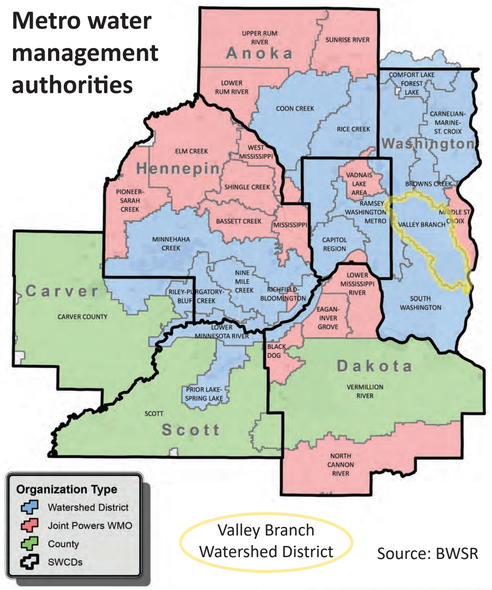
What are watersheds and watershed districts?



A watershed is an area of land where precipitation and associated runoff drain to a low point on the landscape, such as a lake or stream. You could think of a watershed as a funnel.

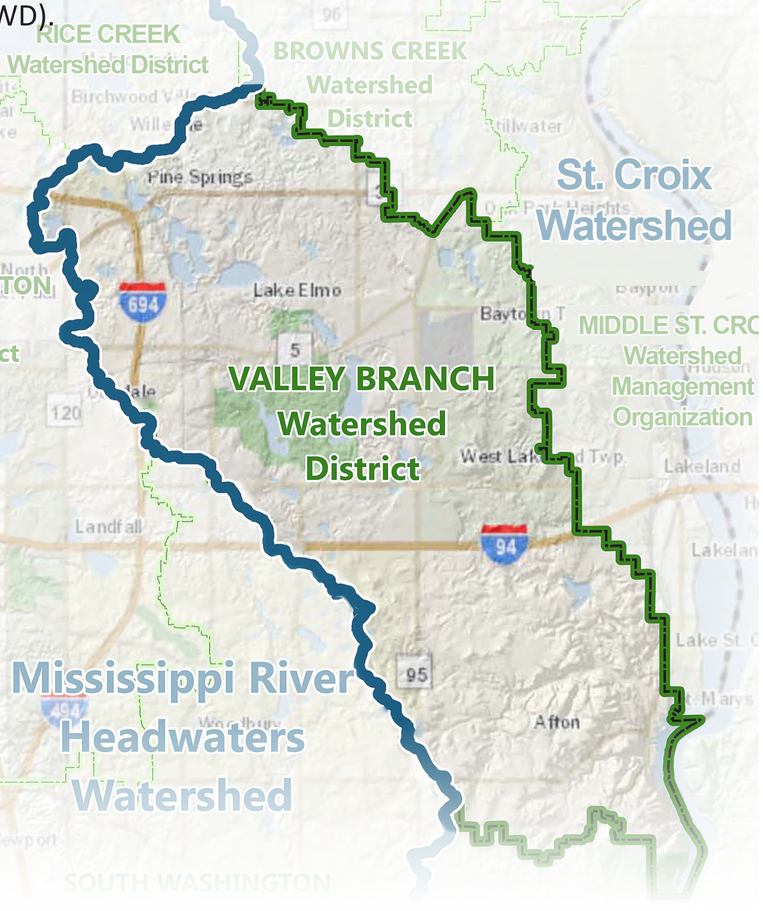
Authorized by the Minnesota legislature, watershed districts and management organizations are local, special-purpose units of government that work to prevent and solve water-related problems on a watershed basis. Today, there are more than 60 watershed districts or watershed management organizations across the state, including the Valley Branch Watershed District (VBWD).

The Valley Branch Watershed District

The Valley Branch Watershed District (VBWD) was formed in 1968 after residents petitioned to form a watershed district so that their flooding concerns could be addressed. VBWD became the first watershed district in Washington County. VBWD encompasses over 70 square miles (including 1 square mile of Ramsey County) and includes all or parts of 14 cities and townships. Water from the VBWD ultimately discharges to the St. Croix River.

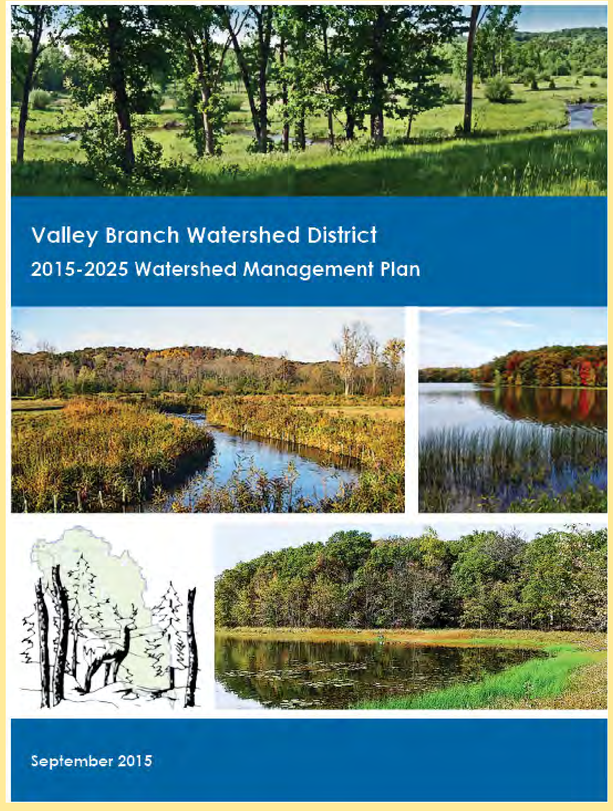
Home to world-class trout stream

The VBWD is home to Valley Creek, one of the best trout streams in the state of Minnesota and the world. It is also home to more than 1,230 wetlands and numerous lakes, including Lake Elmo, the deepest lake in the Twin Cities.



Detailed plans guide the management of water resources

The VBWD adopted its first watershed management plan in 1970 and has adopted four plans since. These plans outline goals, policies, projects, and activities that the watershed is committed to implementing. The VBWD is starting to update its current watershed management plan, which is effective through 2025.



VBWD Landlocked Basin Flood Mitigation Planning Study

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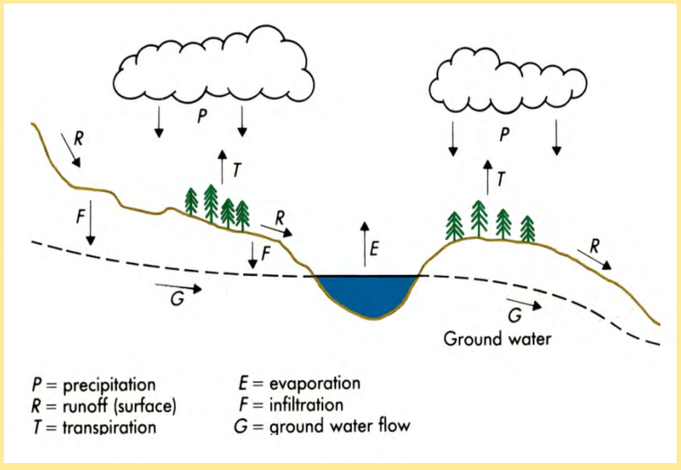
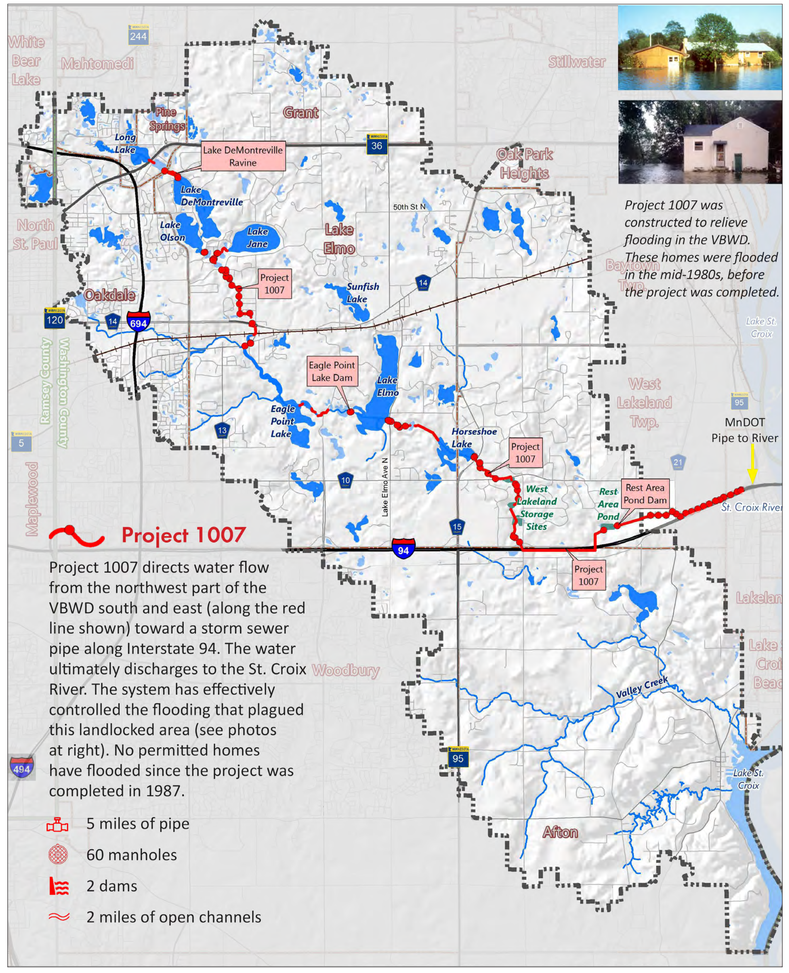
Landlocked basins can increase flood risk

Landlocked basins are lakes, wetlands, and lowlands that do not have surface outlets that can help regulate water levels. The only way water can leave a landlocked basin is through evaporation and seepage, which are relatively slow processes and limit discharge rates. Unlike river flooding that typically peaks and recedes within a few weeks, high-water conditions at landlocked basins can remain for months and years, depending on the future precipitation and groundwater levels.



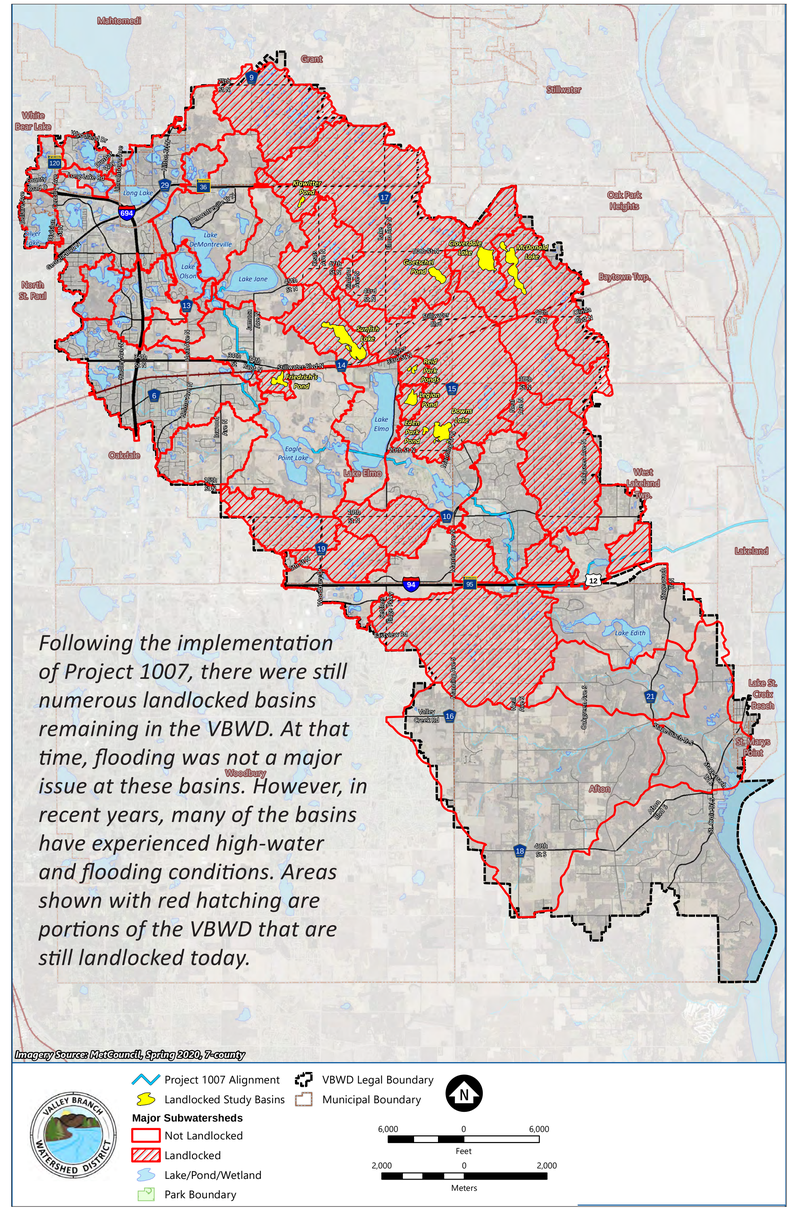
Project 1007

At the time VBWD formed, much of the watershed was landlocked and had chronic flooding issues on numerous basins. VBWD constructed “Project 1007” in 1986-1987. This is a pipe and ditch conveyance system from Long Lake in Pine Springs to I-94 in West Lakeland Township, where MnDOT had a pipe to the St. Croix River.



Project 1007 was constructed to relieve flooding in the VBWD. These homes were flooded in the mid-1980s, before the project was completed.

Many of the “Project 1007” lake outlets have adjustable weirs and operating plans, which allow the VBWD to lower lake levels when conditions allow. This has helped address flooding around several landlocked and flood-prone lakes in the watershed. The figure above shows the flow path (red line) and additional details about Project 1007.



Following the implementation of Project 1007, there were still numerous landlocked basins remaining in the VBWD. At that time, flooding was not a major issue at these basins. However, in recent years, many of the basins have experienced high-water and flooding conditions. Areas shown with red hatching are portions of the VBWD that are still landlocked today.

VBWD Landlocked Basin Flood Mitigation Planning Study

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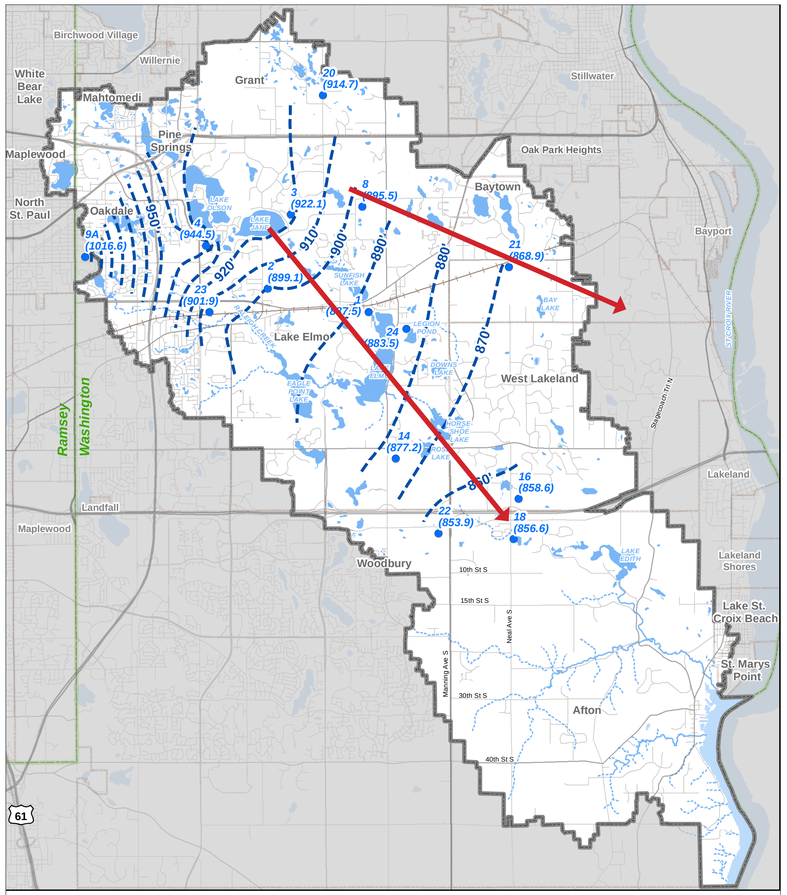
Groundwater can have a significant impact on surface water bodies



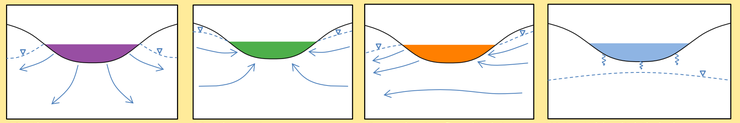
In addition to monitoring basin water levels, the VBWD currently monitors groundwater levels in a series of 14 wells around the watershed, where water generally moves east/southeast toward the St. Croix River.

What is groundwater? Where does it go?

Groundwater is water under the ground surface in rock and soil pore spaces and in fractures of rock formations. Water that infiltrates through surface soils can end up as groundwater, but it is a slow process. Because of this slow rate, groundwater fluctuations are delayed responses to precipitation. The amount of water becoming groundwater changes during the year. Wet springs often yield the most groundwater.

Groundwater is essential for drinking water and healthy, natural ecosystems. Understanding the effects of community growth and other activities on groundwater and the groundwater-surface water interface is part of VBWD's mission.

Groundwater influences surface basins



Mostly loses as seepage to groundwater

Mostly receives groundwater inflow

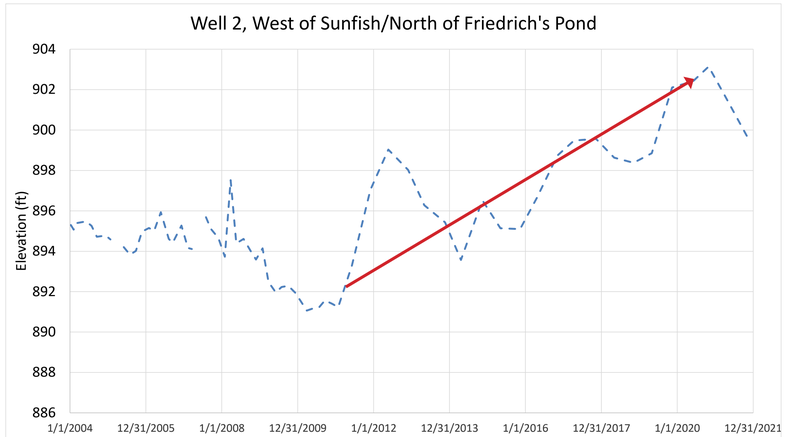
Groundwater flow both into and out of lake/wetland

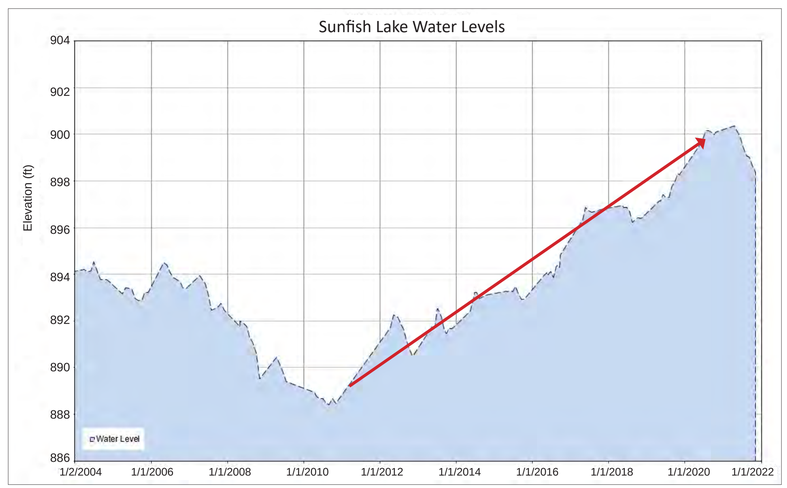
Water table slightly below lake/wetland/stream bottom. Fluctuations in shallow water tables affect flow dynamics, but if the water table is deep enough, water table does not impact the basin.

Lakes, ponds, and streams can be connected to groundwater. They can seep surface water that becomes groundwater, be a reflection of groundwater, both capture and seep groundwater, or be completely disconnected from groundwater. These relationships are dependent on the difference in water levels, lake/stream bed characteristics, and aquifer characteristics and can change with climate and human activities. For example, Sunfish Lake experienced a net positive groundwater inflow during wet conditions, but during dryer conditions may typically lose water as seepage to the groundwater.

Recent wet conditions impacted both groundwater and surface water levels in the VBWD

Over the last decade, significant rises in both groundwater and lake levels (especially in landlocked basins) were observed throughout the watershed.





VBWD Landlocked Basin Flood Mitigation Planning Study

VALLEY BRANCH WATERSHED DISTRICT

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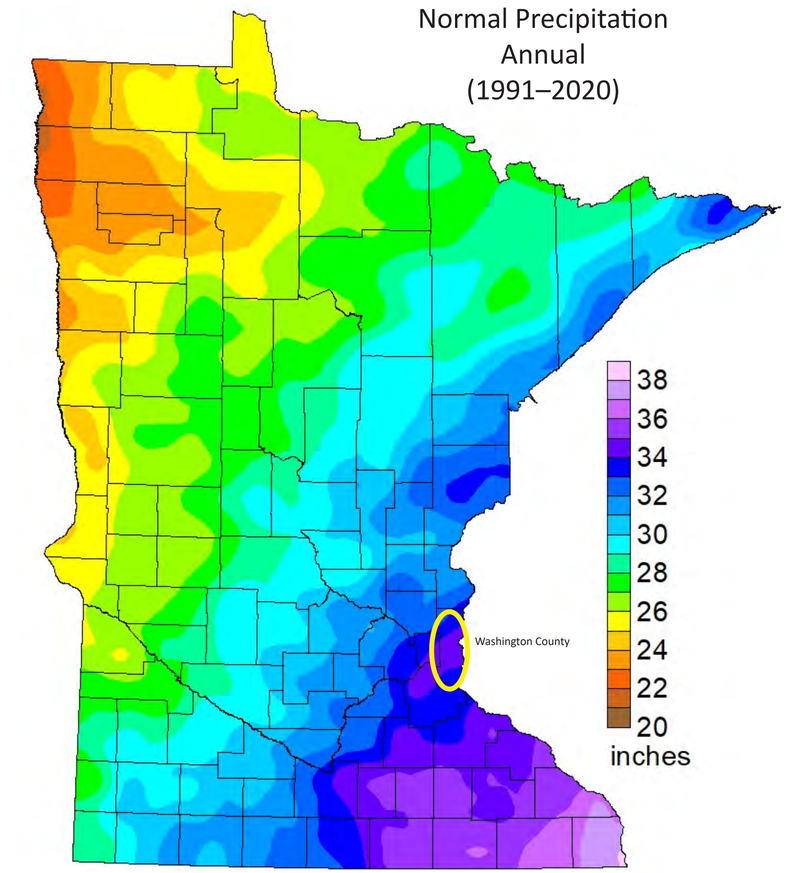
Recent flooding on landlocked basins in the VBWD



DNR State Climatology Office, April 2021

The Twin Cities experience some of the widest ranging temperatures in the country. Because there are no major topographic barriers to keep air from moving south out of Canada, winters can be very cold with extreme wind chills, and summers are hot and humid. Summer precipitation falls primarily during thunderstorms and accounts for nearly half of the annual total. Winter precipitation is variable and includes snow, sleet, freezing rain, and the occasional liquid rain. Washington County typically experiences between 33–35 inches of precipitation per year.

Historic precipitation and high surface water conditions

In the past decade, VBWD has experience some of the wettest years on record.

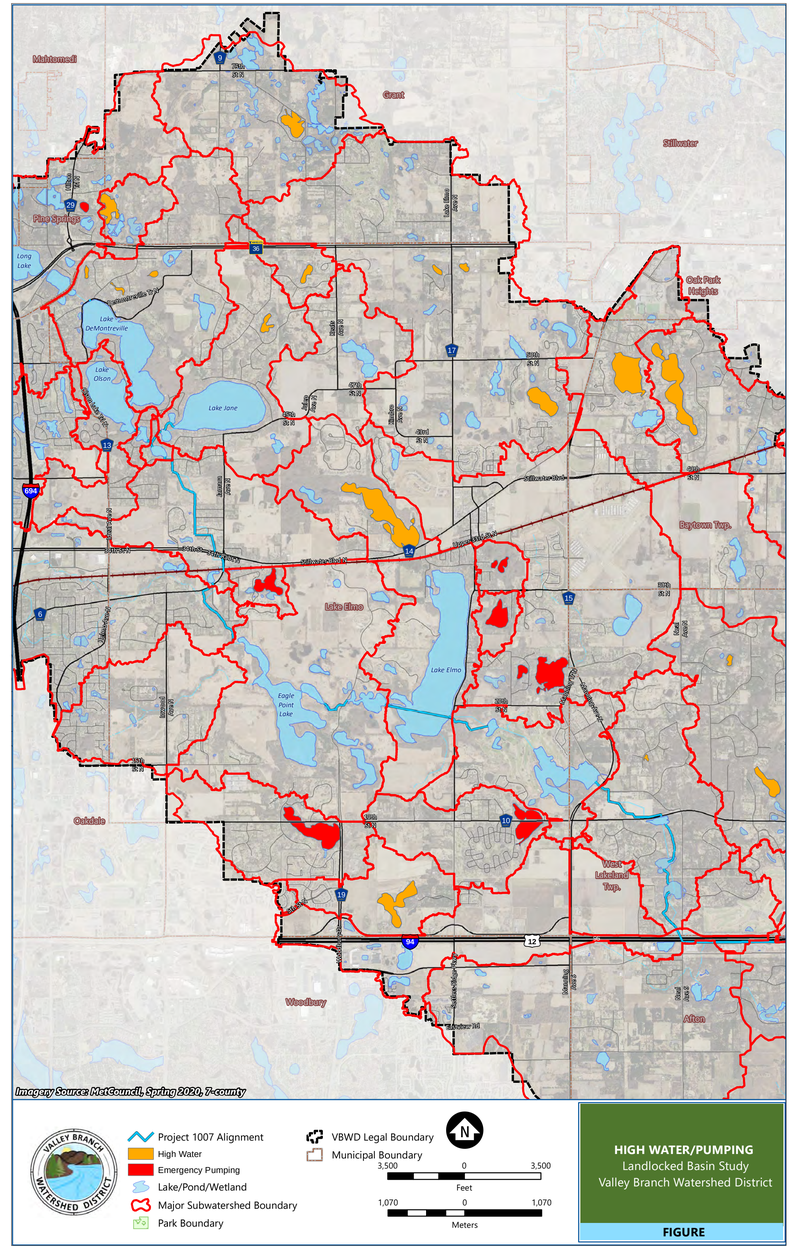
- 2019: Wettest year ever for central VBWD since data was first recorded in 1891
- 2015–2019: Wettest 5 years on record
- 2010–2019: Wettest 10 years on record

Significant rises in both groundwater and lake levels (especially in those landlocked basins) were observed throughout the watershed.

In 2019 and 2020, the VBWD and Washington County had to mobilize emergency pumping to lower high-water levels on several landlocked basins (basins in red at right).

The VBWD recently acquired and removed nine homes on two landlocked basins. On Sunnybrook Lake, a flood-level-reduction project was not feasible.

Top: Flooding on Sunnybrook Lake, where VBWD has acquired and removed homes
Bottom: Home and driveway flooding on Friedrich's Pond (2020)



VBWD Landlocked Basin Flood Mitigation Planning Study

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A comprehensive planning study is underway

Project goals and partners

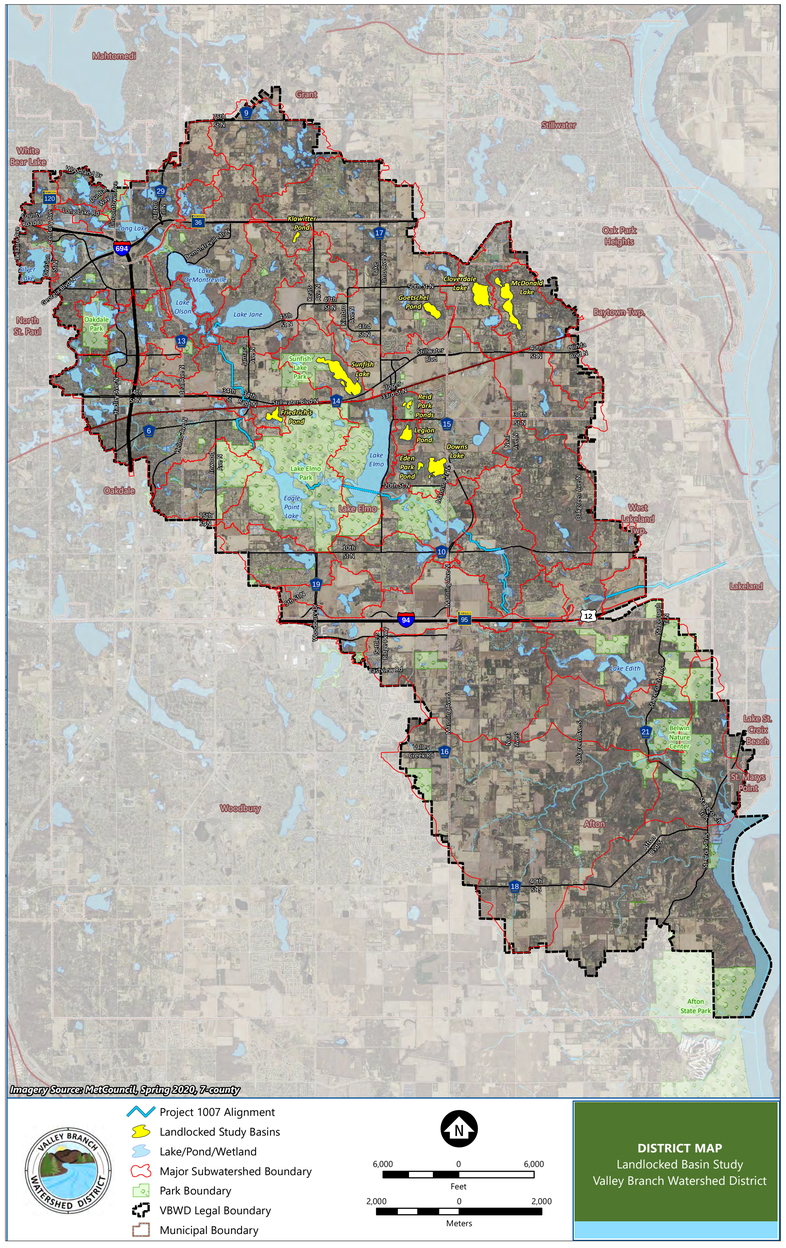
The VBWD has partnered with the United States Army Corps of Engineers (USACE) through the Planning Assistance to the States program to complete a comprehensive planning study. The purpose of the study is to determine how to manage high-water conditions on several landlocked basins in the VBWD. (See basins in yellow at right.)

Project goals include the following:

- Studying high-water/flooding conditions
- Developing and evaluating water-level-management alternatives
- Determining the water quantity and water quality impacts of the proposed alternatives on downstream receiving waters
- Recommending a water management approach for each basin

Project stakeholders

Many stakeholders and agencies are involved throughout the study process to help inform and guide the study. Public input from residents, lake and homeowner associations near the lakes, and other landowners is also important.



Project scope and current status

Task	Status
Data collection and summary	Complete
Baseline (without project) modeling	
Groundwater modeling	Complete
Hydrology and hydraulics (H&H) modeling	Complete
Water quality modeling	Underway
Climate assessment	Underway
Flood risk analysis and establishment of pumping rates and target water levels	Complete
Alternatives analysis (with project)	Underway
Report	Underway

Remaining study schedule

MARCH 2023

- Finalize flood risk and pumping assessment
- Outline management alternatives
- Review with stakeholders

APRIL–JUNE 2023

- Public engagement meeting #1
- Assess alternatives including mitigation needs
- Develop cost estimates
- Summarize permitting
- Review with stakeholders

JULY 2023

- Draft comprehensive planning study report with recommended management alternative
- Review with stakeholders

AUGUST–SEPTEMBER 2022

- Public engagement meeting #2
- Finalize comprehensive planning study report
- Review with stakeholders

VBWD Landlocked Basin Flood Mitigation Planning Study

US Army Corps of Engineers®

Comprehensive planning study: Data collection and review

This flood mitigation planning study is informed by previous data collected and studies completed by the VBWD. However, additional data collection was needed, including the following:

- A survey of structures, including low opening and low floor
- A survey of drainage infrastructure
- A basin bathymetric (below water) survey
- Groundwater and basin water-level monitoring
- Water quality monitoring, including typical nutrient parameters as well as PFOS/PFAS sampling for each basin
- Surveying for aquatic invasive species to understand potential transmission of invasive aquatic plants and mussels, which is prohibited by state law

Plant surveys were completed to identify whether aquatic invasive species were present.

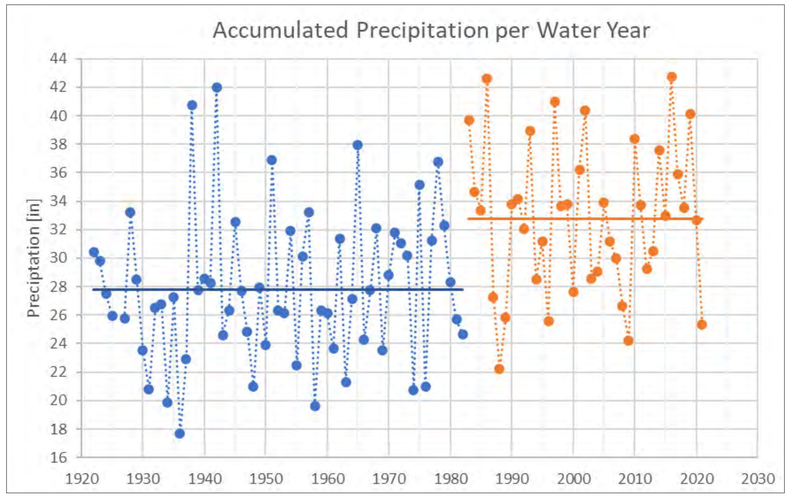
USACE survey crews collected information on structures, drainage systems, and bathymetric data for the study basins.

Preliminary climate assessment: Historic data and global climate models

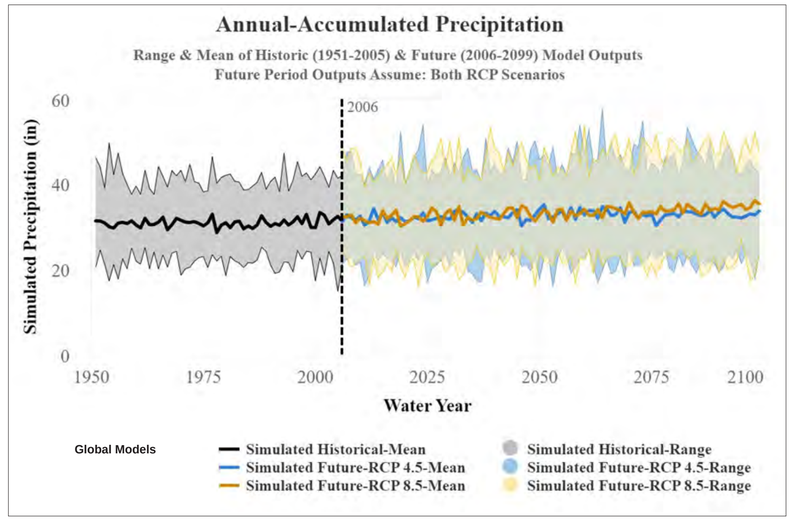
The USACE is required to perform a climate change assessment in accordance with USACE Engineering and Construction Bulletin (ECB) 2018-14. The USACE completed a review of historic climate data as well as downscaled global climate model projections for the VBWD and surrounding regions.

General takeaways of the preliminary assessment include:

- Temperatures are increasing and the growing season is extending.
- Higher annual precipitation is concentrated in heavy precipitation events.
- There is a potential increase in annual precipitation by the end of the century.
- Increasing precipitation could increase groundwater recharge depending on timing during the year; however, an extended growing season and increased evapotranspiration may reduce groundwater recharge.



Statistical analyses of the historic total annual precipitation data indicates that there was a shift in the time series (i.e., nonstationarity) beginning in the mid-1980s, with higher annual precipitation than previously observed. From this point through the present, there is no clear trend in the annual precipitation data (either increasing or decreasing).



Although there is some uncertainty, downscaled global climate models suggest that total annual precipitation will continue to increase over the next century under several greenhouse gas emission scenarios.

Comprehensive planning study: Modeling

Understanding high-water conditions using models

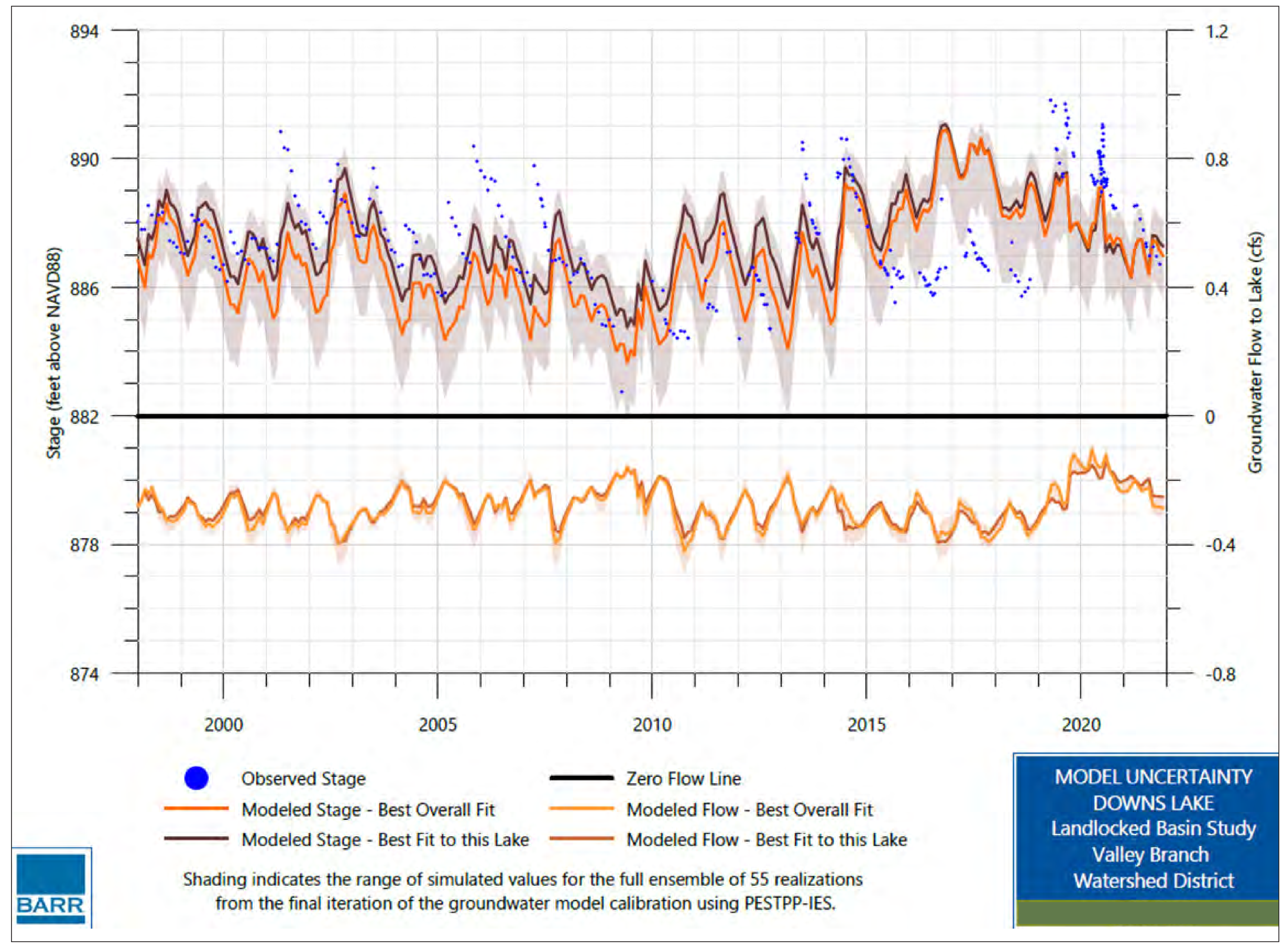
Numerical models were used to understand the conditions leading to the extreme high-water conditions on the VBWD landlocked basins.

A local groundwater model of the VBWD study area was developed using the Metropolitan Council's larger regional groundwater model of the entire Twin Cities metropolitan area (Metro Model 3, MODFLOW). The groundwater model uses detailed climate and geologic data to understand movement of water from the surface to the groundwater and how groundwater moves below the surface and interacts at each basin.

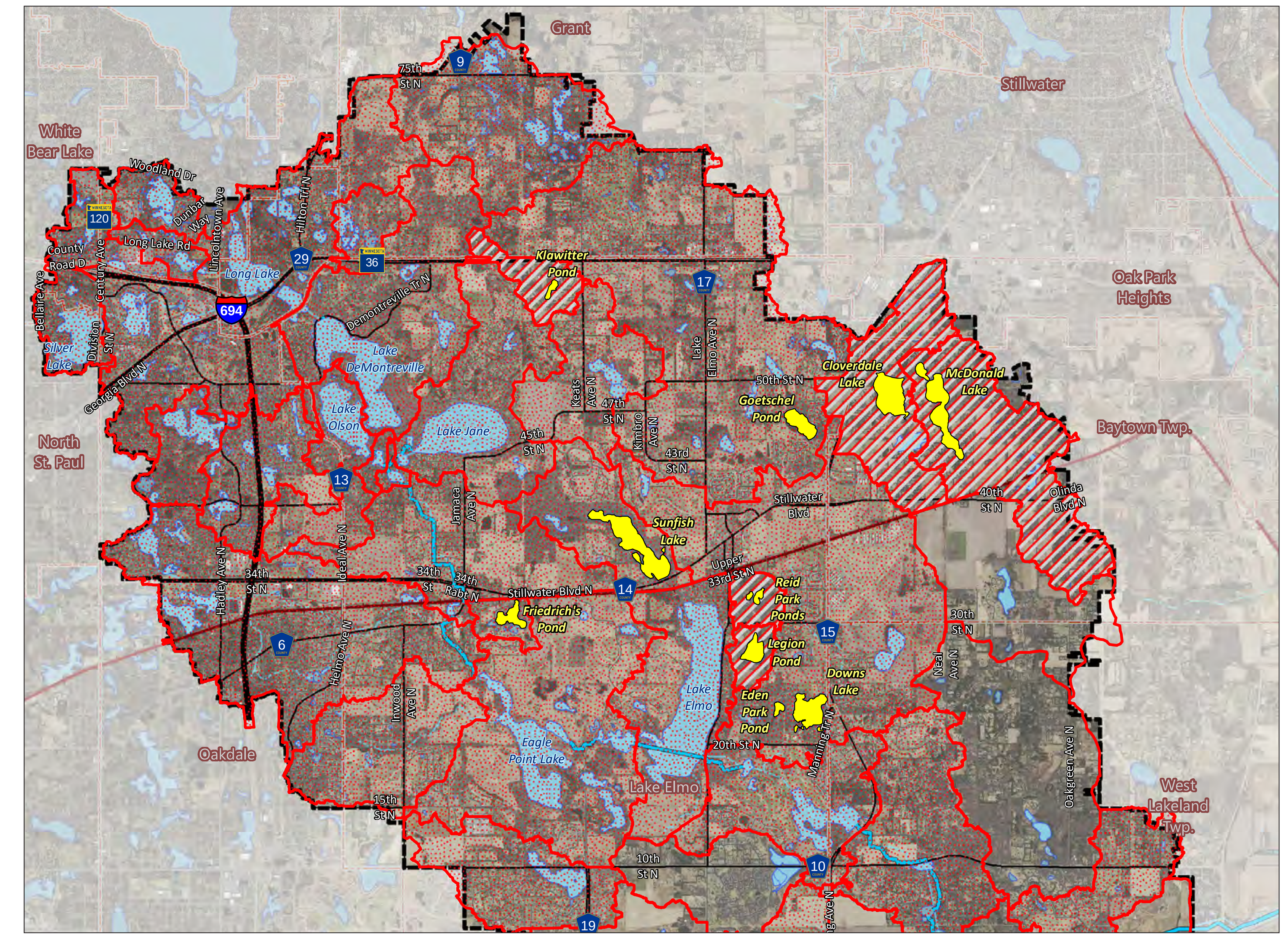
The surface water models (XP-SWMM/PC-SWMM) are used to estimate runoff from the land surface during precipitation events and movement of surface water through a watershed, including runoff rates and volumes, drainage patterns, and resulting water levels on water bodies throughout a watershed.

The modeling results are used to:

- Understand flood risk.
- Estimate impacts to surrounding structures.
- Estimate the impact of groundwater on the basin water levels.
- Identify high-water management alternatives and evaluate possible flood-level lowering options.



Models allow us to estimate the interaction between the groundwater and surface waters, including estimating surface water levels and groundwater flows to or from the basin over time.

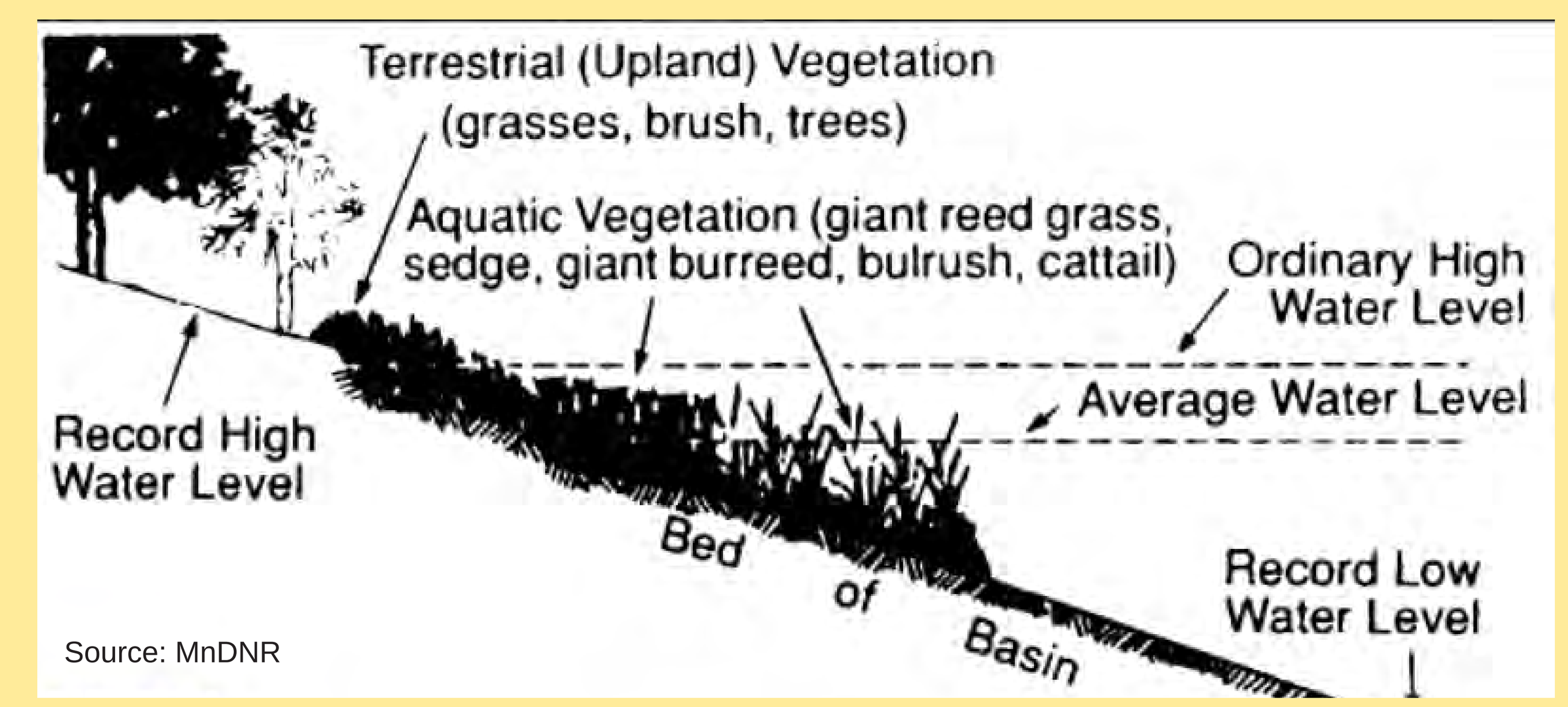


Since 2014, the VBWD has been developing detailed surface water models of the watersheds (for areas shown with red dots), generally working from upstream water bodies toward the discharges to the St. Croix River. New models were also developed for this study (areas in red hatch).

Flood risk analysis and establishment of pumping rates and target water levels

The VBWD is using the numerical models to evaluate hypothetical design storm events to understand flood risk and to identify potentially impacted structures and approximate damages if no long-term water-level-management projects were implemented (i.e., existing conditions).

The modeling results are also being used to determine pumping rates and maximum elevations for each basin to help minimize flood risk and manage groundwater impacts.



Ultimately, the MnDNR limits new outlets on landlocked basins to be established above or between the ordinary high-water level (OHWL) and 1.5 feet below the OHWL.

Valley Branch Watershed District

US Army Corps of Engineers

Comprehensive planning study: Next steps

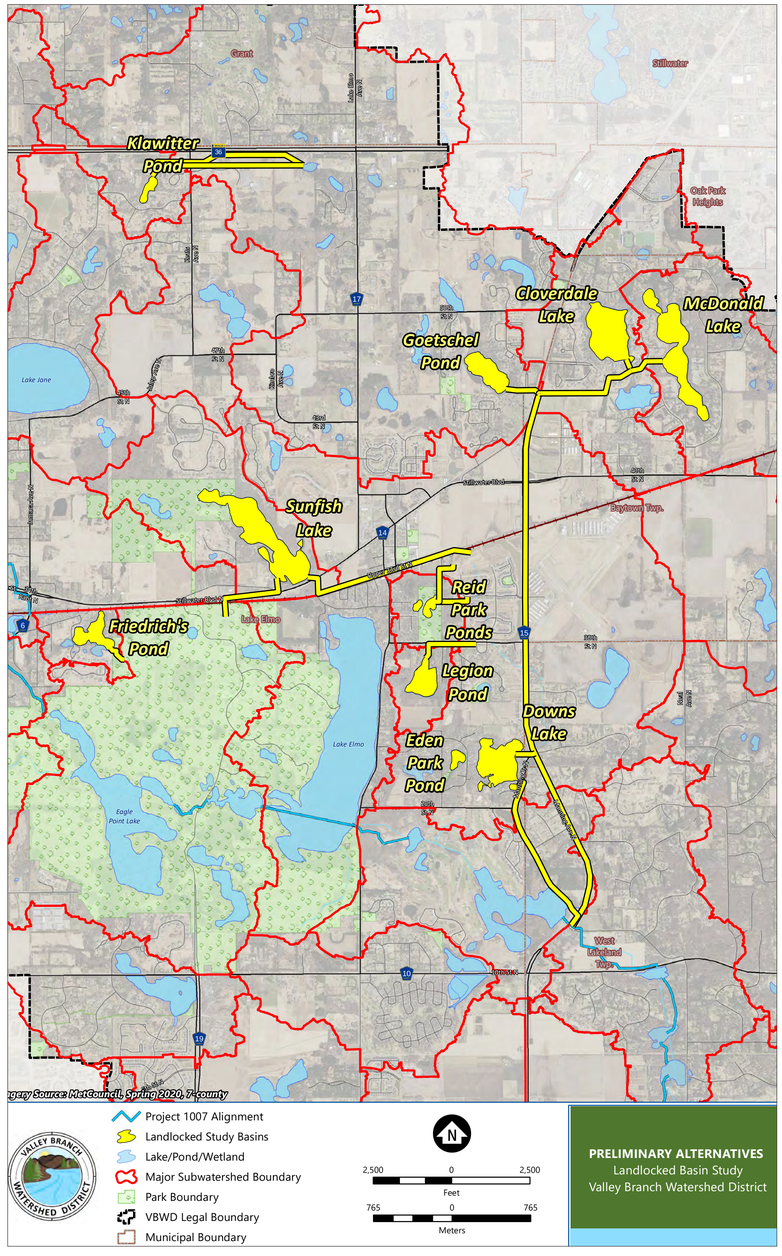
Based on the results of the modeling, flood risk assessment, and establishment of maximum water levels and pumping rates, the VBWD will outline up to three water-level-management alternatives for input from stakeholders.

Water-level-management options could include:

1. Acquisition of potentially impacted properties.
2. Outlet installation (pumped and/or gravity (if possible).
3. No action (if assessment does not indicate flood risk to structures on a given basin).

Preliminary discharge alignments have been developed based on VBWD's understanding of the watershed and the drainage patterns. City, township, county, and state officials have reviewed and provided initial feedback on these alignments (figure at right). VBWD is in the process of outlining the potential project alternatives for further evaluation and will discuss these with stakeholders at an upcoming meeting.

In addition to evaluating the alternatives, VBWD will be considering potential downstream impacts of the proposed water-level-management options on both water quantity (flooding) and water quality. Mitigation measures will be identified and further developed based on the results of the water-level-management evaluation. For the various alternatives, we will also be developing anticipated project costs and permitting requirements.



Chronic flooding at Sunnybrook Lake led to the acquisition of numerous homes around the basin when a pumping solution could not be identified.

Thank you for your interest in the Valley Branch Watershed District Landlocked Basin Flood Mitigation Comprehensive Planning Study. We appreciate you taking the time to learn more about this project.

Feel free to complete the online survey using the QR code below or fill out and submit a paper survey available at this open house. Watch for a second public engagement opportunity later this summer!

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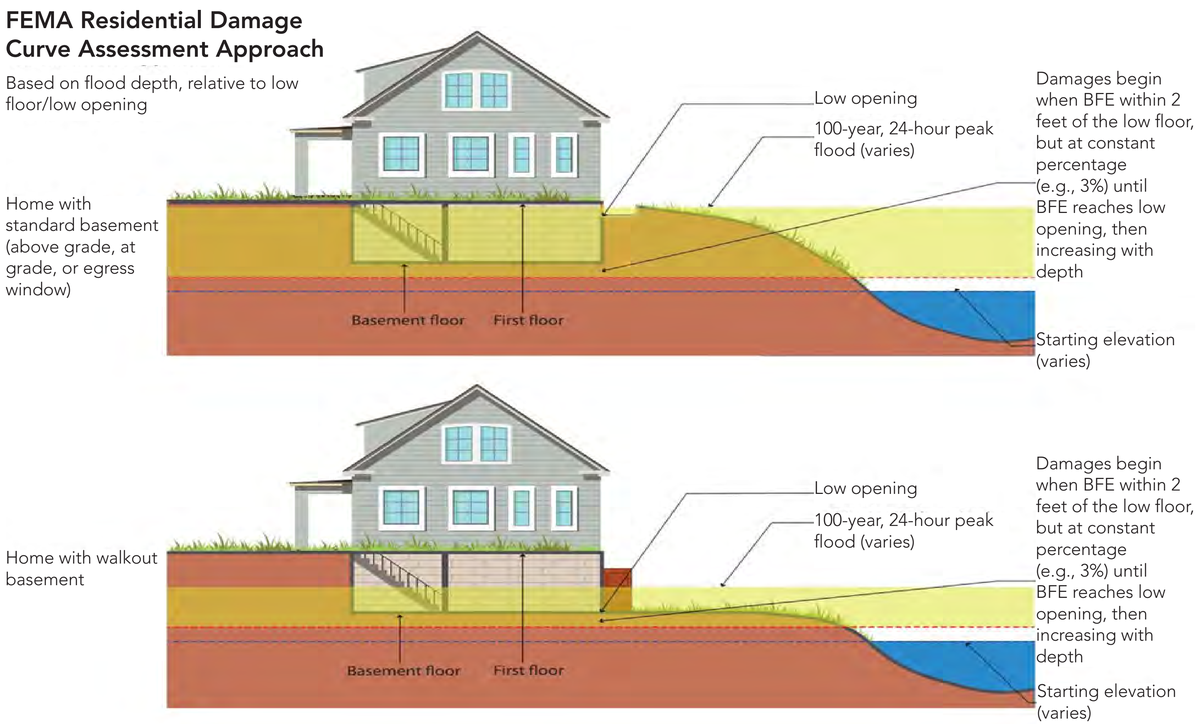
Flood risk analysis and cost assessment summary

The VBWD used surveyed or estimated low-floor and low-opening information for dwellings around each landlocked basin, estimated 100-year, 24-hour design storm event peak elevations, and groundwater modeling results to determine if a dwelling was at-risk of flooding or to have flood damage. This assessment was performed for "without project" conditions (e.g., no pumping or outlet installed). FEMA indicates that flood damages can begin when peak water levels are within 2 feet of the low floor elevation.

We used FEMA residential depth-damage curves to estimate potential flood damages to dwellings around each of the landlocked basins. However, we also used two other approaches to estimate damages/costs associated with potential sustained high-water conditions as was experienced on these landlocked basins in recent years.



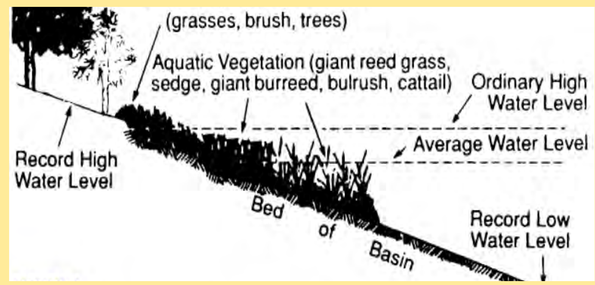
Example of application of FEMA residential damage curves

Lake/Pond	Total Impacted Dwellings (dwellings impacted when peak water level is within 2 feet of low floor elevation)	Estimated Damages/Costs
Klawitter Pond	1–3	$60,000–$1.3 million
Friedrich's Pond	0	$0
Sunfish Lake	1	$51,000–$585,000
Legion Pond	10–16	$180,000–$5.3 million
Reid Park Ponds	2	$30,000–$680,000
Goetschel Pond	0	$0
Cloverdale Lake	8	$185,000–$1.4 million
McDonald Lake	0–1	$50,000–$900,000
Downs Lake	6–8	$ 255,000–$5.2 million
Eden Park Pond	5–6	$90,000–$1.6 million
Total Impacts	**33–45**	**$901,000–$17.0 million**

Pumping rates/target water levels

The groundwater and design storm event modeling results were used to determine the necessary pumping/discharge rates and target elevations for each basin to help minimize flood risk and manage groundwater impacts during high water conditions.

These preliminary estimates were used to help develop the high-water level management alternatives for each basin.



Source: MnDNR. Ultimately, the MnDNR limits new outlets on landlocked basins to be established above or between the Ordinary High-Water Level (OHWL) and 1.5 feet below the OHWL.

Public engagement #1 summary

The first public engagement efforts took place in late March/early April 2023. These efforts included an online survey and interactive map that residents could use to provide input.

Eleven survey responses were received:

- 45% of respondents experienced high water
- 81% were concerned about future flooding

The public open house was held April 5 at Baytown Community Center with 30–40 attendees.

Public comments

Legion Pond	• Concern about future flooding and building resiliency • Consider impacts to invasive species and PFAS contamination • Walkout impacted by high water • Doing nothing is not acceptable, should look at outlet, acquisition, or potentially raising structures
Downs Lake	• Concern about septic and well impacted by high water/contamination, need connections to regional sewer and water • Dislike temporary pumps aesthetics and sound • Preference for a gravity outlet from Downs Lake rather than pumping (noise, damage to trees/landscaping)
Klawitter Pond	• Concern about future flooding and thankful high water is being studied
Goetschel Pond	• Concern about lack of use around Goetschel Pond due to trail flooding • Concern about a high-water level management system being too aggressive, drying out lakes and ponds and causing ecological impact
Reid Park Ponds	• Would like water levels in Reid Park Ponds stabilized and larger/lower connections between the two basins
McDonald Lake	• Don't drain the lake, need water in lake with steep slopes to lake
Unnamed wetland	• Concern about floodplain and basement flooding • Interest in how water flows through his yard to Sunfish Lake
Others	• No negative downstream impacts in West Lakeland Township • Concern about who takes on responsibility for implementation

Developing/evaluating alternatives

Using the technical assessments and design event modeling results for the landlocked basins, preliminary high-water management alternatives were developed. Draft alignments for a comprehensive pumping alternative were provided to the project technical stakeholders for review and comment and several concepts were evaluated based on feedback received. The high-water level management alternative was finalized based on the stakeholder input and public comments. Ultimately, outlets were only proposed on landlocked basins that were determined to have high flood risk to dwellings due to the high cost of lift stations and conveyance as well as the significant mitigation (i.e., storage) volumes needed to reduce downstream impacts.

Both design event and continuous simulation modeling was performed to evaluate the performance of the proposed alternatives. The continuous simulations were also run assuming future land-use conditions as well as assuming the most recent wet period (2014–2020) had more rainfall than was observed.

Alternative 1: Comprehensive Pumping/Outlets

- Pumping on: Klawitter Pond, Reid Park Ponds, Legion Pond, Eden Park Pond
- Gravity outlet on: Downs Lake
- Few acquisitions
- Mitigation for water quantity and quality impacts

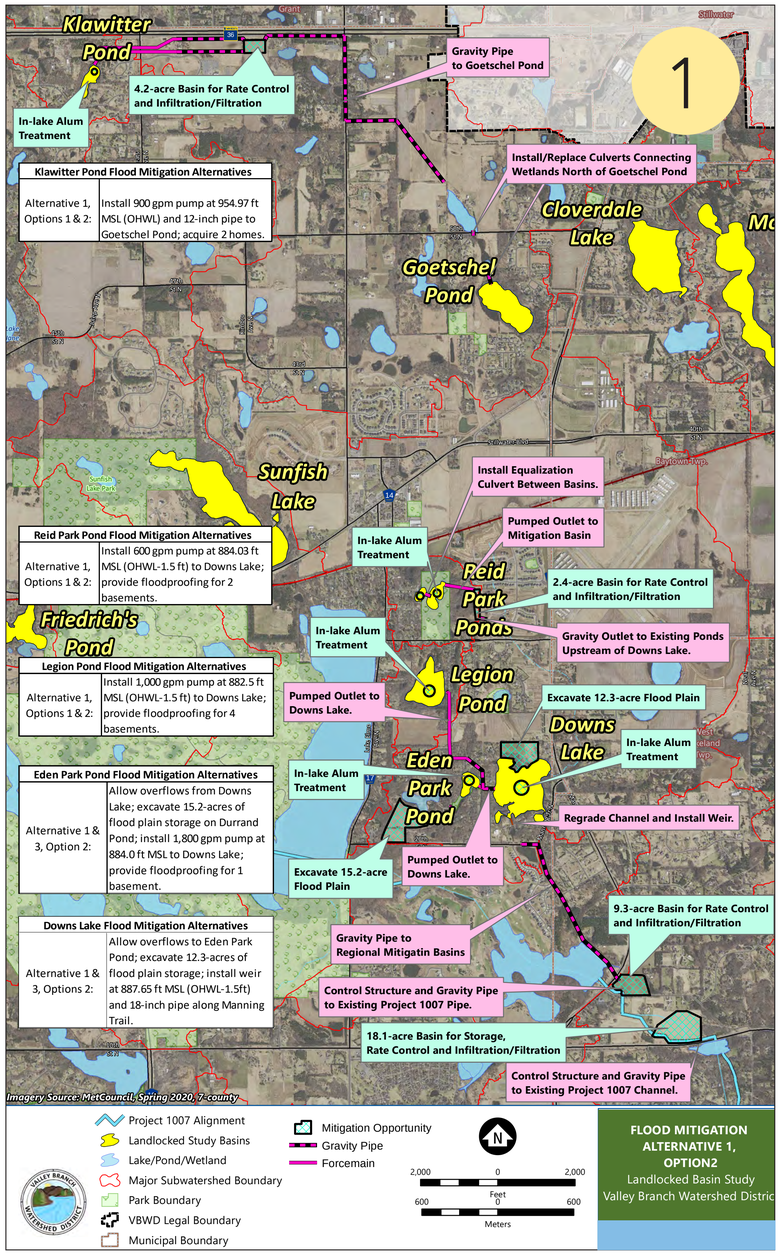
Alternative 2: Voluntary Acquisition

- Voluntary acquisition of all at-risk properties

Alternative 3: Pumping/Outlets at Individual Basins

- Option 1: Reid Park Ponds and mitigation
- Option 2: Legion Pond and mitigation
- Option 3: Reid Park and Legion Ponds and mitigation
- Option 4: Downs Lake/ Eden Park Pond and mitigation

Alternatives 1 and 2 overview



Alternative 1

Pumping/Outlets

Estimated cost: $32.3 million

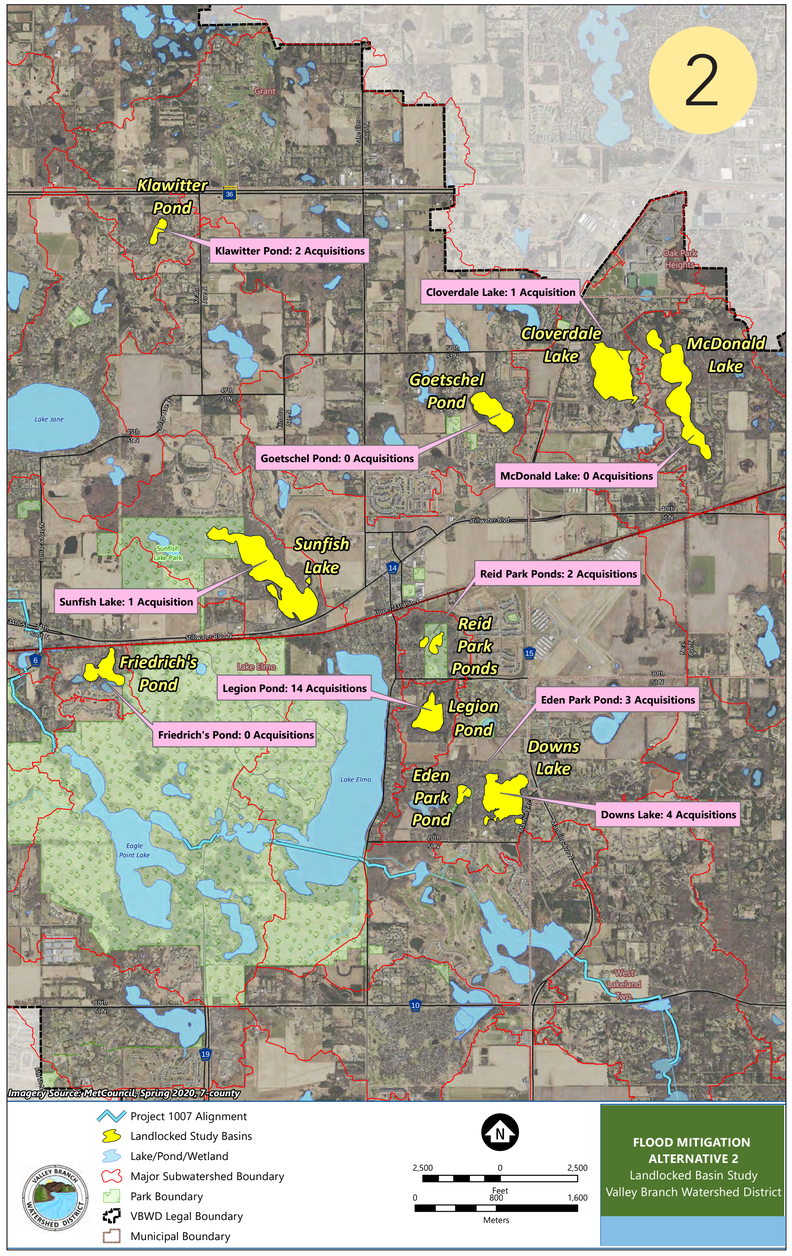
($22.6–$48.4 million)

Alternative 2

Voluntary acquisitions

Estimated cost: $13.5 million

($9.5–$20.3 million)



VBWD Landlocked Basin Flood Mitigation Planning Study

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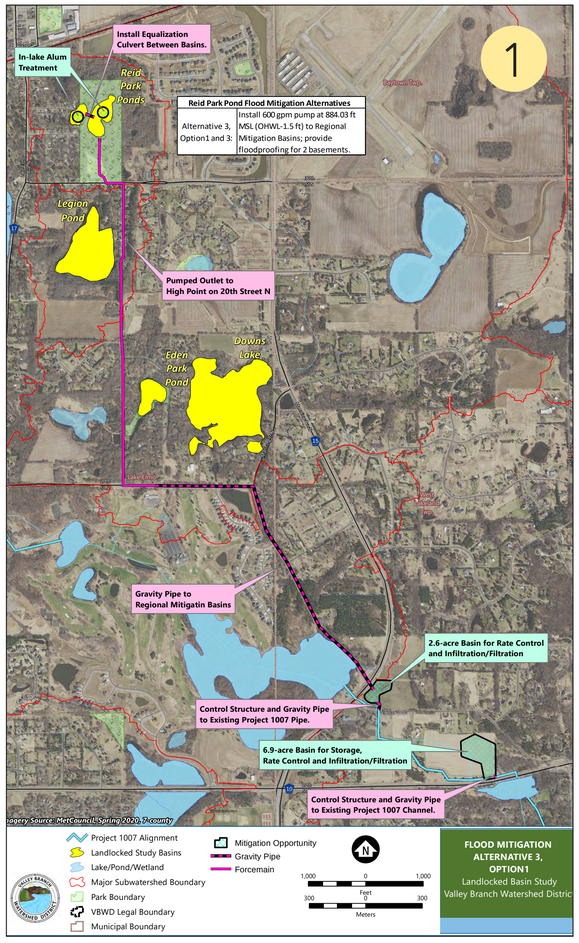
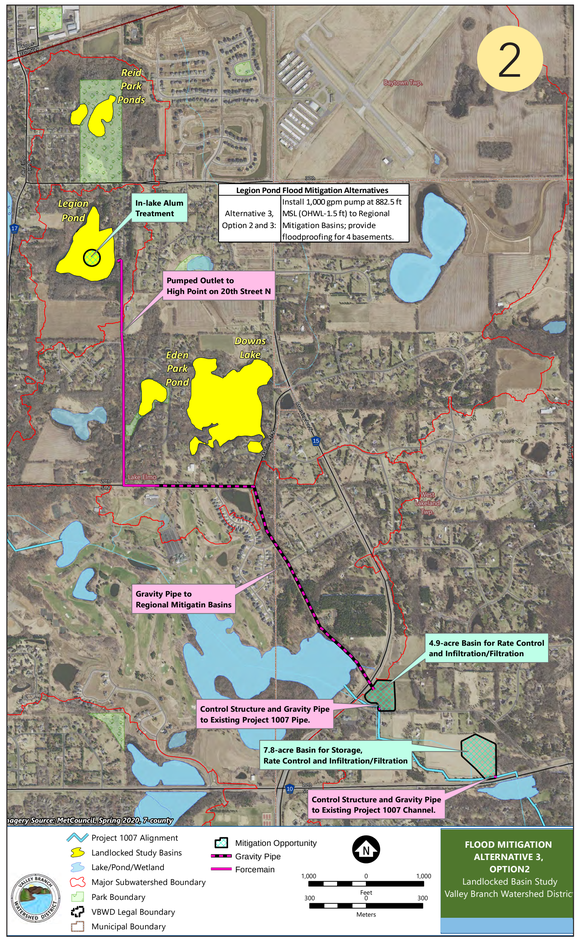
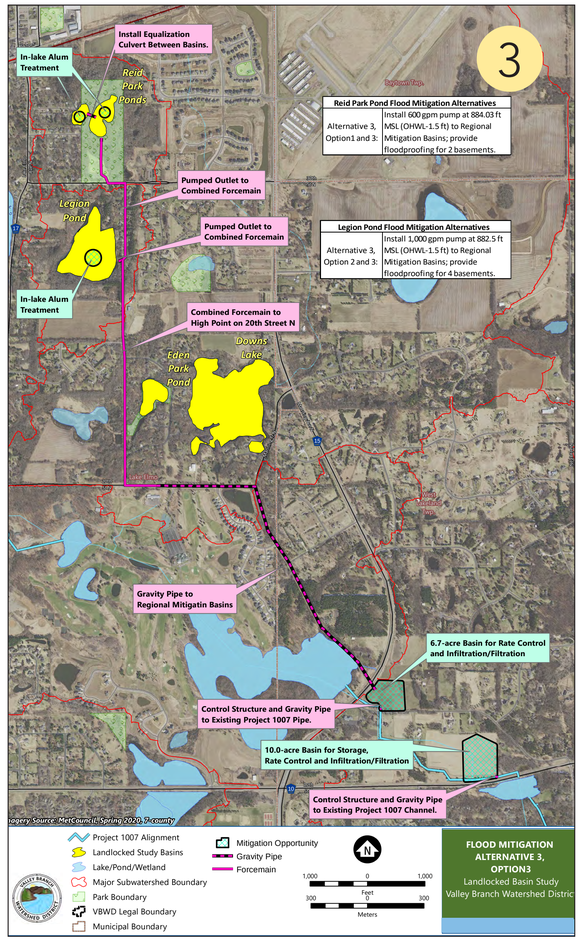
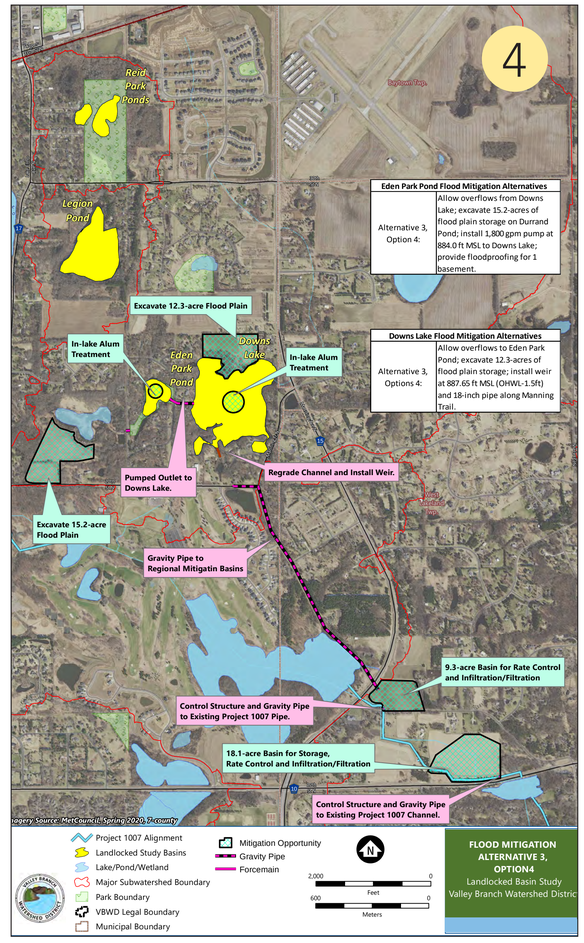
Alternative 3 (Options 1–4) overview









Option 1

Reid Park Ponds only

Estimated cost: $6.4 million ($4.5–$9.6 million)

Option 2

Legion Pond only

Estimated cost: $7.6 million ($5.3–$11.4 million)

Option 3

Reid Park/Legion Ponds

Estimated cost: $9.9 million ($7.0–$14.9 million)

Option 4

Downs Lake/Eden Park Pond

Estimated cost: $21.4 million ($15.0–$32.1 million)

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Summary of costs

For each alternative, planning-level costs were developed for the conceptual designs including the outlets/lift stations, conveyance, storage, water quality mitigation components, land and easement acquisition, construction contingency, planning, engineering, design, and permitting.

As presented, the planning-level costs do not include costs associated with the treatment of "forever chemicals" (PFAS).

Home acquired and demolished in Sunnybrook Lake neighborhood in recent years

Basin	Without Project: Potential Damages/Costs	Alterative 1, Option 2: Comprehensive Pumping/Outlets	Alternative 2: Voluntary Acquisitions	Alterative 3, Options 1–4: Pumping/Outlets on Individual Basins
Cloverdale Lake	$185,000–$1.4 million	N/A	$1,240,000	N/A
Downs Lake	$255,000–$5.2 million	$14,010,000	$4,200,000	**Option 4,** Downs Lake/Eden Park Pond only: $15.0–$32.1 million
Eden Park Pond	$90,000–$1.6 million	Included with Downs Lake	Included with Downs Lake	Included with Downs Lake
Friedrich's Pond	0	N/A	N/A	N/A
Goetschel Pond	0	N/A	N/A	N/A
Klawitter Pond	$60,000–$1.3 million	$7,050,000	$1,285,000	N/A
Legion Pond	$180,000–$5.3 million	$1,520,000	$5,465,000	**Option 2**, Legion Pond only: $5.3–$11.4 million **Option 3**, Reid Park/Legion Ponds only: $7.0–$14.9 million
McDonald Lake	$0–$900,000	N/A	N/A	N/A
Reid Park Ponds	$0–$680,000	$2,270,000	$680,000	**Option 1,** Reid Park Ponds only: $4.5–$9.6 million **Option 3,** Reid Park/Legion Ponds only: $7.0–$14.9 million
Sunfish Lake	$51,000–$585,000	N/A	$585,000	N/A
Regional Mitigation	N/A	$7,410,000	N/A	N/A
Project Total	**$821,000–$17.0 million**	**$32.3 million ($22.6–$48.4 million)**	**$13.5 million ($9.5–$20.3 million**	**Options[1]** **1: $4.5–$9.6 million** **2: $5.3–$11.4 million** **3: $7.0–$14.9 million** **4: $15.0–$32.1 million**

[1] Option 1—Reid Park Ponds only, Option 2—Legion Pond Only, Option 3—Reid/Legion Ponds, Option 4—Eden Park Pond/Downs Lake

VALLEY BRANCH WATERSHED DISTRICT

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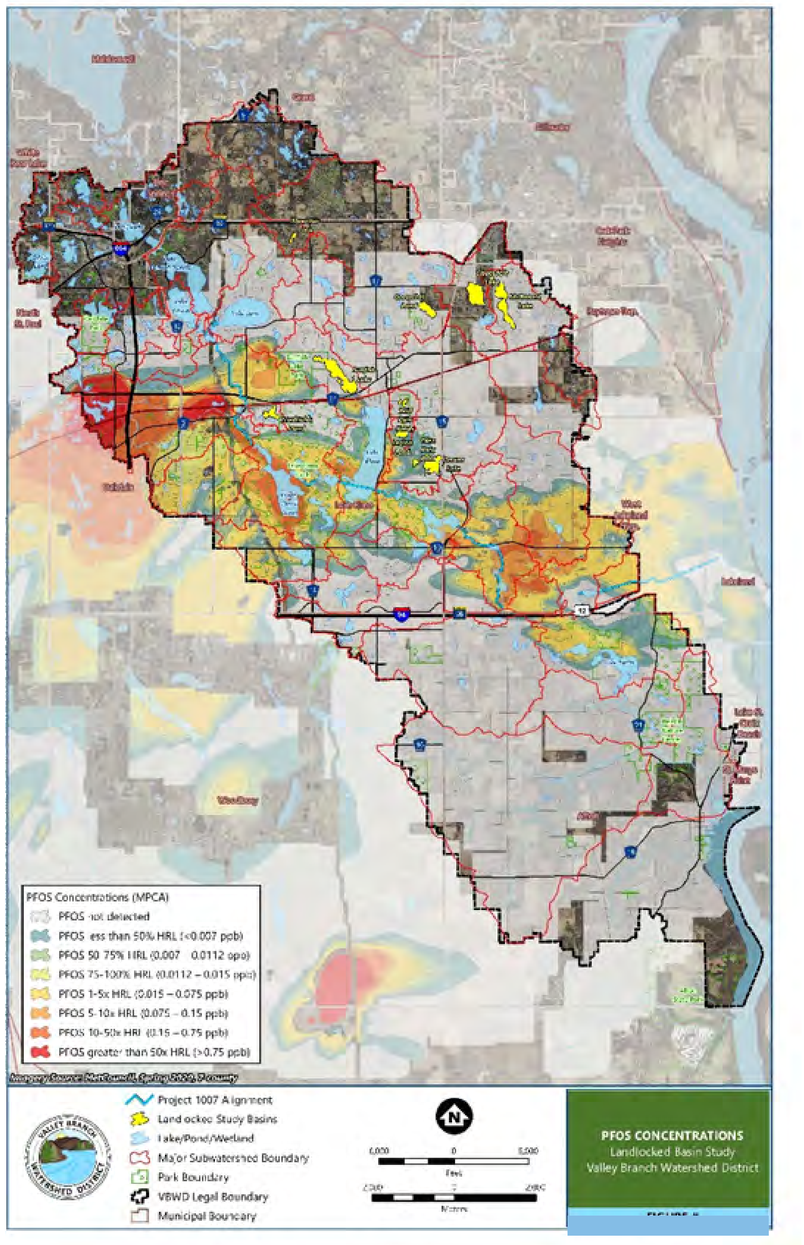
PFAS treatment costs



Many of the basins in the study are located in an area of known groundwater and surface water contamination by "forever chemicals," per- and polyfluoroalkyl substances (PFAS). Although the MPCA was a project stakeholder throughout the study process, it is not clear if or how the presence of PFAS in the VBWD would impact the ability to implement an alternative with pumped or gravity outlets. Similarly, it is not clear whether treatment would be needed.

We used a recently published report (*Evaluation of Current Alternatives and Estimated Cost Curves for PFAS Removal and Destruction from Municipal Wastewater, Biosolids, Landfill Leachate, and Compost Contact Water* [MPCA, June 2023]) to help understand the potential cost implications if PFAS treatment is needed. The cost information from the report was applied to the range of potential flow rates from the proposed system.

Ultimately, the capital costs and annual O&M implications of PFAS treatment would be significant (in addition to the cost of the overall project) and cost-prohibitive, as summarized below.

Flow Rate			Estimated Costs	
Gallons per Minute	Million Gallons per Day	Cubic Feet per Second	Capital	Annual Operations and Maintenance
2,740	3.9	6	$28,900,000	$2,900,000
5,470	7.9	12	$48,800.000	$5,200,000

VBWD Managers/Staff Tour Project 1007 PFAS Treatment System (April 2023)

Permitting requirements

Alternatives including the construction of new outlets will require significantly more permitting than the voluntary acquisition of property (Alternative 2). If an outlet project is pursued, anticipated reviews and permits include:

- State of Minnesota Environmental Assessment Worksheet
- DNR Public Water Work Permit
- DNR Appropriations Permit
- FEMA/DNR Floodplain Permits
- MPCA Construction Stormwater Permit
- VBWD Stormwater, Erosion Control, Wetland/ Buffer, Floodplain Permits
- MN Wetland Conservation Act Permit
- Local (Lake Elmo, West Lakeland Township, Washington County) Permits
- USACE Section 404 permit
- MnDOT Drainage Permit/Project 1007 Agreement

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Study conclusions

- Modeling demonstrated that higher than normal precipitation from 2014–2020 led to increased runoff and higher groundwater levels, resulting in historic, sustained high water levels in the landlocked basins.
- Analysis of historic precipitation data, indicates it is possible that the VBWD could experience a similar or wetter continuous period as was experienced from 2014–2020.
- Estimated flood elevations and flood risk to dwellings and dependent on the starting water elevations in the basins, which can be highly variable. However, some basins had lower flood risk to dwellings (Sunfish Lake, Friedrich's Pond, Goetschel Pond, Cloverdale Lake, Reid Park Ponds, and McDonald Lake). Others have higher flood risk to dwellings where peak elevations are expected to directly impact dwellings via the low openings (Klawitter Pond, Legion Pond, Eden Park Ponds, and Downs Lake).
- Some basins are more sensitive to increased water volumes with more significant increases in long term water levels due to potential changes in land use in the future (resulting in increased imperviousness) or increased precipitation during a future wet climatic period.
- A comprehensive pumped/gravity outlet alternative (Alternative 1) can reduce flood risk to dwellings and provide for more consistent water levels during wet climatic periods. The pumped outlets may be used infrequently (Klawitter Pond, Reid Park Ponds, Legion Pond, and Eden Park Pond). The gravity outlet on Downs Lake would see larger and more regular discharges (approximately 25% to 30% of the time).
- In-lake alum treatments could help improve water quality in the landlocked basins before pumping/outlets; Downs Lake would require both alum treatment and additional watershed management to improve water quality to state standards.
- VBWD will still meet MPCA water quality permit requirements discharges to Lake St. Croix/St. Croix River if a outlet project were pursued.
- The cost of a comprehensive high-water-level management system (e.g., Alternative 1) is significant ($22.6 million–$48.4 million).
  - Due to the distributed nature of the flooding, requiring individual lift stations or gravity outlets and significant conveyance systems and significant mitigation volume to limit downstream impacts
  - Would involve ongoing annual operations and maintenance and energy costs
  - Exceeds the estimated damages/costs due to high water/flooding conditions ($1.0 million–$17.0 million)
  - Uncertainty about how PFAS impacts if/how project could be implemented or if treatment were required/needed
- Alternative 2: Voluntary acquisition of at-risk properties is a more cost-effective approach ($9.5 million–$20.3 million)
  - This is often the preferred approach by agencies to eliminate flood risk

Next steps

1 Finalize study report

2 Prioritize acquisitions and investigate flood risk reduction at individual dwellings

- Hold conversations regarding acquisition policy and funding sources
- Engage with DNR Flood Damage Reduction Grant Program

3 Review VBWD acquisition policy with VBWD managers

4 Review policies regarding development/land use change in landlocked basin watersheds

- Understand affects of limited stormwater runoff retention due to PFAS and karst
- Conduct further technical analysis and modeling to support policy discussion

5 Develop a policy and communications plan for future flooding events

- Determine if VBWD will facilitate any emergency pumping in the future

Thanks for participating in the VBWD Landlocked Basin Flood Mitigation Planning Study. Your input is appreciated. If you have any final questions or comments, please fill out a comment form at the meeting or email:

John Hanson, jhanson@barr.com or
Jennifer Koehler, jkoehler@barr.com

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