

**LOWER MINNESOTA RIVER WATERSHED DISTRICT
STATEMENT OF NEED AND REASONABLENESS FOR PLAN STANDARDS**

May 2018

I. BACKGROUND

A. Introduction

This Statement of Need and Reasonableness (SONAR) presents background on, technical support for, and an explanation of the following standards proposed to be adopted by amendment to the Lower Minnesota River Watershed District's (District) Watershed Management Plan (WMP or Plan). This SONAR does not address standards contained in the current WMP that will be unchanged or clarified by the amendment.

- I. Steep Slopes Standard
- II. High Value Resource Area Protection Standards
 - o Erosion and Sediment Control Standard
 - o Stormwater Management Standard
 - o Water Appropriation Standard

Together these standards will be referred to as the proposed standards.

This SONAR supports the District's decision to adopt the proposed standards, which, as required by Minnesota Statutes §103B.235, must be reflected in official municipal controls as necessary to bring local water management into conformance with the Plan. The District may adopt rules to reinforce implementation of the proposed standards. The proposed standards are in line with the District's mission, which is to manage and protect the Minnesota River, lakes, streams, wetlands, and groundwater and to manage the disposal of river dredge material in support of navigation on the Minnesota River. The proposed standards are beneficial to effective management and protection of water resources in the District, and any burdens that these standards impose are reasonable.

B. Legal Authority

Legal authority for the District to establish standards in its WMP and adopt rules implementing such standards derives from Minnesota Statutes Chapters 103B and 103D. The general purpose of a watershed district is to conserve the state's natural resources through land use planning, flood control, and other conservation projects by using sound scientific principles for the protection of the public health and welfare and for the provident use of natural resources.¹ More specific purposes include, among others, conservation of water for public uses; control of erosion and siltation of lakes, streams, and wetlands; and protection of water quality in these bodies.² District managers are further authorized to regulate and control the use of water within the watershed district, regulate the use of streams and watercourses to prevent pollution, and regulate the use and development of land under certain conditions.³

A District must adopt a WMP for any or all of the purposes for which a watershed district may be established.⁴ The WMP must set forth an implementation program consistent with the management plan that includes standards and schedules for amending the comprehensive plans and official controls of local government units (LGU) in the watershed to bring about conformance with the WMP.⁵ The statutory requirement is that LGUs implement standards contained in a WMP by adopting official controls consistent with the standards.⁶ However, in situations where an LGU does not have an approved local water management plan and consistent official controls, a watershed district may exercise control over land use and development.⁷

The Board of Water and Soil Resources (BWSR) reviews and approves a WMP and amendments thereto after notices and comment periods and a public hearing.⁸

II. PLANNING BACKGROUND & STANDARDS DEVELOPMENT

In 2011, BWSR approved the District's Third Generation Watershed Management Plan and amended in 2015 (Lower Minnesota River Watershed District Plan 2015). The 2011 Plan included land use and water management standards for LGUs within the District. The land use and water management standards were created through a collaborative process with the District's Technical Advisory Committee (TAC) members and stakeholders. The following subsections describe the collaborative process.

¹ Minn. Stat. § 103D.201, subd. 1.

² *Id.* § 103D.201, subd. 2

³ *Id.* § 103D.335, subd's 10, 16, and 23; § 103B.211, subd, 1

⁴ Minn. Stat. § 103D.401, subd. 1.

⁵ Minn. Stat. § 103B.231, subd. 6(8); Minn. R. Part 8410.0105, subp. 6.

⁶ Minn. Stat. § 103B.235, subd. 1

⁷ Minn. Stat. §§ 103D.335, subd. 23(b); 103B.211, subd. 1(3).

⁸ Minn. Stat. §§ 103D.401, subd's 2-5; 103B.231, subd's 7-10.

A. The 2011 Standards Development Process

The 2011 Plan and accompanying standards took two and a half years to develop. The process began with an invitation to advisory committees (Technical and Citizen) and stakeholders to participate in visioning workshops to develop a shared vision of the future. The workshops were an adaptation of the visioning in comprehensive planning process (Haines 2001), which focused on three questions:

- 1) What do we have?
- 2) What do we want?
- 3) How do we get there?

The District hosted four workshops on the following dates in 2009: January 28, February 25, March 17, and April 8. From the visioning workshops emerged the District's standards. Once created, the 2011 Plan (which included the standards) went through the statutorily-required 60-day and 90-day agency and stakeholder reviews and public hearings before approval.

The standards established in the 2011 Plan largely followed the requirements of the National Pollutant Discharge Elimination Systems' (NPDES) Construction Stormwater Permit, the Wetland Conservation Act (WCA), the Model Floodplain Ordinance, and the Minnesota Department of Natural Resources (DNR) permits for water crossings, shoreline and streambank restoration, and bluff protection. Unlike most watershed districts that implement WMP standards through rules and standalone permitting programs, this District relies on the requirements of Minnesota Statute §103B.235 that LGUs adopt official controls to bring water management within the LGU in line with the standards contained in the District's WMP.

B. 2016 Standards Modification Process

Background: Over the past few years, the District has worked closely with LGUs, the DNR, its TAC, and neighboring watershed management organizations to better understand water resources within its jurisdiction. In addition, the District obtained professional monitoring services from the Carver County Water Management Organization, and Dakota and Scott Soil and Water Conservation Districts (SWCD) to collect and assess water samples from fens, lakes, and streams. The District's growing understanding led to its recognition of gaps in management and protection of high value resources (such as fens, trout streams, and lakes) and steep slopes.

In 2016, the District began the amendment process to align its Plan with local water plan timelines and adjacent watershed management organizations. The District also focused on modifying its standards to close the identified gaps in management and protection of high value resources and steep slopes.

Stakeholder and Public Engagement Process: The District designed and facilitated a robust stakeholder engagement process to solicit and incorporate comments from the TAC, DNR, other state agencies, and local and regional stakeholders.

The District hosted four stakeholder workshops to review the proposed changes to standards. Two fundamental changes were proposed:

- 1) a modified bluff protection standard, which provides protections for steep slopes and is in line with the Mississippi River Critical Corridor Area (MRCCA) rule; and
- 2) standards for areas contributing to high value resources (fens, trout streams, and trout lakes).

During each workshop, staff presented draft language for a suite of standards and discussed them with stakeholders. Stakeholders received workshop materials via email before each workshop, and the materials were posted on the District's website. All individuals, including those who could not attend workshops, were encouraged to email their comments, suggested changes, and requests for assistance, if applicable. At the end of each workshop, participants were asked to complete surveys on whether the proposed change went too far, did not go far enough, or was just right. Participants were also asked the following questions:

- 1) Would their organization need assistance implementing the proposed standard?
- 2) What additional information should be considered for ease of implementation?

The District reviewed all responses and, in several cases, proceeded with stakeholder recommendations. Examples where the District followed stakeholder recommendations include the following:

- 1) the District eliminated a proposed wetland standard because the proposed standard did not differ from the WCA, and
- 2) the District modified its presentation of the proposed Bluff Standard to streamline and simplify implementation.

The District released the Draft Amended Plan for the 60-day review by state review agencies, municipalities, and the public in July 2017. The comment period was extended an additional 15 days, as requested by the City of Eden Prairie. At the close of the comment period, the District had received comments from five agencies, seven cities (and the City of Bloomington's Sustainability Commission), one county, and 37 residents. The comments from the agencies, cities, and county varied and spanned different parts of the Draft Amended Plan. The comments from the residents (primarily in the cities of Eden Prairie and Bloomington) focused on the proposed changes to the

Bluff Standard. Residents' comments ranged from concern about the potential impact of the proposed changes on property values to whether minor weed removal would be prohibited or subject to regulatory review. The District reviewed the comments and drafted and distributed responses. After distributing the responses to comments received, the District held its 60-day Draft Amended Plan public hearing on October 25, 2017. More than 50 residents and a handful of municipal staff and elected officials interested in the proposed changes to the existing Bluff Standard attended the hearing. Because of the comments received, the District's managers voted in favor of a continuation of the public hearing to extend the comment period and directed staff to revisit the proposed Bluff Standard. District staff evaluated the comments received on the proposed changes to the existing Bluff Standard and concluded that the primary concerns were the restrictive nature of the changes proposed and the resulting implementation concern of LGUs.

Primary LGU Comments and the District's Responses: To avoid unnecessary duplication of permitting programs, the District prefers to allow LGUs to serve as the permitting authority for the proposed standards. It is the District's firm belief that LGUs are best equipped to implement the proposed standards and should implement them as they would any modification to their official controls (i.e., ordinance or code). Nevertheless, District staff met with several LGUs to discuss their comments and questions about the proposed Bluff and Steep Slopes Standard. The District received following recurring comments and inquiries concerning how the LGU would implement the proposed standards:

- 1) Nonconformities policy
- 2) Policy for lots with current municipal development approval
- 3) Policy for lots with development potential
- 4) Roadway/public works projects
- 5) Project review and technical assistance process
- 6) Timeline for local water management plan (LWMP) and official control amendments
- 7) Variance process

To acknowledge the District's understanding of and appreciation for the LGU and public's concern while maintaining its focus on water resource protection and safety, the District revised and released the proposed Draft Bluff and Steep Slope Standard. The revision to the proposed draft standard eliminated the standard's restrictive nature and made it permissive. As a result, LGU concerns about policies related to nonconformities, lots with current municipal development approval, lots with

development potential, and roadway/public works projects were negated. The District offers the following to support the reasonableness of the proposed standard.

Project Review and Technical Assistance Process

The District is developing a project review process for the Minnesota Department of Transportation (MnDOT) and other state and regional agency projects to assist LGUs and project proposers. Additionally, when requested, the District will provide technical assistance to LGUs for evaluating a development or project proposal for consistency with the proposed standards.

Timeline for LWMP/Code amendments

Minnesota Statute 103B.235 requires:

After the watershed plan is approved and adopted, or amended, pursuant to section 103B.231, the local government units having land use planning and regulatory responsibility for territory within the watershed shall prepare or cause to be prepared a local water management plan, capital improvement program, and official controls as necessary to bring local water management into conformance with the watershed plan within the time period prescribed in the implementation program of the watershed plan and, as necessary, shall prepare or cause to be prepared amendments to the local comprehensive plan.⁹

This District requires adoption of LMWP/Code amendments within 18 months following approval of the District's amended Plan.

Variance and Conditional Use

The District's variance and conditional use policies are presented in Appendix K of the District's WMP. For each LGU with a variance and/or conditional use process contained in its official controls, the District will allow that LGU to issue the variances or conditional use permits. As stated above, the District will provide technical assistance to an LGU, if requested, to assist in evaluating requests.

Following the release of the proposed Bluff and Steep Slope Standard (previously the Bluff Standard), the District held a meeting on January 30, 2018, with its TAC to gather comments on the proposal and package and release the proposed Bluff and Steep Slopes Standard to the agency review team for review. The District also hosted four informational meetings in February, March, and April 2018 for residents in the cities of Bloomington, Eden Prairie, Burnsville, and Savage. District staff also presented the proposed standards to the Carver City Council and met with municipal staff from the cities of Burnsville, Bloomington, and Savage. Upon receipt of comments from the TAC, the agency review team, and informational meeting attendees, the name of Bluff and Steep Slopes Standard was simplified to the Steep Slope Standard.

⁹ Minn. Stat. § 103B.235(1)(a)

The District managers reconvened the public hearing on April 18, 2018, received additional comments and statements from the public and state and municipal staff, closed the public hearing, and directed staff to prepare the WMP for submittal to the BWSR for its statutory 90-day review.

III. PROPOSED STANDARDS

For the reasons outlined herein, the District proposes changes to its standards. The changes proposed are critical to the District's resource management strategy of preserving, protecting, and restoring water and natural resources within its jurisdiction. The proposed changes are needed and reasonable.

To facilitate the implementation of the proposed standards, the District proposed creating two overlay districts: a Steep Slopes Overlay District and a High Value Resource Area (HVRA) Overlay District.

- The Steep Slopes Overlay District covers natural topographic features having average slopes of 18 percent or greater measured over a horizontal distance of 25 feet or more. Areas fitting these definitions were delineated using a DNR mapping tool (developed during the MRCCA) and are presented in Appendix K of the Plan.
- The HVRA Overlay District includes surface areas that drain directly to fens and trout waters. Areas draining to the HVRA Overlay District were delineated using 2011 LiDAR data of the area. Proposed HVRA Overlay District maps of areas within this District are presented in Appendix K of the Plan.

The following sections present the rationale for the standards proposed for the Steep Slopes and HVRA Overlay Districts. Appendix K of the Plan contains the District's comprehensive standards.

A. Steep Slopes Overlay District

The District is concerned about the existing regulatory gap limiting the effective management and protection of steep slopes. If not adequately managed and protected, steep slopes are prone to erosion and slope failures (State of Minnesota 2015). Even where responsible development has occurred, accelerated deterioration of the steep slopes has resulted in catastrophic failure and associated deterioration of surface waters. The District proposes updating the standards to provide additional protection to downslope water resources and properties adjacent to potentially unstable steep slopes.

Current/Existing District Bluff Standard: The current District bluff standard regulates land-disturbing activities on bluffs adjacent to property, waterbodies, and unique natural resources to maintain the stability of the bluffs and protect them from erosion, sedimentation, flooding, and other damage. Before any land-disturbing activity can occur in the District, the existing standard requires a topographic survey to determine if a bluff is present. However, the standard did not specify a detailed description of what constitutes a bluff, making its consistent implementation throughout the District difficult for LGUs (Lower Minnesota River Watershed District 2015).

District Bluff and Steep Slope Concerns: Within the District, several miles of bluffs and steep slopes (or, simply, steep slopes) exist along the Minnesota River and its tributaries. Some natural erosion has occurred, but human land use practices near the steep slopes have made these extreme slopes even more susceptible to damaging erosion. Construction activity, structure placement, vegetation removal, land alteration, and stormwater runoff over the steep slopes have led to increased erosion throughout the District. This excessive erosion threatens slope stability and serves as a source of sediment and pollutants in the Minnesota River and other receiving waters and floodplains.

The District has long recognized that increased steep slope erosion has the potential to degrade water quality, negatively affect wildlife habitat and native plant communities, and cause damage to homes and infrastructure located along steep slopes. In 2006, the District hired the Minnesota Civilian Conservation Corps to inventory all the gullies within the District to identify steep slopes with current and potential erosion and pollution issues. The gully inventory was used to identify potential slope stabilization projects that the District continues to implement with partnering cities. In Bloomington, the District helped with the restoration of a ravine in Parker's Picnic Grounds and streambank restoration on an unnamed stream near Lyndale Avenue and the Minnesota River. In Eden Prairie, the District assisted with a streambank restoration project on Purgatory Creek. The District also helped finance a feasibility study to better understand an area of severe erosion on the north bank of the Minnesota River bordering Eden Prairie (Lower Minnesota River Watershed District 2015). The report found that the river has cut north toward Eden Prairie, undermining the shoreline and causing the riverbank to cave in. The report goes on to explain that this type of erosion occurs naturally but that it "may have accelerated in the past several years due to increased drainage or climate change" (Blake 2010). The District installed inclinometers at the top of the steep slope to monitor movement, and it continues to work with Eden Prairie as they attempt to procure funding for a future bank stabilization project to protect the private property and public infrastructure threatened by the bank movement (Lower Minnesota River Watershed District 2016).

The removal of vegetation from steep slopes can also create an unstable slope and trigger erosion. Established vegetation has strong roots that help to keep soil in place. Vegetation protects the soil surface from compaction by heavy raindrops, and it slows the delivery of water to the soil surface. Plant stems slow down storm runoff flowing over the soil surface and allow more time for water to infiltrate. In contrast, when a slope is completely denuded of vegetation, runoff and soil erosion increase dramatically. During large storm events rainfall runs off rapidly, eroding the unprotected soil and reducing the slope's stability (Lehigh Valley Planning Commission 2008). While removal of hazardous or invasive vegetation is usually beneficial, the way the vegetation is removed can increase the risk of soil erosion and sedimentation.

Studies show that most slope failures have occurred after soil has become saturated (Barr Engineering 2017). The addition of water from rainfall or storm runoff adds weight to the slope because water seeps into the soil and replaces air in the soil pore spaces. Water is heavier than air, so the weight of the soil increases, which increases the amount of force acting on the slope. Water also changes the stable angle of a soil slope. When the soil becomes saturated with water, the water gets between the grains of soil and decreases the amount of frictional contact. This reduces the angle of repose (the slope angle that is the stable angle for the slope) to very small values, and the soil material begins to flow like a fluid. Water can also dissolve mineral cements that hold soil grains together, like calcite, gypsum, and halite. Water entering the soil dissolves these minerals and reduces the cohesion between the soil grains (Nelson 2013).

Current Precipitation Trends: Even as the District and LGUs work to restore and protect failing slopes throughout the watershed, more slope failures and landslides continue to occur. Heavy rainfall throughout June 2014 (Minnesota's wettest recorded month of the modern record) saturated soils across southern Minnesota. Two particularly heavy rain events during this time resulted in slope failures across the District. A storm sewer failure in Eden Prairie along Purgatory Creek caused a landslide that significantly damaged a home and left it "teetering on the edge of the gully" (GoMN 2014). The city ended up purchasing the home and demolishing it because of safety concerns (Conrad 2014). A mudslide forced the closure of the Big Rivers Regional Trail in Mendota because of debris blocking the trail (Roby 2014). A portion of the Minnesota River Bluffs LRT Regional Trail between Eden Prairie and Chanhassen was also closed because of "significant mudslides and unsafe conditions." The trail is still closed (Eden Prairie News 2014). Further upstream on the Minnesota River, two of the four major access roads to the small community of Blakely Township in Scott County were blocked by landslides, resulting in the town's complete evacuation (Mayerle 2014).

Heavy rains over the past decade, including those in June 2014, have led to significant erosion and steep slope failures in other parts of Minnesota as well. Analysis of over 100 years of hourly and daily precipitation data from across Minnesota shows that total precipitation in the state has increased. More significantly, the research shows that extreme rainfall events have gotten larger and become more frequent in the last century, especially over the last three to five decades (Pryor, et al. 2014). In Minnesota, 37 percent more rain falls in large storms (more than 2.5 inches of precipitation) than it did 50 years ago. This increase in the frequency and intensity of extreme precipitation results in more flooding and erosion. Water infrastructure for flood control and erosion control are particularly susceptible to increased precipitation intensity because the designs of these structures are based on historical precipitation and streamflow data, which are no longer appropriate as design guidelines.

Technical Paper 40 (TP-40), developed by the National Oceanic and Atmospheric Administration (NOAA) and initially published in 1961, was the key document that hydrologists and designers of hydraulic structures (e.g., storm sewer infrastructure, detention ponds, streambank restorations) used. TP-40 has rainfall data for every county in every US state for a range of rainfall recurrence intervals (one year to 100 years) and durations (30 minutes to four days) and has been universally used and widely accepted since its inception. Development of TP-40 required much less recorded precipitation data, and the recent increase in large storm events had scientists questioning whether the document was under-projecting rainfall depths, so an updated document was developed. The Hydrometeorological Design Studies Center within the Office of Hydrologic Development of the NOAA's National Weather Service developed NOAA Atlas 14 Volume 8 (Perica, et al. 2013). Atlas 14 used denser precipitation data networks with a greater period of record, new statistical approaches, and new spatial interpolation and mapping techniques to develop new precipitation frequency estimates.

Table 1 compares Atlas 14 and TP-40 precipitation depths at the Minneapolis-Saint Paul International Airport.

Table 1. Comparison of precipitation estimates for a 24-hour duration storm event Minneapolis/Saint Paul International Airport

Frequency (years)	TP-40 (inches)	Atlas 14 (inches)	% Change
2	2.8	2.83	+1
5	3.5	3.54	+1
10	4.1	4.24	+2
50	5.3	6.37	+20
100	5.9	7.50	+27

For higher frequency storms, the difference between TP-40 and Atlas 14 is relatively small. However, as the storm frequency decreases, Atlas 14 estimates substantially higher precipitation depths than TP-40. Many stormwater features designed using TP-40 data may be undersized for the current climate conditions, which could cause flooding and erosion problems if the structures are overwhelmed during a large storm event.

2016 MRCCA Bluff Rule: For the reasons outlined above, the District proposes changes to its Bluff Standard. The proposed Steep Slopes Standard, which applies to all areas within the proposed Steep Slopes Overlay District, originated from the DNR’s MRCCA bluff rule created in 2016. The MRCCA is a joint state, regional, and local program that provides coordinated planning, management, and protection for many unique natural and cultural resources along a 72-mile stretch of the Mississippi River (Minnesota Department of Natural Resources n.d.). Much of the justification for the MRCCA Bluff rule, which is detailed in a December 2015 SONAR (2015 MRCCA SONAR) developed by the Minnesota DNR, is equally applicable to the District, as the following paragraphs describe.

The geology of the District steep slopes is similar to that of the MRCCA bluffs (Minnesota River Valley and Mississippi River), and both face comparable opportunities and threats. In the District and the MRCCA, soils above the steep slope are the result of glacial deposits that have never been buried at a sufficient depth to be consolidated into rock. These unconsolidated materials are sensitive to disturbance and susceptible to erosion. Glacial deposits can be unstable and are subject to slumping, sliding, creep, and erosion when exposed to stresses such as construction activities, stormwater runoff, structure placement, vegetation removal, and land alteration (Minnesota DNR 2015, 22). The Minnesota River Valley’s steep slopes, in particular, are composed of

highly erodible, sandy soils that are difficult to stabilize once disturbed, which accelerates soil erosion (Lower Minnesota River Watershed District 2015, 1-59).

The 2015 MRCCA SONAR includes information about the possible consequences of not adopting the proposed rule that also applies to the District's proposed Steep Slope Standard. The 2015 MRCCA SONAR mentions the positive relationship between water quality, natural landscapes, and property values and anticipates that property owners will benefit economically if the proposed rules protect and preserve those landscapes. There would also be economic benefit to the public and property owners in the form of reduced restoration and remediation expenses for degraded resources if the proposed standard is adopted (Minnesota DNR 2015, 15).

The entire MN DNR 2015 MRCCA SONAR can be found at the DNR Library at 500 Lafayette Road, St. Paul, Minnesota, or at this link: [SONAR \(http://files.dnr.state.mn.us/input/rules/rulemaking/mrcca/sonar.pdf\)](http://files.dnr.state.mn.us/input/rules/rulemaking/mrcca/sonar.pdf).

Hennepin County Landslide Inventory: In 2016 the DNR published an inventory of historical landslide incidents based primarily on newspaper reports. Building on that work, the DNR created a more complete inventory of landslide-prone regions in 2018 by identifying nonreported and prehistoric landslides by their geomorphology. Suspected prehistoric landslide features and signs in Hennepin County were identified and categorized using LIDAR (light detection and ranging) data and other resources. Areas of landslide activity were designated as one of five types based on the shape, size, and location of each slide. Shapefiles containing this information were used to create mapping identifying regions where landslides have occurred (Jennings and Kurak 2018).

According to the landslide inventory, the portion of the Lower Minnesota River Watershed District within Hennepin County contains 618 landslide features. More than half of these features are small slides occurring in the interior of the county (not along the banks of the Minnesota or Mississippi Rivers). These are areas of active, shallow-seated erosion that include ravine sides along first-order (small tributary) stream valleys. Approximately 22 percent of the landslide features in the Hennepin County portion of the District are large scarps, where slides originated along steep head and side slopes, also known as escarpments (scarps). This deep-seated slide activity is primarily located along the Minnesota River and its major tributaries. In contrast to shallow slides, which are rooted in the soil layer and remain relatively small, deep-seated slides are rooted in bedrock, are often slow moving, and can cover large areas (Washington Geological Survey 2017).

A small number of failures (approximately 7 percent) were identified along extensively modified slopes near Highway 169 in the Minnesota River Valley. These failures occurred in non-natural terrain in steep slope zones that may have been modified or repaired after a previous landslide and appear to be failing again. For all failure types, increasing surface water discharge to slopes and ravine heads, further steepening of slopes, and allowing slope saturation will all intensify natural landslide processes (Jennings and Kurak 2018).

The landslide inventory and associated mapping were developed to provide awareness of landslide-prone areas that could affect the safety of people and infrastructure in Hennepin County. The portion of Hennepin County that is part of the District includes approximately 27 acres along the north banks of the river between Eden Prairie and the Minnesota's confluence with the Mississippi River. While this makes up only 34 percent of the total District area, the geology throughout the District is similar to that of Hennepin County, so it is likely that there are many more landslide-prone areas in the District. The prevalence of historic landslide activity throughout the Hennepin County portion of the District highlights the importance of protecting the stability of steep slopes to protect property and prevent degradation of downstream water resources.

Regulatory Comparison: Several LGUs in the District have existing controls in place to provide bluff protection, including the cities of Bloomington and Eden Prairie. The following paragraphs outline the existing protections in these cities.

City of Bloomington

Bloomington has adopted multiple official controls to protect the river and the bluffs while balancing environmental protection and property rights (Verbrugge 2017). The city has created two overlay zoning districts that apply to portions of all land within the city along the Minnesota River Bluff between the 722-foot elevation and the 800-foot elevation. The Bluff Protection Overlay District applies to land that is zoned as single-family residential, whereas the Bluff Development Overlay District applies to land that is zoned to all designations other than single-family residential. Bloomington City Code prohibits development in these overlay districts that will have a floor elevation below 760 feet. Basement floor elevations below the 760-foot elevation cannot be within 50 feet of the bluff face, and expansion of existing structures with a floor elevation below 760 feet is limited to 20 percent of the existing structure's footprint. In the Bluff Development Overlay District, new structures located between the 760-foot and 800-foot elevations have additional side setback requirements based on the size of the bluff-facing façade.

Impervious surface coverage within Bloomington's Bluff Protection and Bluff Development Districts cannot exceed 20 percent of the lot area that is within the overlay district. On slopes greater than 12 percent, the maximum allowable impervious area varies from 16 to 34 percent depending on the slope. Erosion control measures must be employed before any construction can occur within the overlay districts, and soil stabilization is required after construction is complete. A permit is required for all excavation, filling, or grading within the Bluff Protection and Bluff Development Overlay Districts, no matter the size. To limit erosion and maintain bluff integrity, post-development, over-the-bluff stormwater discharge rates in the Bluff Development Overlay District cannot exceed the predevelopment discharge rates. On lots with an average slope of 12 percent or more, the City Council can require applicants to redirect surface water runoff away from steep slopes through control over roof design, downspout placement, and lot grading.

In addition to the protections associated with Bloomington's Bluff Overlay Zones, the City preserves publicly owned land along the Minnesota River bluff as open space by designating areas as conservation districts and substantially limiting land use. This designation also assures that adjacent land will not significantly affect the natural areas it is designed to protect.

City of Eden Prairie

Eden Prairie defines a bluff as a topographic feature located in a shoreland area, drains toward a waterbody, and has an average slope of 30 percent or greater. The bluff impact zone is a bluff and the land located within 20 feet of the top of the bluff. Slopes over 12 percent with an elevation difference of 30 feet or more in a given parcel are considered "steep slopes." City Code requires all structures to be set back at least 30 feet from the top of a bluff, and no structures are allowed in bluff impact zones (except stairways and landings). The city has not mapped a designated overlay district indicating where bluffs and steep slopes requiring additional protection are located. Instead, the city makes determinations about the suitability of land development on bluff-adjacent sites on a case-by-case basis using contour information and "toe" and "top" of bluff locations provided by permit applicants.

Roads, driveways, parking areas, and any other impervious surface cannot be placed within bluff impact zones unless no other alternative exists. If they must be placed in a bluff impact zone, impervious surfaces must be designed to “minimize adverse impacts.” The City of Eden Prairie requires a grading and filling permit for movement of more than ten cubic yards of material on steep slopes and within bluff impact zones. No fill or excavated material can be placed in bluff impact zones. All storm sewer system components located near steep slopes and bluffs must be designed for a 100-year-frequency storm event and must have a designated overland emergency overflow. The Eden Prairie City Code does not have provisions for preserving public land as open space by designating areas as conservation districts.

As the comparison of the existing bluff and steep slope protections in Table 2 shows, the standards in Bloomington differ significantly from the standards in Eden Prairie. Many other LGUs in the District have their own slightly different protection standards as well. The result of having multiple steep slope standards throughout the District is that some steep slopes are being protected while nearly identical steep slopes in other LGUs are not. Having one minimum standard that applies across the District will eliminate the existing regulatory gaps that limit effective protection of bluffs and steep slopes while also providing additional protection to downslope water resources and properties adjacent to the Minnesota River steep slopes.

Table 2. Comparison of existing bluff/steep slope protection controls

	Bloomington	Eden Prairie
Bluff Definition	<ul style="list-style-type: none"> All land within the city along the Minnesota River Bluff between elevation 722.0' and 800.0' MSL¹ is mapped Referred to as Bluff Protection Overlay Districts or Bluff Development Overlay Districts depending on zoning 	<ul style="list-style-type: none"> Topographic feature Located in a shoreland area Slope rises $\geq 25'$ above OHWL² Average slope $\geq 30\%$ Slope drains toward waterbody Bluff Impact Zone (BIZ) = bluff and land within 20' of top of bluff No overlay district mapping
Steep Slope Definition	<ul style="list-style-type: none"> Average slope $\geq 12\%$ 	<ul style="list-style-type: none"> Average slope $\geq 12\%$ Elevation difference $\geq 30'$
Development Limits	<ul style="list-style-type: none"> No development w/floor elevation $< 760'$ Basement floor elevation $< 760'$ requires 50' setback from bluff face Expansion of existing structures $< 760'$ limited to 20% 	<ul style="list-style-type: none"> All structures must be at least 30' from top of bluff No structures in BIZ
Impervious Surface Limits	<ul style="list-style-type: none"> Overlay district: $< 20\%$ of lot area within overlay district Steep slope: varies from 16% to 34% depending on slope 	<ul style="list-style-type: none"> Cannot be placed in BIZ unless no alternative exists Must be designed to minimize adverse impacts
Excavation, Fill, Grading	Permit required for all excavation, filling, grading, no matter the size	<ul style="list-style-type: none"> Grading/filling permit required for $< 10 \text{ yds}^3$ (steep slopes and BIZ) No fill or excavated material can be placed in BIZ
Stormwater Discharge	<ul style="list-style-type: none"> Overlay district: Post-development over-the-bluff discharge rate \leq predevelopment discharge rate Steep slopes: City can control roof design, gutter placement, lot grading 	<ul style="list-style-type: none"> Storm sewer components near BIZ or steep slopes designed for 100-year storm Must have designated overland emergency overflow
Conservation Districts	<ul style="list-style-type: none"> Preserves publicly owned land along bluff as open space by limiting land use 	None

¹MSL = Mean sea level

²OHWL = Ordinary high-water level

Protection of District Steep Slopes: Based on the need presented herein, the District proposes the following protections for steep slopes. Land disturbing activities as regulated that involve the excavation of 50 cubic yards or more of earth, displacement or removal of 5,000 square feet or more of surface or vegetation, and activities requiring municipal/LGU grading, building, parking lot, or foundations permits that result in a net increase in impervious surface or stormwater runoff within the Steep Slope Overlay District are allowed provided that a qualified professional or professional engineer registered in the state of Minnesota certifies the suitability of the area for the proposed activities, structures, or uses resulting from the activities and that the following requirements are addressed:

- A. Minimum erosion and sediment control best management practices (BMPs) include site stabilization and slope restoration measures to ensure that the proposed activity will not result in
 1. adverse impacts to adjacent and/or downstream properties or water bodies;
 2. unstable slopes conditions; and
 3. degradation of water quality due to erosion, sedimentation, flooding, and other damage.
- B. Existing hydrology and drainage patterns are preserved. Land-disturbing activities may not result in any new water discharge points on steep slopes or along the bluff.

Stormwater ponds, swales, infiltration basins, or other soil saturation-type features shall not be constructed within the Steep Slopes Overlay District.

Development of the Steep Slopes Overlay District: Many municipalities throughout the district have existing bluff management standards in place to provide protection to steep slopes. The existing standards differ from one LGU to the next, with varying applications of bluff and steep slope definitions and protection requirements. The District is concerned that the lack of agreement about what should be protected has created a regulatory gap that limits the effective management and protection of steep slopes. Specific definitions for bluffs and steep slopes were developed to ensure consistent treatment of development throughout the District. Using these definitions, the Steep Slope Overlay District was created to specifically show what areas of the District meet these definitions and will require future protection and management.

The Steep Slope Overlay District was developed using a geographic information system (GIS)-based bluff mapping tool developed by the DNR. The DNR Mapping Tool was created to assist local governments in identifying bluff locations for the administration of shoreland and river-related ordinances (Minnesota Department of Natural Resources 2017). Digital elevation model (DEM) data within the District boundaries were obtained from the DNR and mosaicked together to create a comprehensive DEM for the entire District. This DEM was used as an input to the DNR Mapping Tool. Both the Existing Bluff Standard and Proposed Bluff and Steep Slope Standard slope thresholds were used as parameters in the DNR Mapping Tool. Exhibit A contains the maps resulting from the existing and proposed standard.

Affected Property Analysis: The District and municipalities within its boundary wanted to understand the number of properties that the proposed change of the Bluff and Steep Slopes Standard could affect. To do this, the District obtained parcel data for each county in the District and overlaid it with the GIS files developed as a part of the process discussed above. The number of parcels in each municipality affected by the existing and proposed standards were counted, and the net change was calculated (Ronchetti and Young 2017). Table 3 shows the results of the analysis.

Table 3. LMRWD proposed Steep Slopes Standard affected properties summary

	Bloomington	Burnsville	Carver	Chanhassen	Eden Prairie	Chaska	Eagan	Fort Snelling	Lilydale	Mendota	Mendota Heights	Metropolitan Airport Commission	Savage	Shakopee
Existing Bluff Standard	511	286	121	54	33	145	37	5	1	15	16	1	109	88
Steep Slope Standard	676	363	159	65	84	229	49	5	1	16	16	1	239	199
Net change	165	77	38	11	51	84	12	0	0	1	0	0	130	111

Impact of Regulation: Several landowners and municipalities have questioned whether the proposed Bluff and Steep Slope Standard¹⁰ and resulting official controls will result in a taking of property under either the Minnesota or US Constitutions. When a regulation substantially advances a legitimate governmental interest, the takings implications of that regulation depends on the regulation's effect. The United States Supreme Court has acknowledged that government regulation must be able to diminish the value of private property to some extent without paying for every such change in the general law. If, however, the government goes too far, such regulation may constitute an unconstitutional taking of private property unless the government pays just compensation for what it has taken.

A categorical taking occurs only if the regulation deprives the owner of all economically viable uses of the land. If the regulation is not a categorical taking, the takings analysis shifts to the character of the action and the nature and extent of the interference with [the owner's] rights in the parcel as a whole. The key test for a regulatory taking was announced by the United States Supreme Court in *Penn Central Transp. Co. v. City of New York*. The Minnesota Supreme Court has adopted the *Penn Central* test. Under the *Penn Central* test, a court must weigh (1) the regulation's economic impact on the owner, (2) the extent to which the regulation has interfered with particular investment-backed expectations, and (3) the nature of the regulation.

Under the first *Penn Central* factor, a court examines the magnitude of a regulation's economic impact and the degree to which it interferes with legitimate property interests. Notable in the analysis is the concept of a legitimate property interest. Legitimate property interests do not include activities that are injurious or detrimental to the public interest. The Supreme Court has observed that government regulation, by definition, involves the adjustment of rights for the public good, and that often this adjustment curtails some potential for the use or economic exploitation of private property. The Minnesota Supreme Court has repeatedly upheld zoning ordinances and other land use restrictions against allegations of unconstitutional taking, even where the value of the property declined significantly because of the restrictions.

Examining a property owner's investment-backed expectations under the second *Penn Central* factor shows that the existing and permitted uses of the property when the land was acquired generally constitute the landowner's primary expectation regarding the property. When an owner buys property with knowledge of restrictions on that property's development, he or she assumes the risk of any economic loss. Similarly, when an owner buys property possessing certain obvious physical conditions or restrictions, he or she assumes the risk that those restrictions and conditions will limit the property's

¹⁰ Note: This is now just the Steep Slope Standard. For purposes of the Impact of Regulation discussion here, we have retained reference to the Bluff and Steep Slope Standard. Implications analysis remains the same under the revised Steep Slope Standard.

use. While such knowledge will not automatically defeat a takings claim, the effect of existing regulations is relevant to determining the reasonableness of the owner's expectations.

Finally, because the third *Penn Central* factor focuses on the nature of the regulation, the relevant considerations may vary depending on the circumstances of the individual conditions being regulated. Here, nothing in the proposed Bluff or Steep Slope Standard prohibits the use and development of property. Rather, the standard simply identifies, upon sound scientific bases, areas of the watershed where land disturbance and development pose significant risks to the public. The standard requires a qualified professional or professional engineer to evaluate proposed uses and development for viability given site conditions. This standard simply protects the public interest by ensuring that proposed land use and development can occur safely and with minimal risk of failure. If application of the standard prevents a land use or development activity, the prevention will not be a result of the standard. Rather, the prevention will be the result of an engineering determination that the activity cannot be accomplished safely and with minimal risk of failure. The question, then, is whether an activity that cannot be accomplished safely and with minimal risk of failure is a viable use of property.

For the foregoing reasons, the District does not believe that the proposed Bluff and Steep Slope Standard—or resulting official controls—will result in a constitutional taking of property.

Summary: It is the District's policy to maintain the stability of bluffs and steep slopes to protect adjacent properties, promote public safety, and prevent degradation of down gradient water resources. Bluff erosion has led to numerous slope failures across the District in the recent past, most notably during the heavy rainfall events of June 2014. The 2018 Hennepin County landslide study shows that, historically, landslide activity has been prevalent within the District. As extreme rainfall events continue to increase in severity and become more frequent, bluff erosion incidents will occur more often. Recognizing the susceptibility of bluff areas to failure and the possibility that these failures could cause far more property and resource damage than the 2014 events did, the District believes (reinforced by the 2015 MRCCA SONAR) that the proposed standard presents better and more reasonable corridor-wide management practices that address structure placement and vegetation, land alteration, and stormwater management. The proposed standard, if implemented, could reduce the risk of soil erosion and bluff failure as well as economic loss and human injury.

B. High Value Resources Area Overlay District

The District is home to several rare fens and sensitive trout waters. Fens are distinctive wetlands that depend on a constant supply of cold groundwater rich in calcium and magnesium bicarbonates. Trout waters also require a stable supply of cold water as well as high oxygen concentrations and adequate nutrient inputs. These specific hydrologic and chemical requirements make fens and trout waters especially sensitive to changed groundwater conditions, stormwater runoff, and sedimentation (Lower Minnesota River Watershed District 2015). These high value resources could be lost forever if adequate protections are not established and enforced.

District HVRA Concerns: Calcareous seepage fens are one of the rarest natural communities in the United States. Most are located in the Midwest, and approximately 200 exist in Minnesota, most of which are only a few acres in size. Fens support a large number of rare plant species in Minnesota. Of the eight state-listed, rare plant species that exist in Minnesota fens, four occur almost exclusively in fens. Other plant species cannot invade an undisturbed fen because they cannot tolerate the cool temperatures and constantly wet, low-oxygen soils (Leete and Gullett 1989). However, these rare plant species are highly susceptible to disturbance. A reduction in groundwater levels or an increase in nitrogen-rich surface water runoff into fens promotes the growth of coarse vegetation and aggressive exotic plants that outcompete and displace fen plants (Minnesota DNR 2015).

Because of development in the District, few natural fens remain, and there is concern about the quality of the existing fen habitat. In 2005, seven fens and other groundwater-dependent resources were evaluated as part of a study commissioned by the District to develop a groundwater monitoring strategy to protect groundwater-dependent resources (Bonestroo, Rosene and Anderlik & Associates 2005).

The Black Dog Fen is one example of a heavily affected fen that has experienced irreparable damage. This fen is located east of Interstate I-35W in the City of Burnsville. The report on Black Dog Fen (Bonestroo, Rosene, Anderlik & Associates 2005) found the following:

- The exact size and extent of the fen is difficult to determine because it has been so heavily affected., Portions of the fen lie on both the north and south side of the Union Pacific railroad tracks in the area.
- Some DNR staff and others associated the degraded condition of Black Dog Fen with the Kraemer Quarry dewatering operation, but all agreed that stormwater runoff has done more damage to the fen.
- A reduction in infiltration upgradient of the fen is also thought to have reduced ground water flow.

- Agency staff agree that Black Dog Fen is the most heavily affected fen in the area. The US Army Corps of Engineers and Fort Snelling Park staff believe that the fen is extinct, especially north of the Union Pacific railroad tracks.

The Nicols Meadow fen is another example of a heavily affected District fen. This 35-acre fen is located northeast of the intersection of Cedar Avenue (Highway 77) and Highway 13 in the City of Eagan and is the third fen located in Fort Snelling State Park. The report on Nicols Fen (Bonestroo, Rosene and Anderlik & Associates 2005) found the following:

- Anecdotal evidence states that the fen was in excellent condition in the mid-1970s.
- Construction of Cedar Avenue in 1977 is thought to have heavily affected the fen, with stormwater runoff heavily affecting the peat layer.
- Dewatering from the nearby Seneca Wastewater Treatment Plant is thought to have heavily affected water levels in and around the fen, possibly resulting in the peat aquifer's partial collapse.
- As water levels in the fen have decreased, the number of native plant species in the fen has declined, and invasive species are prevalent.

Minnesota environmental agencies have closely watched the Nicols Meadow fen for decades. In 1989, Minnesota DNR and Minnesota Pollution Control Agency staff recognized that the planned expansion and upgrade of the Seneca Wastewater Treatment Plant posed a potential threat to the fen because the construction plans included excavation and dewatering that could disrupt the flow of groundwater (Leete and Gullett 1989). When the impacts of the dewatering near the fen were recognized, two sets of observation wells were installed to monitor water levels. As pumping at the Seneca site continued and pumping volumes increased, the observation wells showed downward movement of ground water rather than the recharging (upward movement) observed before construction began. Water levels in the Savage Fen were monitored at the same time to provide a comparison with a fen unaffected by the Seneca plant construction. The comparison showed that at the end of the 1989 growing season, water levels in the Nicols Meadow fen were four feet lower than the seasonal norm. To mitigate the impacts to the fen from dewatering, Metropolitan Council Environmental Services installed an irrigation system and a series of injection wells in 1990 in an attempt to rehydrate the fen (Leete and Gullett 1989).

District development has negatively affected Nicols Meadow fen for many years, but the fen has fortunately remained relatively healthy. Well monitoring data from 2016 show that the water level in the fen may be recovering after several years of low water conditions, although the apparent increasing trend may be related to recent wetter-than-average years (Dakota County Soil and Water Conservation District 2016).

Unfortunately, damage isn't isolated to fens, as development has also negatively affected trout waters. In 2012, the District led a study to identify the relationship between stormwater runoff from Highway 101 and the temperature of Eagle Creek. Temperatures recorded upstream and downstream of the pond tributary between Highway 101 and the railroad tracks showed that the tributary was approximately 5°C warmer than Eagle Creek and that the temperature increased by 2°C after the tributary discharged into the creek (Scott SWCD, 2015). The study attributed the increase in water temperature to warm water discharge from a stormwater pond upstream of Eagle Creek as well as runoff from Highway 101. Future similar situations could degrade these precious resources within the District. Equally important to these resources is ensuring a constant and sustained groundwater supply. Groundwater has the health-sustaining chemistry and temperature that fens and trout waters need.

A small, unnamed stream near the Mall of America in Bloomington, locally known as Ike's Creek, has been a subject of interest for more than a decade. The spring-fed creek, which is less than one mile long, flows directly to the Minnesota River through a ravine located entirely in the Minnesota Valley National Wildlife Refuge. In the mid-2000s, DNR fisheries experts determined that the creek had enough flow, a low enough water temperature, appropriate dissolved oxygen levels, and an insect community capable of supporting trout. In 2007, the DNR and Trout Unlimited stocked the stream with 1,450 brook trout. Some of the trout survived, but the population remained vulnerable because of a small dam that prevented the trout from reaching better spawning and nursery habitat upstream. The trout needed the full run of the creek to thrive, so in 2012 the dam was removed and the DNR restored the stream with funding from Twin Cities Trout Unlimited, the Minnesota Valley National Wildlife Refuge, and the Outdoor Heritage Fund (Meersman 2013).

In 2017 the DNR investigated the possibility of designating Ike's Creek as a trout stream. The investigation found adequate evidence of suitable conditions for trout in the creek based on water temperature monitoring, dissolved oxygen levels, and the presence of a self-sustaining brook trout population. However, feedback from the City of Bloomington indicated that a trout designation would not materially add to the existing protections for Ike's Creek, so the DNR stopped pursuing trout designation for the creek.

In a 2017 letter from the DNR to the City of Bloomington, one of the reasons given for not designating Ike's Creek as a trout stream was that "existing city ordinance, PCA and DNR permitting, and proposed Lower Minnesota River Watershed standards will meet or exceed any standards that would come from a trout designation." In the interest of protecting this rare habitat, especially given the urban nature of the surrounding drainage area and the sensitivity of trout waters to increased water temperature and turbidity, the District includes Ike's Creek as a HVRA.

Protection of District HVRA: The proposed HVRA Overlay District includes surface areas that drain directly to fens and trout waters. Reasonable and appropriate land use planning restrictions and regulations are needed throughout the District to protect these high value resources. Erosion and sediment control and stormwater management literature and research findings have thoroughly documented that the conversion of land from a vegetated state to urban and suburban landscapes retards infiltration, thereby increasing the rate and quantity of stormwater discharged downstream. These conversions also increase the potential for discharging stormwater laden with sediment, nutrients, and other constituents that could negatively affect the health and well-being of rivers, lakes, streams, and their inhabitants.

Since the early 1970s, federal and state governments have worked to protect water resources by passing regulations such as the NPDES. The NPDES program regulates both point and nonpoint sources of pollution. In most cases, the District believes that the NPDES program and its permits adequately address water resources management and protection by regulating potential impacts. However, additional protections are necessary for surface and subsurface watersheds that drain to high value resources like fens and trout waters. Within HVRA, the District proposes the following needed protection measures:

1. Erosion and sediment control: Projects with land-disturbing activities that involve the alteration or removal of 5,000 square feet or more of surface area or vegetation or the excavation of 50 cubic yards or more of earth within the HVRA Overlay District must complete a grading/erosion control plan and provide weekly construction inspections and facilitate maintenance of construction BMPs.
2. Stormwater management: Projects with development, redevelopment, and drainage alterations (including roads) that create new impervious areas greater than 10,000 square feet must meet rate, volume, and water quality requirements and, in areas adjacent to trout waters, buffer and temperature requirements.

Minnesota's construction stormwater permit, an extension of the NPDES Stormwater Program, requires a stormwater pollution prevention plan (SWPPP) for all construction activity that results in land disturbance of one acre or more, no matter where the site drains to. Considering the sensitivity of fens and trout waters to sedimentation and chemical composition, requiring a grading/erosion control plan, weekly construction inspections, and maintenance of construction BMPs for somewhat smaller areas of land disturbance is not an unreasonable requirement.

In addition to erosion and sediment control and stormwater management, management of temporary and permanent groundwater appropriations is necessary. A sustainable, nonfluctuating supply of groundwater is required to maintain water levels and soil chemistry in the fens and temperature in trout water. The District proposes additional protection measures for projects requiring temporary and permanent groundwater appropriations of less than 10,000 gallons per day and 1,000,000 gallons per year for nonessential use, including but not limited to temporary dewatering activities. Projects meeting the above criteria within the HVRA Overlay District must develop a discharge management plan and demonstrate no net change in groundwater levels to adjacent fens and trout waters.

Summary: The District's policy is to prevent resource degradation resulting from erosion and sedimentation and to protect and improve natural resources within the watershed to protect further degradation. This is especially true for high value resources like fens and trout waters. Establishing adequate protections for HVRAs is critical for preventing the further destruction of these unique and irreplaceable resources. Increased development has resulted in changed groundwater conditions, increased stormwater runoff, and sedimentation, all of which have negatively affected HVRAs throughout the District. Some District resources, like Black Dog Fen, have experienced irreparable damage. However, increased monitoring and protection have positively affected other resources such as Nicols Meadow Fen. The proposed HVRA Overlay District makes it easier to identify and protect these resources before more damage is done, and the proposed changes to the District standards, if implemented, are reasonable and necessary for the protection of HVRA.

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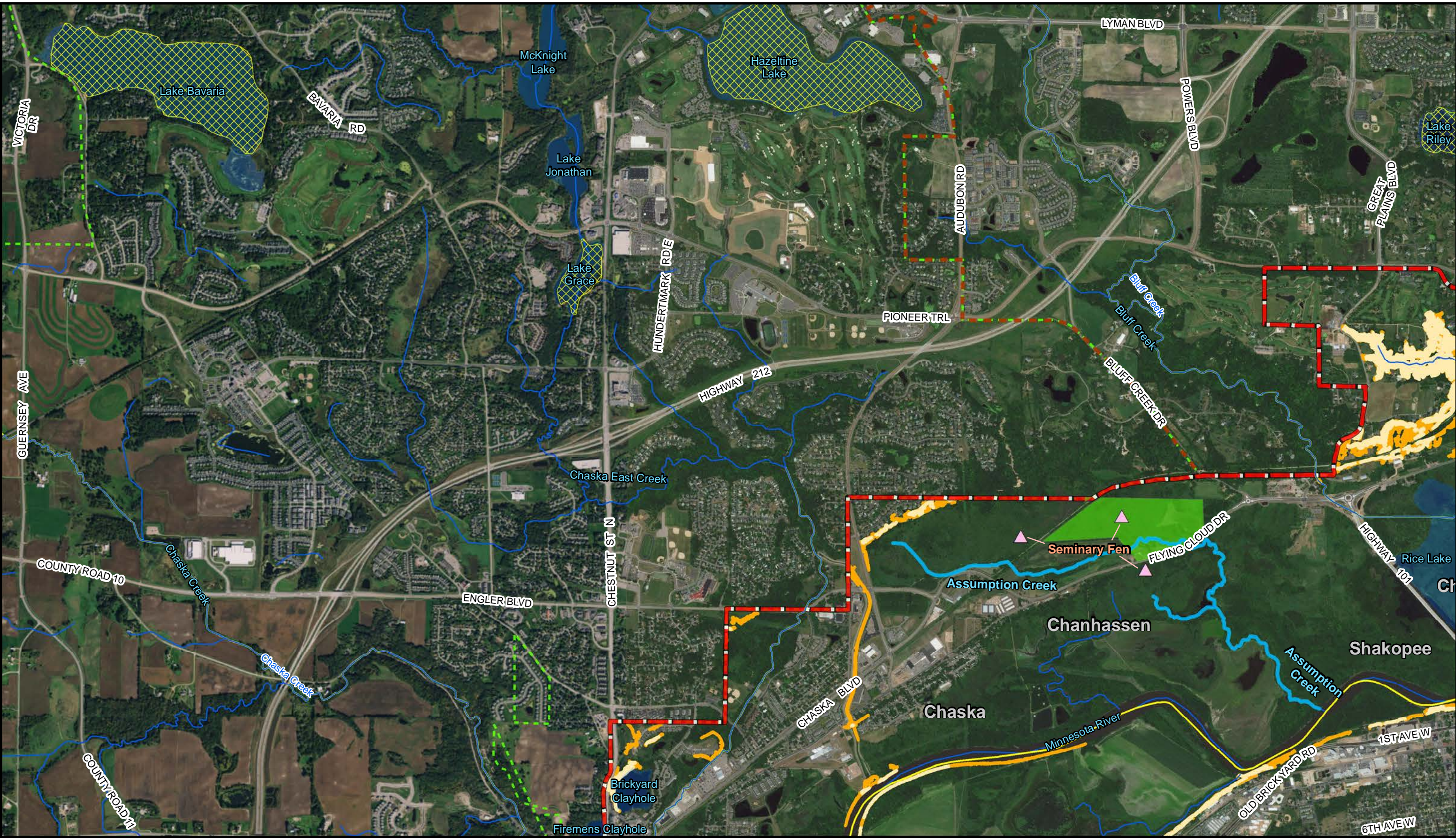
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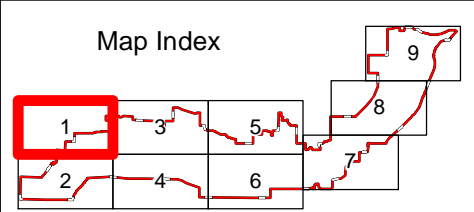
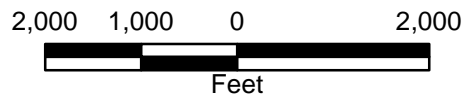
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Exhibit A - Comparison Maps of the Existing Bluff Standard and the
Proposed Bluff and Steep Slope Overlay District Maps

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 Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

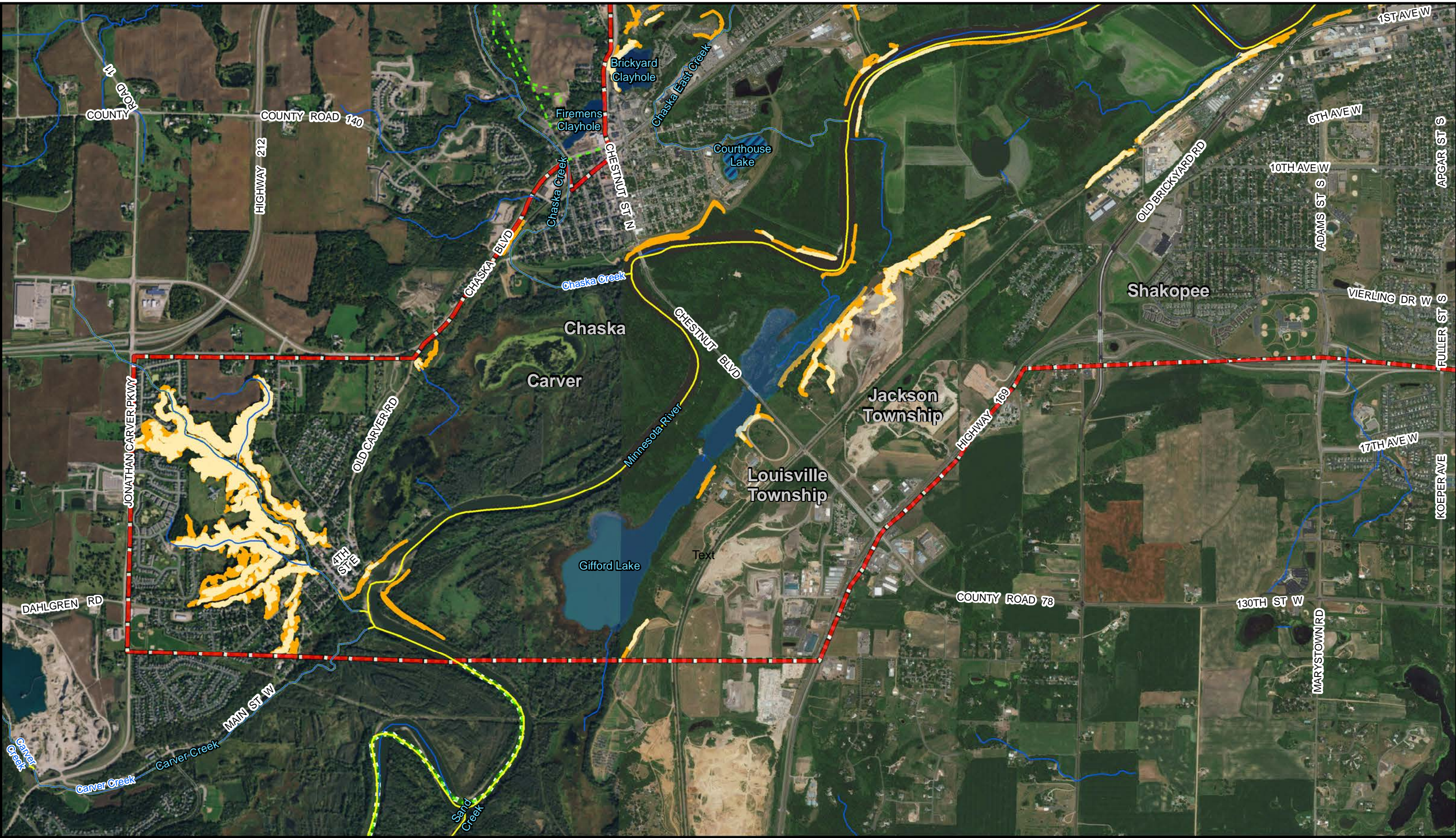


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|-------------------------------|------------------------------------|--------------------------------------|----------------------|
| Bluff Overlay District | Watershed District Boundary | MNDNR Publicly Available Data | SNA - Fens |
| 30% Slope | Carver County | Stream/River | PWI Water |
| Additional with 18% Slope | Riley-Purgatory-Bluff Creek | Impaired River or Stream | Trout Stream |
| | Scott | Impaired Lake | Calcareous Fen Point |
| | Lower MN River | | Municipal Boundary |

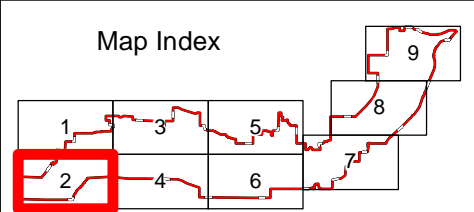
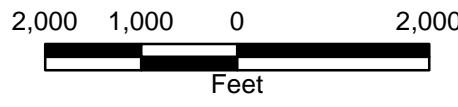


Lower Minnesota River Watershed District
 Draft Bluff Overlay District Map
 Figure L1
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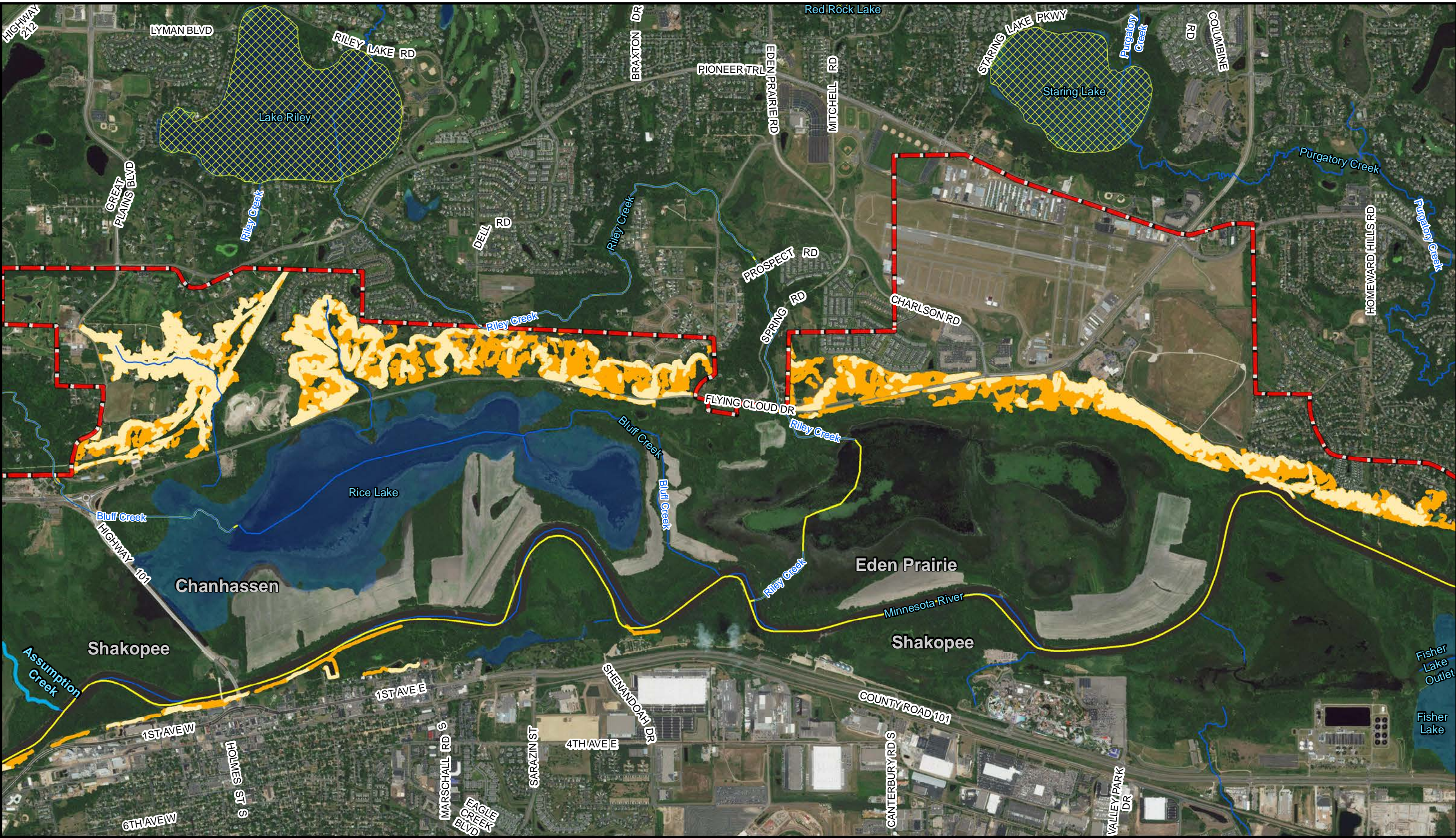


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|-------------------------------|------------------------------------|--------------------------------------|----------------------|
| Bluff Overlay District | Watershed District Boundary | MNDNR Publicly Available Data | SNA - Fens |
| 30% Slope | Carver County | Stream/River | PWI Water |
| Additional with 18% Slope | Scott | Impaired River or Stream | Trout Pond/Lake |
| | Lower MN River | Impaired Lake | Calcareous Fen Point |
| | | | Municipal Boundary |

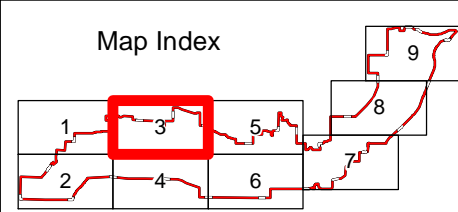


Lower Minnesota River Watershed District
 Draft Bluff Overlay District Map
 Figure L1
 2 of 9
 October 2017

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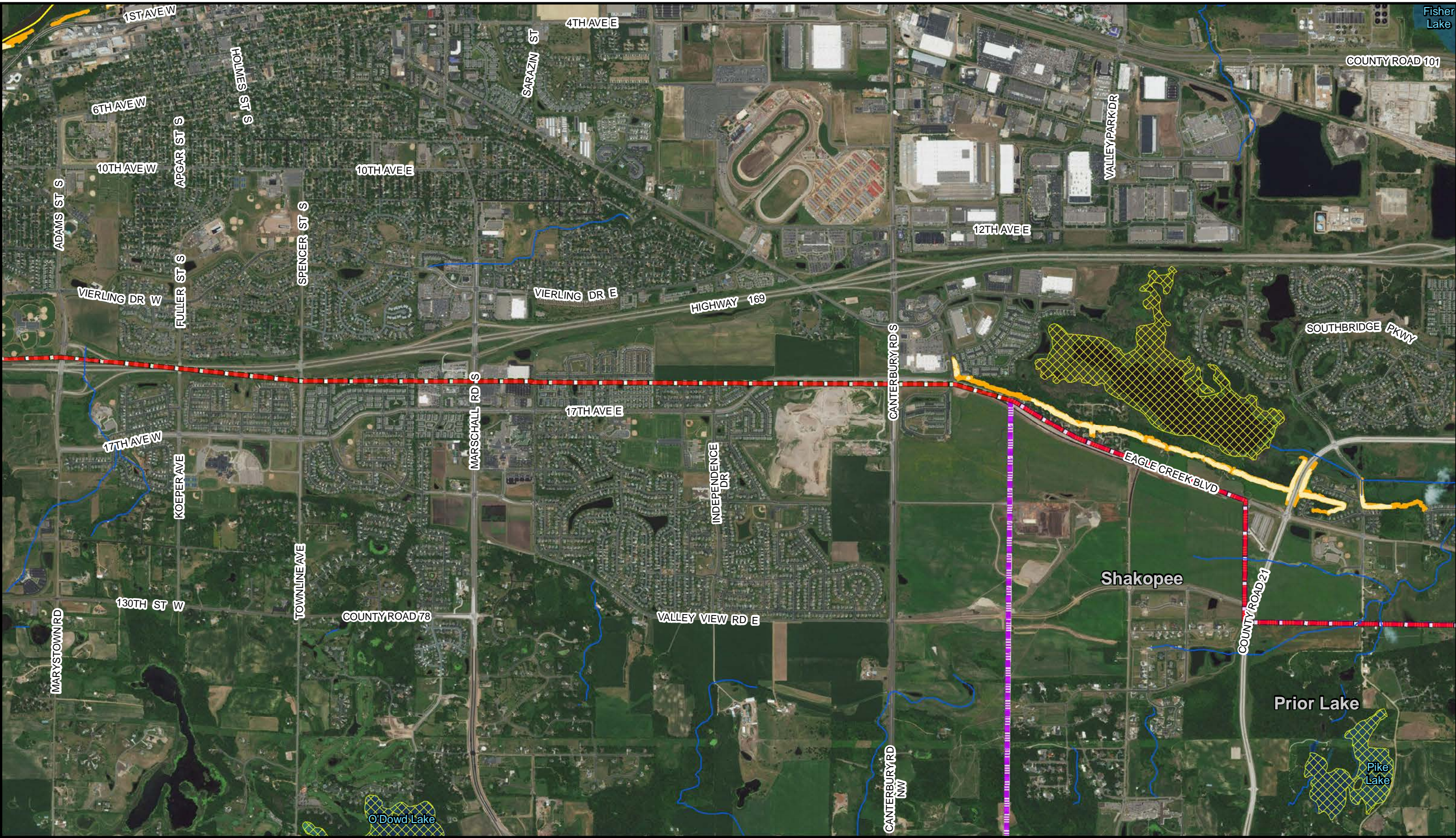


Bluff Overlay District	Watershed District Boundary	MNDNR Publicly Available Data	SNA - Fens
30% Slope	Riley-Purgatory-Bluff Creek	Stream/River	PWI Water
Additional with 18% Slope	Scott	Impaired River or Stream	Trout Stream
	Lower MN River	Impaired Lake	Calcareous Fen Point
			Municipal Boundary

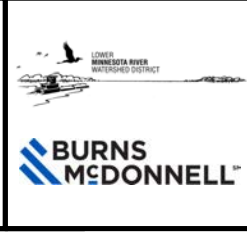
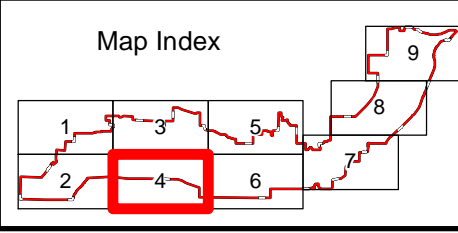
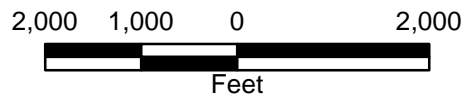


Lower Minnesota River Watershed District
 Draft Bluff Overlay District Map
 Figure L1
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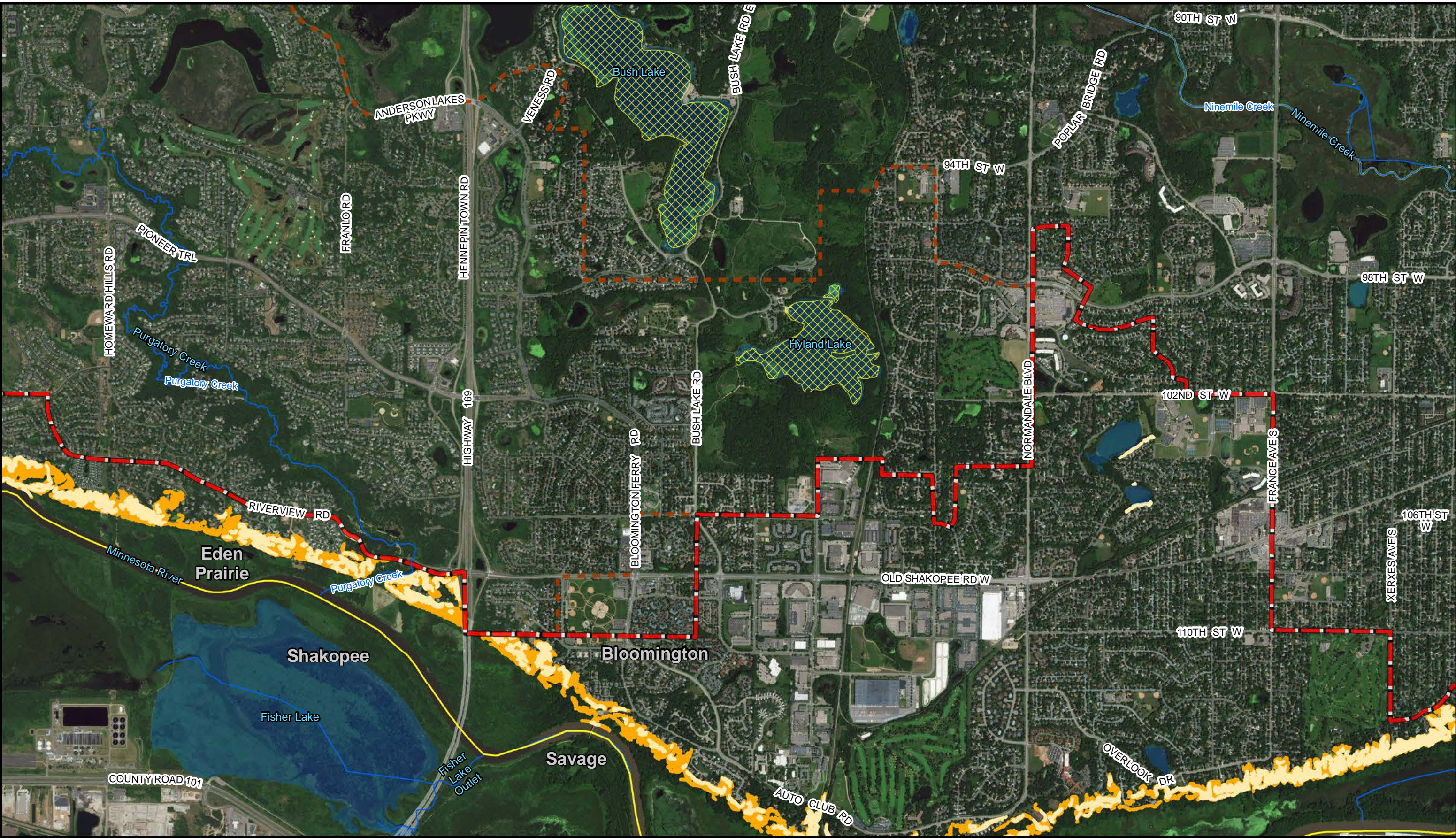


Bluff Overlay District 30% Slope Additional with 18% Slope	Watershed District Boundary Prior Lake-Spring Lake Scott Lower MN River	MNDNR Publicly Available Data Stream/River Impaired River or Stream Impaired Lake	SNA - Fens SNA - Fens PWI Water Calcareous Fen Point Municipal Boundary
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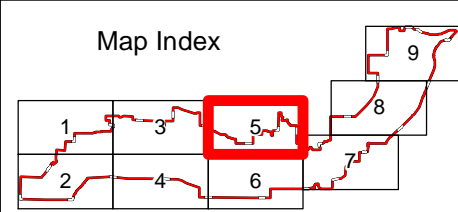


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 Draft Bluff Overlay District Map
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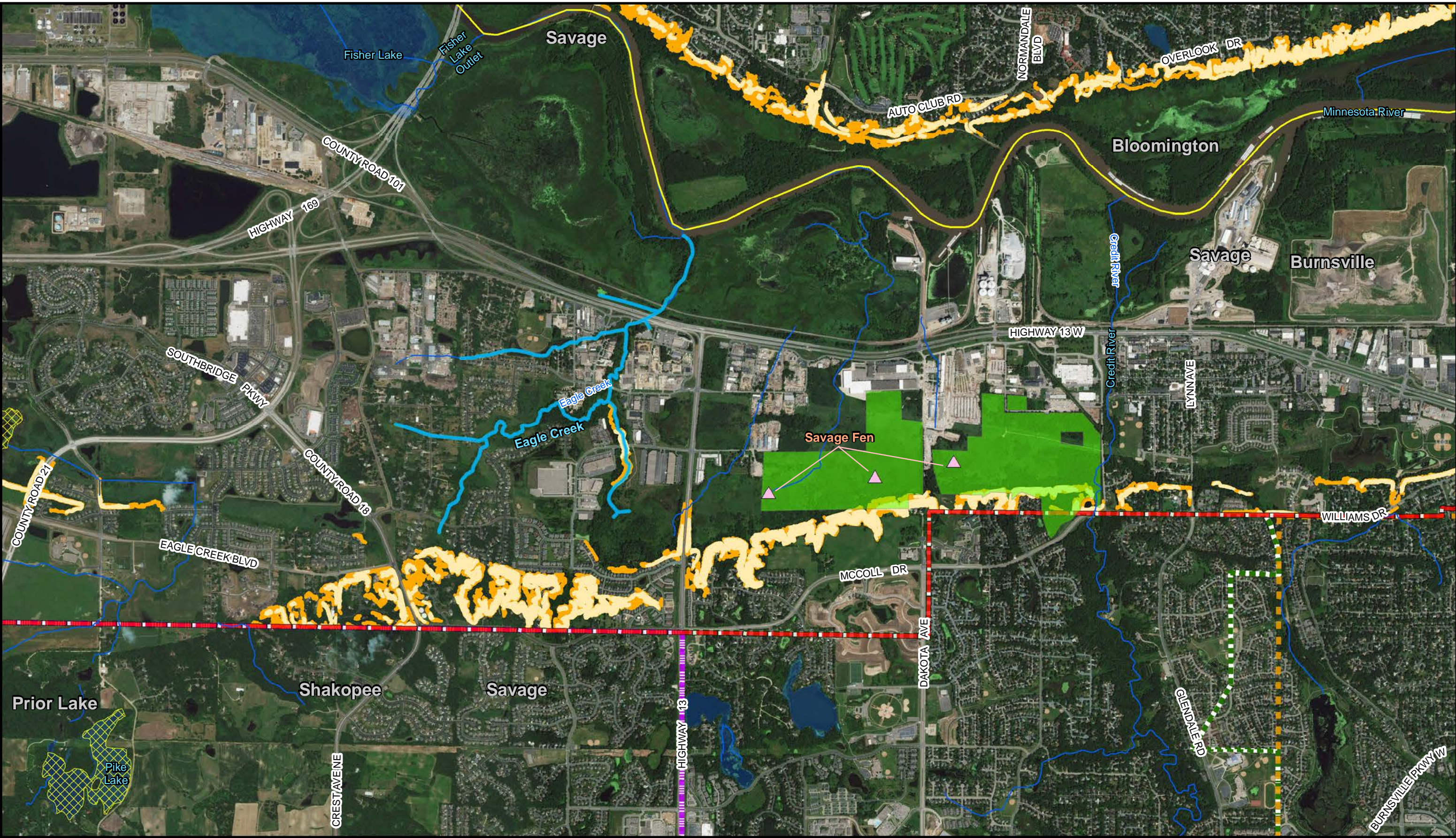


Bluff Overlay District	Watershed District Boundary	MNDNR Publicly Available Data	SNA - Fens
30% Slope	Riley-Purgatory-Bluff Creek	Stream/River	PWI Water
Additional with 18% Slope	Scott	Impaired River or Stream	Calcareous Fen Point
	Lower MN River	Impaired Lake	Municipal Boundary

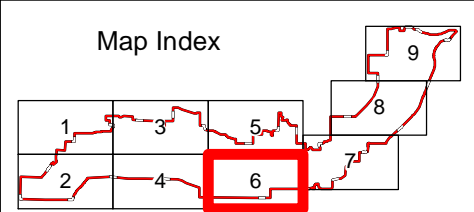
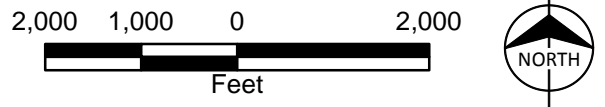


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 Draft Bluff Overlay District Map
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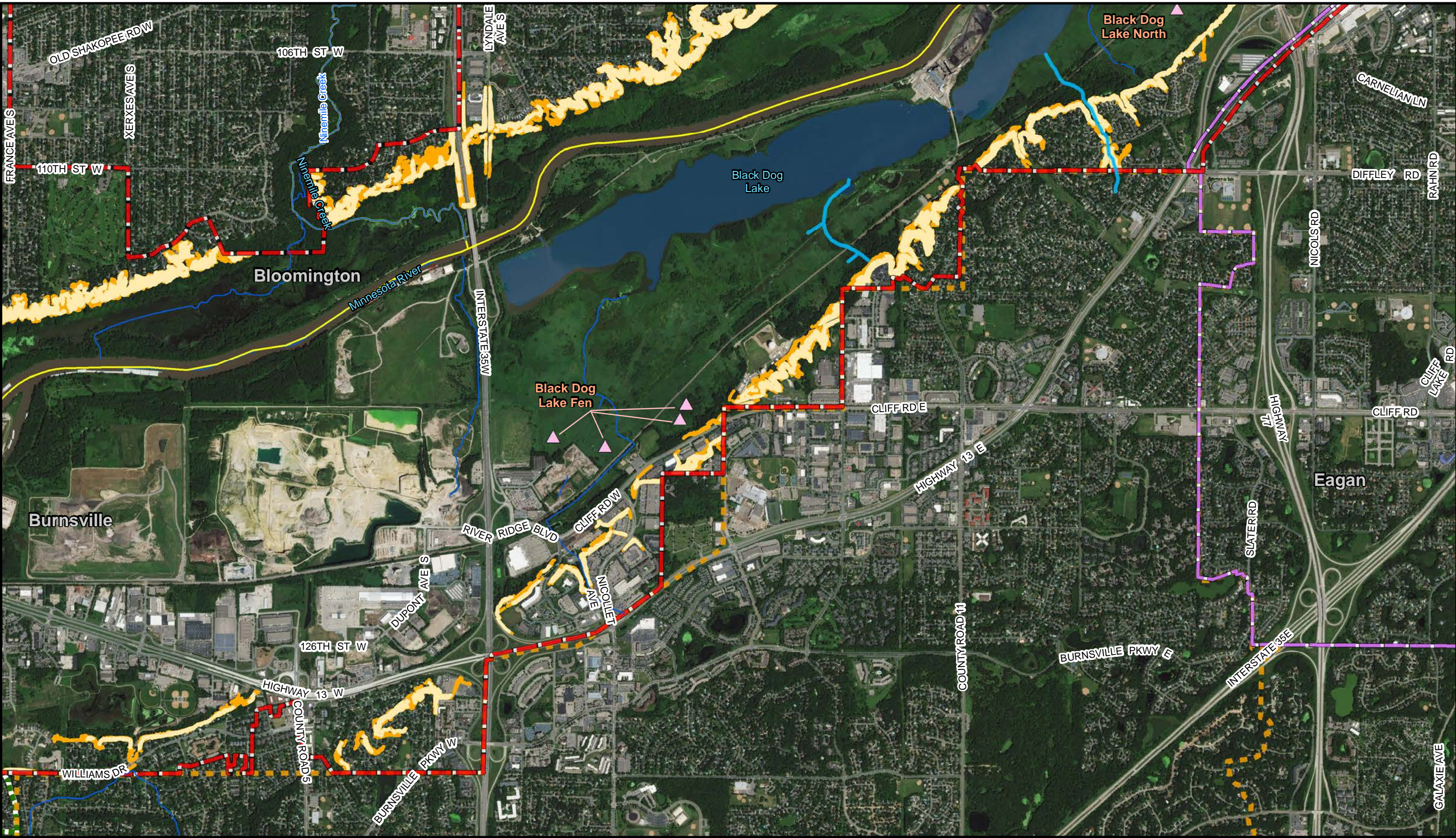


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| Bluff Overlay District | Watershed District Boundary | MNDNR Publicly Available Data |
| 30% Slope | Black Dog | Stream/River |
| Additional with 18% Slope | Prior Lake-Spring Lake | Impaired River or Stream |
| | Scott | Impaired Lake |
| | Lower MN River | |
| | | SNA - Fens |
| | | PWI Water |
| | | Trout Stream |
| | | Calcareous Fen Point |
| | | Municipal Boundary |

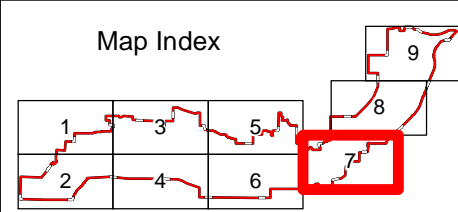


Lower Minnesota River Watershed District
 Draft Bluff Overlay District Map
 Figure L1
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 October 2017

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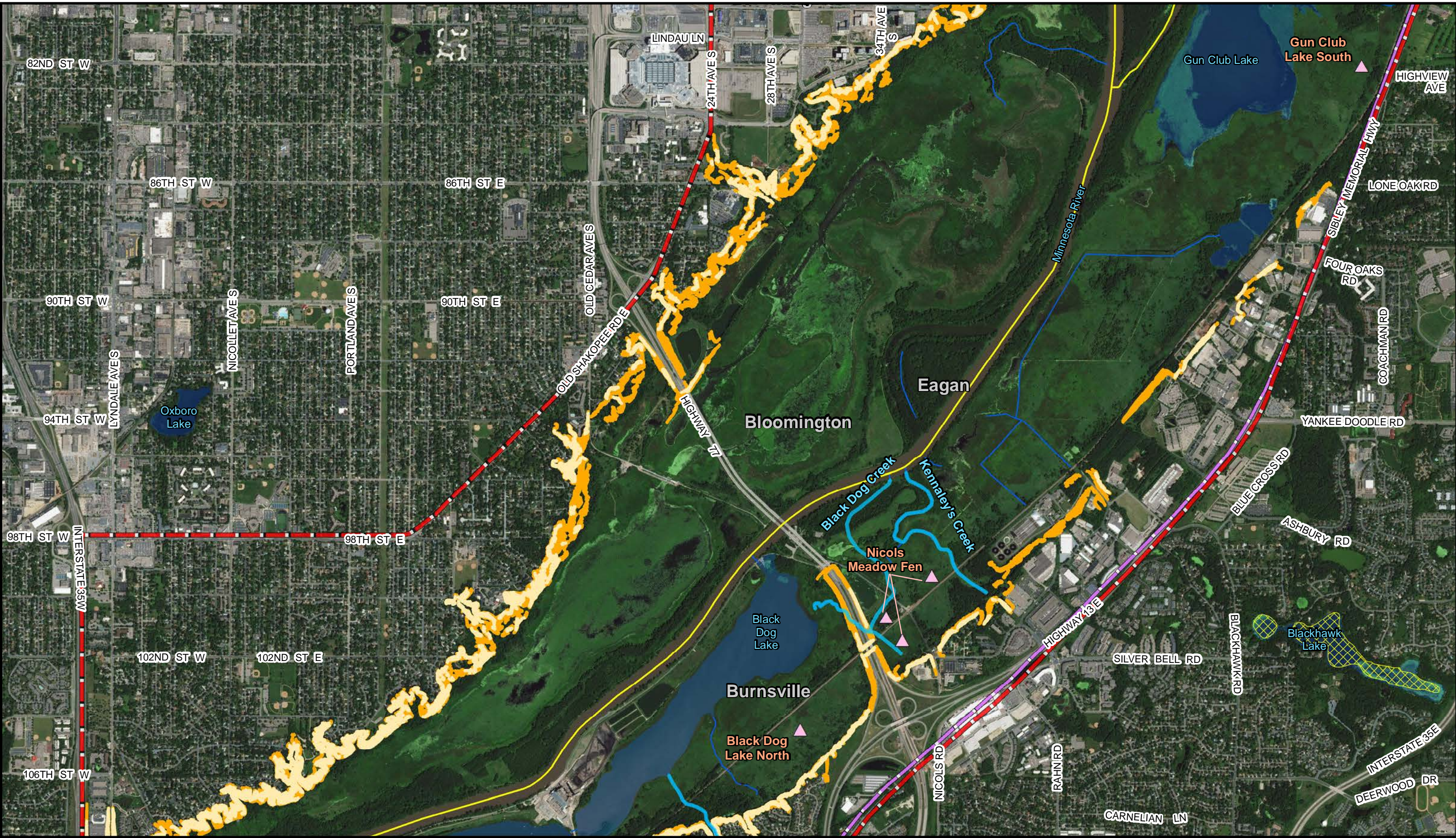


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|-------------------------------|------------------------------------|--------------------------------------|----------------------|
| Bluff Overlay District | Watershed District Boundary | MNDNR Publicly Available Data | SNA - Fens |
| 30% Slope | Black Dog | Stream/River | PWI Water |
| Additional with 18% Slope | Eagan-Inver Grove | Impaired River or Stream | Trout Stream |
| | Scott | Impaired Lake | Calcareous Fen Point |
| | Lower MN River | | Municipal Boundary |



Lower Minnesota River Watershed District
 Draft Bluff Overlay District Map
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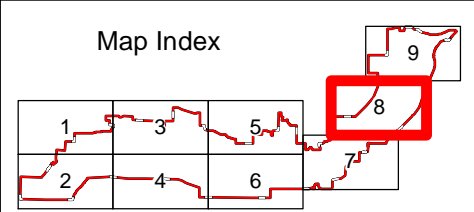
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Bluff Overlay District	Watershed District Boundary	MNDNR Publicly Available Data	SNA - Fens
30% Slope	Eagan-Inver Grove	Stream/River	PWI Water
Additional with 18% Slope	Scott	Impaired River or Stream	Trout Stream
	Lower MN River	Impaired Lake	Calcareous Fen Point
			Municipal Boundary

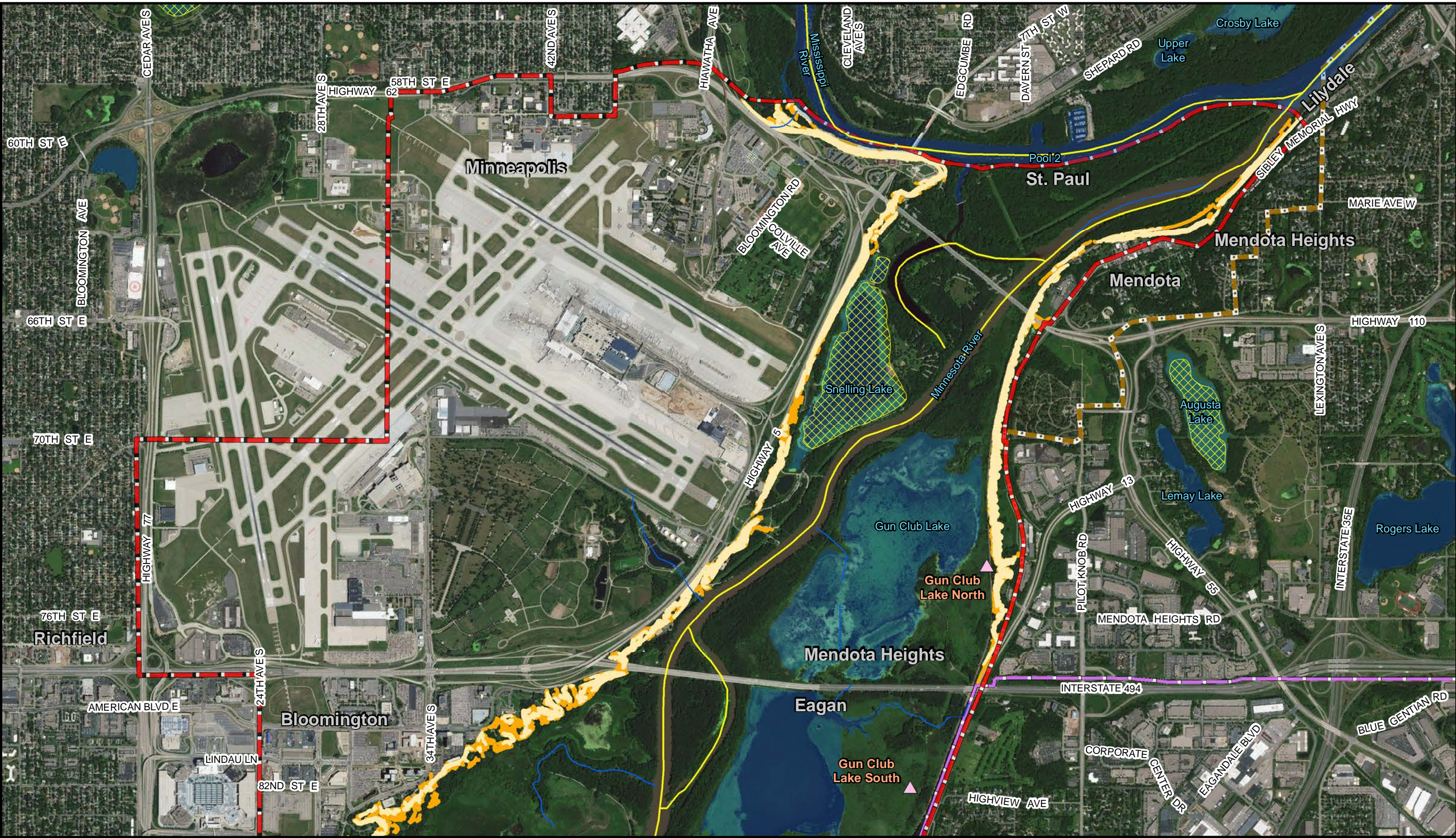
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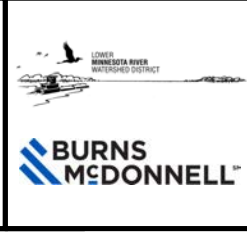
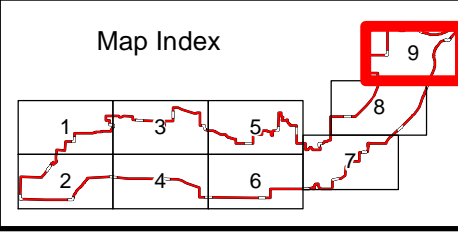
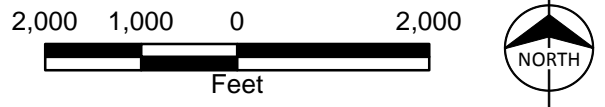


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Bluff Overlay District	Watershed District Boundary	MNDNR Publicly Available Data	SNA - Fens
30% Slope	Eagan-Inver Grove	Stream/River	PWI Water
Additional with 18% Slope	Lower MS River	Impaired River or Stream	Calcareous Fen Point
	Scott	Impaired Lake	Municipal Boundary
	Lower MN River		



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