

**APPENDIX C - CURRENT AND FUTURE LAND USES WITHIN THE LOWER
MINNESOTA RIVER WATERSHED DISTRICT**

Technical Memorandum

To: Linda Loomis, Administrator
Lower Minnesota River Watershed District

From: Shane Soukup, Water Resources Scientist
Katy Thompson, PE, CFM
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Date: April 21, 2020

Re: Land Use and Ownership of the Calcareous Fens of the Lower
Minnesota River Watershed District

Introduction

Calcareous fens (fens) within the Lower Minnesota River Watershed District (LMRWD or District) are given the high-value resource special designation and additional protections by the District. These fen complexes consist of Seminary Fen, Savage Fen, Black Dog Lake Fen, Nicols Meadow Fen, Gun Club Lake North Fen, and Gun Club Lake South Fen.

Urbanization and land use changes can alter hydrology, reducing the amount of water infiltrating and recharging the underlying aquifer, increasing the amount of surface runoff and pollutants entering the fens, stressing native vegetation, and allowing invasive species to take hold.

The areas with direct drainage to the fens are considered high-value resource areas (HVRAs) and are designated HVRA overlay districts by the LMRWD. These HVRA overlay districts are intended to help protect the fens by requiring more stringent erosion and sediment control and stormwater management standards for development projects, with an emphasis on treating and infiltrating stormwater runoff. However, even with these standards, the fens' hydrology could be altered by future development, which could result in increased impervious surfaces upstream of the fens.

The following documents the current and planned land uses within each of the District's HVRA overlay districts associated with the fens. In reviewing the existing and future land uses, we identified areas within the HVRA that may present more risk to the fens than others. Converting land from agricultural territory or open space to commercial or industrial use could present more of a risk to the fen in terms of decreased infiltration and increased stormwater runoff than conversion from undeveloped land to parkland. Our risk analysis identified the current (as of 2016) land use within the fen HVRAs as having a low-, moderate-, or high-risk development potential in the future (2030 and beyond). Using this information, areas identified as having high-risk development potential were further analyzed by reviewing land ownership parcel data to identify private ownership within the fen extents that may warrant purchase for conservation.

Data and Methods

The following details the sources of data and methods used in this study to evaluate the development pressures in the fens by identifying high-risk development potential and private ownership so that we could then recommend potential conservation opportunities to the District.

Data Collection

HVRA Data: High-Value Resource Area (HVRA) overlay districts were delineated to represent areas where surface water runoff drains directly to designated high-value resources (fens and trout waters) within the LMRWD watershed. Only the HVRAs associated with the calcareous fens in this analysis.

2016 Land Use Data: Land use data were collected and aggregated through the Metropolitan Council. These data can be found on the Minnesota Geospatial Commons website. Current land use is based upon the 2016 Generalized Land Use Inventory data set, published by the Metropolitan Council in April 2016. The 2016 Generalized Land Use Inventory is the most comprehensive and recent municipal data set published by the Metropolitan Council.

Future Land Use: Future land use is derived from the Metropolitan Council's Regional Planned Land Use data set. This data set was updated in December 2019 and represents an aggregation of municipal comprehensive plans (comp plans). It uses a common classification scheme for planned land use but may be limited by the completion of local comp plans. The following is a list of the relevant comp plan versions from which the future land use data are derived:

- Burnsville—2040 Comprehensive Plan

- Chanhassen—2030 Comprehensive Plan
- Chaska—2030 Comprehensive Plan
- Eagan—2030 Comprehensive Plan
- Mendota Heights—2030 Comprehensive Plan
- Savage—2030 Comprehensive Plan
- Shakopee—2040 Comprehensive Plan

Ownership Data: Parcel ownership data for Seminary Fen, last updated on January 31, 2020, were found on Carver County’s Open Data Portal. Parcel ownership data for Savage Fen, last updated on February 6, 2020, were found on Scott County’s Open Data website. Parcel ownership data for Black Dog Lake Fens, Nicols Meadow Fens, Gun Club Lake North Fen, and Gun Club Lake South Fen, last updated on February 6, 2020, were found on the Minnesota Geospatial Commons (where Dakota County publishes its available data). Land valuation data were included in these data sets, in 2019 dollars, by county.

Fen Extents: The calcareous fens in the LMRWD are typically represented by points on a map, but the fen boundaries were necessary to understand for our high-risk land ownership analyses. The US Fish and Wildlife Service’s (USFWS) National Wetland Inventory (NWI) data was used as a proxy for the extents of the individual fens in this analysis.

Data Analyses

Using HVRA overlay districts, the current and future land use data and parcel ownership data were clipped to the extent of each of the HVRA boundaries. Using Geographic Information Systems software, the total acreage for the 2016 and future land uses within the HVRA were determined for each land use category for each fen. To simplify the analyses, the Metropolitan Council’s individual land use categories were aggregated into generalized land use categories, summarized in **Table 1**. The risk associated with each generalized category was assigned to each Metropolitan Council land use. “Low-risk” development includes park, recreational, or preserve land; agricultural land; and undeveloped areas, whereas “high-risk” development includes urbanization of previously undeveloped areas or the adaptation of agricultural lands for industrial uses. “Moderate” development risk describes those land uses that are already developed and unlikely to pose a significant threat to the fens.

Table 1. Generalized Land Use Categories

Generalized Category	Metropolitan Council’s Individual Land Uses	Risk to Fens
Agricultural	Agriculture, Farmstead	Low
Commercial	Business Park, Business/Retail/Office, Commercial, Mixed Employment Center, Mixed Use, Mixed Use Commercial, Office, Retail, or Other Commercial	High
Transportation	County Trail, Major Highway, Railroad, Railway, Utilities, Vehicular Right-of-Way	Moderate
High-Density Residential	High-Density Residential, Multifamily, Single-Family Attached	High
Medium-Density Residential	Single-Family Detached, Medium-Density Residential, Residential Medium Density, Suburban Edge Residential, Suburban Residential	Moderate
Low-Density Residential	Low-Density Residential, Residential - Large Lot	Low
Industrial	Industrial, Industrial/Office, Industrial and Utility, Limited Industrial, Office/Industrial,	High
Institutional	Institutional, Public/Quasi-Public	Low
Park, Recreational, or Preserve	Golf Course, Open Space, Open Space Restricted Use, Open Water, Park, Park/Open Space, Park and Recreation, Private Recreation, Preserve, State Park	Low
Undeveloped	Undeveloped	Low

To evaluate the development pressure the fens may be facing in the future, the 2016 low-risk land uses were analyzed to determine whether there were any potential conversions to high-risk land uses. To do this, areas categorized as 2016 low-risk were compared to their planned land use to determine whether the risk level changed. Those changes, for each fen, characterized that fen’s development pressures.

The final factor related to land use within the fens’ HVRAs was determination of land ownership and conservation opportunities. Identifying the land ownership details and

comparing those to the estimated fen extents allowed us to identify areas of the HVRAs that are privately held. Reviewing the county parcel data, each parcel that intersected the HVRA was extracted and classified it as private, public, or transportation/utility right-of-way ownership for further analysis. Public parcels represent land owned by a city, county, state, or other federal entity. Private parcels are those owned by individuals or corporations. Some parcels did not contain accompanying ownership data; however, after review, these parcels were determined to predominantly consist of rights-of-way. The privately held parcels that intersected with the estimated fen boundaries were identified and privately held areas that are expected to convert to high-risk land use in the future, were highlighted them for conservation opportunities. The estimated cost to conserve these areas was calculated based on the 2019 tax assessor land valuation data and the portion of the private parcel located within the fen itself, rounded to the nearest \$1,000.

The following sections contain 2016 land use, planned land use, and land ownership data for each of the fens. The data are displayed in map and table form.

Seminary Fen

Seminary Fen Land Use Changes

Figure 1 displays the 2016 land uses within the Seminary Fen HVRA, and **Figure 2** displays the planned land uses. **Table 2** provides a summary of the total areas for each land use category and the change, in acres, from 2016. Minor differences in total areas are due to rounding. Cells highlighted in red indicate a decrease in a particular land use, whereas blue cells indicate an increase.

Table 2. Seminary Fen Land Use Change Summary

	2016 Area [acres]	Future Area [acres]	Change [acres]
Agricultural	51	92	41
Commercial	-	4	4
Industrial	-	1	1
Institutional	-	-	-
High-Density Residential	-	-	-
Medium-Density Residential	30	78	48
Low-Density Residential	-	46	46

	2016 Area [acres]	Future Area [acres]	Change [acres]
Park, Recreational, or Preserve	245	215	-30
Undeveloped	109	-	-109
Transportation	-	-	-

The predominant 2016 and future land uses within the Seminary Fen HVRA are park, recreational, or preserve. The Metropolitan Council defines this as passive open space that can include such uses as park preserves, wildlife refuges, habitat area, and land owned by the Minnesota Department of Natural Resources (MNDNR) or USFWS. However, this category is expected to experience a reduction of 30 acres by 2030. Other major changes anticipated in this HVRA are the total loss of undeveloped lands and an increase in agricultural and residential land use.

Seminary Fen HVRA Development Pressures

Whereas the previous section provided helpful information about the overall HVRA land use changes, when looking at the individual fens, it is beneficial to identify how these land use changes are occurring and what the development pressures are for Seminary Fen. To do this, the low-risk land use categories previously identified in **Table 1** were analyzed in more detail to determine how those areas are projected to change in the future. **Table 3** presents the development pressures for the Seminary Fen HVRA. This table presents the 2016 land uses at the top, with the future land uses on the left. Reading from top to bottom presents the 2016 low-risk categories and their estimated future breakdown of areas by 2030 planned land uses. Minor differences in the total areas between **Table 2** and **Table 3** are due to rounding for the reader’s ease.

Table 3. Seminary Fen HVRA Development Pressures

		2016 LAND USE			Future Totals [acres]
		Agricultural [acres]	Park, Recreational, or Preserve [acres]	Undeveloped [acres]	
PLANNED LAND USE	Agricultural	2	49	40	92
	Commercial	-	1	3	4
	Industrial	-	< 1	< 1	1
	Institutional	-	-	-	-
	High-Density Residential	-	-	-	-

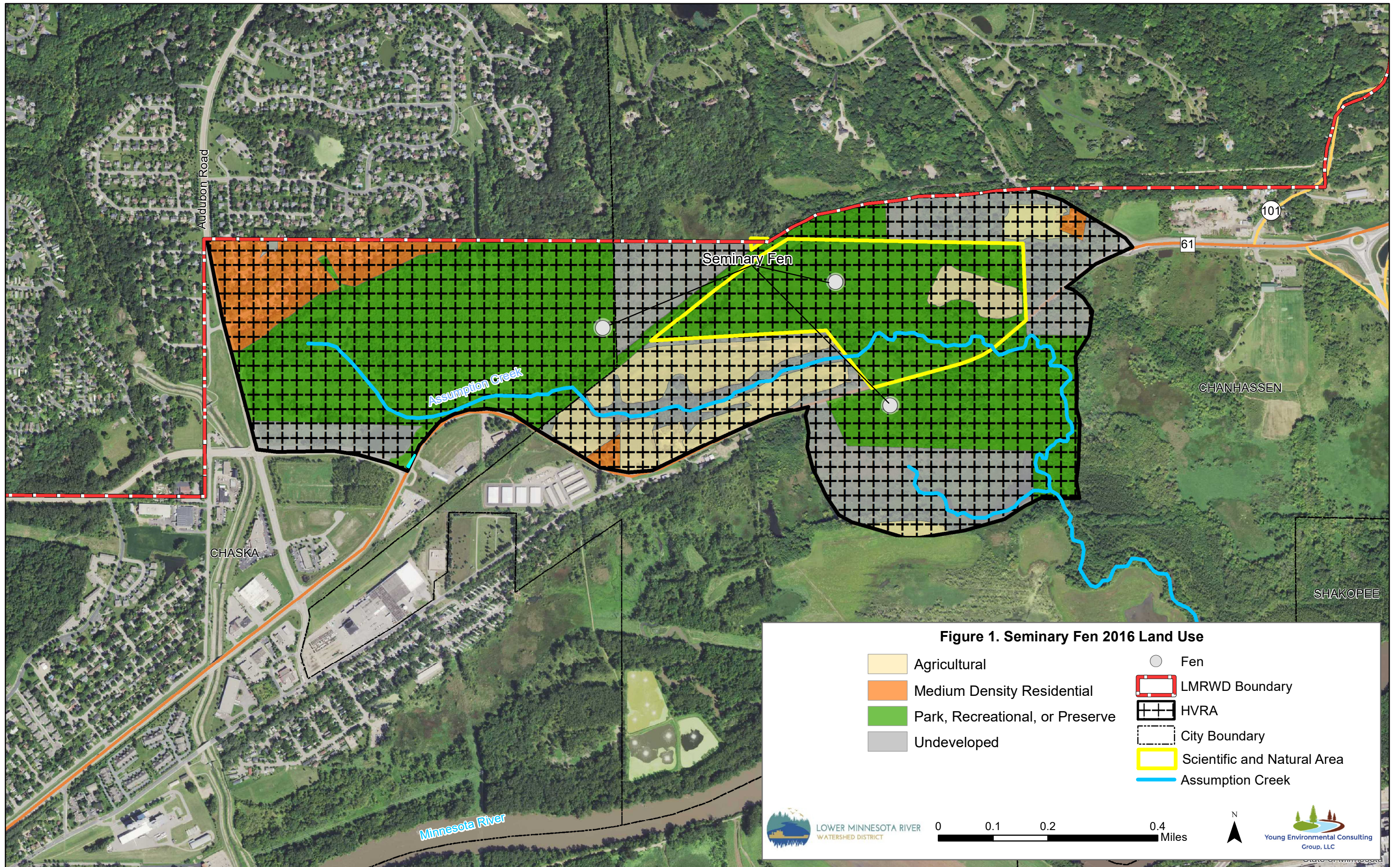
		2016 LAND USE			
		Agricultural [acres]	Park, Recreational, or Preserve [acres]	Undeveloped [acres]	Future Totals [acres]
	Medium-Density Residential	43	< 1	32	75
	Low-Density Residential	-	< 1	18	19
	Park, Recreational, or Preserve	6	194	15	215
	Transportation	-	-	-	-
	2016 Totals [acres]	51	245	109	

Table 3 demonstrates that, although the entirety of the undeveloped land is expected to be built out by 2030, the majority will remain for low-risk park, recreational, or preserve and agricultural use. The development pressure in the Seminary Fen HVRA is limited to one acre or less of moderate- and low-density residential, commercial, and industrial development. With close coordination with municipal partners and continued enforcement of the District’s rules, these future land uses would not be expected to be a major concern for the health of the fen. Due to the perceived low to moderate risk to Seminary Fen of future development, land ownership or conservation opportunities were not evaluated.

Seminary Fen Summary

Seminary Fen is expected to see land use changes from the current (2016) conditions by 2030, as shown in **Table 2**, including an increase in agricultural lands, medium-density residential, and low-density residential uses. These changes are offset by decreases in undeveloped and park, recreation, and preserve lands.

Although Seminary Fen is expected to experience development in the surrounding HVRA, most of these developments are expected to carry low to moderate risk. Close coordination with municipal partners and continued enforcement of the District rules will help ensure adequate stormwater management is implemented to protect the health of the fen from the potential effects of future development.



Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)

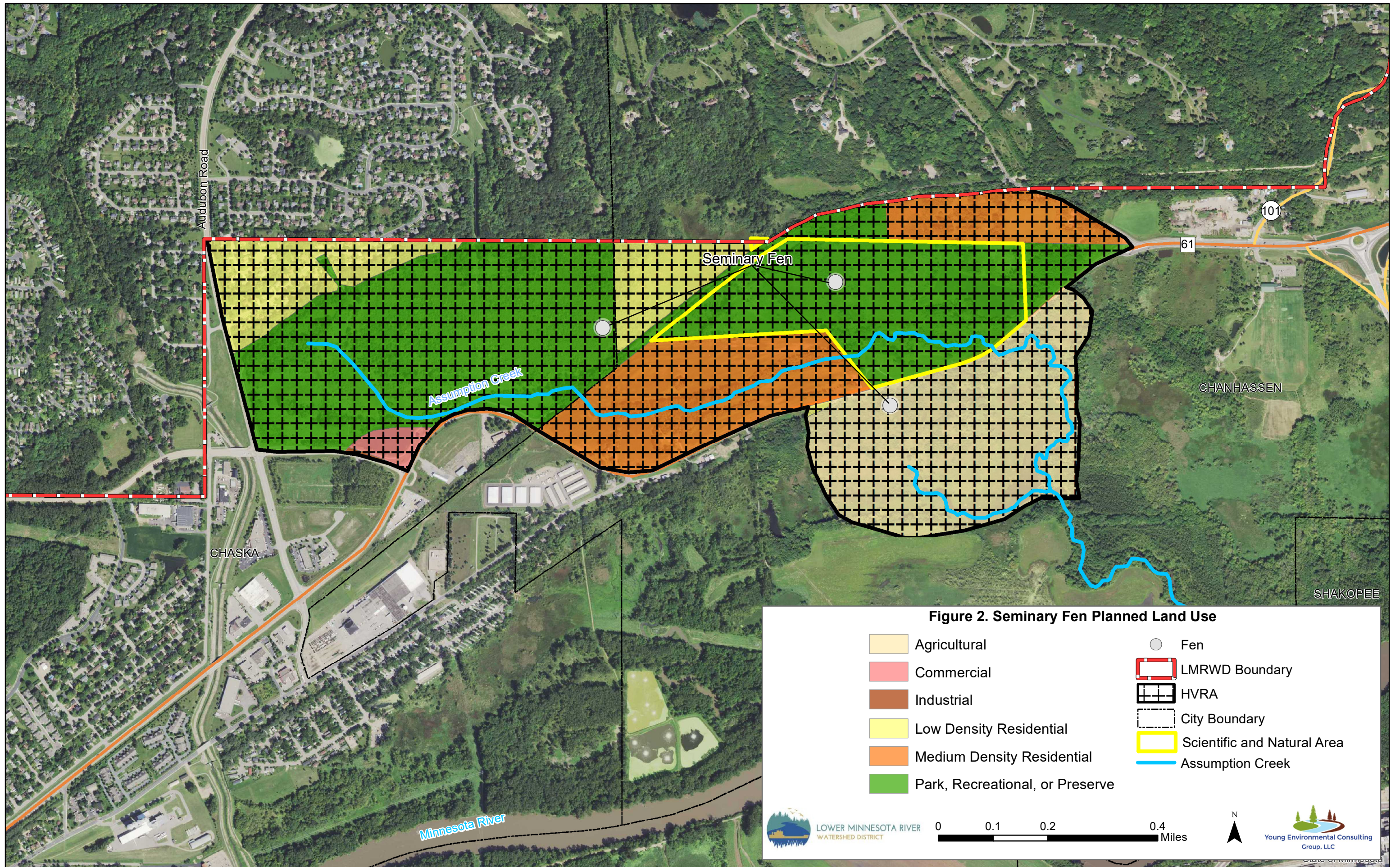













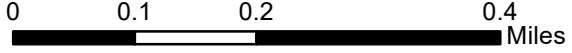




Figure 2. Seminary Fen Planned Land Use

- | | |
|---|---|
|  Agricultural |  Fen |
|  Commercial |  LMRWD Boundary |
|  Industrial |  HVRA |
|  Low Density Residential |  City Boundary |
|  Medium Density Residential |  Scientific and Natural Area |
|  Park, Recreational, or Preserve |  Assumption Creek |

 LOWER MINNESOTA RIVER WATERSHED DISTRICT
  0 0.1 0.2 0.4 Miles
  N
  Young Environmental Consulting Group, LLC

Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)

Savage Fens

Savage Fen Land Use Changes

Figure 3 displays the 2016 land use within and adjacent to the Savage Fen HVRA, and **Figure 4** displays the planned land use. **Table 4** provides a summary of the total areas for each land use category and the change, in acres, from 2016. Minor differences in total areas are due to rounding. Cells highlighted in red indicate a decrease in a particular land use, whereas blue cells indicate an increase.

Table 4. Savage Fen Land Use Summary

	2016 Area [acres]	Future Area [acres]	Change [acres]
Agricultural	28	-	-28
Commercial	10	51	41
Industrial	39	180	141
Institutional	-	<1	<1
High-Density Residential	-	13	13
Medium-Density Residential	21	25	4
Low-Density Residential	-	85	85
Park, Recreational, or Preserve	240	288	48
Undeveloped	305	-	-305
Transportation	-	-	-

The predominant 2016 and future land uses within the Savage Fen HVRA are park, recreational, or preserve. This category is anticipated to experience a minor increase of 48 acres by 2030. The major change anticipated in this HVRA is the total loss of 305 acres of undeveloped lands and an increase in residential, commercial, and industrial land uses.

Savage Fen HVRA Development Pressures

Table 5 presents the development pressures, which we compiled by analyzing proposed future changes from low-risk to higher-risk land use categories in the Savage Fen HVRA. This table presents the 2016 land uses at the top, with the future land uses

on the left. Reading from top to bottom presents the 2016 low-risk categories and their estimated future breakdown of areas by 2030 planned land use. Minor differences in the total areas between **Tables 2** and **5** are due to rounding for the reader’s ease.

Table 5. Savage Fen HVRA Development Pressures

		2016 LAND USE			Future Totals [acres]
		Agricultural [acres]	Park, Recreational, or Preserve [acres]	Undeveloped [acres]	
PLANNED LAND USE	Agricultural	-	-	-	-
	Commercial	14	< 1	25	40
	Industrial	-	4	138	142
	Institutional	-	-	< 1	< 1
	High-Density Residential	-	< 1	13	13
	Medium-Density Residential	7	< 1	18	25
	Low-Density Residential	6	< 1	58	64
	Park, Recreational, or Preserve	-	235	53	289
	Transportation	-	-	-	
	2016 Totals [acres]	27	239	305	

Table 5 highlights the risk future land development within the HVRA may present to Savage Fen. Although most of the 2016 park, recreational, or preserve lands are being preserved in their current state, agricultural and undeveloped land is expected to undergo a drastic change. Most of these low-risk land uses are expected to be converted to high-risk commercial and industrial use by 2030. Because of the increased risk, the land ownership evaluation of Savage Fen.

Savage Fen HVRA Land Ownership

Using the land ownership and parcel information, **Figure 5** shows a comparison of public and private lands within the Savage Fen HVRA. Private ownership accounts for 56 percent of the area, and public ownership makes up the remaining 44 percent. The MnDNR is the majority public landowner immediately adjacent to the fen. **Figure 6** also highlights private parcels adjacent to and within the fen. These parcels may be considered for purchase to expand the extent of publicly owned land surrounding the

fen.

For planning purposes only, the following provides an estimate of the cost of placing the fen entirely in public ownership. Using the NWI data as a proxy for the fen extents, the parcel data was clipped to determine private ownership of the fens themselves. The estimated cost to conserve the portion of the private land in the fen boundary was calculated using the 2019 land values provided by Scott County’s online property information database (<https://gis.co.scott.mn.us/sg3/>) and the portion of the private parcel directly within the fen, provided in **Table 6** below. Parcels with proposed high-risk development are highlighted in green.

Table 6. Savage Fen Private Land Ownership

Owner	Total Parcel Area ¹ [acres]	Approximate Portion within Fen [acres]	2019 Land Value ¹	Estimated Cost to Conserve
BOBBY & STEVE'S AUTO WORLD LLP	1.889	< 0.1	\$378,000	\$17,000
BOHN KARL	5.000	< 0.1	\$170,000	\$3,000
BOHN KARL	5.251	< 0.1	\$1,076,300	\$1,000
BOHN KARL	7.437	< 0.1	\$1,522,500	\$5,000
BOHN KARL	5.987	< 0.1	\$9,200	\$1,000
BOHN KARL	24.204	0.2	\$2,570,400	\$17,000
BOHN KARL	19.123	18	\$30,600	\$29,000
BOHN KARL	8.277	7	\$4,300	\$4,000
BOHN KARL	3.729	3	\$5,600	\$5,000
BOHN KARL	5.001	1.5	\$4,500	\$2,000

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Watershed District
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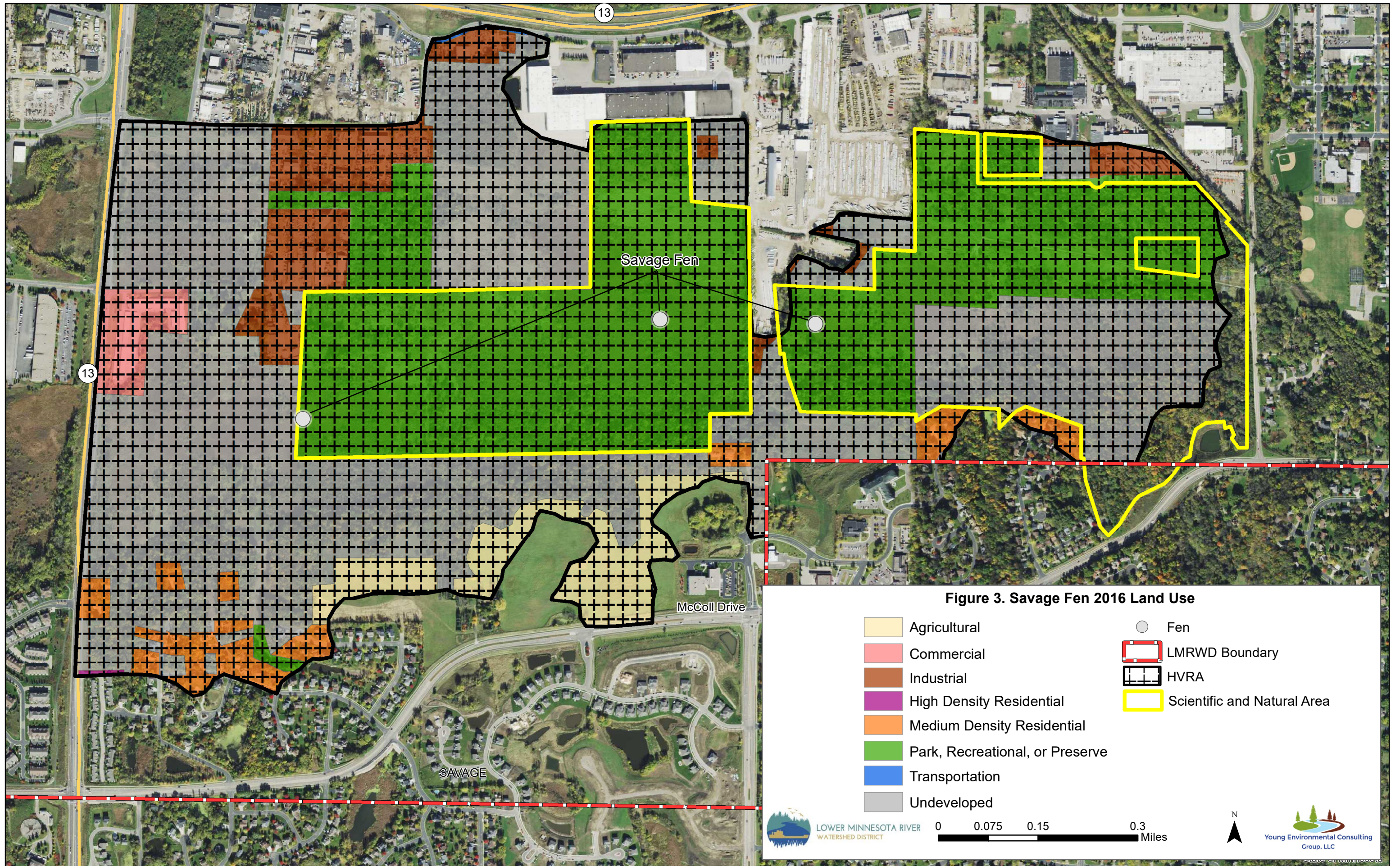
Owner	Total Parcel Area ¹ [acres]	Approximate Portion within Fen [acres]	2019 Land Value ¹	Estimated Cost to Conserve
BOHN KRISTIAN K & JAKE K J	3.237	0.3	\$120,000	\$10,000
BOHN PROPERTIES LTD PTNRSHP II	41.141	11	\$826,000	\$219,000
BOHN PROPERTIES LTD PTNRSHP II	43.179	3	\$2,310,100	\$162,000
FABCON	37.492	9	\$3,412,500	\$798,000
HOGAN MICHAEL A	9.986	6	\$866,300	\$521,000
JOAN S FORMANEK TRUST	18.015	14	\$29,100	\$23,000
LLOYDS PROPERTIES LLC	4.242	< 0.1	\$840,000	\$10,000
SECURE MINI STORAGE LTD PTNSHP & DEPT-PT-MN-25554	9.069	3	\$1,200,000	\$336,000
SECURE MINI STORAGE LTD PTNSHP & DEPT-PT-MN-25554	20.089	20	\$30,000	\$30,000
SWS LANDCO LLC	3.069	< 0.1	\$630,000	\$1,000
VALLEY INDUSTRIAL PROPERTIES	3.003	< 0.1	\$4,500	\$1,000
VENESS NORMAN & MARIAN	6.011	1	\$120,000	\$19,000

Owner	Total Parcel Area ¹ [acres]	Approximate Portion within Fen [acres]	2019 Land Value ¹	Estimated Cost to Conserve
VERIZON WIRELESS & ATTN NETWORK REAL ESTATE	6.796	4	\$260,000	\$136,000
¹ Scott County, 2019				

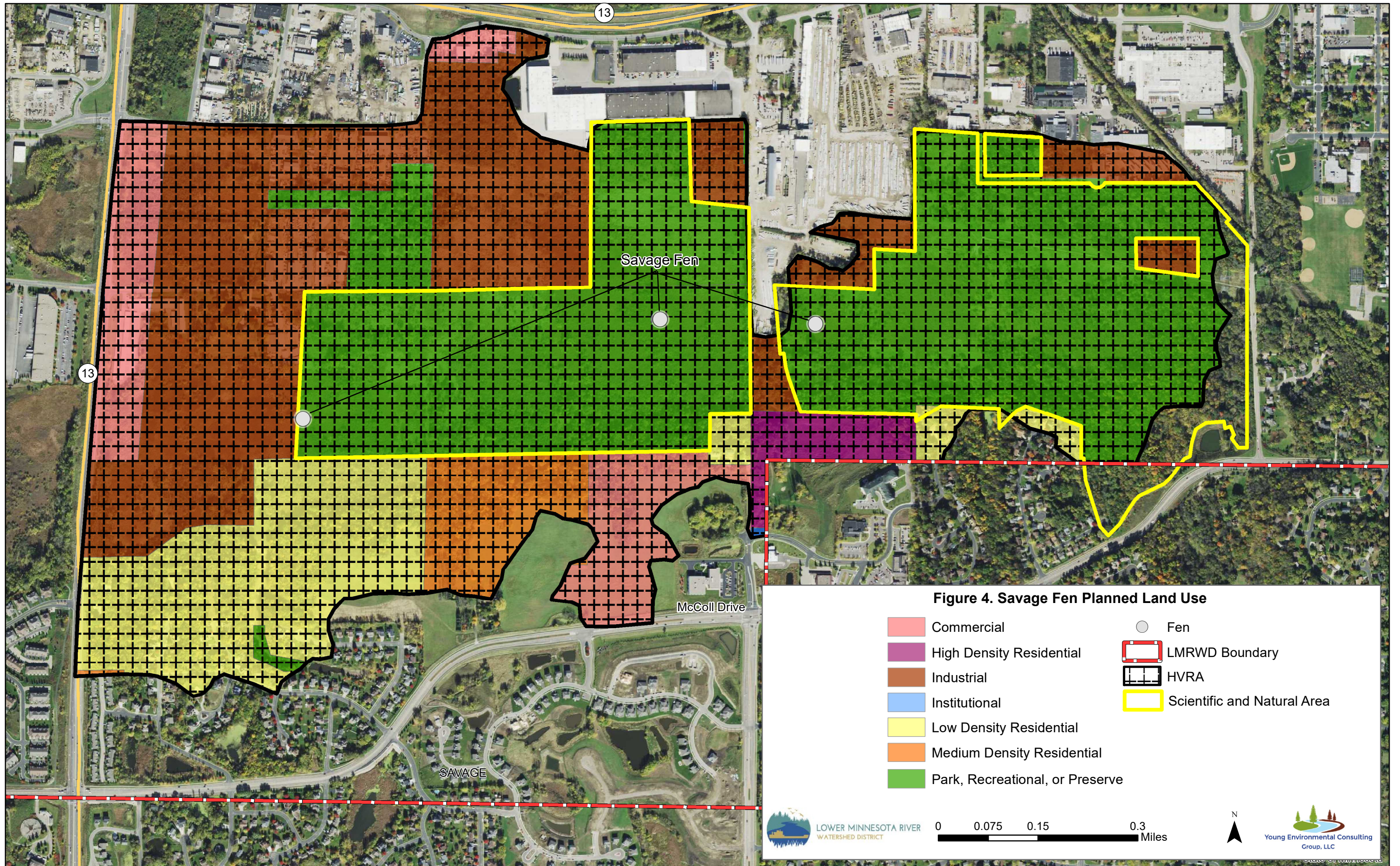
Savage Fen Summary

By 2030, Savage Fen is expected to see significant land use changes from the current (2016) conditions, as shown in **Table 4**, including increases in low-density residential, commercial, and industrial land use.

These changes are offset by a complete loss of undeveloped land and a decrease in agricultural lands. Almost half of these low-risk lands are expected to convert to high-risk land use (commercial and industrial) in the future. Given the potential for private lands to develop into higher-risk categories, the private lands within Savage Fen are recommended for conservation. Based on this preliminary assessment, approximately \$2.2M (based on the 2019 full market cost of the land) would be needed to purchase and conserve the high-risk private lands within the boundary of Savage Fen. In addition, close coordination with municipal partners and continued enforcement of the District rules would help ensure adequate stormwater management is implemented to protect the health of the fen from future development.



Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)



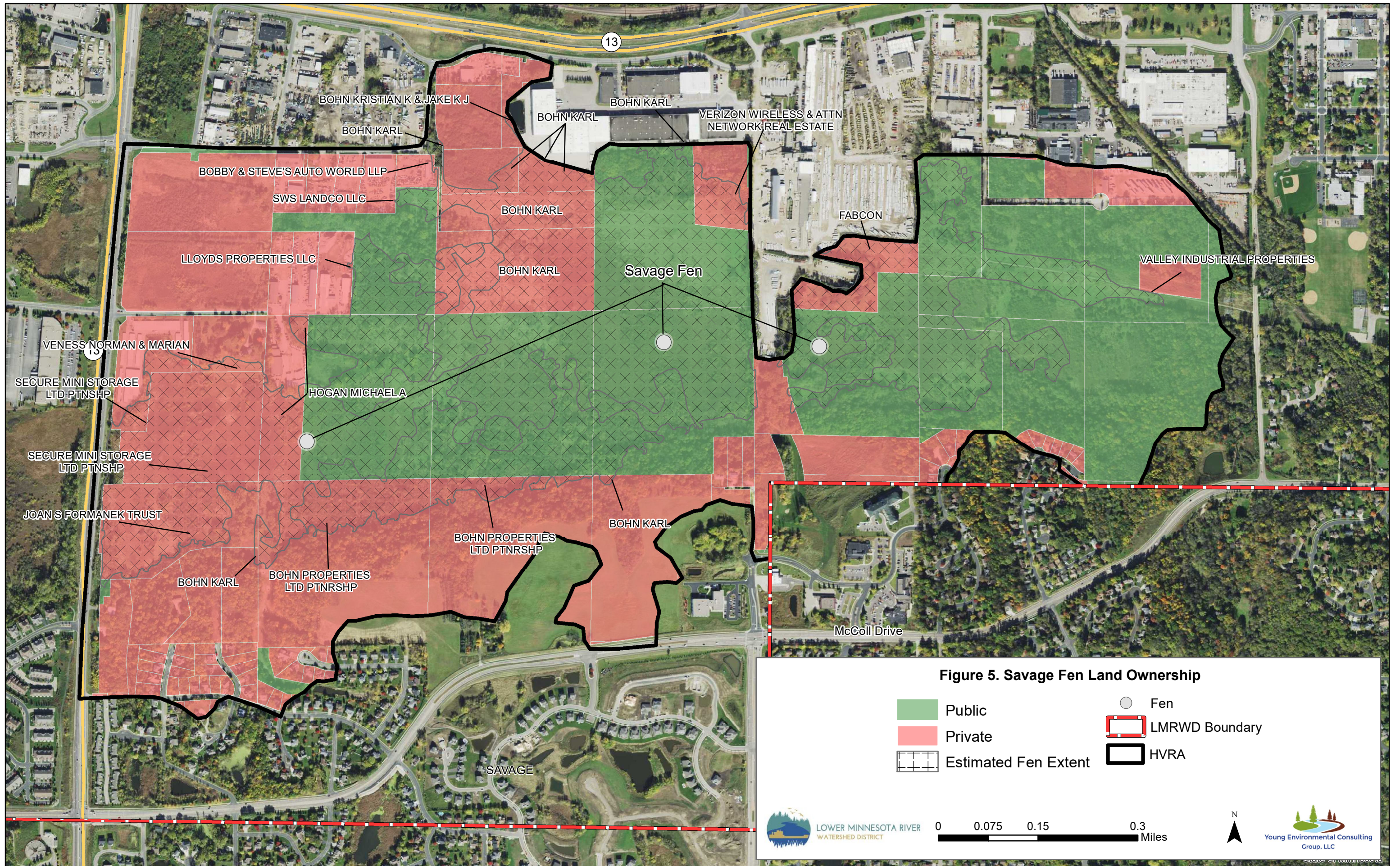


Figure 5. Savage Fen Land Ownership

- Public
- Private
- Estimated Fen Extent
- Fen
- LMRWD Boundary
- HVRA



0 0.075 0.15 0.3 Miles



Black Dog Lake Fens

Black Dog Lake Fens Land Use Changes

According to the MNDNR, Black Dog Lake Fen has already experienced significant degradation and may no longer be viable. The MNDNR will be conducting relevés to look for fen indicator species during the 2020–2021 field seasons and evaluate whether the fen community is extinct. **Figure 6** displays the 2016 land uses within and adjacent to the Black Dog Lake Fen HVRA, and **Figure 7** displays the planned land uses. **Table 7** provides a summary of the total areas for each land use category and the change, in acres, from 2016. Minor differences in total areas are due to rounding. Cells highlighted in red indicate a decrease in a particular land use, whereas blue cells indicate an increase.

Table 7. Black Dog Lake Fen Land Use Summary

	2016 Area [acres]	Future Area [acres]	Change [acres]
Agricultural	-	-	-
Commercial	21	72	50
Industrial	51	115	65
Institutional	-	-	-
High-Density Residential	-	-	-
Medium-Density Residential	162	-	-162
Low-Density Residential	-	171	171
Park, Recreational, or Preserve	997	831	-165
Undeveloped	6	-	-6
Transportation	29	77	48

The Black Dog Lake Fen HVRA predominantly consisted of park, recreational, or preserve areas in 2016, and this will continue in the future. There is a significant reduction in the amount of park, recreational, or preserve lands offset by increases in commercial, industrial, and low-density residential uses. It should be noted that the

reduction of medium-density residential use is likely due to zoning or categorization issues, rather than an actual change in land use.

Black Dog Lake Fen HVRA Development Pressures

Table 8 below presents the development pressures for the Black Dog Lake Fen HVRA. This table presents the 2016 land uses at the top, with the future land uses on the left. Reading from top to bottom provides the 2016 low-risk categories and their estimated future breakdown of areas by 2030 planned land uses. Minor differences in the total areas between **Tables 7** and **8** are due to rounding for the reader's ease.

Table 8. Black Dog Lake Fen HVRA Development Pressures

		2016 LAND USE			Future Totals [acres]
		Agricultural [acres]	Park, Recreational, or Preserve [acres]	Undeveloped [acres]	
PLANNED LAND USE	Agricultural	-	-	-	-
	Commercial	-	30	-	30
	Industrial	-	83	< 1	83
	Institutional	-	-	-	-
	High-Density Residential	-	-	-	-
	Medium-Density Residential	-	-	-	-
	Low-Density Residential	-	< 1	6	<7
	Park, Recreational, or Preserve	-	829	< 1	829
	Transportation	-	54	-	54
	2016 Totals [acres]	-	997	6	

Table 8 highlights the risk future land development within the HVRA presents to Black Dog Lake Fen. Although most of the 2016 park, recreational, or preserve lands are being preserved in their current state, 17 percent of the current area is expected to be converted to commercial, industrial, and transportation land uses.

Black Dog Lake Fen HVRA Land Ownership

Figure 8 shows the breakdown of public, private, and right-of-way land within the Black Dog Lake Fen HVRA. The HVRA breakdown is as follows: 31 percent public land, 59

percent privately held, and 10 percent transportation right-of-way. The public land immediately adjacent to the fen is predominantly owned by the USFWS. There is a portion to the southwest of the fen complex that is owned by the City of Burnsville, within Cliff Fen Park. Much of the private land is associated with utilities, such as Centerpoint Energy and Northern States Power Company. These areas are zoned as open space and, even if they are in private landownership, are unlikely to change much in the future. With consideration given to the fact that the viability of Black Dog Lake Fen is unknown at this time, we did not complete a private land ownership analysis at this time.

Black Dog Lake Fen Summary

The health of Black Dog Lake Fen is not known at this time, but there is speculation by the MNDNR that the fen community has been degraded to the point of no recovery. Although there are proposed changes to the current (2016) land uses, much of these changes appear to be minor and of low risk to the fen. Conservation purchases are not recommended until the MNDNR determines whether enough of the native fen community exists to be viable. Close coordination with municipal partners and continued enforcement of the District rules will help prevent further degradation of the fens.

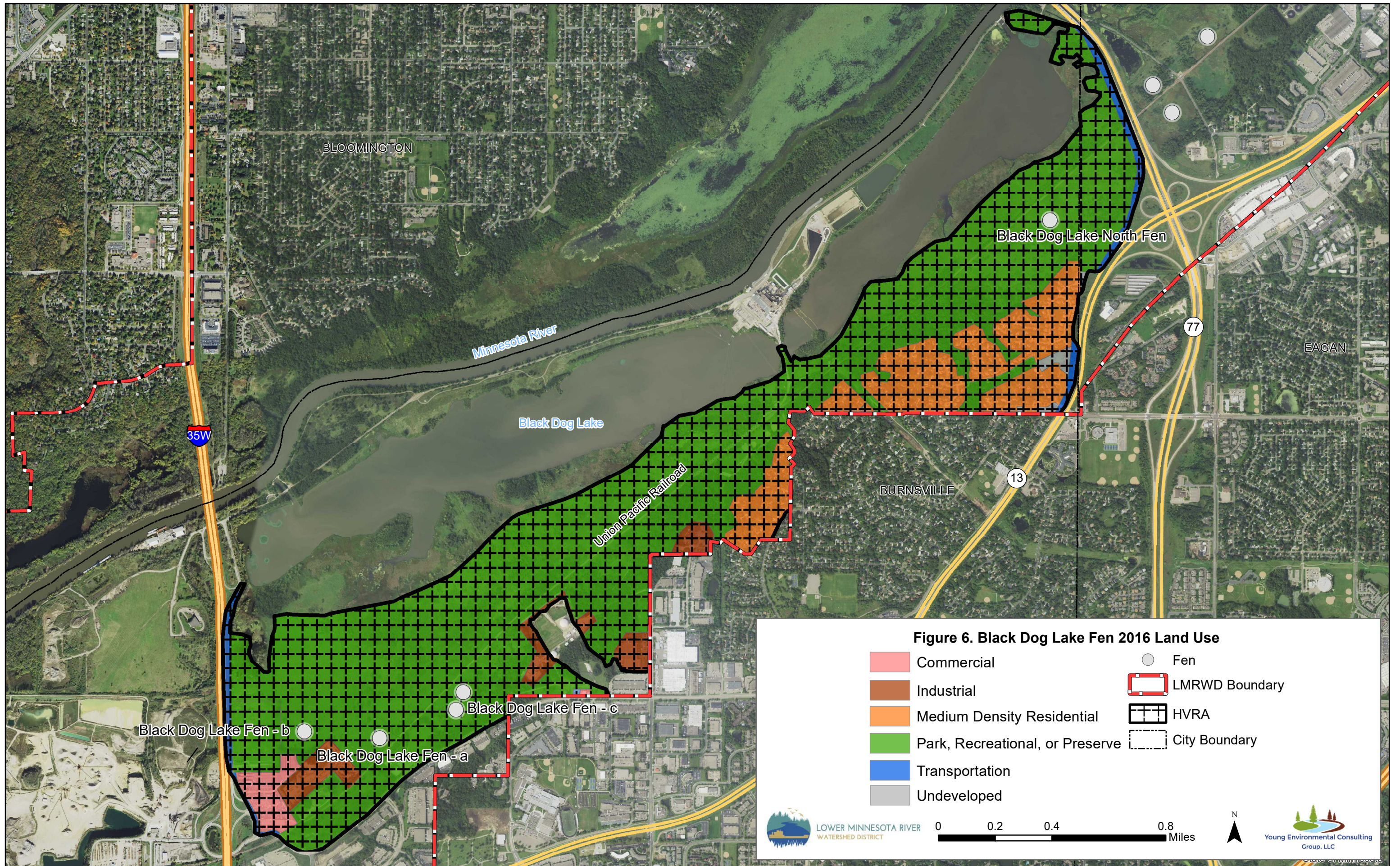










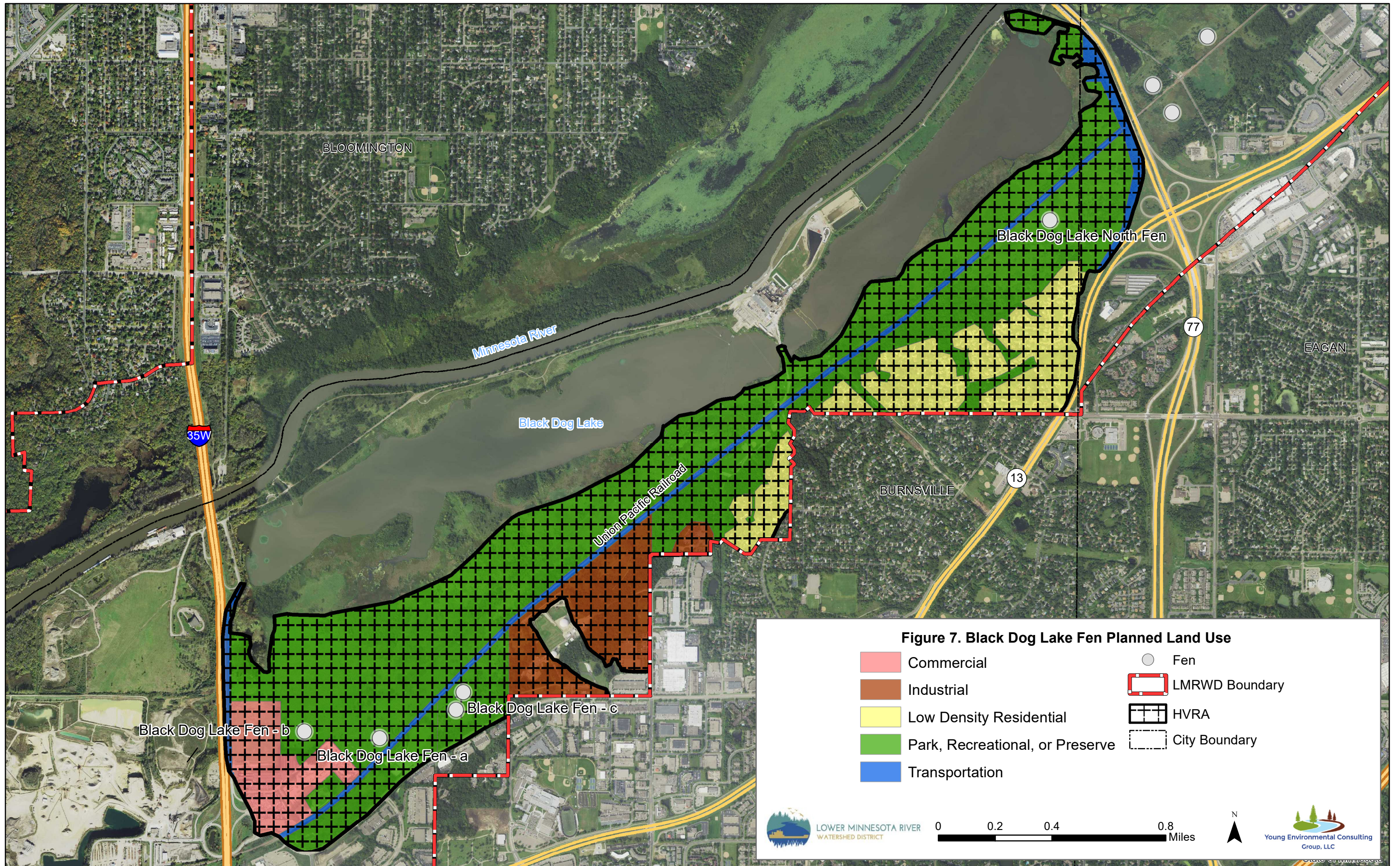


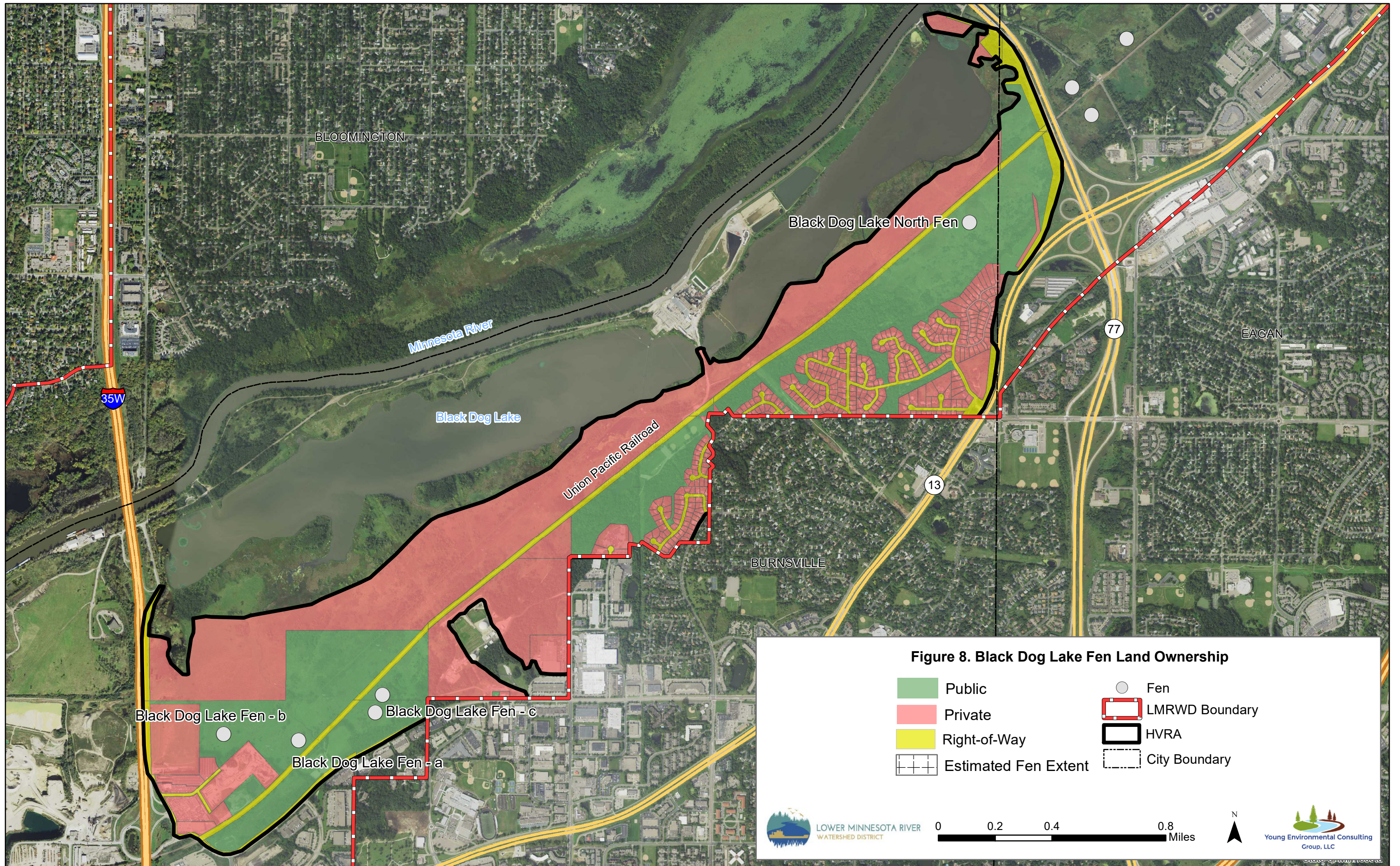
Figure 6. Black Dog Lake Fen 2016 Land Use

- | | |
|---|--|
|  Commercial |  Fen |
|  Industrial |  LMRWD Boundary |
|  Medium Density Residential |  HVRA |
|  Park, Recreational, or Preserve |  City Boundary |
|  Transportation | |
|  Undeveloped | |

Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)



Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)



Source: Minnesota Geospatial Commons (MNDNR), Dakota County

Nicols Meadow Fen

Nicols Meadow Fen Land Use Changes

Figure 9 displays the 2016 land uses within the Nicols Meadow Fen HVRA, and **Figure 10** displays the planned land uses. **Table 9** provides a summary of the total areas for each land use category and the change, in acres, from 2016. Minor differences in total areas are due to rounding. Cells highlighted in red indicate a decrease in a particular land use, whereas blue cells indicate an increase.

Table 9. Nicols Meadow Fen Land Use Summary

	2016 Area [acres]	Future Area [acres]	Change [acres]
Agricultural	-	-	-
Commercial	-	56	56
Industrial	52	54	3
Institutional	14	41	27
High-Density Residential	11	18	7
Medium-Density Residential	17	-	-17
Low-Density Residential	-	14	14
Park, Recreational, or Preserve	205	192	-13
Undeveloped	85	-	-85
Transportation	54	62	8

As with most of the fens in this study, the Nicols Meadow Fen HVRA predominantly consisted of park, recreational, or preserve areas in 2016, and this will continue in the future. The northern boundary of the HVRA is encompassed by Fort Snelling State Park, so land use in that area will remain unchanged.

Similar to other fens, the undeveloped areas are proposed for development in the future, resulting in a loss of 85 acres of undeveloped land and moderate increases in most of the urban categories. Of note, there is a small reduction in Medium-Density Residential, which is almost offset by the increase in Low-Density Residential. This is likely caused by a reclassification of the land use data rather than any municipal plans to convert medium-density residential lots to low-density developments.

Nicols Meadow Fen HVRA Development Pressures

Table 10 below presents the development pressures for the Nicols Meadow Fen HVRA. This table presents the 2016 land uses at the top, with the future land uses on the left. Reading from top to bottom presents the 2016 low-risk categories and their estimated future breakdown of areas by 2030 planned land uses. Minor differences in the total areas presented between **Tables 9** and **10** are due to rounding for the reader’s ease.

Table 10. Nicols Meadow Fen HVRA Development Pressures

		2016 LAND USE			Future Totals [acres]
		Agricultural [acres]	Park, Recreational, or Preserve [acres]	Undeveloped [acres]	
PLANNED LAND USE	Agricultural	-	-	-	-
	Commercial	-	8	26	34
	Industrial	-	-	20	20
	Institutional	-	< 1	27	27
	High-Density Residential	-	-	6	6
	Medium-Density Residential	-	-	-	-
	Low-Density Residential	-	< 1	< 1	< 1
	Park, Recreational, or Preserve	-	192	< 1	192
	Transportation	-	6	6	12
	2016 Totals [acres]	-	206	85	

Table 10 highlights the risk future land development within the HVRA may present to Nicols Meadow Fen. Although most of the 2016 park, recreational, or preserve lands are being preserved in their current state, the entirety of the undeveloped land is expected to be developed for higher-risk commercial, industrial, and institutional use.

Nicols Meadow Fen HVRA Land Ownership

Using the land ownership and parcel information, **Figure 11** shows the breakdown of public, private, and right-of-way land within the Nicols Meadow Fen HVRA. The breakdown is as follows: 64 percent are public lands, 18 percent are privately held, and 18 percent are transportation right-of-way. There is a large portion of publicly owned

land to the northeast of the fen that is owned by the Metropolitan Council, where the Seneca Wastewater Treatment Plant is located.

For planning purposes only, the following provides an estimate of the cost of placing the fen entirely under public ownership. Using the NWI data as a proxy for the fen extents, the parcel data was clipped to determine private ownership of Nicols Meadow Fen itself. The estimated cost to conserve the portion of the private parcel in the fen boundary was calculated using the 2019 land values provided by Dakota County’s online property information database (<https://gisdata.mn.gov/dataset/us-mn-co-dakota-plan-parcels>) and the portion of the private parcel directly within the fen, and is provided in **Table 11**. Parcels with high-risk development proposed are highlighted in green.

Table 11. Nicols Meadow Fen Land Private Ownership Summary

Owner	Total Parcel Area ¹ [acres]	Approximate Portion within Fen [acres]	2019 Land Value ¹	Estimated Cost to Conserve
BERNSTEIN R L	6.94	0.8	\$991,500	\$121,000
BROWN ROGER D	0.26	0.3	\$600	\$1,000
CLEAR CHANNEL OUTDOOR INC	3.52	3.5	\$135,100	\$135,000
NAEGELE OUTDOOR AD INC	0.17	0.2	\$1,900	\$2,000
NAEGELE OUTDOOR AD INC	1.21	0.7	\$13,200	\$8,000
ROSS JAMISON PETER	1.43	0.4	\$101,300	\$29,000
¹ Dakota County, 2019				

Nicols Meadow Fen Summary

As with many of the fens in the LMWRD’s jurisdiction, the Nicols Meadow Fen HVRA is expected to be fully developed by 2030 and experience a complete loss of 91 acres of undeveloped land. These 91 acres are anticipated to be converted primarily to commercial, industrial, and institutional land uses. Given the potential for 2016 low-risk land to enter future high-risk categories, we recommend conservation of the private

lands within the Nicols Meadow Fen. Based on this preliminary assessment, presented in **Table 11**, the cost to purchase and conserve this area is estimated at \$296,000, based on the 2019 full market value.

Additionally, close coordination with municipal partners and continued enforcement of the District rules will help ensure adequate stormwater management is implemented to protect the health of the fen from future development.

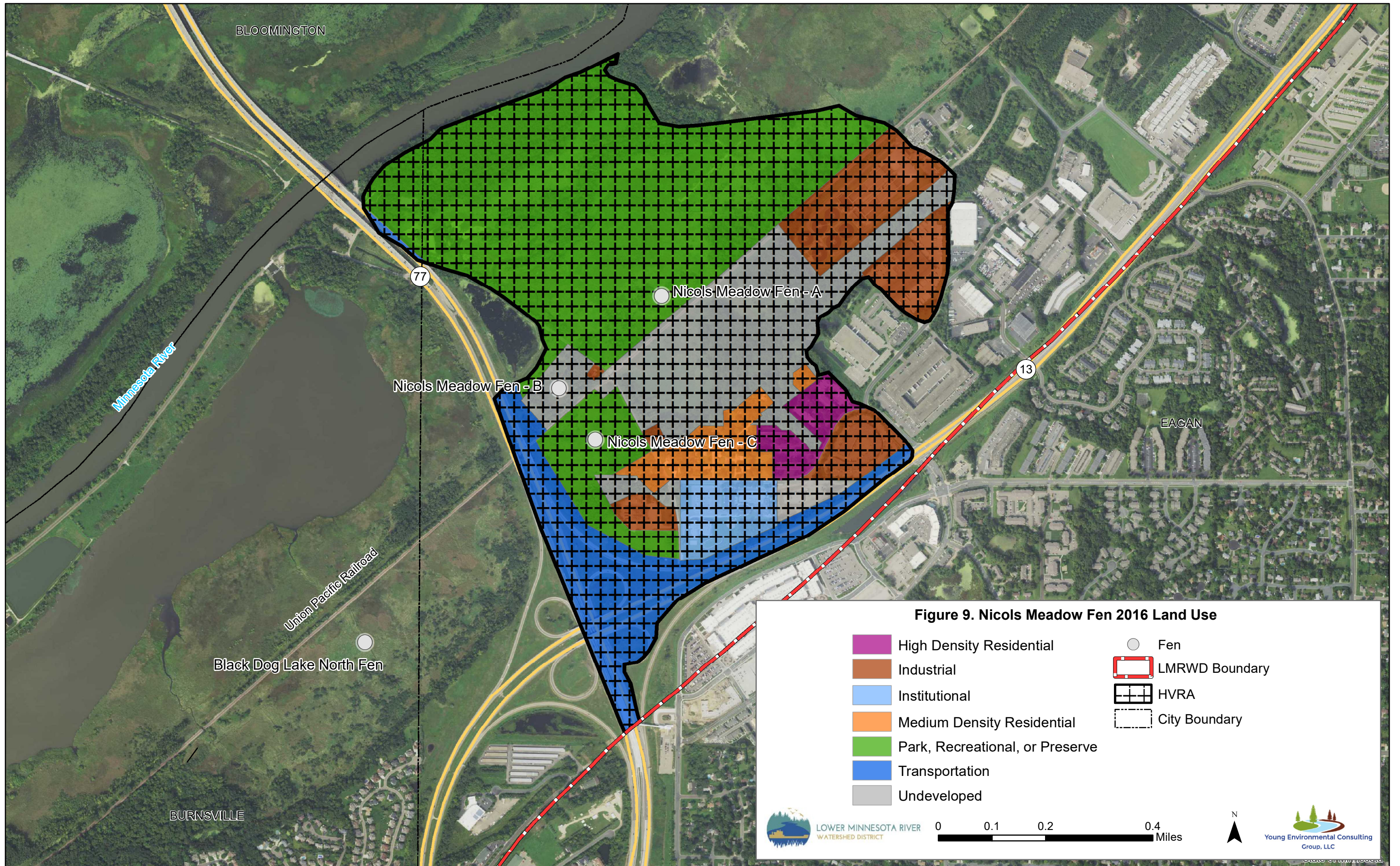











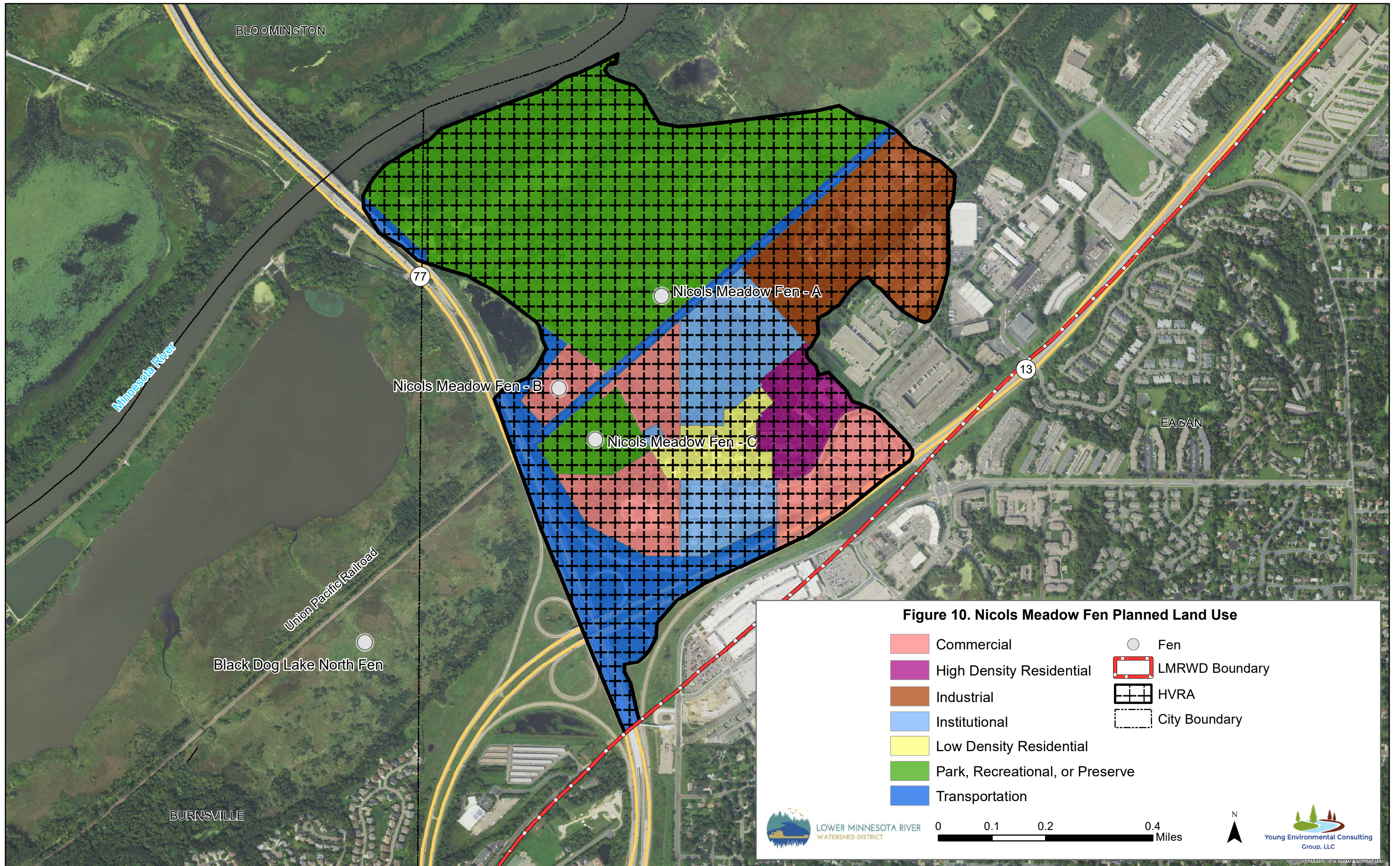


Figure 9. Nicols Meadow Fen 2016 Land Use

- | | | | |
|---|---------------------------------|---|----------------|
|  | High Density Residential |  | Fen |
|  | Industrial |  | LMRWD Boundary |
|  | Institutional |  | HVRA |
|  | Medium Density Residential |  | City Boundary |
|  | Park, Recreational, or Preserve | | |
|  | Transportation | | |
|  | Undeveloped | | |

Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)



Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)

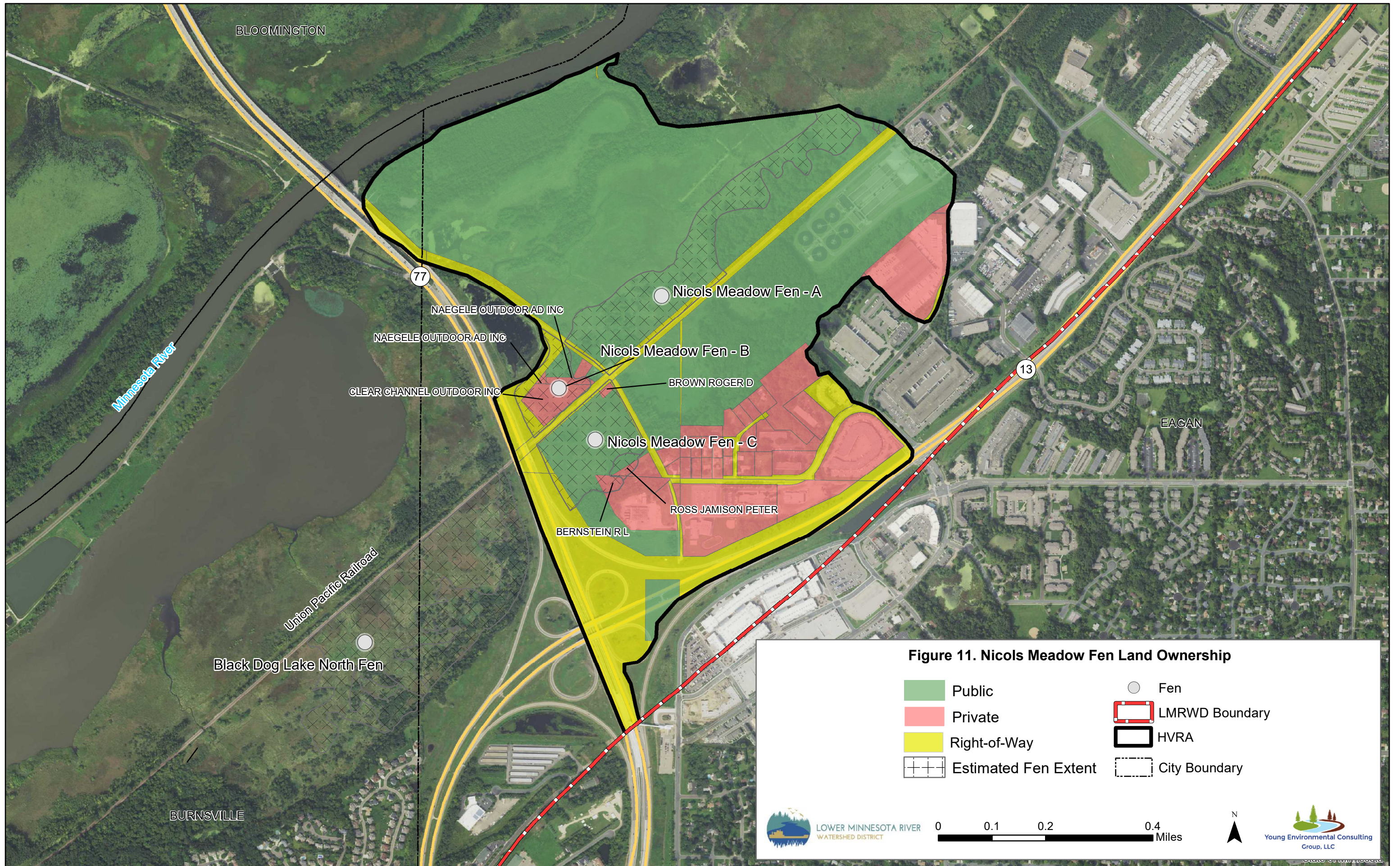
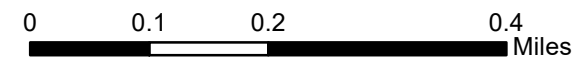


Figure 11. Nicols Meadow Fen Land Ownership

- | | |
|--|--|
| Public | Fen |
| Private | LMRWD Boundary |
| Right-of-Way | HVRA |
| Estimated Fen Extent | City Boundary |



Source: Minnesota Geospatial Commons (MNDNR), Dakota County

Gun Club Lake North Fen

Gun Club Lake North Fen Land Use Changes

Figure 12 displays the 2016 land uses within the Gun Club Lake North Fen HVRA, and **Figure 132** displays the planned land uses. **Table 12** provides a summary of the total areas for each land use category and the change, in acres, from 2016. Minor differences in total areas are due to rounding. Cells highlighted in red indicate a decrease in a particular land use, whereas blue cells indicate an increase.

Table 12. Gun Club Lake North Fen Land Use Summary

	2016 Area [acres]	Future Area [acres]	Change [acres]
Agricultural	-	-	-
Commercial	-	-	-
Industrial	1	1	0
Institutional	-	-	-
High-Density Residential	-	-	-
Medium-Density Residential	-	-	-
Low-Density Residential	-	-	-
Park, Recreational, or Preserve	186	175	-11
Undeveloped	-	-	-
Transportation	12	23	11

The Gun Club Lake North Fen is in Fort Snelling Park and thus is predominantly park, recreational, or preserve land. Transportation accounts for the majority of the rest of the land within the HVRA. The only change in land use expected is associated with transportation projects.

Gun Club Lake North Fen HVRA Development Pressures

Table 13 below presents development pressures for the Gun Club Lake North Fen HVRA. This table presents the 2016 land uses at the top, with the future land uses on the left. Reading from top to bottom presents the 2016 low-risk categories and their

estimated future breakdown of areas by 2030 planned land uses. Minor differences in the total areas presented between **Tables 12 and 13** are due to rounding for the reader's ease.

Table 13. Gun Club Lake North Fen HVRA Development Pressures

		2016 LAND USE			Future Totals [acres]
		Agricultural [acres]	Park, Recreational, or Preserve [acres]	Undeveloped [acres]	
PLANNED LAND USE	Agricultural	-	-	-	-
	Commercial	-	-	-	-
	Industrial	-	< 1	-	< 1
	Institutional	-	-	-	-
	High-Density Residential	-	-	-	-
	Medium-Density Residential	-	-	-	-
	Low-Density Residential	-	-	-	-
	Park, Recreational, or Preserve	-	174	-	174
	Transportation	-	12	-	12
	2016 Totals [acres]	-	186	-	

Table 13 highlights the risk that future land development within the HVRA may present to Gun Club Lake North Fen. Most of the land in the HVRA is already protected by the Ft. Snelling State Park; the only significant change is a minor decrease in the park, recreation, or preserve land category, which is offset by an increase in transportation associated with I-494 and the Union Pacific Railroad right-of-way.

Gun Club Lake North Fen HVRA Land Ownership

Figure 14 shows the breakdown of public, private, and right-of-way land within the Gun Club Lake North HVRA. The breakdown is as follows: 83 percent public and 17 percent transportation right-of-way. The right-of-way is dominated by I-494 and the Union Pacific Railroad.

Using the NWI, fen extents were estimated, and parcel data was clipped to determine the extent of private ownership of the fens themselves. Through this process, it was found there is no current private ownership within the estimated fen extent.

Gun Club Lake North Summary

Due to Gun Club Lake North Fen's location within Fort Snelling State Park, there are minimal changes between the 2016 land use and the planned land use. Close coordination with municipal partners and continued enforcement of the District rules will help ensure adequate stormwater management is implemented to protect the health of the fen from future development.

Figure 12. Gun Club Lake North Fen 2016 Land Use

- Industrial
- Park, Recreational, or Preserve
- Transportation
- Fen
- LMRWD Boundary
- HVRA
- City Boundary



LOWER MINNESOTA RIVER
WATERSHED DISTRICT

0 0.05 0.1 0.2
Miles



Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)

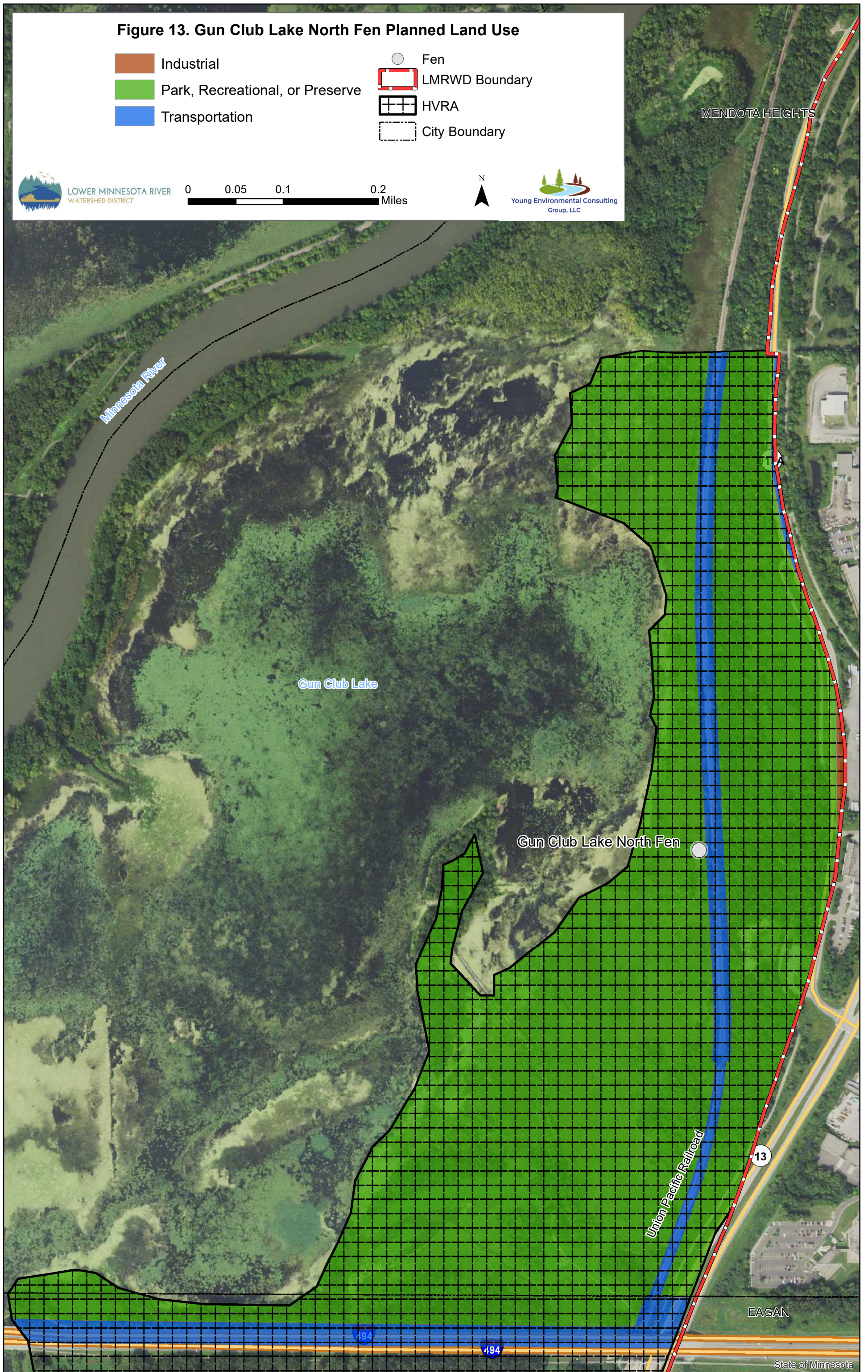
Figure 13. Gun Club Lake North Fen Planned Land Use

- Industrial
- Park, Recreational, or Preserve
- Transportation
- Fen
- LMRWD Boundary
- HVRA
- City Boundary



LOWER MINNESOTA RIVER
WATERSHED DISTRICT

0 0.05 0.1 0.2 Miles



Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)

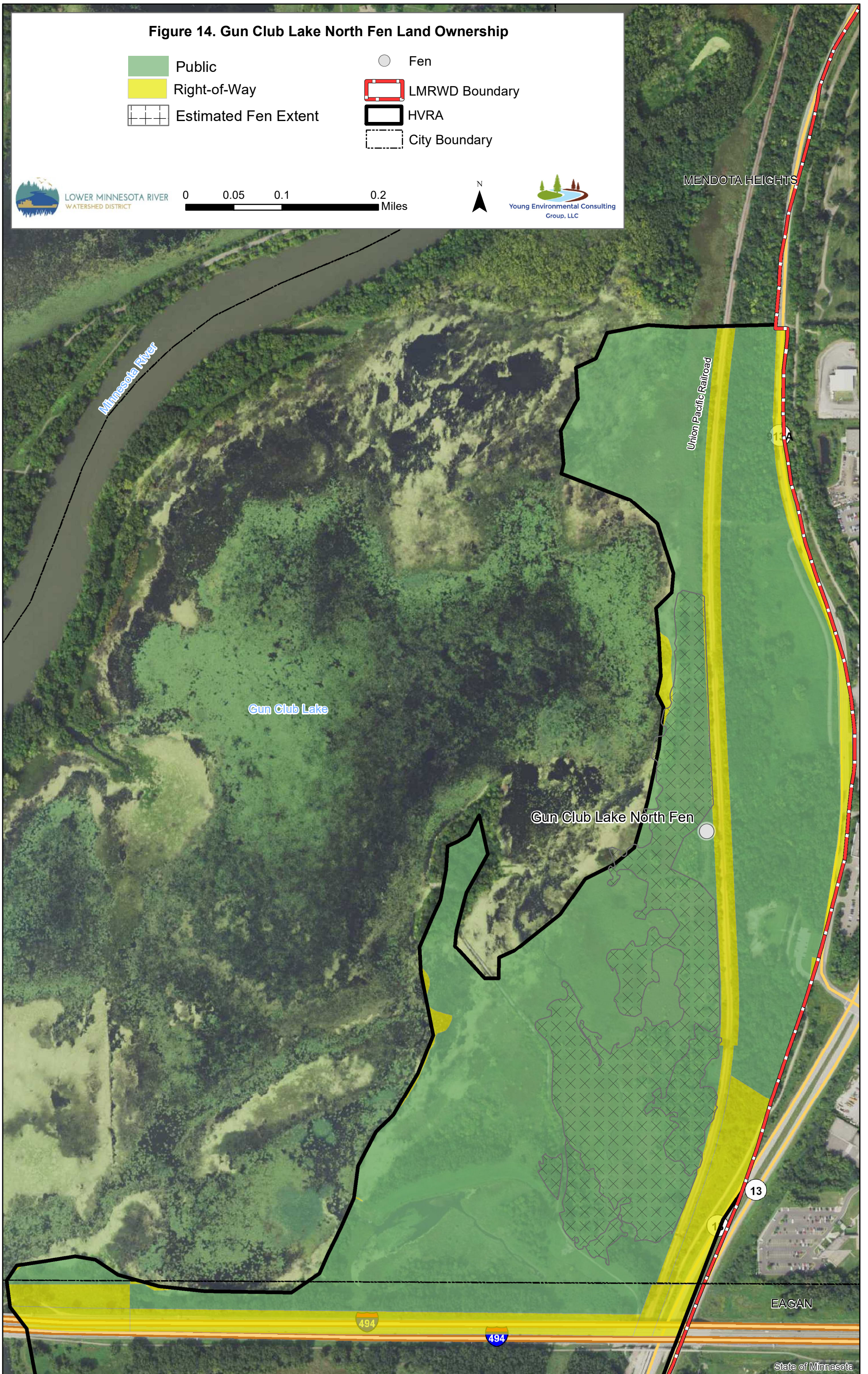
Figure 14. Gun Club Lake North Fen Land Ownership

- Public
- Right-of-Way
- Estimated Fen Extent
- Fen
- LMRWD Boundary
- HVRA
- City Boundary



LOWER MINNESOTA RIVER
WATERSHED DISTRICT

0 0.05 0.1 0.2
Miles



Source: Minnesota Geospatial Commons (MNDNR), Dakota County

Gun Club Lake South Fen

Gun Club Lake South Fen 2016 Land Use

Figure 15 displays the 2016 land uses within the Gun Club Lake South Fen HVRA, and **Figure 16** displays the planned land uses. **Table 14** provides a summary of the total areas for each land use category and the change, in acres, from 2016. Minor differences in total areas are due to rounding. Cells highlighted in red indicate a decrease in a particular land use, whereas blue cells indicate an increase.

Table 14. Gun Club Lake South Fen 2016 Land Use Summary

	2016 Area [acres]	Future Area [acres]	Change [acres]
Agricultural	-	-	-
Commercial	-	-	-
Industrial	20	26	6
Institutional	-	-	-
High-Density Residential	-	-	-
Medium-Density Residential	-	-	-
Low-Density Residential	-	-	-
Park, Recreational, or Preserve	222	217	-5
Undeveloped	3	-	-3
Transportation	20	22	2

The Gun Club Lake South Fen HVRA is contained almost entirely within Fort Snelling State Park, except for a portion on the southern edge. Due to this location, the predominant land use within the HVRA in 2016 and in the future is and will be park, recreational, or preserve. A small portion of the HVRA outside of Fort Snelling State Park is classified as industrial.

Gun Club Lake South Fen HVRA Development Pressures

Table 15 below presents the development pressures for the Gun Club Lake South Fen HVRA. This table presents the 2016 land uses at the top, with the future land uses on

the left. Reading from top to bottom presents the 2016 low-risk categories and their estimated future breakdown of areas by 2030 planned land uses. Minor differences in the total areas presented between **Tables 14 and 15** are due to rounding for the reader's ease.

Table 15. Gun Club Lake South Fen HVRA Development Pressures

		2016 LAND USE			Future Totals [acres]
		Agricultural [acres]	Park, Recreational, or Preserve [acres]	Undeveloped [acres]	
PLANNED LAND USE	Agricultural	-	-	-	-
	Commercial	-	-	-	-
	Industrial	-	< 1	3	3
	Institutional	-	-	-	-
	High-Density Residential	-	-	-	-
	Medium-Density Residential	-	-	-	-
	Low-Density Residential	-	-	-	-
	Park, Recreational, or Preserve	-	207	< 1	207
	Transportation	-	15	< 1	15
	2016 Totals [acres]	-	222	3	

Table 15 highlights the risk that future land development within the HVRA may present to Gun Club Lake South Fen. Most of the land in the HVRA is already protected by the Ft. Snelling State Park; the only significant change is a minor decrease in park, recreation, or preserve land category, which is offset by an increase in transportation and industrial land uses.

Gun Club Lake South Fen HVRA Land Ownership

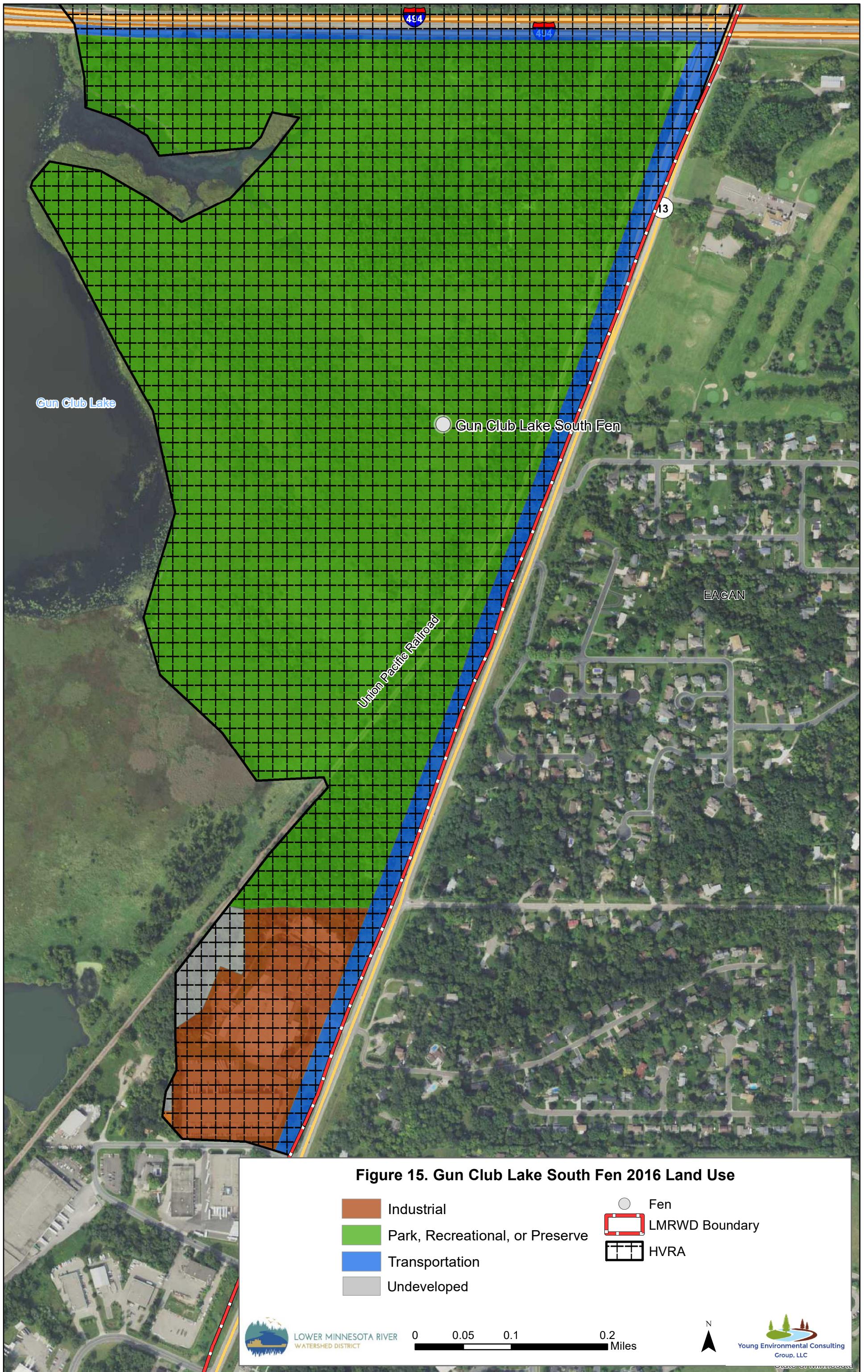
Figure 17 displays the breakdown of public, private, and right-of-way land within the Gun Club Lake South Fen HVRA. The breakdown is as follows: 74 percent public, 9 percent private, and 17 percent transportation right-of-way.

Using the NWI, fen extents were estimated, and parcel data was clipped to determine the extent of private ownership of the fens themselves. Through this process, it was found that there is no current private ownership within the estimated fen extent.

Gun Club Lake South Fen Summary

Due to the fact that the majority of the Gun Club Lake South Fen HVRA is located almost entirely within Ft. Snelling State Park, there is unlikely to be large variability between 2016 and future land uses and ownership. Because there are no private lands directly affecting the fen itself, there are no recommendations at this time for conservation opportunities.

Close coordination with municipal partners and continued enforcement of the District rules will help ensure adequate stormwater management is implemented to protect the health of the fen from future development.



Source: Minnesota Geospatial Commons (MNDNR and Metropolitan Council)

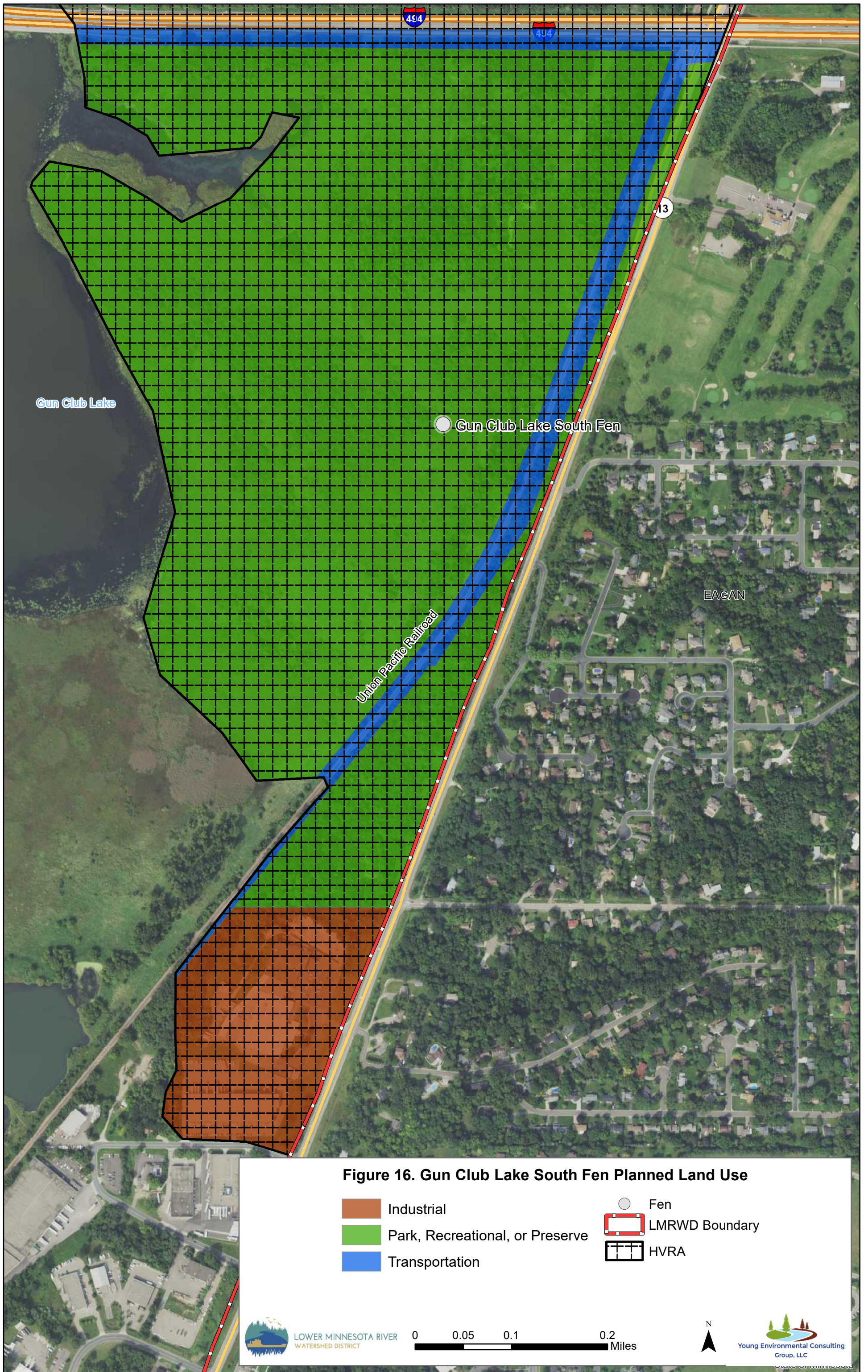


Figure 16. Gun Club Lake South Fen Planned Land Use

- Industrial
- Park, Recreational, or Preserve
- Transportation
- Fen
- LMRWD Boundary
- HVRA

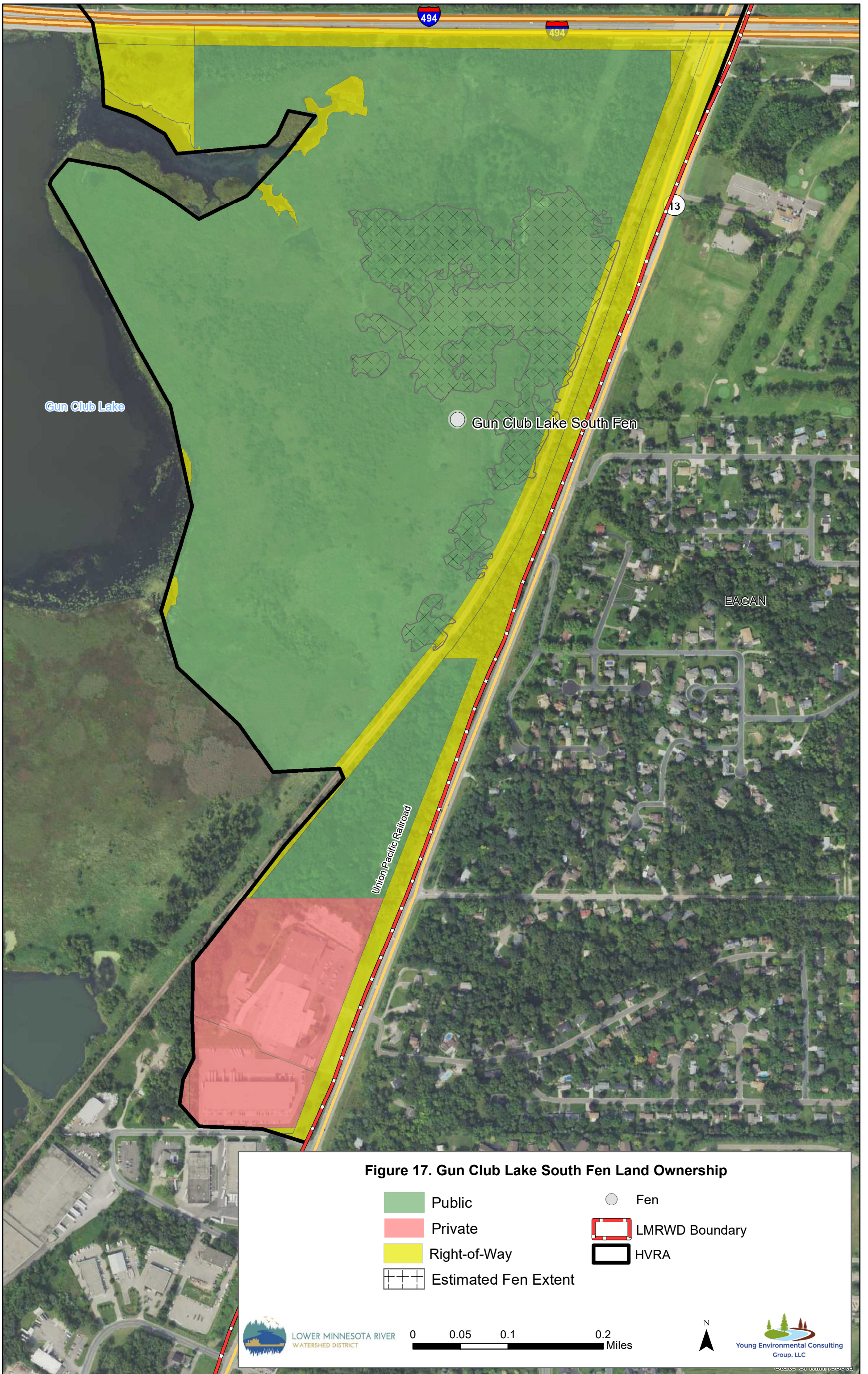







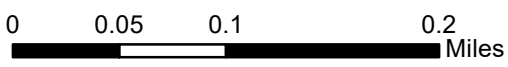


Figure 17. Gun Club Lake South Fen Land Ownership

- | | |
|--|--|
|  Public |  Fen |
|  Private |  LMRWD Boundary |
|  Right-of-Way |  HVRA |
|  Estimated Fen Extent | |



Land Use Summary and Conclusions

The land surrounding calcareous fens in the Lower Minnesota River Valley is integral to the health of the fens. To protect the fens in its jurisdiction, the LMRWD established HVRA that encompass the upstream areas directly draining to the fens. Considering the current and future development of the HVRA and the risk of impact on the health of the fens, we have compiled the following recommendations for consideration:

- Continue to enforce the District rules and complete project reviews on all proposed developments within the fens' HVRA overlay districts.
- Savage Fen and Nicols Meadow Fen are both expected to experience increased land development from open space or park, recreation, or reserve areas into industrial and commercial developments. Given the potential for impact on these fens, we recommend that consideration be given to the purchase of private fen land for conservation. The preliminary acquisition costs are estimated at \$2.2M for Savage Fen and \$296,000 for Nicols Meadow Fen. Grant funding sources are available for the purchase of conservation lands, including from the Legislative-Citizen Commission on Minnesota Resources and the Trust for Public Lands, among others. A review of potential funding sources should be evaluated, and an application and/or proposal should be drafted to secure this area in the future.
- Black Dog Lake Fen, according to the MNDNR, is degraded due to a number of factors. Before we can recommend any conservation practices, we first suggest determining whether this fen is still viable.