat and Stormwater Management Plan review
- Jeffers Pond 10th Addition – Construction & Stormwater Management Plan approval
- Whispering Waters 2nd Addition – Construction (ongoing)
- Pike Lake Landing – Individual Lot Development (ongoing)

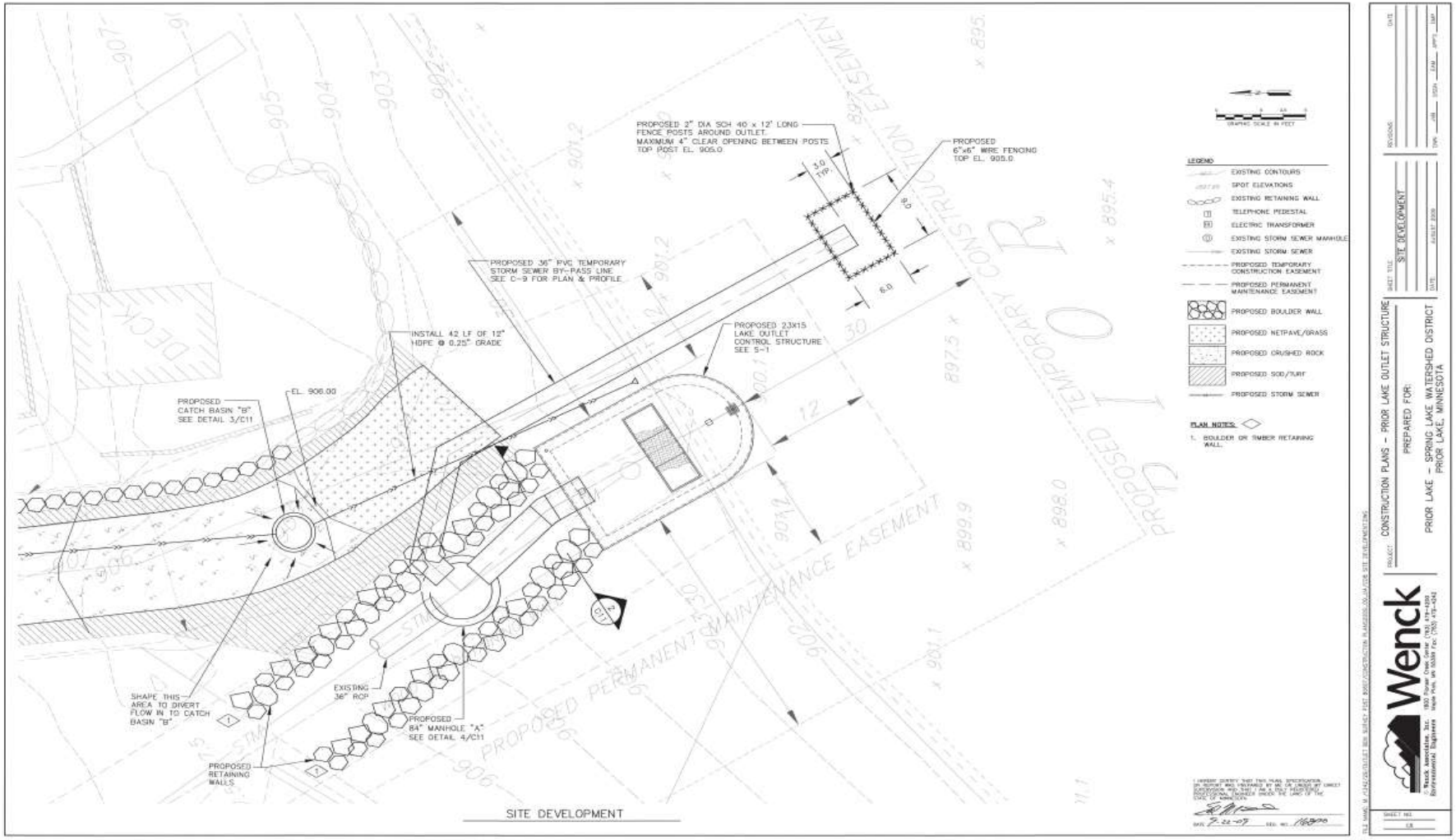
EASEMENTS

The District holds drainage easements along most of the Outlet Channel. Holding an easement allows the District to access and maintain the channel and the land within the easement area. For example, because of damage to the channel by the 2014 flood, bank repair was needed along much of the channel. During the preparatory review process for this work, it was found that some of the easements did not align with the channel, thus requiring amendment. These unalignments could be attributed to the channel shifting over time or due to errors in the legal description when it was established. Although the existing easements may be erroneous, the District retains prescriptive rights along the channel.

Another example is the 2022 upper segment 4 restoration, where the channel had drifted to the edge of the easement. Bank stabilization work was carefully completed within temporary easements, allowing contractors to realign the channel into current easement boundaries. There are still locations along the channel that need easements or alignment amendments. Per direction provided by the Cooperators, easement purchases or amendments will not be pursued until the land ownership changes or development occurs.

In February 2024, work was completed on a PLOC easement inventory project establishing protocols for updating the easement database. District staff identified all parcels along the PLOC and determining if drainage easements exist within the recorded plats. The inventory summarized the following information: PID number, PLOC segment number, Whether an easement exists for the parcel, Easement number (if it exists), Whether the easement is shown on a recorded plat, and Plat name. Cooperators agreed on keeping staff updated on developments to maintain the inventory moving forward.

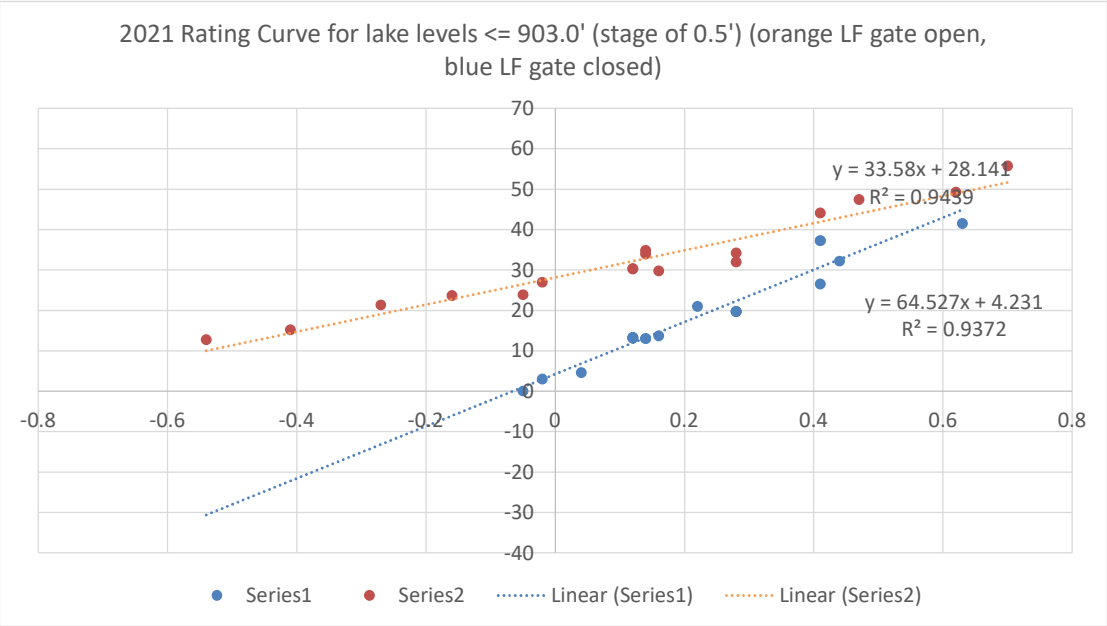
Attachment A. Prior Lake Outlet Structure Diagram

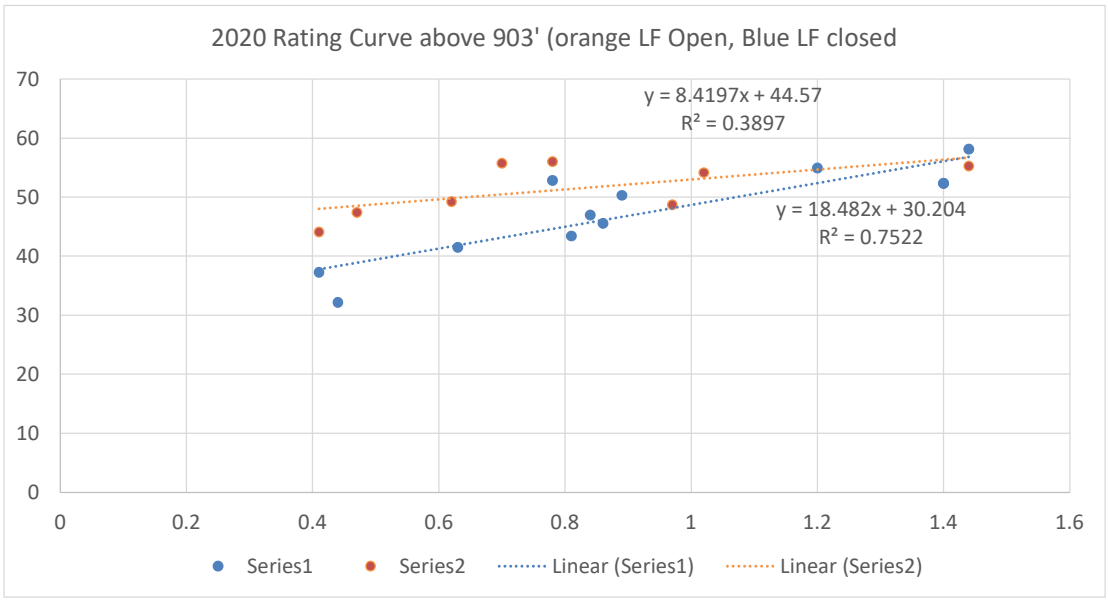


Attachment B. Annual Outlet Channel Operations Summary

Date	Elevation	Outlet Activity	Inspections/Channel Activity
3/8/2024	898.73	Monitoring	Installed outlet structure water level sensors. Both inner and outer wells. Ice out on March 3.
4/2/2024	898.83	Inspection	Channel inspection focused between Segment 1 and Segment 5.
4/23/2024	899.07	Inspection	Channel inspection focused between Segment 6 and Segment 8.
4/26/2024	899.13	Inspection	Channel inspection of Segment 5.
5/1/2024	899.46	Inspection	EOR assessed Segment 1 to Segment 7.
5/8/2024	899.64	Inspection	Channel Inspections.
5/13/2024	899.71	Inspection	SMSC Meeting to discuss carp barriers in the PLOC.
6/3/2024	900.6	Inspection	Channel Inspections.
6/21/2024	901.59	Inspection	Channel inspection focused on Segment 4.
6/27/2024	902.16	Inspection	Channel inspection focused on Segment 1.
7/2/2024	902.5	Operations	Opened low-flow gate.
7/3/2024	902.51	Inspection	Inspected the outlet structure.
7/8/2024	902.73	Inspection/Maintenance	Cleared vegetation build-up from the Outlet Structure.
7/12/2024	902.73	Inspection/Maintenance	Cleared vegetation build-up from the Outlet Structure.
7/15/2024	902.71	Monitoring	Segment 5C desiltation pond survey.
7/16/2024	902.69	Inspection	Channel inspections and cleared vegetation build-up from outlet structure.
7/19/2024	902.58	Inspection/Maintenance	Channel inspections and cleared vegetation build-up from outlet structure.
7/22/2024	902.52	Operations	Cleared vegetation build-up from the Outlet Structure and closed the low-flow gate.
7/23/2024	902.51	Inspection/Maintenance	District/EOR invasive species management in segments 1, 4,5, and 7.
7/25/2024	902.48	Operations	Seg5 Sedimentation
8/9/2024	902.57	Inspection	Channel inspections focused on Segment 1.
8/26/2024	902.43	Inspection	Channel inspections focused on Segment 4.
8/28/2024	902.48	Inspection	Channel inspections focused on Segment 1.
8/30/2024	902.47	Inspection	Channel inspections focused on Segment 4.
10/7/2024	901.6	Inspection	Inspecting Segment 7 for invasive vegetation management.
10/16/2024	901.41	Inspection	EOR assessed Segment 1 to Segment 7
10/22/2024	901.28	Inspection	Channel inspections. Removed beaver dam at Segement 8
11/21/2024	901.24	Inspection	Inspecting Segment 7 for invasive vegetation treatment.
11/26/2024	901.17	Monitoring	Uninstalled water level sensors. Icing.

Attachment C. Stage-Discharge Relationship





Attachment D. Volumes Discharged from Prior Lake

Volumes Discharged from the Prior Lake Outlet and Associated Elevations								
Year	Volume Discharged (ac*ft)	Depth Eliminated from Lake (ft)	Min Elevation for the Year	Date of Min Elevation	Max Elevation for the Year	Date of Max Elevation	Max Elevation *without* Outlet	Annual Rainfall
2024	2077	1.10	898.56	3/23/2024	902.74	7/10/2024	903.84	*33.63*
2023	0.00	0.00	898.77	8/3/2023	901.17	5/21/2023	901.17	24.08
2022	0.00	0.00	898.34	11/21/2022	900.93	5/30/2022	900.93	18.68
2021	700	0.37	900.58	10/1/2021	902.62	4/28/2021	902.99	20.63
2020	8841	4.53	898.56	12/2/2020	902.74	5/27/2020	907.27	32.63
2019	21468	10.40	902.02	12/19/2019	903.93	3/30/2019	914.33	39.95
2018	11785	5.98	902.00	9/16/2018	903.32	6/26/2018	909.30	34.52
2017	11942	6.00	902.35	8/13/2017	903.56	5/29/2017	909.56	32.4
2016	9351	4.80	898.56	8/9/2016	902.74	12/1/2016	907.54	36.74
2015	3043	1.60	901.09	3/20/2015	902.91	12/21/2015	904.51	35.74
2014	12028	6.10	900.1	3/28/2014	906.16	6/30/2014	912.26	36.44
2013	7609	3.93	900.25	3/28/2013	903.95	7/22/2013	907.88	33.25
2012	5751	3.00	900.48	12/6/2012	903.59	6/25/2012	906.59	30.57
2011	20314	9.93	900.87	12/28/2011	903.95	4/5/2011	913.88	26.07
2010	1110	0.59	899.38	1/14/2010	902.78	12/23/2010	903.37	37.23
2009	0	0.00	898.98	9/30/2009	900.44	4/29/2009	900.44	27.41
2008	4993	2.61	900.28	12/29/2008	902.90	5/8/2008	905.51	23.88
2007	1395	0.74	900.55	8/10/2007	902.78	4/23/2007	903.52	28.59
2006	4331	2.27	900.50	12/14/2006	903.27	4/7/2006	905.54	27.77
2005	2299	1.21	900.71	1/18/2005	903.10	10/18/2005	904.31	38.02
2004	13	0.01	900.50	4/15/2004	902.79	7/12/2004	902.80	32.96
2003	5921	3.08	900.62	12/30/2003	903.17	5/23/2003	906.25	23.00
2002	9520	4.88	900.70	3/4/2002	903.60	9/10/2002	908.48	41.96
2001	8692	4.47	901.04	12/28/2001	904.28	5/7/2001	908.75	28.52
2000	80	0.04	901.52	2/20/2000	903.00	7/11/2000	903.04	26.09
1999	6240	3.24	902.00	11/25/1999	904.78	5/27/1999	908.02	33.29
1998			*902.05*	*1/1/1998*	*903.90*	*4/13/1998*		*35.00*
1997	4150	2.18	901.20	2/28/1997	902.90	4/21/1997	905.08	*32.36*
1996			*900.77*	*11/4/1996*	*902.98*	*4/10/1996*		*26.52*
1995			*902.26*	*9/26/1995*	*903.25*	*3/30/1995*		*30.62*
1994	1760	0.93	901.90	9/7/1994	903.05	10/24/1994	903.98	*35.28*
1993	10000	5.12	902.00	3/9/1993	904.49	7/14/1993	909.61	*36.40*
1992	8331	4.29	899.95	2/19/1992	903.16	10/12/1992	907.45	35.86
1991			*898.11*	*4/1/1991*	*900.92*	*6/13/1991*		
1990			*895.46*	*4/24/1990*	*899.38*	*8/10/1990*		
1989			*895.49*	*11/27/1989*	*897.15*	*4/3/1989*		
1988			*896.90*	*11/11/1988*	*899.63*	*1/1/1988*		
1987			*899.63*	*12/31/1987*	*901.54*	*3/6/1987*		
1986			*901.22*	*2/14/1986*	*903.96*	*5/15/1986*		
1985			*902.23*	*9/12/1985*	*903.93*	*4/25/1985*		
1984			*901.75*	*10/9/1984*	*903.60*	*6/24/1984*		
1983	Outlet Installed		*901.76*	*1/17/1983*	*905.68*	*7/20/1983*		
1982			*900.06*	*3/24/1982*	*902.56*	*5/21/1982*		
1981			*898.91*	7/31/1981	*899.88*	*9/17/1981*		
1980			*899.92*	*12/29/1980*	*902.60*	*4/18/1980*		
Average	**6805 (when operated)**	**3.46 (when operated)**	**900.24**		**902.79**		**906.27**	**31.40**
Unless otherwise noted, data is taken from annual Prior Lake Outlet operations reports								
Italicized rainfall data is from MN Climatology office for 115N, 22W, 15 Prior Lake; all other rainfall as recorded at PLSLWD Office								
Italicized lake level data is from PLSLWD Historic Volunteer Collected Lake Level Data								

Attachment E. 2024 Prior Lake Elevations and Precipitation

Elevation		Precipitation	
Average	901.02	**Yearly Total**	33.63
Minimum	898.56	**Max 1 Day**	1.95
Maximum	902.74		

Daily Average Lake Level is calculated from an automated logger located on the outside of the trash barrier on the Outlet Structure.
Staff Gage is located under Highway 21 Wagon Bridge on pillar. The automated logger is calibrated to the staff gauge readings.
Precipitation values are recorded from the Prior Lake public works weather station located near Eagle Creek Ave SE and Adelmann St SE.

Date	Daily Average Lake Level	Staff Gage	Precipitation
1/1			0.00
1/2			0.00
1/3			0.00
1/4			0.00
1/5			0.00
1/6			0.00
1/7			0.00
1/8			0.00
1/9			0.00
1/10			0.00
1/11			0.00
1/12			0.00
1/13			0.00
1/14			0.00
1/15			0.00
1/16			0.00
1/17			0.00
1/18			0.00
1/19			0.00
1/20			0.00
1/21			0.00
1/22			0.00
1/23			0.00
1/24			0.00
1/25			0.01
1/26			0.01
1/27			0.00
1/28			0.00
1/29			0.00
1/30			0.00
1/31			0.00
2/1			0.00
2/2			0.00
2/3			0.00
2/4			0.00
2/5			0.00
2/6			0.00
2/7			0.00
2/8			0.32
2/9			0.01

Date	Daily Average Lake Level	Staff Gage	Precipitation
2/10			0.00
2/11			0.00
2/12			0.00
2/13			0.00
2/14			0.00
2/15			0.01
2/16			0.00
2/17			0.00
2/18			0.07
2/19			0.01
2/20			0.00
2/21			0.00
2/22			0.00
2/23			0.00
2/24			0.00
2/25			0.00
2/26			0.00
2/27			0.00
2/28			0.00
3/1			0.00
3/2			0.00
3/3			0.00
3/4			0.00
3/5			0.00
3/6			0.00
3/7			0.00
3/8	898.73	898.70	0.00
3/9	898.63		0.00
3/10	898.61		0.00
3/11	898.65	898.68	0.00
3/12	898.67		0.00
3/13	898.66		0.00
3/14	898.65		0.00
3/15	898.65		0.00
3/16	898.64		0.00
3/17	898.62		0.00
3/18	898.61		0.00
3/19	898.60		0.00
3/20	898.57		0.00
3/21	898.56		0.00
3/22	898.57		0.00
3/23	898.56		0.10
3/24	898.58		0.00
3/25	898.74		0.01
3/26	898.93		0.93
3/27	898.90		0.27
3/28	898.87		0.00
3/29	898.86		0.00
3/30	898.84		0.00
3/31	898.84		0.00
4/1	898.83		0.00
4/2	898.83		0.00

Date	Daily Average Lake Level	Staff Gage	Precipitation
4/3	898.82	898.68	0.08
4/4	898.78		0.00
4/5	898.77		0.00
4/6	898.79		0.00
4/7	898.85		0.00
4/8	898.88		0.59
4/9	898.86	898.74	0.27
4/10	898.88		0.03
4/11	898.89		0.00
4/12	898.86		0.00
4/13	898.89		0.00
4/14	898.86		0.00
4/15	898.85		0.00
4/16	898.87		0.00
4/17	898.93		1.40
4/18	899.02		0.05
4/19	899.07		0
4/20	899.08		0
4/21	899.08		0
4/22	899.09		0
4/23	899.07	898.97	0
4/24	899.07		0
4/25	899.09		0
4/26	899.12		0
4/27	899.17		0.14
4/28	899.23		0.22
4/29	899.29		0.86
4/30	899.34		0.04
5/1	899.40		0.44
5/2	899.46		0.00
5/3	899.51		0.72
5/4	899.57		0.00
5/5	899.58		0.29
5/6	899.62		0.00
5/7	899.64		0.00
5/8	899.64		0.25
5/9	899.65		0.00
5/10	899.68		0.00
5/11	899.69		0.00
5/12	899.71		0.00
5/13	899.71		0.03
5/14	899.72		0.00
5/15	899.73		0.00
5/16	899.74		0.20
5/17	899.76		0.03
5/18	899.78		0.34
5/19	899.78		0.08
5/20	899.80		0.00
5/21	899.87		0.19
5/22	899.96		1.95
5/23	900.05		0.01
5/24	900.11		0.00

Date	Daily Average Lake Level	Staff Gage	Precipitation
5/25	900.12		0.21
5/26	900.13		0.00
5/27	900.17		0.00
5/28	900.19		0.36
5/29	900.21	900.24	0.09
5/30	900.22		0.00
5/31	900.24		0.55
6/1	900.29		0.04
6/2	900.35		0.73
6/3	900.60	900.53	1.02
6/4	900.62		0.31
6/5	900.67		0.01
6/6	900.69		0.01
6/7	900.73		0.00
6/8	900.77		0.06
6/9	900.80		0.00
6/10	900.82		0.00
6/11	900.85	900.91	0.06
6/12	900.90		0.57
6/13	900.98		0.38
6/14	900.99		0.00
6/15	901.04		0.64
6/16	901.20		0.48
6/17	901.34		0.89
6/18	901.41		0.07
6/19	901.44		0.01
6/20	901.48		0.03
6/21	901.59		1.21
6/22	901.84		0.75
6/23	901.93		0.00
6/24	901.99		0.00
6/25	902.05		0.00
6/26	902.11		0.02
6/27	902.16		0.07
6/28	902.27		0.95
6/29	902.33		0.01
6/30	902.38		0.00
7/1	902.42		0.00
7/2	902.48	902.50	0.15
7/3	902.51		0.00
7/4	902.60		1.44
7/5	902.68		0.12
7/6	902.68		0.00
7/7	902.68		0.07
7/8	902.73	902.75	0.00
7/9	902.73	902.76	0.03
7/10	902.74		0.46
7/11	902.74		0.00
7/12	902.73		0.00
7/13	902.70		0.00
7/14	902.70		0.05
7/15	902.71		0.14

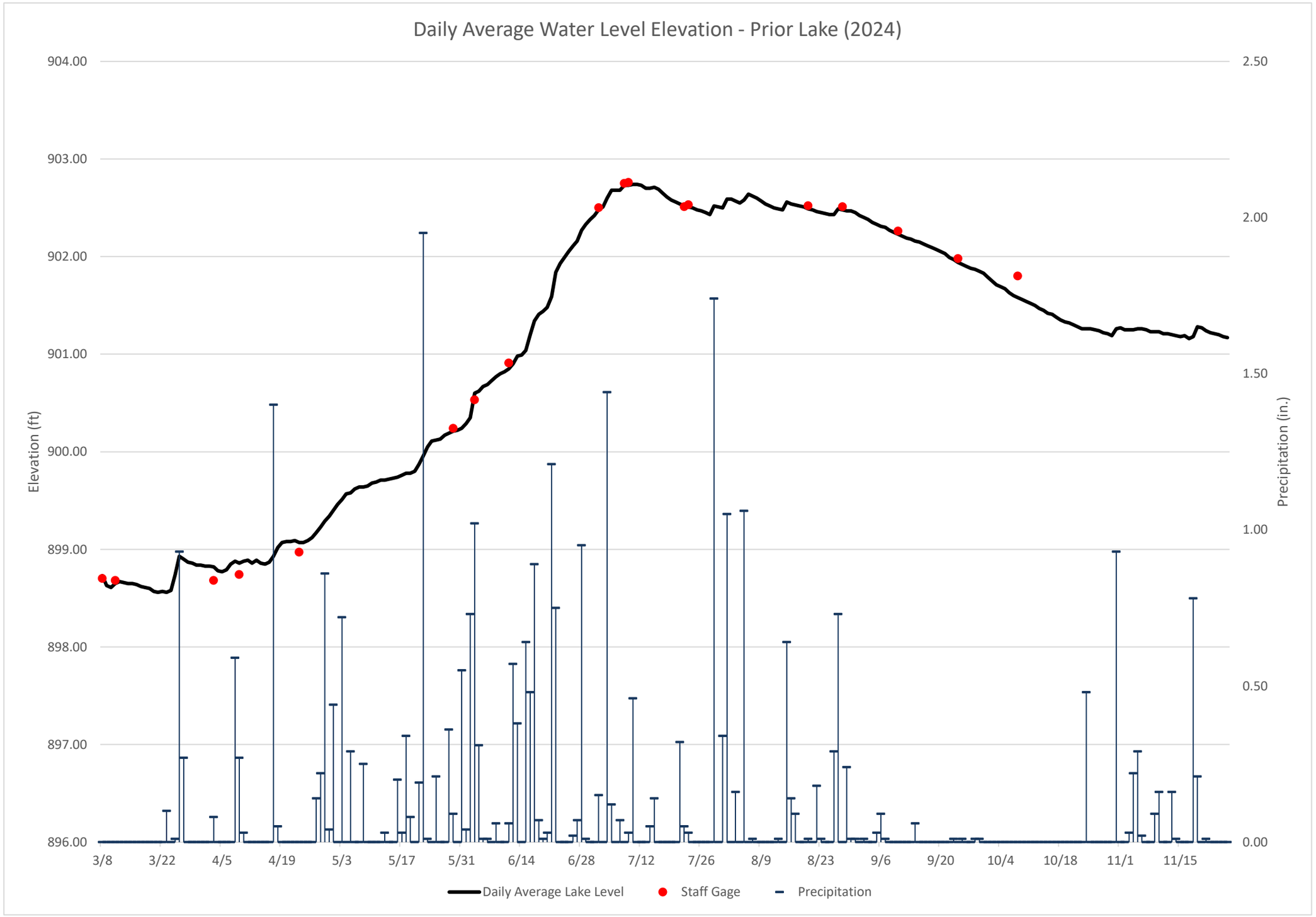
Date	Daily Average Lake Level	Staff Gage	Precipitation
7/16	902.69		0.00
7/17	902.65		0.00
7/18	902.61		0.00
7/19	902.58		0.00
7/20	902.56		0.00
7/21	902.54		0.32
7/22	902.52	902.51	0.05
7/23	902.51	902.53	0.03
7/24	902.50		0.00
7/25	902.48		0.00
7/26	902.47		0.00
7/27	902.45		0.00
7/28	902.43		0.00
7/29	902.52		1.74
7/30	902.51		0.00
7/31	902.50		0.34
8/1	902.59		1.05
8/2	902.59		0.00
8/3	902.57		0.16
8/4	902.55		0.00
8/5	902.58		1.06
8/6	902.64		0.00
8/7	902.62		0.01
8/8	902.60		0.00
8/9	902.57		0.00
8/10	902.54		0.00
8/11	902.52		0.00
8/12	902.50		0.00
8/13	902.49		0.01
8/14	902.48		0.00
8/15	902.56		0.64
8/16	902.54		0.14
8/17	902.53		0.09
8/18	902.52		0.00
8/19	902.51		0.00
8/20	902.49	902.52	0.01
8/21	902.48		0.00
8/22	902.46		0.18
8/23	902.45		0.01
8/24	902.44		0.00
8/25	902.43		0.00
8/26	902.43		0.29
8/27	902.49		0.73
8/28	902.48	902.51	0.00
8/29	902.47		0.24
8/30	902.47		0.01
8/31	902.45		0.01
9/1	902.42		0.00
9/2	902.40		0.01
9/3	902.38		0.00
9/4	902.35		0.00
9/5	902.33		0.03

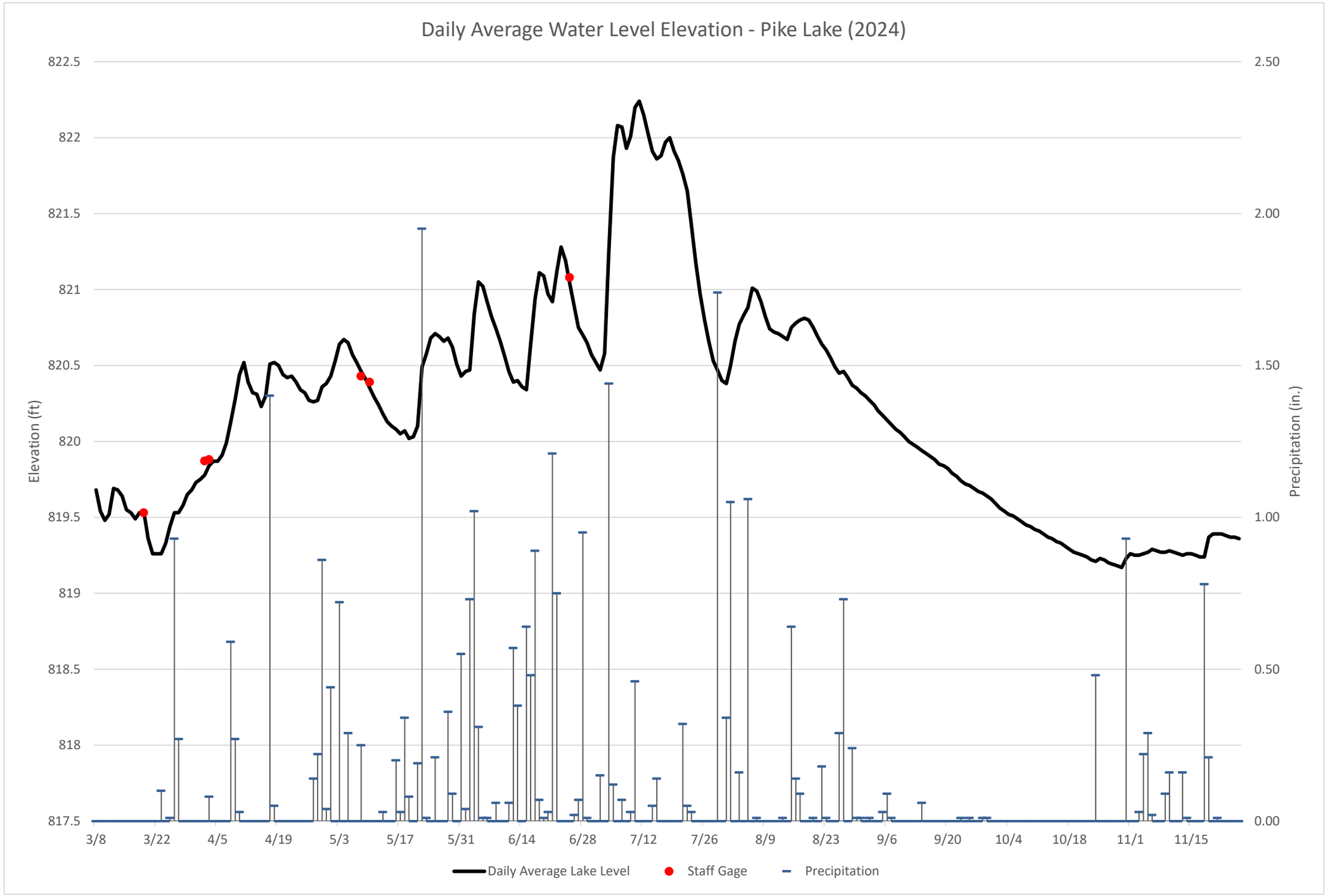
Date	Daily Average Lake Level	Staff Gage	Precipitation
9/6	902.31		0.09
9/7	902.30		0.01
9/8	902.27		0.00
9/9	902.25		0.00
9/10	902.23	902.26	0.00
9/11	902.21		0.00
9/12	902.19		0.00
9/13	902.18		0.00
9/14	902.16		0.06
9/15	902.15		0.00
9/16	902.13		0.00
9/17	902.11		0.00
9/18	902.09		0.00
9/19	902.07		0.00
9/20	902.05		0.00
9/21	902.03		0.00
9/22	901.99		0.00
9/23	901.97		0.01
9/24	901.94	901.98	0.00
9/25	901.92		0.01
9/26	901.90		0.00
9/27	901.88		0.00
9/28	901.87		0.01
9/29	901.85		0.01
9/30	901.83		0.00
10/1	901.79		0.00
10/2	901.75		0.00
10/3	901.71		0.00
10/4	901.69		0.00
10/5	901.67		0.00
10/6	901.63		0.00
10/7	901.60		0.00
10/8	901.58	901.80	0.00
10/9	901.56		0.00
10/10	901.54		0.00
10/11	901.52		0.00
10/12	901.50		0.00
10/13	901.47		0.00
10/14	901.45		0.00
10/15	901.42		0.00
10/16	901.41		0.00
10/17	901.38		0.00
10/18	901.35		0.00
10/19	901.33		0.00
10/20	901.32		0.00
10/21	901.30		0.00
10/22	901.28		0.00
10/23	901.26		0.00
10/24	901.26		0.48
10/25	901.26		0.00
10/26	901.25		0.00
10/27	901.24		0.00

Date	Daily Average Lake Level	Staff Gage	Precipitation
10/28	901.22		0.00
10/29	901.21		0.00
10/30	901.19		0.00
10/31	901.26		0.93
11/1	901.27		0.00
11/2	901.25		0.00
11/3	901.25		0.03
11/4	901.25		0.22
11/5	901.26		0.29
11/6	901.26		0.02
11/7	901.25		0.00
11/8	901.23		0.00
11/9	901.23		0.09
11/10	901.23		0.16
11/11	901.21		0.00
11/12	901.21		0.00
11/13	901.20		0.16
11/14	901.19		0.01
11/15	901.18		0.00
11/16	901.19		0.00
11/17	901.16		0.00
11/18	901.18		0.78
11/19	901.28		0.21
11/20	901.27		0.00
11/21	901.24		0.01
11/22	901.22		0.00
11/23	901.21		0.00
11/24	901.20		0.00
11/25	901.18		0.00
11/26	901.17		0.00
11/27			0.00
11/28			0.00
11/29			0.00
11/30			0.00
12/1			0.00
12/2			0.00
12/3			0.00
12/4			0.01
12/5			0.00
12/6			0.00
12/7			0.00
12/8			0.00
12/9			0.00
12/10			0.00
12/11			0.00
12/12			0.00
12/13			0.00
12/14			0.00
12/15			0.03
12/16			0.00
12/17			0.00
12/18			0.00

Date	Daily Average Lake Level	Staff Gage	Precipitation
12/19			0.00
12/20			0.00
12/21			0.00
12/22			0.07
12/23			0.02
12/24			0.00
12/25			0.00
12/26			0.12
12/27			0.60
12/28			0.06
12/29			0.01
12/30			0.01

Attachment F.




Daily Average Water Level Elevation - Pike Lake (2024)
822.5
822
821.5
821
820.5
820
819.5
819
818.5
818
817.5
Elevation (ft)
2.50
2.00
1.50
1.00
0.50
0.00
Precipitation (in.)
3/8
3/22
4/5
4/19
5/3
5/17
5/31
6/14
6/28
7/12
7/26
8/9
8/23
9/6
9/20
10/4
10/18
11/1
11/15
Daily Average Lake Level
Staff Gage
Precipitation

Attachment G. Summary of Precipitation within PLSLWD

Month	2024* Rain Gauge Readings (inches)	PLSLWD 2024 YTD (in.)	NOAA Prior Lake, MN 30yr mo avg**	NOAA Prior Lake, MN 30yr YTD avg	Monthly % Deviation***	Monthly Numeric Deviation	YTD % Deviation	YTD Numeric Deviation
Jan	0.02	0.02	0.95	0.95	-97.9%	-0.93	-97.9%	-0.93
Feb	0.42	0.44	1.02	1.97	-58.8%	-0.60	-77.7%	-1.53
Mar	1.31	1.75	1.88	3.85	-30.3%	-0.57	-54.5%	-2.10
Apr	4.12	5.87	3.13	6.98	31.6%	0.99	-15.9%	-1.11
May	5.3	11.17	4.33	11.31	22.4%	0.97	-1.2%	-0.14
Jun	8.32	19.49	4.78	16.09	74.1%	3.54	21.1%	3.40
Jul	4.94	24.43	4.25	20.34	16.2%	0.69	20.1%	4.09
Aug	4.64	29.07	4.56	24.90	1.8%	0.08	16.7%	4.17
Sep	0.24	29.31	3.22	28.12	-92.5%	-2.98	4.2%	1.19
Oct	1.41	30.72	2.72	30.84	-48.2%	-1.31	-0.4%	-0.12
Nov	1.98	32.70	1.71	32.55	15.8%	0.27	0.5%	0.15
Dec	0.93	33.63	1.25	33.80	-25.6%	-0.32	-0.5%	-0.17
Year Total	33.63	inches	33.8	inches			-0.5%	-0.17

*measurements recorded by: KMNPRIOR35 Prior Lake Public Works building office gauge

** NOAA 30 Climate Normals in Prior Lake, MN for the years 1991-2020

***Deviation is calculated by the difference between the current year PLSLWD average and the 30 year NOAA Climate Normals

May 19,2022

American Environmental LLC

3086 Walden Drive Chaska, MN 55318
Phone (612) 226-0516
Email: Midwesttony81@aol.com

Project Bid

Prepared for:

Joni Giese, ASLA, PLA
Administrator
Direct: (952) 440-0067
4646 Dakota Street SE, Prior Lake MN 55372
www.plslwd.org | (952)-447-4166

Pipe review

2243' 36'' RCP Storm sewer Recommendations for rehab:

MH – outlet:
Observations:
Overall, this pipe is in good condition except for small longitudinal cracks throughout the top section of the pipe.
No visible leaks were seen however there is signs of infiltration from a few joints and lift holes.
Suggested fix: CIPP lining of sewer section

MH 2 – MH 1:
Observations:
Overall, this pipe is in good condition except for small longitudinal and circumferential cracks throughout the top section of the pipe.
Light visible leaks were seen and there are signs of infiltration from a few joints and lift holes.
Light to medium mineral deposits around joints.(sign of infiltration)
Light root intrusion was noticeable from lift holes.
1-2'' of unattached debris and organics throughout the bottom of pipe section
Suggested fix: CIPP lining of sewer section

May 19,2022

MH 3 – MH 2:
Observations:
Overall, this pipe is in fair condition except for small longitudinal and circumferential cracks throughout the top section of the pipe.
Light to medium visible leaks were seen and there are signs of infiltration from a few joints.
Light to medium mineral deposits around joints.(sign of infiltration)
1'' of unattached debris and organics through the pipe section
Suggested fix: CIPP lining of sewer section

MH 4 – MH 3:

Please note: Video data was Miss labeled as pipe segment reference 4-2 on the video screen and should be 4-3
Observations:
Concrete appears to be deteriorated from the downstream manhole going upstream 132'
Overall, this pipe is in fair condition except for small longitudinal cracks throughout the top section of the pipe.
Medium visible leaks were seen and there are signs of infiltration from majority of the joints.
Light to medium mineral deposits around joints.(sign of infiltration)
Less than 1'' of unattached debris and organics through the pipe section
Suggested fix: CIPP lining of sewer section

MH 5 – MH 4:
Observations:
Concrete appears to show light deterioration from MH 5 downstream 225'
Light visible leaks were seen and there are signs of infiltration from a few joints.
Light mineral deposits around joints.(sign of infiltration)
Less than 1'' of unattached debris and organics through the pipe section
Suggested fix: CIPP lining of sewer section

Inlet 1 – MH 5:
Observations:
Overall, this pipe is in good condition except for small longitudinal and circumferential cracks throughout the top section of the pipe.
Light visible leaks were seen and there are signs of infiltration from a few joints.
Light mineral deposits around joints.(sign of infiltration)
Less than 1'' of unattached debris and organics through the pipe section
Suggested fix: CIPP lining of sewer section

May 19,2022

Possible Lining contractors:

Ross Kramer | **Senior Estimator** | **Insituform Technologies USA, LLC**
1140 Bunker Lake Blvd NW | Anoka, MN 55303
Cell: 612.518.0087 | **rkramer@insituform.com**

Chuck Delaney
Vice President General Manager
S.J. Louis Trenchless LLC.
Cell: 320-247-3297
Email: Cdelaney@SJLtrenchless.com

Willie Grams
Senior Project Manager - Midwest North
Pipe Services Operations
office: 920.924.4300 | fax: 920.924.4377 | cell: 920.392.4589
wgrams@michels.us
PO Box 128 | 817 Main Street | Brownsville, WI 53006

Attachment I

Below is a summary of maintenance, construction, and development projects within the drainage area of the Prior Lake Outlet Channel that have been completed each year:

- 2006
  - Work completed on Segment 1 in 2006 consisted of bank stabilizations, increased native plantings and a creation of a spillway between Upper and Lower Jeffers Ponds.
- 2007
  - A basin was excavated and sinuosity was added to the channel in Segment 5c prior to entering Dean Lake during the early portion of 2007.
- 2009
  - Replacement of an undersized culvert on the northern end of Segment 8.
- 2010
  - Finalization of work in several segments including reshaping banks
  - Toe stabilization and weir reinforcements in Segment 7a.
  - Toe stabilization, bank protections and flow realignment in Segment 3.
  - Built up the channel bed and reconnected it to the floodplain in Segment 2.
- 2012
  - Site checks were made throughout 2012 to ensure stability against erosion and vegetation establishment within the areas of previous work in Segments 2, 3, and 7a.
- 2013
  - Three failing culverts were replaced between Segments 3 and 4B (Pike Lake Road, Jackson Trail, and Gonyea field crossing).
  - Vegetation along the channel was managed for herbaceous invasives by EOR and woody invasives by Applied Ecological Services. Garlic mustard was hand cut in Segments 3-8. Small populations of common burdock were cut in Segments 4A, 4B, and 8. Block locust, common buckthorn, and Tatarian honeysuckle suckers and seedlings were treated in segments 1, 3, 4A, 5C, 6, and 7A.
- 2014 – Prior Lake flooding occurred
  - Garlic mustard was hand cut with a weed cutter in segments 3-7 by EOR.
  - Wild Parsnip was hand cut with a weed cutter in segment 1 by EOR (only location wild parsnip was found).
  - A foliar spray was applied for woody invasives (black locust, common buckthorn, and honeysuckle) in segments 1, 3, 4a, 5c, 6, and 7a by AES.
- 2015
  - Garlic mustard was hand cut by EOR on May 15 in segments 3 through 8.
  - EOR released flea beetles on June 26 in Segment 7 to treat the leafy spurge in that segment.
  - Downed trees were removed from the channel by WHR.
  - Segment 4A was realigned by Sunram to protect field road from eroding (EOR design). Trees replaced by Scott Soil and Water Conservation District (SWCD).
  - The Shakopee Mdewakanton Sioux Community replaced the KiciYapi culvert in Segment 3 (Bolton and Menk design).

  - USFWS removed the field road crossing near the parking lot north of Highway 101. This crossing had experienced damage many times and was restored the area to a native flood plain instead of replacing the crossing again.
- 2016
  - EOR hand-cut garlic mustard in Segments 3-7.
  - A site visit with EOR and Minnesota Department of Agriculture determined beetle establishment in Segment 7 was successful, but too low to capture and redistribute beetles to more sites. Another assessment will be completed in 2017.
  - In Segment 1, AES spot-treated wild parsnip, locust and thistle and removed locust and silver poplar.
  - AES treated a large patch of garlic mustard on the north and south side of County Road 16 (Segments 4 and 5).
  - A large purple loosestrife plant was removed from Segment 4A by AES.
  - All manhole benches in the outlet pipe were reconstructed (smoothed) by IBA Manhole.
  - Kes Field Crossing culvert (Figure 6), Gonyea culvert, and Pike Lake Park stream crossing repaired by Nadeau Companies.
  - The remaining downed trees and woody debris were removed by WHR.
- 2017
  - Segment 1 – Locust foliar, parsnip rosette, and thistle spot treatment
  - Segment 2 – Buckthorn foliar treatment, larger than ½" diameter cut/treated
  - Segment 4a – Buckthorn scouting/treating (foliar treat small individuals, cut/treated larger as needed); pulled loosestrife
  - Segment 4b - Buckthorn scouting/treating (foliar treat small individuals, cut/treated larger as needed); spot treat thistle northern half – especially pasture
  - CR 16 – Garlic mustard treatment; pulled loosestrife
- 2018
  - Outlet Pipe – Chemical grouting to seal 120 leaks
  - Segment 1 – Wild parsnip treatment
  - Segment 3 – Scouted for garlic mustard, but no plants were found.
  - Segment 4 – Five purple loosestrife and 11 wild parsnip plants were treated.
  - Segment 5 – Six purple loosestrife plants treated.
  - Segment 7 – Released purple loosestrife and leafy spurge beetles and weevils.
  - Ice dam on Gonyea culvert steam jetted by City of Shakopee staff due to flooding.
- 2019
  - Removed beaver dam near the inlet to Pike Lake.
  - Inspections were conducted for Quarry Lake pumping/drawdown into Outlet Channel.
  - Bank Erosion work
    - Jedlicki construction completed the FEMA bank erosion project from 2014 flood in Segments 1, 2, 3, 4, and 7 – more detail in section below
    - Additional bank erosion repair, that was *not* funded by FEMA, was completed while doing FEMA repairs in Segments 3 and 4.

        - Emergency bank stabilization in KiciYapi camp completed by SMSC.
        - Maintained opening and closing of Outlet Structure gates for bank erosion project.
    - Culvert Maintenance
        - Cleared ice jams at culverts along the channel during snowmelt.
        - Emergency culvert repair at KiciYapi culvert completed by SMSC.
        - Beaver buster grate installed at Jeffers Pass culvert.
        - Repaired crushed culvert at Kes Driveway which was likely damaged during the bank erosion repair project.
    - Vegetation Maintenance
        - **Segment 1** - Three wild parsnip populations and garlic mustard were treated by AES. The City of Prior Lake staff mowed the dense patch of wild parsnip. Foliar treatments for herbaceous and woody invasive plants were conducted by AES.
        - **Segment 2** - Foliar treatments for woody invasive species were conducted by AES.
        - **Segment 3** - EOR scouted for garlic mustard in the Kici Yapi area previously managed by hand-pulling efforts, but no plants were found. Foliar treatments for woody invasive species were conducted by AES staff.
        - **Segment 4** - Foliar treatments for herbaceous and woody invasive plants were conducted by AES staff. Two large patches of garlic mustard and eight wild parsnip plants were treated by AES.
        - **Segment 5** - Foliar treatments for herbaceous invasive plants were conducted by AES. One purple loosestrife plant was found and subsequently hand removed by EOR staff.
        - **Segment 6** - Foliar treatments for herbaceous invasive plants were conducted by AES.
        - **Segment 7** - Foliar treatments for herbaceous and woody invasive plants were conducted by AES. Over 1,000 leafy spurge flea beetles were collected by EOR and PLSLWD staff from a known population west of Deans Lake and were released in four separate locations where dense patches of leafy spurge were found.

- **2020**
    - Culvert replaced under driveway at outlet of Pike Lake
    - Map vegetation density in Upper Jeffers Pond
    - Installed carp tracking PIT tag reading stations at the inlet and outlet of Pike Lake
    - Final repairs were made to the FEMA bank erosion projects
    - Outlet pipe televised
    - Security cameras installed at outlet structure
    - Vegetation Maintenance
        - **Segment 1** -
            - Three wild parsnip populations were treated by AES staff in June & July, including the area just north of Jeffers Pass NW, the area east of

Chickadee Landing on Jeffers Pond Elementary property, and at the east and west sides of the channel just north of Fountain Hills Road. In addition, the wild parsnip population located southwest of the intersection of Jeffers Pass NW and Eagle Creek Avenue was treated in June/July

- Black locust sapling treatment in October
- Two Siberian elm trees were cut down near Chickadee Landing and were placed within Jeffers Pond for turtle loafing logs
- Japanese hedge parsley was hand-removed by AES in late September/early October

- **Segment 2** –
  - Garlic mustard in Pike Lake Park was treated by AES staff in late May/early June
  - Foliar treatments for woody invasive species were conducted by AES staff in October
- **Segment 3** –
  - EOR scouted for garlic mustard in the Kici Yapi area previously managed by hand-pulling efforts. Two garlic mustard plants were found in May 2020 and were hand-pulled
  - No other herbaceous management was conducted in 2020
  - Foliar treatments for woody invasive species were conducted by AES staff in October
- **Segment 4 –**
  - Foliar treatments for herbaceous invasive species were conducted by AES staff in late May/early June for garlic mustard and June/July for wild parsnip. One purple loosestrife plant and one Japanese hedge parsley plant was hand-clipped in late August/early September
  - Foliar treatments for woody invasive species were conducted by AES staff in October
- **Segment 5 -**
  - Foliar treatments for garlic mustard were conducted by AES staff in late May/ early June
  - Purple loosestrife plants in Segment 5C were treated by AES in July
  - The phragmites patch in Segment 5C was treated by AES staff in late September/early October
- **Segment 6** –
  - Foliar treatments for herbaceous invasive species were conducted by AES staff in June/July
- **Segment 7 –**

- Foliar treatments for garlic mustard were conducted by AES staff in late May/early June and purple loosestrife in July. Additional purple loosestrife plants were hand-clipped in late September
- Foliar treatments for woody invasive species were conducted by AES staff in October
- Hand-pulling of invasive species from the rare plant community in Segment 7A was completed by EOR & AES staff in July/August
- Several hundred leafy spurge flea beetles were collected by EOR staff from a known population west of Deans Lake and were released in two separate locations where dense patches of leafy spurge were found. The beetle collection and release were conducted on July 2

- **2021**
  - Driveway and culvert removed in connection with Permit 20.02 Strauss Driveway (Figure 7)
  - Kes field road culvert removed in connection with the Pike Lake Landing Development
  - Installed carp tracking PIT tag reading stations at the Daylight pond and at the inlet of Pike Lake
  - Conducted trap netting fish surveys in Upper and Lower Jeffers Ponds.
  - Security cameras maintained at outlet structure
  - Vegetation maintenance

Segment 1 -

- May 21: Natural Shore Technologies cut garlic mustard along the walking path south of Fountain Hills Road
- June 22 & August 20: Three wild parsnip populations were managed by EOR and PLSLWD staff, including the area just north of Jeffers Pass NW, the area east of Chickadee Landing on Jeffers Pond Elementary School property, the east and west sides of the channel just north of Fountain Hills Road, and the city-owned parcel at the southwest quadrant of Jeffers Pass NW and Eagle Creek Avenue. All plants were dug up with a shovel, bagged, and removed from the site
- Late July/early August: Herbaceous invasive treatments by RES
- Mid-September: Woody invasive foliar treatments by RES

- **Segment 2** –
  - May 21: Natural Shore Technologies attempted to cut garlic mustard in this segment but could not access the park due to construction. EOR staff hand-pulled several dozen plants on May 15 downstream of the last culvert crossing at Pike Lake Park
  - Late July/early August: Herbaceous invasive treatments by RES
  - Mid-September: Buckthorn foliar treatments by RES
- **Segment 3** –
  - May 15: During the channel inspection, EOR scouted for garlic mustard in the Kici Yapi area previously managed by hand-pulling efforts. Several garlic mustard plants were found and hand-pulled

- Late July/early August: Herbaceous invasive treatments by RES
- Mid-September: Woody invasive foliar treatments by RES

- **Segment 4 –**
  - May 21: Natural Shore Technologies cut garlic mustard at known locations between Pike Lake Trail and County Road 16
  - June 22 & August 20: EOR staff dug up wild parsnip from the known location downstream of Pike Lake Trail. The plants were bagged and removed from the site
  - Late July/early August: Herbaceous invasive treatments by RES
  - Mid-September: Buckthorn foliar treatments by RES
- **Segment 5 -**
  - May 21: Natural Shore Technologies cut garlic mustard at Segment 5A
  - Late July/early August: Herbaceous invasive treatments by RES including the purple loosestrife near the sediment pond in Segment 5C
  - August 13: EOR staff hand-pulled purple loosestrife plants along the flow channel in Segment 5A and the adjacent eastern stormwater pond where new plants were discovered in 2021
- **Segment 6** –
  - Late July/early August: Herbaceous invasive treatments by RES
- **Segment 7 –**
  - May 21: Natural Shore Technologies cut garlic mustard at Segment 7A & 7B
  - Late July/early August: Herbaceous invasive treatments by RES including purple loosestrife along the channel at previous known locations
  - July 1: Several hundred leafy spurge flea beetles were collected by EOR staff from a population discovered west of the intersection of Valley Park Drive and Innovation Blvd (Figure 54). The beetles were released at two separate locations where dense patches of leafy spurge were found
  - August 13: EOR staff hand-pulled purple loosestrife plants immediately downstream of Highway 169 where new plants were discovered in 2021. These plants are likely the result of seed dispersal from the stormwater pond located immediately west of the PLOC. The stormwater pond discharges directly to the PLOC immediately downstream of Highway 169
  - Mid-September: Buckthorn foliar treatments by RES

- **2022**
  - PLOC Sediment Removal – Pike Lake Road Pond Project
  - PLOC 2022 Bank Stabilization; status complete, vegetation warranty period still open
  - Parkhaven at Pike Lake – presumably, there are still some homes under construction.
  - Whispering Waters – presumably, there are still homes under construction for the 1st Addition. The 2nd Addition is still under review / development approval by Shakopee.
  - Quarry Lake Trail & Pedestrian Bridge – reviewed, uncertain of status but doubtful it has been bid on
  - Beckler Easement Amendment

- Vegetation Maintenance:
  - **Segment 1**
    - Late May: NST treated garlic mustard and other broadleaf weeds within the channel easements downstream to County Road 42. NST also cut down the large Siberian elm near Chickadee Landing and placed the tree in the pond for a loafing log.
    - June 6: Three wild parsnip populations were managed by EOR and PLSLWD staff, including the area just north of Jeffers Pass NW, the area east of Chickadee Landing on Jeffers Pond Elementary School property, the east and west sides of the channel just north of Fountain Hills Road, and the city-owned parcel at the southwest quadrant of Jeffers Pass NW and Eagle Creek Avenue. All plants were dug up with a shovel and disposed of onsite.
    - July 22: Herbaceous invasive treatments by NST.
    - August 22: Follow-up herbaceous treatments by NST in Segment 1A South. Note from NST: "All Japanese Hedge Parsley going to seed was bagged and taken off site. Visible rosettes were also pulled and left on site to decay. Identified Wild Parsnip segments were scouted, and plants were sprayed with Aquaneat. The Wild Parsnip rosettes were fairly small, 10-20 plants were treated with herbicide."
    - Early to mid-October: Woody invasive foliar treatments by RES.

  - **Segment 2**
    - Late May: NST treated garlic mustard and other broadleaf weeds within the channel easements downstream to Pike Lake.
    - Early to mid-October: Woody invasive foliar treatments by RES.

  - **Segment 3**
    - Late May: NST treated garlic mustard and other broadleaf weeds within the channel easements downstream to Pike Lake Trail.
    - Early to mid-October: Woody invasive foliar treatments by RES.

  - **Segment 4**
    - Late May: NST treated wild parsnip, garlic mustard, and other broadleaf weeds within the channel easements downstream to County Road 16.
    - July 22: Herbaceous invasive treatments by NST.
    - August 22: Follow-up herbaceous treatments by NST in Segment 4A & 4B. Note from NST: "Segment 4A: 1 purple loosestrife was cut and treated with Aquaneat and bagged and taken off site. 2 wild parsnip rosettes that survived the last herbicide treatment were sprayed with Aquaneat. Segment 4B-5A: purple loosestrife was cut and treated with Aquaneat, bagged, and taken off site. Plants that were not blooming were placed on top of other vegetation to decay. 30+ plants were found and treated with herbicide."
    - Early to mid-October: Woody invasive foliar treatments by RES.

  - **Segment 5**

- July 22: purple loosestrife treatments by NST.
- August 22: Follow-up herbaceous treatments by NST in Segment 5A. Note from NST: "Segment 4B-5A: purple loosestrife was cut and treated with Aquaneat, bagged, and taken off site. Plants that were not blooming were placed on top of other vegetation to decay. 30+ plants were found and treated with herbicide."
- August 11: During the summer vegetation survey, EOR staff hand-pulled 1 purple loosestrife plant at the edge of the sediment pond in Segment 5C.

▪ **Segment 6**
- Late May: NST treated broadleaf weeds within the channel easements downstream of Deans Lake weir.
- July 22: Herbaceous invasive treatments by NST.
- August 22: Follow-up herbaceous treatments by NST in Segment 6. Note from NST: "Purple loosestrife was cut and treated with Aquaneat, bagged, and taken off site. 5 plants were found and treated with herbicide."

▪ **Segment 7**
- Late May: NST treated garlic mustard and other broadleaf weeds within the channel easements downstream to Highway 101.
- July 22: Herbaceous invasive treatments by NST.
- August 11: During the summer vegetation survey, EOR staff hand-pulled 1 purple loosestrife plant in Segment 7A.
- Early to mid-October: Woody invasive foliar treatments by RES.

- **2023**
  - Jeffers Parkway apartment building plan approved – construction underway
  - Rachels development apartment building construction
  - Building permit plans for apartments next to Prior Lake City Hall
  - Apartment development 42 by Rolling Oaks
  - 169 Pedestrian Bridge Construction
  - Xcel – Blue Lake Peaking Plant Driveway SWMP
  - Arbor Bluff development plat approved
  - Whispering Waters development - 2nd phase likely to commence in 2024
  - SMSC Introducing Bison Back to Prairie Lands
  - Vegetation assessments:
    - **Segment 1**
      - June 5: The known populations of wild parsnip were managed by EOR and PLSLWD staff, including the area just north of Jeffers Pass NW, the area east of Chickadee Landing on Jeffers Pond Elementary School property, the east and west sides of the channel just north of Fountain Hills Road, and the city-owned parcel at the southwest quadrant of

Jeffers Pass NW and Eagle Creek Avenue. All plants were dug up with a shovel and disposed of onsite.
- July 21: EOR conducted a follow-up inspection and scouted for wild parsnip. Six wild parsnip plants were found and dug out with a shovel.
- Early to mid-October: Woody invasive foliar treatments by RES.

- **Segment 2**
  - Early to mid-October: Woody invasive foliar treatments by RES.

- **Segment 3**
  - Early to mid-October: Woody invasive foliar treatments by RES.

- **Segment 4**
  - June 5: The known population of wild parsnip was managed by EOR and PLSLWD staff. All plants were dug up with a shovel and disposed of onsite.
  - July 21: EOR conducted a follow-up inspection and scouted for wild parsnip. One wild parsnip plant was found and dug out with a shovel.
  - Early to mid-October: Woody invasive foliar treatments by RES.

- **Segment 5**
  - July 21: EOR scouted for purple loosestrife and hand-pulled two purple loosestrife plants in Segment 5A and one plant at the far upstream end of Segment 5B.

- **Segment 6**
  - July 21: EOR scouted for purple loosestrife and hand-pulled one plant located immediately downstream of CR21 in Segment 5C, and another single plant was hand-pulled just upstream of Highway 169.
  -

- **Segment 7**
  - July 21: EOR scouted for purple loosestrife and hand-pulled four plants in the wooded section of Segment 7B.
  - Early to mid-October: Woody invasive foliar treatments by RES.

- 2024
  - Villas at Crest Woods – Preliminary Plat & Stormwater Management Plan review
  - Stone Path – Preliminary Plat and Stormwater Management Plan review
  - Jeffers Pond 10th Addition – Construction & Stormwater Management Plan approval
  - Whispering Waters 2nd Addition – Construction (ongoing)
  - Pike Lake Landing – Individual Lot Development (ongoing)
  - Vegetation assessments:
    - **Segment 1**
      - May 9: Garlic mustard was spot sprayed/ weed whipped by MNL staff.
      - June 26: Twenty-seven wild parsnip plants were dug up by EOR and PLSLWD staff, including the area east of Chickadee Landing on Jeffers Pond Elementary property, and along the east and west sides of the

channel just north of Fountain Hills Road. All plants were dug up with a shovel and disposed of onsite.
- October: Woody invasive foliar treatments by PRI staff.

- Segment 2
  - May 9: Garlic mustard was spot sprayed/ weed whipped by MNL staff.
  - October: Woody invasive foliar treatments by PRI staff.

- **Segment 3**
  - May 1: Several garlic mustard plants were hand-pulled by EOR staff during the channel inspection.

- **Segment 4**
  - June 26: One wild parsnip plant was dug up by EOR staff (only 1 plant was found in the entire segment).
  - July 23: EOR scouted for purple loosestrife. No plants were found.
  - October: Woody invasive foliar treatments by PRI staff.

- **Segment 5**
  - July 23: EOR scouted for purple loosestrife and hand-pulled 8 purple loosestrife plants in Segment 5B downstream of Oak Ridge Trail. One plant was also pulled from the wetland complex upstream of CR 21.

- **Segment 6**
  - July 23: EOR scouted for purple loosestrife. No plants were found.

- **Segment 7**
  - July 23: EOR and PLSLWD staff scouted for purple loosestrife and hand-pulled 50 plants along the eastern edge of the stormwater ponds west of the PLOC. In addition, hoary alyssum, spotted knapweed, and crown vetch were hand pulled from the sand prairie remnant to protect the rare plants that occur along the channel.
  - October & early November: Woody invasive foliar and cut stump treatments by PRI staff (work to be completed by the end of November).

PRIOR LAKE OUTLET CHANNEL-INSPECTION CHECKLIST

UPDATED: 2023

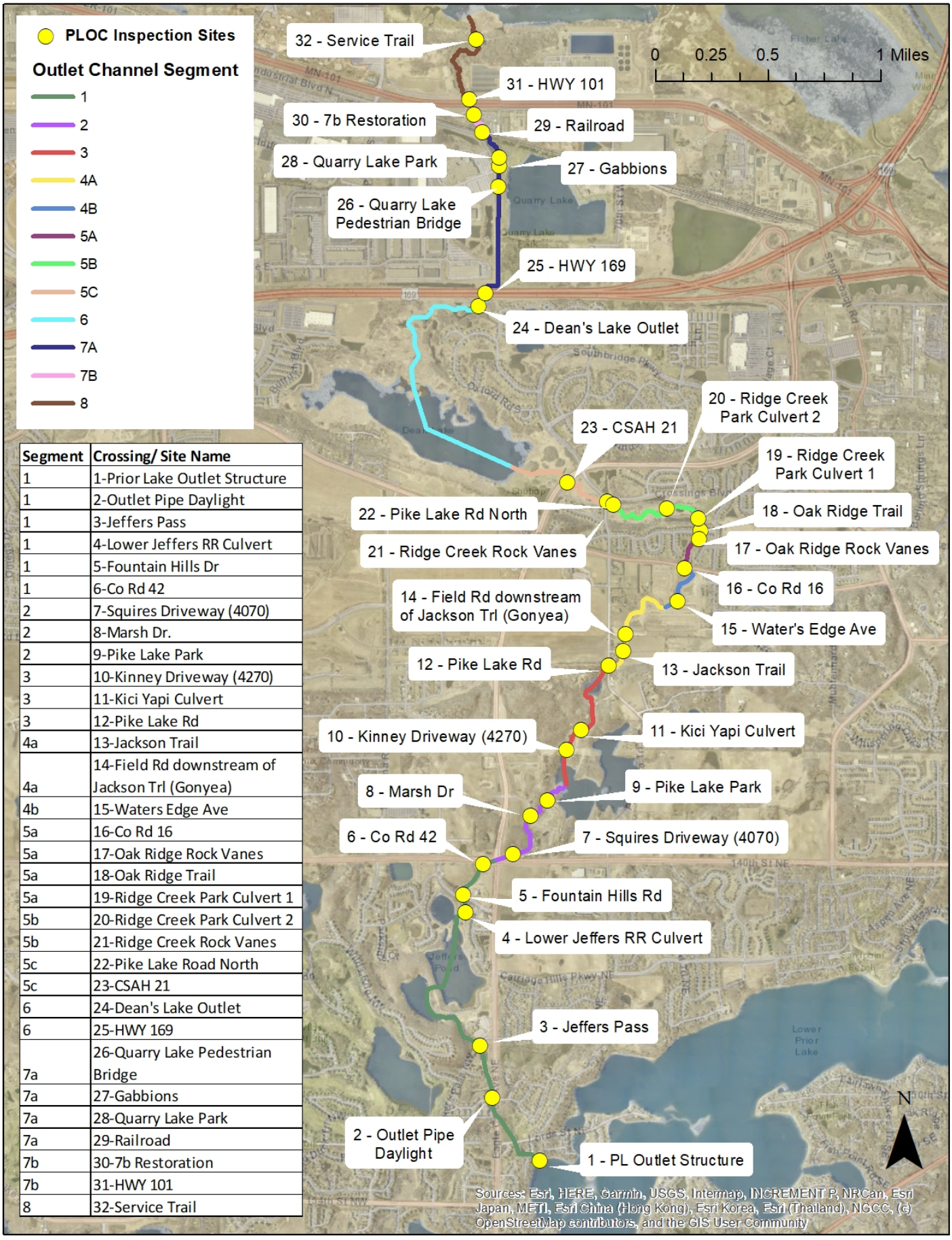
Date:	Current Weather Conditions:
Inspector:	Ground Conditions:
Recent Precip:	Inspection Start Time:
Level of Prior Lake:	Inspection End Time:

Note: Only discrete crossings are listed, record any additional channel conditions in "Notes" section

TIME	*SEGMENT*	*CROSSING NAME/MAP ID #*	*NOTES*
	1	1-Prior Lake Outlet Structure	
	1	2-Outlet Pipe Daylight	
	1	3-Jeffers Pass	
	1	4-Lower Jeffers RR Culvert	
	1	5-Fountain Hills Dr	
	1	6-Co Rd 42	
	2	7-Squires Driveway (4070)	
	2	8-Marsh Drive	
	2	9-Pike Lake Park	
	3	10-Kinney Driveway (4270)	
	3	11-Kici Yapi Culvert	
	3	12-Pike Lake Rd	
	4a	13-Jackson Trail	
	4a	14-Field Rd downstream of Jackson Trl (Gonyea)	
	4b	15-Waters Edge Ave	
	5a	16-Co Rd 16	

	5a	17 Oak Ridge Rock Vanes
	5b	18-Oak Ridge Trail
	5c	19-Ridge Creek Park Culvert 1
	5c	20-Ridge Creek Park Culvert 2
	5c	21-Ridge Creek Rock Vanes
	5c	22- Pike Lake Road North
	5c	23-CSAH 21
	6	24-Hwy 169
	6	25-HWY 169
	7a	26-Quarry Lake Pedestrian Bridge
	7a	27-Gabbions
	7a	28-Quarry Lake Park
	7a	29-Railroad
	7a	30-7b Restoration
	7b	31-HWY 101
	8	32-Service Trail

Maintenance Needed/ Illicit Discharge/Notes:



Segment	Crossing/ Site Name
1	1-Prior Lake Outlet Structure
1	2-Outlet Pipe Daylight
1	3-Jeffers Pass
1	4-Lower Jeffers RR Culvert
1	5-Fountain Hills Dr
1	6-Co Rd 42
2	7-Squires Driveway (4070)
2	8-Marsh Dr.
2	9-Pike Lake Park
3	10-Kinney Driveway (4270)
3	11-Kici Yapi Culvert
3	12-Pike Lake Rd
4a	13-Jackson Trail
4a	14-Field Rd downstream of Jackson Trl (Gonyea)
4b	15-Waters Edge Ave
5a	16-Co Rd 16
5a	17-Oak Ridge Rock Vanes
5a	18-Oak Ridge Trail
5a	19-Ridge Creek Park Culvert 1
5b	20-Ridge Creek Park Culvert 2
5b	21-Ridge Creek Rock Vanes
5c	22-Pike Lake Road North
5c	23-CSAH 21
6	24-Dean's Lake Outlet
6	25-HWY 169
7a	26-Quarry Lake Pedestrian Bridge
7a	27-Gabbions
7a	28-Quarry Lake Park
7a	29-Railroad
7b	30-7b Restoration
7b	31-HWY 101
8	32-Service Trail

Prior Lake Outlet System Inspection Frequency Guidelines

Updated 6/20/19

Channel Inspections: Walk entire length of channel during spring and fall to document any significant changes that could cause issues, such as: erosion, blockage, downed trees, hazardous waste, or invasive species. If possible, inspect before outlet structure starts discharging or when flow is low.

Culvert Inspections: All crossings of the outlet channel will be inspected based on risk factor. These are general guidelines and may be modified if needed.

LOW RISK CROSSINGS:

- Bridges
- Box culverts
- Oversized culverts
- Weirs
- Downstream sides of crossings when no grate is attached

MEDIUM RISK CROSSINGS:

- Crossings constructed or reconstructed within the last year
- All other crossings that are not considered high or low risk

HIGH RISK CROSSINGS:

- Culverts with grates
- Undersized culverts
- Crossings with items of concern from previous inspections

	No Flow from outlet structure	Flow from outlet structure
Low Risk	2x/year	2x/year
Medium Risk	2x/year	1x/month
High Risk	1x/month	1x/ week

Report Frequency – An annual report will be emailed to all partners by February 20th of each year summarizing the inspections and all projects in along the PLOC. If issues arise and need attention, the appropriate partner will be contacted.

Illicit Discharge: All crossings of the outlet channel will be inspected based on risk factor. These are general guidelines and may be modified if needed. The District's PLOC Inspection Form can be used during routine outlet channel inspections to detect continuous, transitory or intermittent discharges. If an illicit discharge is observed, such as significant flow during dry weather, the presence of raw sewage indicators, staining or residue, then an Illicit Discharge Detection and Elimination (IDDE) Inspection Form may be used during a follow-up inspection (See SOP Minimum Control Measure 3). If a citizen calls in a complaint about an illicit discharge, fill out the Illicit Discharge Inspection Form and follow-up, as needed.