Sochacki Park Water Quality Improvement Project Feasibility Study

Prepared for
Three Rivers Park District

September 2023

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Certifications

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the state of Minnesota.

Greg Wilson PE #: 25782	Date

Abbreviations

BCWMC	Bassett Creek Watershed Management Commission
BMP	Best Management Practice
Chl-a	Chlorophyll-a
LiDAR	Light Detection and Ranging
MSL	Mean Sea Level
MDNR	Minnesota Department of Natural Resources
MNRAM	Minnesota Routine Assessment Method for Evaluating Wetland Functions
NRCS	Natural Resources Conservation Service
OHW	Ordinary High Water
P8	Program for Predicting Polluting Particle Passage Thru Pits, Puddles, and Ponds
PWI	Public Waters Inventory
SD	Secchi Disc
SSURGO	Soil Survey Geographic Database
TRPD	Three Rivers Park District
TP	Total Phosphorus
USFWS	United States Fish and Wildlife Service

1 Executive Summary

The Bassett Creek Watershed Management Commission's (BCWMC) current Capital Improvement Program (CIP) (Table 5-3 in the 2015-2025 Bassett Creek Watershed Management Plan, as revised) includes the Sochacki Park Water Quality Improvement project (CIP BC-14) (Project).

As is required for BCWMC CIP Projects, a feasibility study must be completed prior to BCWMC holding a hearing and ordering the project. This study examines the feasibility of developing water quality treatment best management practices (BMPs) in Sochacki Park and South Halifax Park. Project goals include improved water quality in Bassett Creek; improved water quality, ecological function, and wildlife habitat in the Sochacki Park wetlands (Grimes Pond, North Rice Pond and South Rice Pond); and enhanced recreation and education opportunities.

If ordered, the CIP calls for implementing the project in 2024 and 2025. The BCWMC CIP funding (ad valorem tax levied by Hennepin County on behalf of the BCWMC), is not the sole source of funding for this project. The remainder of the funding will come from the Cities of Robbinsdale and Golden Valley, Three Rivers Park District, and other sources (e.g., other grants, as appropriate).

Recent efforts to better understand the ecological health, and set appropriate goals for, the Sochacki Park wetlands (South and North Rice Ponds), plus adjacent, upstream Grimes Pond have identified improvements that are likely necessary to improve the ecological health of the wetlands, improve aesthetics, and provide recreation and education opportunities. Many of the goals or metrics for ecological health are directly tied to improved wetland water quality (through nutrient reductions) and enhancements to vegetative diversity and integrity.

Using monitoring data and other data/information, Barr updated and calibrated the Bassett Creek Watershed Management Commission's (BCWMC) pollutant loading model to better understand the ecological conditions and evaluate the source of pollutants impacting the ponds. The modeling results revealed that the ponds' contributing watersheds currently provide low levels of water quality treatment. The water quality data and modeling results also showed that internal loading of phosphorus is an important source of phosphorus for each pond. We used the monitoring and modeling results, along with mapping information, to identify high priority areas for implementing watershed best management practices (BMPs).

Barr performed a Phase I environmental site assessment (ESA) for Sochacki Park and South Halifax Park (South Halifax Park is a Robbinsdale city park located on the north side of Grimes Pond). A Phase I ESA is primarily a desktop review that provides an initial evaluation of environmental conditions on a property. The Phase I ESA identified significant debris (construction debris landfill) present at Sochacki Park. Based on the Phase I ESA results, Barr recommends completion of a Phase II investigation as a first step in final design. A Phase II investigation involves collecting samples from various media (e.g., soil, groundwater) for chemical analysis to verify the absence or presence of contamination. Similar to previous BCWMC CIP projects, Barr recommends that the entity implementing the project enter the MPCA's Brownfields Program for hazardous substances, which can protect entities with ownership interests, and these protections can be extended to entities performing work through an approved Response Action Plan (RAP). Although working in contaminated areas may be more complicated and costly, there are human health and ecological benefits to removing contaminants from the environment. Further, there are methods and protections for dealing with the contaminants.

The BCWMC included the Sochacki Park Water Quality Improvement Project in its CIP, based on the following "gatekeeper" policy from the BCWMC Plan. Those items in bold italics represent those that directly apply to this project.

110. The BCWMC will consider including projects in the CIP that meet one or more of the following "gatekeeper" criteria.

- ***Project is part of the BCWMC trunk system (see Section 2.8.1, Figure 2-14 and Figure 2-15 of the report)***
- ***Project improves or protects water quality in a priority waterbody***
- ***Project addresses an approved TMDL or watershed restoration and protection strategy (WRAPS)***
- Project addresses flooding concern

The BCWMC will use the following criteria, in addition to those listed above, to aid in the prioritization of projects:

- Project protects or restores previous Commission investments in infrastructure
- Project addresses intercommunity drainage issues
- ***Project addresses erosion and sedimentation issues***
- ***Project will address multiple Commission goals (e.g., water quality, runoff volume, aesthetics, wildlife habitat, recreation, etc.)***
- ***Subwatershed draining to project includes more than one community***
- Addresses significant infrastructure or property damage concerns

The BCWMC will place a higher priority on projects that incorporate multiple benefits, and will seek opportunities to incorporate multiple benefits into BCWMC projects, as opportunities allow.

The Sochacki Park Water Quality Improvement Project meets multiple gatekeeper criteria— the project will improve water quality by reducing the amount of sediment and pollutants that reach the Main Stem of Bassett Creek. Additionally, this project is part of the trunk system (South Rice Pond, North Rice Pond, and Grimes Pond), multiple communities (the Cities of Robbinsdale, Golden Valley and Crystal) are within the project's subwatershed, and the project will address multiple Commission goals by enhancing water quality and aesthetics, providing recreation opportunities, and improving wildlife habitat.

Based on the calibrated watershed and pond water quality modeling, we recommend implementation of the following watershed BMPs and in-pond management options to substantially improve water quality, enhance vegetative diversity and integrity for each pond, and reduce downstream phosphorus loadings to and enhance biological integrity in Bassett Creek:

- Clear clogged debris and develop an annual maintenance plan for all inlet and outlet structures. Remove accumulated sediment and fill materials from BMPs and within, and adjacent to, each wetland.
- Reconfigure discharge outfall and stabilize erosion from stormwater conveyance entering northwest corner of Grimes Pond.
- Re-vegetate and control soil erosion from bare soil areas within the upland buffer areas. If mountain bike activity in the adjacent upland area is currently supported, isolate potential soil disturbance and adjacent vegetation improvements to prevent erosion into surrounding wetland areas.
- Conduct controlled water level drawdowns in each wetland prior to the winter season to ensure that curly-leaf pondweed is decreased to less than 20 percent cover and to enhance overall vegetative diversity and integrity. Remove, treat, and control other non-native invasive species, where possible, and remove fill material and trash.
- Initiate, or increase the frequency of, street sweeping and fall leaf litter removal programs, with emphasis in subwatersheds that have direct drainage to the wetlands.
- Install structural BMPs and/or pretreatment protection measures to prevent future sediment delivery and reduce nutrient loading into the ponds with design(s) intended to meet water quality goals. Untreated stormwater runoff from two discharge outfalls each to South Rice Pond (Pond SR-3 and Pond SR-4) and Grimes Pond (BMP GR-6), as well as one outfall to North Rice Pond (Pond NR-1), are prioritized for implementation.
- Complete in-pond alum treatment in all three ponds to control summer sediment phosphorus release, following implementation of watershed BMPs, to improve water clarity and support submersed aquatic plant growth.

The total estimated cost to construct all the above BMPs is $1,903,000. The BCWMC's CIP includes $600,000 for this project. See Table 7 1 for a summary of the potential pond improvement options, estimated annual total phosphorus removal, planning level capital cost estimate, annualized cost-benefit, and recommended sequence for implementation of each improvement option.

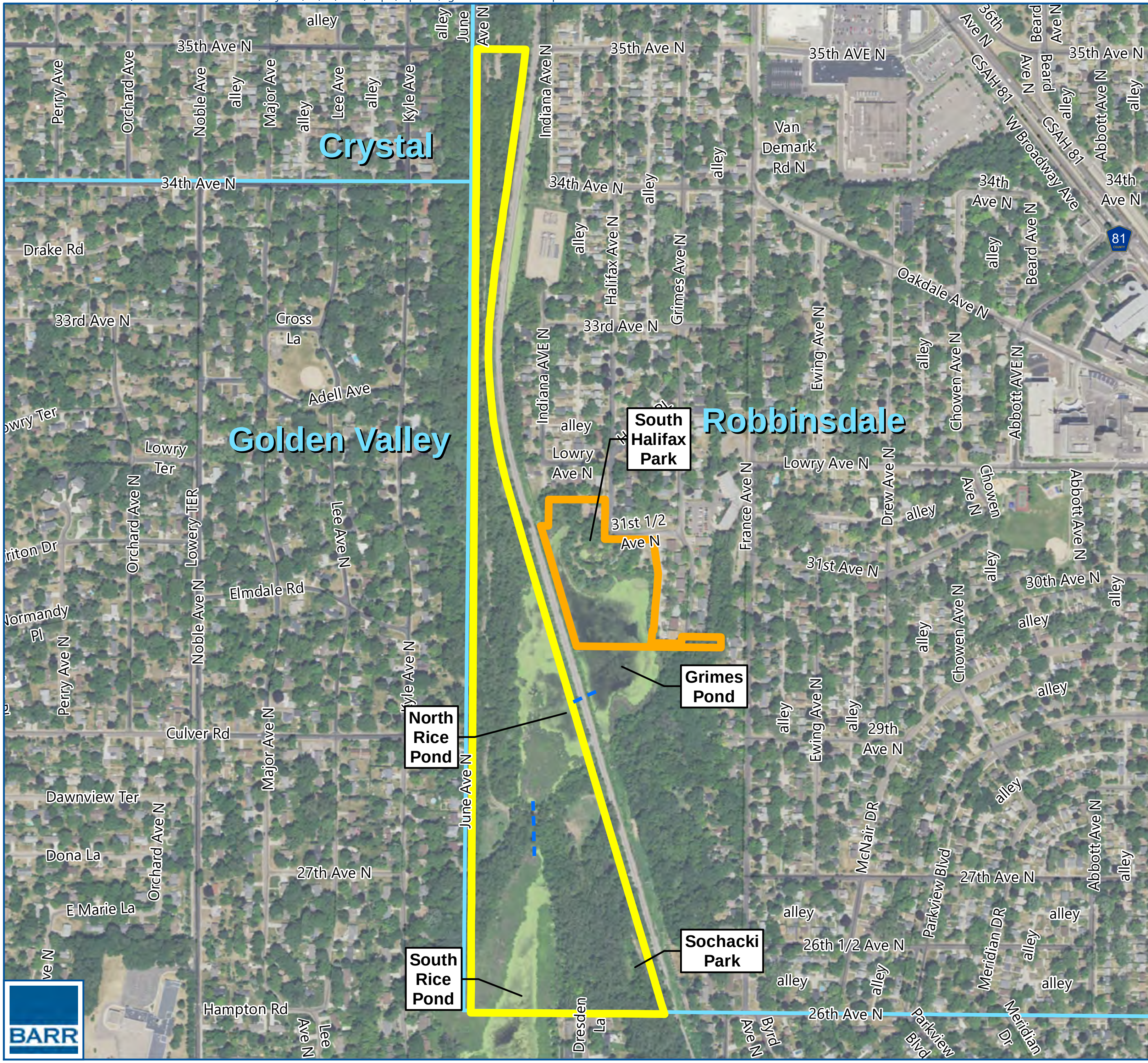
2 Background and Objectives

The Sochacki Park Water Quality Improvement Project is included in the BCWMC's current CIP as BC-14 (Table 5-3, as amended in 2023). The proposed project is in Robbinsdale and Golden Valley and will improve water quality in the Main Stem of Bassett Creek and the wetlands in Sochacki Park and South Halifax Park (see Figure 2-1). The feasibility study will aid in the future development of designs for anticipated construction and implementation of the project in 2024 and 2025.

Recent efforts to better understand the ecological health, and set appropriate goals for, the Sochacki Park wetlands (South and North Rice Ponds) and Grimes Pond, identified improvements that are likely necessary to improve the ecological health of the wetlands, improve aesthetics, and provide recreation and education opportunities. Many of the goals or metrics for ecological health are directly tied to improved wetland water quality (through nutrient reductions) and enhancements to vegetative diversity and integrity. Another goal involved stakeholder engagement throughout the development of the Sochacki Park feasibility study.

2.1 Project Area Description

Sochacki Park is surrounded by residential property, located within the City of Robbinsdale, west of the BNSF Railroad and east of June Ave N (Township 29, Range 24, and Sections 7 and 18) within Hennepin County. The park is operated by Three Rivers Park District (TRPD) in cooperation with the cities of Robbinsdale and Golden Valley. The park access road off 36th Ave N leads to a small parking lot at the north end of the park adjacent to an Xcel Energy utility line. A picnic structure and paved trails are located within the park. North Rice Pond, located south of the picnic structure, is identified in the Minnesota Department of Natural Resources (MN DNR) Public Water Inventory (PWI) as Public Water Wetland 27-644W and South Rice Pond, located at the south end of the park, is identified as Public Water Wetland 27-645W. Grimes Pond, which shares the same PWI number as North Rice Pond, is located northeast of the railroad tracks. Robbinsdale's South Halifax Park is adjacent to Sochacki Park and includes the north side of Grimes Pond. South Rice Pond extends beyond Sochacki Park to the south adjacent to Bassett Creek into the City of Golden Valley. A restored prairie is located near the upland edges between North and South Rice Ponds. In addition to the main paved trails, several unpaved paths are present throughout the park. Mounds and logs placed for mountain bike activity are present east of South Rice Pond. Figure 2-2 shows the pond bathymetry and provides the maximum depths of each pond. Figure 2-3 shows the subwatersheds and drainage for the Sochacki Park study area.



LOCATION MAP
Sochaki Park Feasibility Study
Three Rivers Park District
Hennepin County, MN

FIGURE 2-1

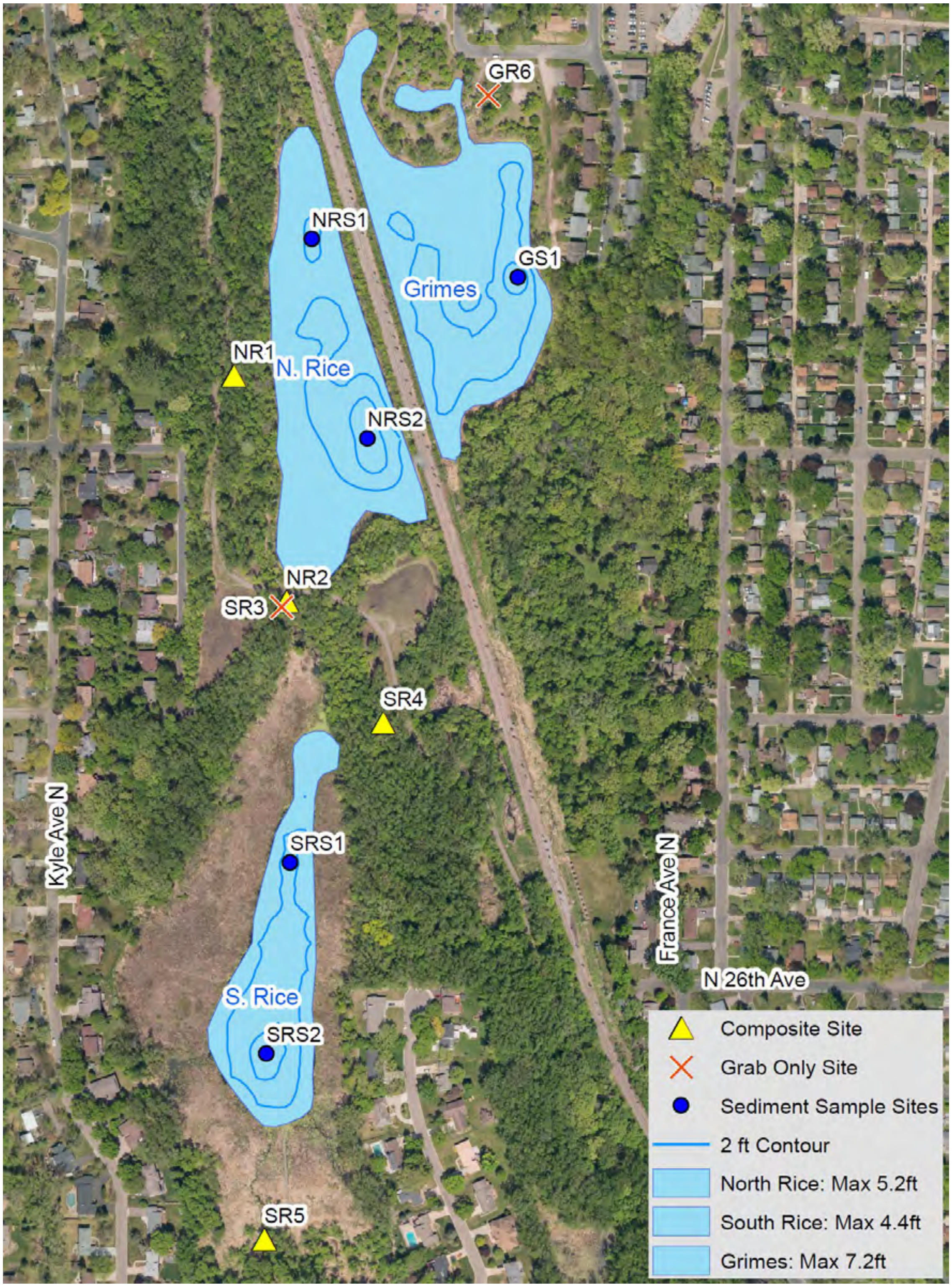
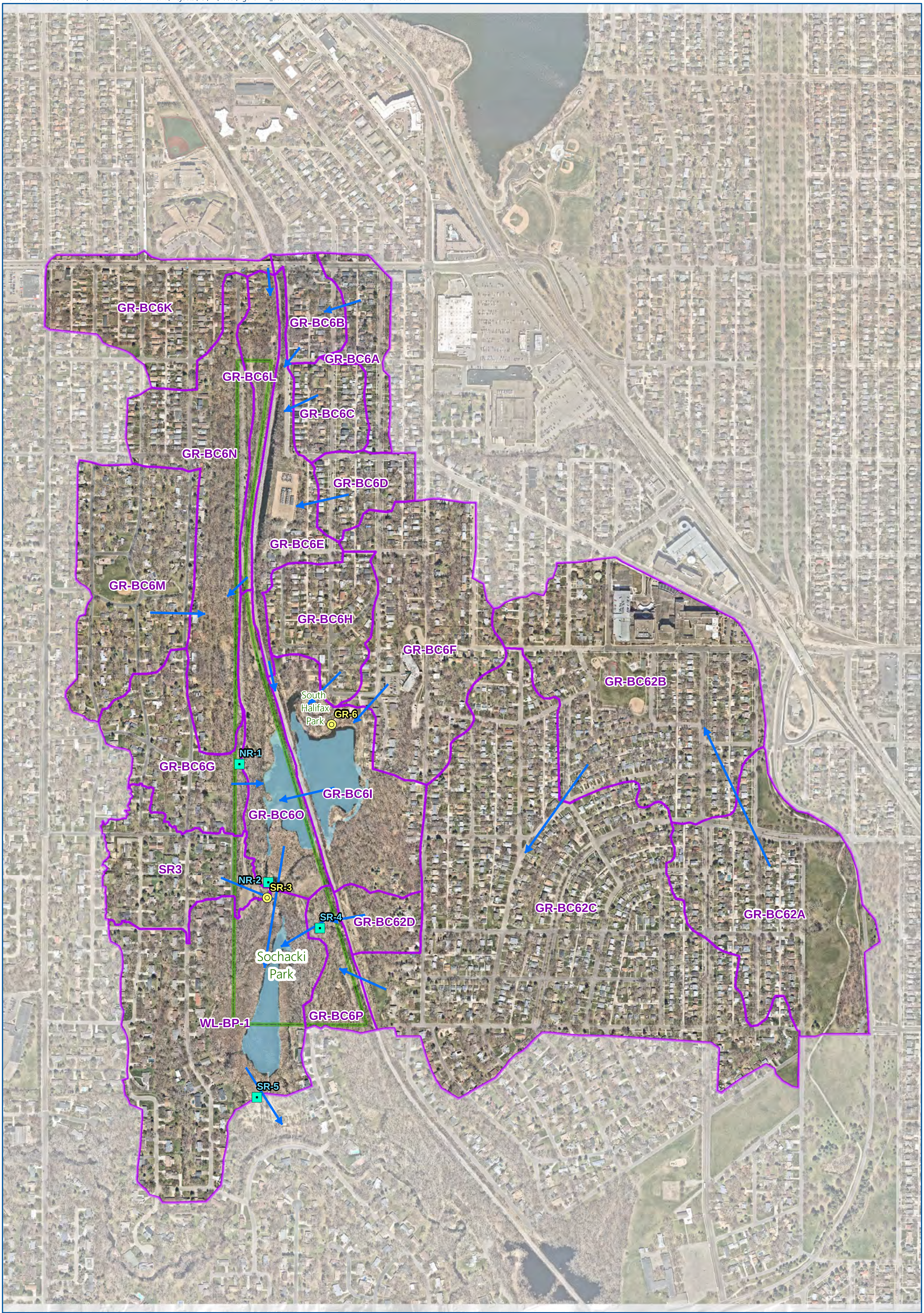


Figure 2-2 Sochacki Park Ponds, Bathymetry and Monitoring Sites



Automated Monitoring Site
Grab Sample Site
Pipe
Flow Direction
Waterbodies
Sochacki Park
Subwatersheds
Municipal Boundary

N

0 300 600
Feet

Imagery: NearMap; May 6, 2022

BARR

SUBWATERSHEDS & STORM SEWER
Sochacki Park
Subwatershed Assessment
Three Rivers Park District

FIGURE 2-3

2.2 Goals and Objectives

This project is consistent with the goals (Section 4.1) and policies (Sections 4.2.1, 4.2.4, 4.2.6, 4.2.8, and 4.2.10) in the 2015 – 2025 BCWMC Watershed Management Plan.

The goals and objectives of the feasibility study were to:

- Review the feasibility of developing water quality treatment best management practices (BMPs) in Sochacki and South Halifax Parks and identify and evaluate multiple water quality improvements.
- Develop conceptual BMP and water quality improvement designs, including evaluating the water quality improvements using water quality modeling (P8 model).
- Provide a planning level opinion of cost for design and construction of the improvement options.
- Identify potential project impacts and permitting requirements.
- Develop visuals of the improvement options for public input.

The goals and objectives of the water quality improvement project are to:

1. Develop stormwater BMPs in the project area to remove sediment and particulate and dissolved nutrients to improve water quality for the Main Stem of Bassett Creek, as well as the existing ponds and wetlands within the project study area.
2. Reduce sediment, bacteria and nutrient loading to Bassett Creek and improve downstream water quality by providing additional upstream water quality treatment in the existing ponds and in new stormwater BMPs in the project area.
3. Remove accumulated, contaminated sediment to restore water quality treatment capacity and provide enhanced aquatic habitat.

Although the 2015 Bassett Creek Watershed Management Plan does not include water quality goals for North and South Rice Ponds and Grimes Pond, the Bassett Creek Watershed Management Commission's (BCWMC) 2004 goal for Grimes, North Rice and South Rice Ponds was a management classification of Level III, meaning its water quality should support aesthetic viewing (BCWMC, 2004 and Barr Engineering, 2014). Level III goals were: (1) maximum total phosphorus (TP) concentration of 75 µg/L, (2) maximum chlorophyll *a* (Chl-a) concentration of 40 µg/L, and (3) minimum Secchi disc (SD) transparency of 1.0 meters (about 3 feet). Since Grimes and North Rice Ponds (27-644W) and South Rice Pond (27-645W) are considered wetlands, there are no MPCA water quality standards that apply. Although not BCWMC priority waterbodies, these ponds are directly upstream of the Main Stem of Bassett Creek and therefore impact the stream's health.

Based on literature and stakeholder feedback, there was consensus that it was important to improve wetland water quality and ecology in all three ponds by making an initial harvest of aquatic plants, followed by significant nutrient reductions to shift away from floating plant dominance and the resulting low or no oxygen conditions (anoxia) in the pond water (per Scheffer et al., 2003). As a result, the previous BCWMC water quality goals provide a benchmark for making this shift in wetland ecology that will also enhance vegetative diversity and integrity. It will also be important to control invasive species, both in wetland and upland areas, while controlling and/or removing sediment deposits.

2.3 Considerations

Key considerations for project alternatives included:

1. Maximizing the amount of water quality benefit provided by the project.
2. Minimizing the permitting required to construct the project improvements.
3. Maintaining or improving the ecological integrity of the ponds, including water quality and habitat functions.
4. Minimizing impacts to upstream wetlands.
5. Balancing tree loss and water quality treatment volume development while preserving healthy, significant hardwoods trees in upland areas.
6. Maintaining or improving the functionality of the trails and park features, while enhancing water quality educational opportunities.

The considerations listed above played a key role in determining final recommendations and will continue to play a key role through final design.

3 Site Conditions

3.1 Pond Water Quality Concerns

Figures 2-2 and 2-3 shows the automated and grab sample sites for watershed water quality monitoring. The automated monitoring sites included flow monitoring equipment to facilitate the development of pollutant load estimates. Figure 2-1 shows the wetland water quality and sediment monitoring sites. Continuous water level measurements were also collected at all three wetlands. Except for the sediment monitoring and testing, Three Rivers Park District (TRPD) staff performed all the field sampling and analytical testing for this assessment.

3.1.1 Total Phosphorus, Chlorophyll-a and Secchi Disc Transparency

Figures 3-1, 3-2 and 3-3 show the summer average TP, Chl-a and SD transparency data for Grimes Pond, North Rice Pond, and South Rice Pond, respectively. The results for all three ponds generally show that summer average TP concentrations greatly exceed the Level III goal, while summer average Chl-a and SD transparencies correspond well with the respective Level III goals. This data, together with observations of heavy growths of free-floating plants (duckweed and watermeal) across the surface of all three ponds, indicates that algae growth is being limited by the amount of sunlight that can reach the water profile. This phenomenon will also limit the growth of submerged plant growth in each pond. Nutrient reductions will be needed to shift away from floating plant dominance in each pond.

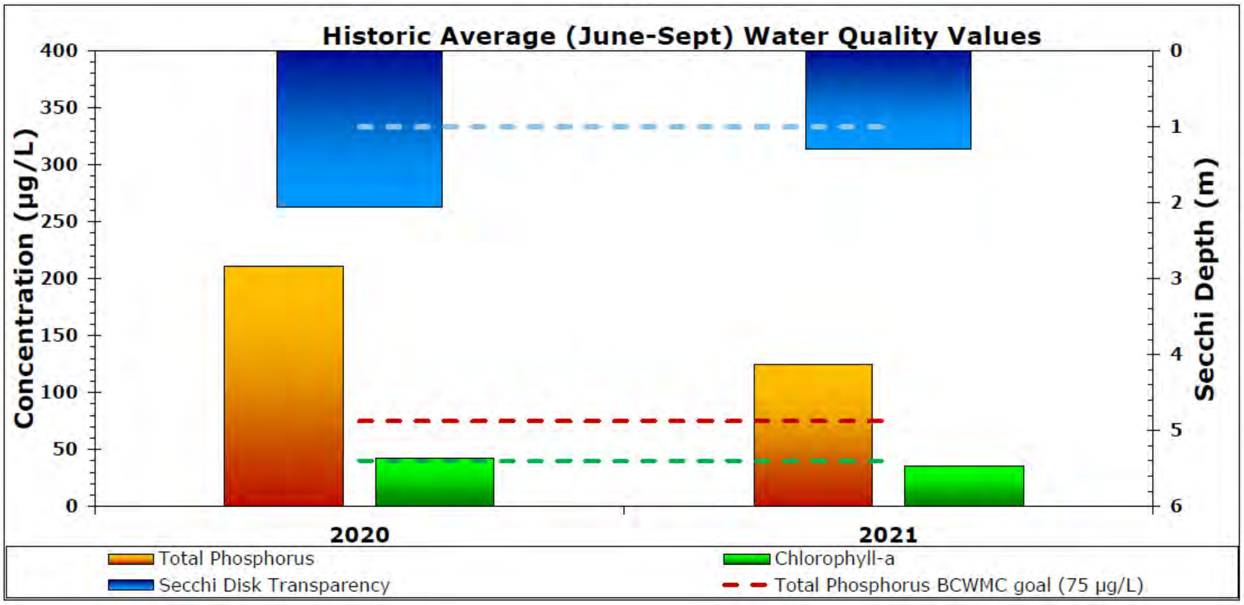


Figure 3-1 Grimes Pond Total Phosphorus, Chlorophyll-a, and Secchi Disc Transparency

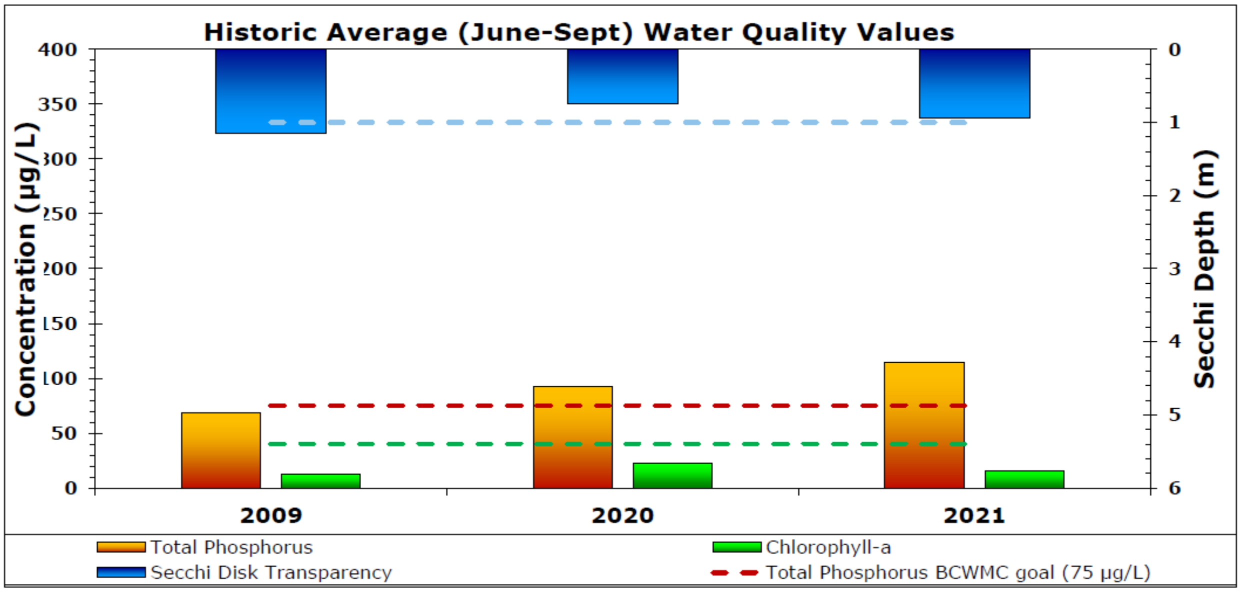


Figure 3-2 North Rice Pond Total Phosphorus, Chlorophyll-a, and Secchi Disc Transparency

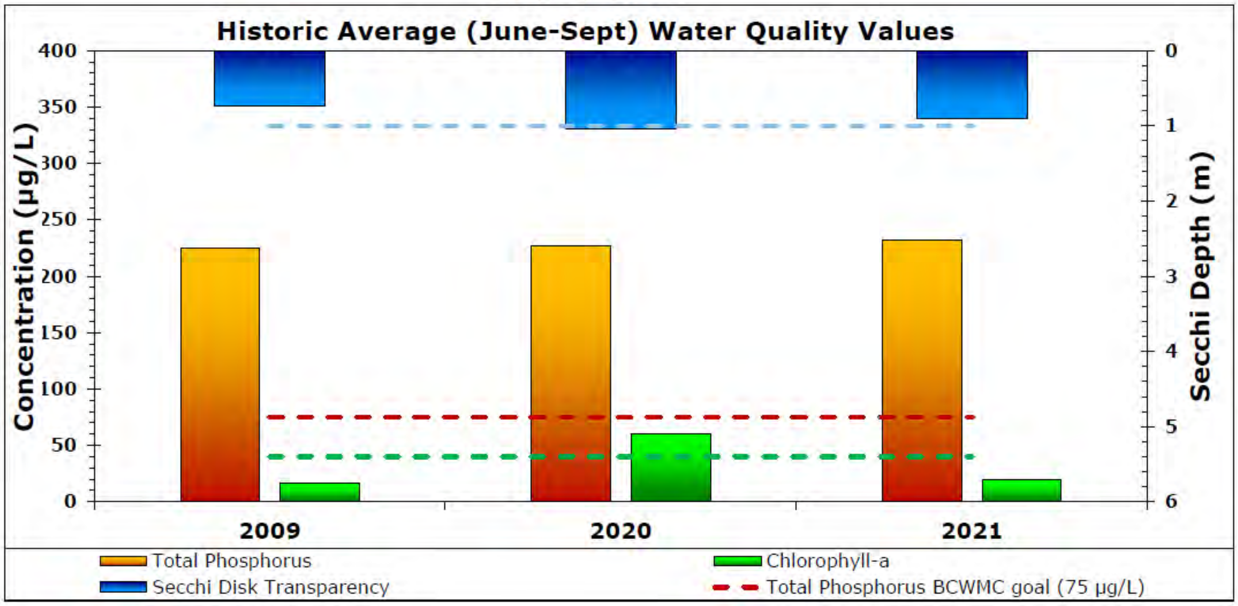


Figure 3-3 South Rice Pond Total Phosphorus, Chlorophyll-a, and Secchi Disc Transparency

3.1.2 Dissolved Oxygen

Continuous dissolved oxygen measurements were taken in all three ponds during July 2020, and again in July and early-August 2021, as well as instantaneous measurements during each of the water quality sampling events. The continuous dissolved oxygen measurements showed that all three ponds were anoxic (completely devoid of oxygen) in 2020 and 2021. The instantaneous oxygen measurements indicated that April and June had higher levels, but the rest of season was anoxic at all ponds. Due to low oxygen levels, bacteria do not efficiently break down decaying organic material and sediment chemistry will typically result in the release of phosphorus into the pond. In addition, anoxia under floating plant beds may boost the decline of submerged plants (Scheffer et al., 2003).

3.1.3 Sediment phosphorus fractions and phosphorus release

Phosphorus in sediment can be present in different forms. The mobile and organic fractions (types) of sediment phosphorus are readily available for release under anoxic conditions. Figures 3-4 and 3-5 show how the respective mobile and organic fractions of phosphorus vary by depth in the sediment of each pond sampling location (shown in Figure 2-1). Figures 3-4 and 3-5 also show that the concentrations of the mobile and organic fractions of sediment phosphorus at each sampling location are elevated near the sediment-pond water interface. Results of the dissolved oxygen monitoring, combined with the pond sediment phosphorus data, confirmed that internal phosphorus loading, under anoxic conditions, can be an important source of phosphorus input to each pond during the summer months.

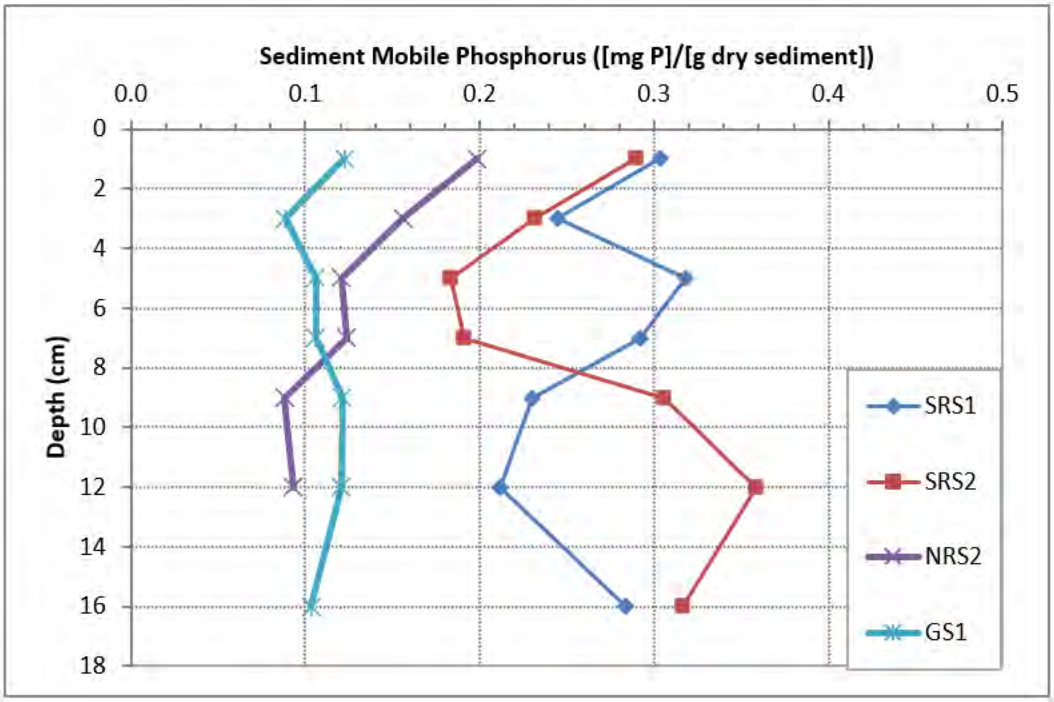


Figure 3-4 Sediment Mobile Phosphorus Concentrations

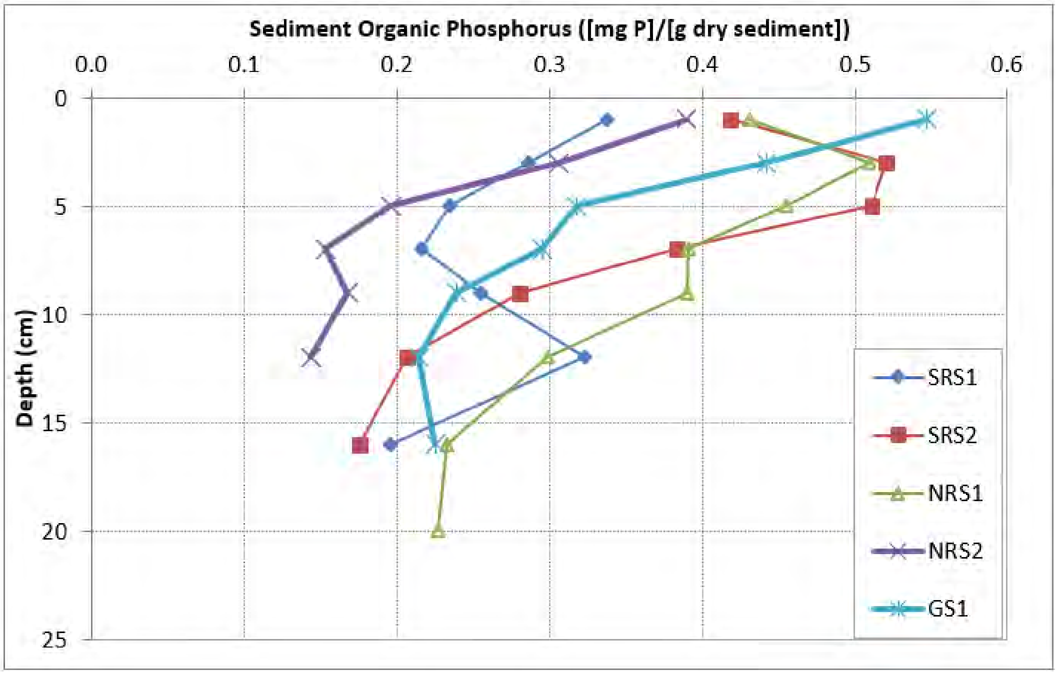


Figure 3-5 Sediment Organic Phosphorus Concentrations

TRPD collected multiple sediment cores from each pond sampling location and subjected each intact sediment core to oxic and anoxic conditions to measure the phosphorus release to the overlying water during regular time increments. This laboratory testing was used to calculate average sediment phosphorus release rates (shown in Table 3-1). The results indicate that anoxic release rates are between five times and two orders of magnitude higher than oxic release rates, which underscores the importance of shifting the floating-leaf dominance of each pond to submerged plants, that in turn, ensure that dissolved oxygen can be replenished from the atmosphere.

Table 3-1 Calculated Average Anoxic and Oxic Sediment Phosphorus Release Rates

Pond	Anoxic Flux (mg/m^2-d)	Oxic Flux (mg/m^2-d)
Grimes	3.43	0.35
North Rice	4.09	0.87
South Rice	4.20	0.28

3.1.4 Vegetation Surveys

TRPD conducted two surveys each year (early- and late-summer) of aquatic plants in all three ponds. Thick coontail was noted, as well as large amounts of duckweeds and watermeal (see Figure 3-6). Invasive curly-leaf pondweed (CLP) was found in all 3 ponds, except in late summer, due to normal die off (see Figure 3-6).

Vegetation surveys 2020	% Frequency of Occurance					
	6/17/2020			8/26/2020		
	Grimes	North Rice	South Rice	Grimes	North Rice	South Rice
Ceratophyllum demersum (Coontail)	98	97	92	100	100	89
Potamogeton crispus (Culy-leaf Pondweed)	12	21	39			
Elodea canadensis (Elodea)			47			
Potamogeton spp (Narrow Pondweed spp)	28	45	68	9	14	5
Stuckenia pectinata (Sago Pondweed)	11	17		4	7	
Chara spp (Chara)	2					
Lemna trisulca (Star Duckweed)	30	48		16	80	
Lemna minor (Small Duckweed)	84	83	100	100	100	82
Spirodela polyrhiza (Greater Duckweed)	87	65	100	51	100	82
Wolffia columbiana (Watermeal)	96	89	100	100	100	89

Vegetation surveys 2021	% Frequency of Occurance					
	6/24/2021			9/1/2021		
	Grimes	North Rice	South Rice	Grimes	North Rice	South Rice
Ceratophyllum demersum (Coontail)	96	93	87	100	100	90
Potamogeton crispus (Culy-leaf Pondweed)	12	3	37			
Elodea canadensis (Elodea)			68			53
Potamogeton spp (Narrow Pondweed spp)	42	41	79	7		10
Stuckenia pectinata (Sago Pondweed)	9	10		2	3	
Chara spp (Chara)				2		
Lemna trisulca (Star Duckweed)	33	65		39	65	13
Lemna minor (Small Duckweed)	100	100	100	98	100	98
Spirodela polyrhiza (Greater Duckweed)	100	100	100	100	100	98
Wolffia columbiana (Watermeal)	100	100	100	100	100	98

Figure 3-6 2020 and 2021 Pond Vegetation Survey Results

3.1.5 Water Levels

Figure 3-7 shows the monitored water levels for each pond during the 2020 and 2021 monitoring seasons, as well as the corresponding precipitation amounts. The largest storm events during the monitoring period resulted in water level changes of about one foot in Grimes Pond and North Rice Pond, while South Rice Pond experienced water level changes of about three quarters of a foot. The existing outlet infrastructure for Grimes Pond would accommodate a water level drawdown (further discussed in Section 5.1) of approximately 2.5 feet using gravity flow into North Rice Pond, which in turn, could be drawn down by 3 to 3.5 feet through gravity flow to South Rice Pond. South Rice Pond cannot be drawn down by gravity due to the tailwater conditions associated with Bassett Creek, so pumping would be required to draw the pond down.

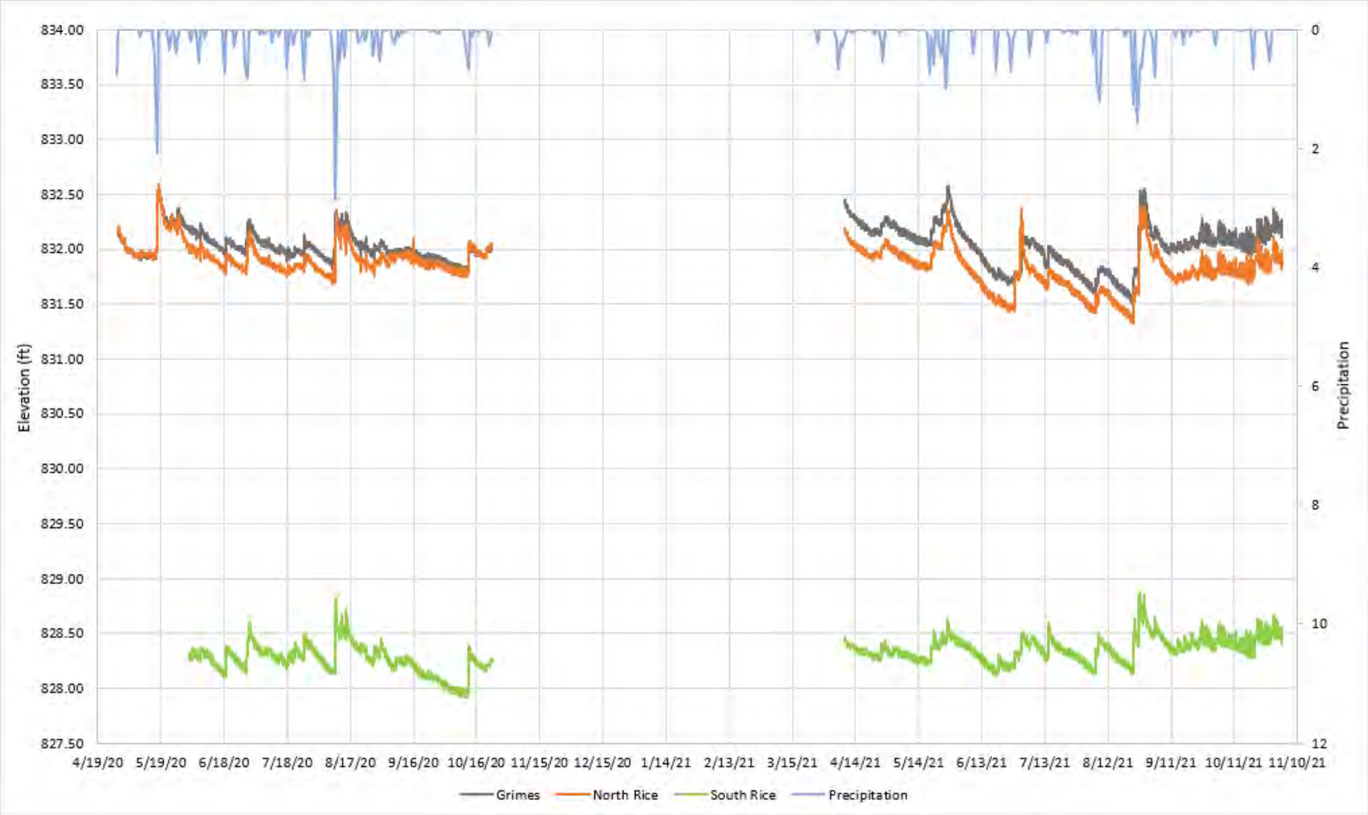


Figure 3-7 2020 and 2021 Pond Water Levels

3.1.6 Stormwater Monitoring

Stormwater water quality and flow monitoring data at each watershed station was used to compute pollutant loadings. Table 3-2 shows the respective annual pollutant loadings and flow-weighted mean concentrations for each watershed monitoring site (shown in Figure 2-1). Comparing the combined NR2 and SR4 TP loads to the SR5 TP load indicates that internal phosphorus loading was significant in South Rice Pond during both years. This also confirmed by the high flow-weighted mean TP concentration at SR5 during each year. The high flow-weighted mean TP and SRP concentrations at SR4 also indicate that the existing stormwater treatment from Pond SR-4 is inadequate. The same corresponding data at NR2 confirms that North Rice Pond has significantly better water quality than the other two ponds.

Table 3-2 Stormwater Pollutant Loadings and Flow-Weighted Mean Concentrations

Site	Year	# of samples	Pollutant Loading					Flow-Weighted Mean Pollutant Concentration						
			TP (lbs/yr)	SRP (lbs/yr)	TN (lbs/yr)	TSS (lbs/yr)	Cl (lbs/yr)	TP (µg/L)	SRP (µg/L)	TN (mg/L)	TSS (mg/L)	Cl (mg/L)	Flow Volume (x 10^6 M3)	Annual Precipitation (inches)
NR1	2020	7	2	1	12	283	0	359	195	2.09	49	0	0.003	25.88
NR1	2021	8	4	2	21	994	27	396	229	2.22	105	3	0.004	23.43
NR2	2020	17	50	13	459	1,906	45,739	147	39	1.36	6	135	0.15	25.88
NR2	2021	13	63	36	546	2,307	92,479	119	68	1.03	4	174	0.24	23.43
SR4	2020	14	30	18	213	3,933	577	279	163	1.96	36	5	0.05	25.88
SR4	2021	8	64	49	253	1,769	2,531	367	282	1.44	10	14	0.08	23.43
SR5	2020	21	74	26	526	9,343	28,703	261	94	1.86	33	102	0.13	25.88
SR5	2021	13	57	23	379	8,522	25,625	315	124	2.09	47	141	0.08	23.43

3.2 Site Access

Construction access will be straightforward because the project is located on public property in Sochacki Park or South Halifax Park within the City of Robbinsdale. Relatively few obstacles or infrastructure elements block access to the proposed work areas. Potential site access locations are along the Sochacki Park entrance road or trail that extends from the parking lot, as well as the two playground areas that straddle South Halifax Park (see Figure 2-1).

3.3 Pond Sediment Contaminant Sampling

In summer 2023, sediment characterization surveys were completed for Ponds SR-4 and GR-6 in preparation for this feasibility study. Sediment sampling was conducted in accordance with the MPCA's *Managing Stormwater Sediment, Best Management Practice Guidance May 2017* (MPCA, 2017). This document provides technical guidance for characterizing sediment in stormwater ponds, including the number of samples that should be collected and potential contaminants to be analyzed. The baseline parameters listed in the MPCA guidance are arsenic, copper, and polycyclic aromatic hydrocarbons (PAHs). PAHs are organic compounds that are formed by the incomplete combustion of organic materials, such as wood, oil, and coal. They are also naturally occurring in crude oil and coal.

The objectives of the surveys completed were to characterize sediment contamination for dredging and filling purposes. Dredged materials that do not exceed the Minnesota Pollution Control Agency's (MPCA) Residential Soil Reference Values (SRV) are considered unregulated fill and are suitable for use or reuse on properties within all land use categories, including residential (MPCA, 2014).

A full summary of the sediment sampling results, including figures and tables, is in Appendix A.

Sediments from the ponds were tested for a variety of contaminants to define the disposal requirements for any material removed from the ponds as part of future maintenance and projects. The sediment samples were analyzed by Pace Analytical for the following parameters:

- Resource Conservation and Recovery Act (RCRA) metals: arsenic, barium, cadmium, chromium, copper, lead, selenium, silver, and mercury

- Polycyclic aromatic hydrocarbons (PAHs), measured using BaP (benzo[a]pyrene) equivalent values
- Diesel range organics (DRO)
- Gasoline range organics (GRO)

Sediment characterization indicates that the sediment from both Ponds SR-4 and GR-6 do not meet guidelines for unregulated fill and are not suitable for reuse under the MPCA's Unregulated Fill Policy (MPCA, 2014). The BaP equivalents value in three out of the four sediment cores collected from the two ponds exceeded the MPCA's Residential Soil Leaching Value (SLV); therefore, it is expected that sediment from the GR-6 Pond, and a portion of Pond SR-4 would require landfill disposal. During final design, it is recommended that the sediment characterization data be reevaluated to verify the data is sufficient and representative of the planned dredge locations and depths and compared to the MPCA SRVs in effect at that time.

3.4 Topographic, Utility and Tree Survey

Barr performed a topographic and utility survey in summer, 2023 within the project extents. Topographic information was collected in Hennepin County NAD83 horizontal datum and NAVD88 vertical datum. Underground utilities were located based on the location of manhole structures, as-built/construction plan drawings from the cities, and through a Gopher State One Call utility locate. Topographic survey information was imported into AutoCAD Civil 3D to create an existing conditions surface for this feasibility study. The locations of the surveyed extents of topography and utilities corresponded with the proposed structural BMPs (which are shown and discussed in Section 5).

Barr conducted a tree survey in summer 2023, where we collected species, condition, and diameter data for deciduous trees greater than six inches in diameter (DBH) and coniferous trees with a diameter of 4 inches or greater. The locations of the surveyed trees extents corresponded with the proposed structural BMPs (discussed in Section 5). Figures showing the tree survey overview and detailed results are included in Appendix B. Based on the survey data collected, trees were classified in accordance with the City of Robbinsdale tree ordinance, which is intended to preserve all deciduous trees measuring at least six inches in diameter at breast height (DBH) that are not exempt. The tree survey results indicated that cottonwood, ash, and elm trees were the most prevalent species present, with very few hardwood species observed (a few small hackberry trees and a couple of oaks near the playground). Besides large cottonwoods, there were very few high quality/value trees within the work limits of the proposed BMPs. Approximately 100, 10, 70 and 60 trees were located within the grading limits of the SR-4, GR-6, NR-1, and SR-3 BMPs, respectively. The groundcover in the proposed project work area is generally degraded with little diversity, with buckthorn and honeysuckle prevalent throughout.

3.5 Phase I Environmental Site Assessment

A Phase I ESA was performed for Sochacki Park and South Halifax Park. South Halifax Park is a Robbinsdale city park located on the north side of Grimes Pond and is the proposed location of one BMP in the Sochacki Park Water Quality Project feasibility study. A Phase I ESA is the accepted standard for initially evaluating a property. It consists primarily of a desktop review of historical information (i.e., aerial photographs, topographic maps, regulatory sites, etc.) and a site visit. Through this process, recognized environmental conditions (RECs) are identified where a potential release of contaminants to the environment exists.

As expected, the Phase I ESA (see Appendix C) identified significant debris (construction debris landfill) present at Sochacki Park as a REC.

Additionally, in South Halifax Park there is a restrictive environmental covenant in place for the presence of unregulated fill; this is labeled as a "controlled REC" or CREC. In 2004, a Phase I ESA was performed at South Halifax Park, and in 2005, a Phase II investigation was performed. A Phase II investigation involves collecting samples from various media for chemical analysis to verify the absence or presence of contamination. For South Halifax Park, the investigation included collecting samples from the surface soil, fill, soil below the fill, sediment, and groundwater. For Phase II investigations at uncontrolled dump sites, the MPCA recommends analyzing the samples for the full range of compounds that includes volatiles, semi-volatiles, and pesticides, including PCBs and other specific analytes. The fill (5 samples), soil below the fill (5 samples), and sediment (3 samples) at South Halifax Park were analyzed for the full range of compounds recommended by the MPCA. Although no PCBs were detected in these samples, several other contaminants were present in the soil at concentrations above the MPCA recreational soil reference values (SRVs) and/or soil leaching values (SLVs) established by the MPCA. Some contaminants were also present in the groundwater at elevated concentrations and/or above the Health Risk Limits established by the MDH.

There is some evidence that conditions in Sochacki Park may be similar to South Halifax Park. For the Phase I ESA, Barr reviewed aerial photographs; the aerial photographs between 1957 and 1974 show historical fill placement at both Sochacki Park and South Halifax Park. The transition from 1966 to 1969 also shows where the fill was placed in both locations.

Results of the Phase I ESA are not surprising and are not unusual in highly urban settings. The estimated budget for the Sochacki Park Water Quality Improvement Project incorporates the cost of contaminated materials disposal.

Similar to previous BCWMC CIP projects, Barr recommends that the entity implementing the project enter the MPCA's Brownfields Program for hazardous substances which can protect entities with ownership interests, and these protections can be extended to entities performing work through an approved Response Action Plan (RAP). Any of the four entities (BCWMC, Robbinsdale, Golden Valley, Three Rivers Park District) can be at risk of being a responsible party if they placed the waste or exacerbate a release. Exacerbating a release includes taking actions that would cause any of the contaminants present to migrate from its current location either vertically or horizontally. For example, digging a utility trench through a contaminated area may cause the contamination (vapors and/or groundwater) to migrate to other areas of a site or off the site. Previous BCWMC CIP projects where contaminated sediment or soil were addressed include the Main Stem Lagoon Dredging Project, Winnetka Pond Dredging Project, Bryn Mawr Meadows Water Quality Improvement Project, and the Bassett Creek Main Stem Erosion Repair Project (Cedar Lake Rd. to Dupont Ave. and Fruen Mill). Although working in contaminated areas may be more complicated and costly, there are human health and ecological benefits to removing contaminants from the environment. Further, there are systematic and prescriptive methods and protections for dealing with the contaminants.

Based on the REC at Sochacki Park, Barr recommends completion of a Phase II investigation as a first step in final design. As noted above, a Phase II investigation involves collecting samples from various media for chemical analysis to verify the absence or presence of contamination. Barr recommends drilling soil borings and/or excavating test pits to observe the subsurface conditions at Sochacki Park and to collect soil, sediment, and groundwater samples. Because this is an uncontrolled dump site, we recommend following the MPCA recommendations to analyze the samples for the full range of compounds that includes volatiles, semi-volatiles, and pesticides, including PCBs and other specific analytes. The Phase II investigation will not define the limits of the contamination, if present. If contamination is present, additional soil, fill, groundwater, sediment, and/or soil gas sampling and delineation will be needed.

If contaminants are detected, Barr recommends preparing a RAP following delineation of the contaminants. The type of contaminants and their concentrations may drive the level of remediation and cost. In the case of PCBs, the remediation is often the same as other contaminants (i.e., excavation and disposal) but the cost and regulatory requirements vary widely depending on the PCB concentrations. If the PCB concentrations are low, its handling would be similar to treating other industrially contaminated soil, but if the concentrations trigger Toxic Substance Control Act (TSCA) regulations, the costs for planning, implementing, and disposing the materials would be significantly higher.

3.6 Wetland Delineations

In 2023, Moore Engineering (under separate contract with TRPD) completed wetland delineations for the entire study area. Six wetlands were delineated within the project area. Descriptions and assessments of each wetland are provided in Appendix D, which provides a full summary of the wetland delineation, including figures and field data sheets.

The wetland delineation report was prepared in accordance with the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual (“1987 Manual,” USACE, 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (USACE, 2012) and the requirements of the Minnesota Wetland Conservation Act (WCA) of 1991.

The delineated wetland boundaries and sample points were surveyed using a Global Positioning System (GPS) with sub-meter accuracy. Wetlands were classified using the U.S. Fish and Wildlife Service (USFWS) Cowardin System (Cowardin et al., 1979) and the USFWS Circular 39 system (Shaw and Fredine, 1956).

Wetland plant communities within each delineated pond were also identified and potential wetland improvements were summarized in the Subwatershed Assessment, and further described in Section 5.1.

3.7 Threatened and Endangered Species

Barr reviewed the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website on June 7, 2023, to identify federally listed species and designated critical habitat protected under the Endangered Species Act that may be present within or near the project workspace (Attachment A, Appendix E). Additionally, Barr reviewed the MDNR's Natural Heritage Information System (NHIS) database (Barr License Agreement LA-986) on June 7, 2023, to determine if any Minnesota state-listed species have been documented within one-mile of the Project area. The USFWS IPaC identified two endangered species, one proposed endangered species, one candidate species and one experimental population that may occur within the Project area. No critical habitat was identified within the Project area. Descriptions of the species habitats and effect determinations are provided in Appendix E.

The federal species review indicated the northern long-eared bat, tricolored bat, whooping crane, monarch butterfly, bald eagle, rusty patched bumble bee, and a variety of migratory bird species as potentially occurring in the vicinity of the Project. Section 6.4.3 provides more detailed discussion about potential impacts on bats and considerations for project implementation. If the project will require federal funding or approvals, consultation with USFWS will need to be completed for the rusty patched bumble bee and northern long-eared bat. The Project area does contain suitable summer habitat for tricolored bat; however, it currently is not legally protected under the Endangered Species Act, and nothing further would be required for this species unless it becomes listed prior to Project construction. Similarly, the Project area does contain suitable habitat for monarch butterflies, however, as a candidate species the monarch is not legally protected under the ESA. As such, nothing further would be required for this species unless it becomes listed prior to project construction.

Barr recommends visual inspection for active bald eagle, whooping crane, or migratory bird nests prior to initiating construction activity during the breeding season.

The state species review identified one state listed species known to occur within one mile of Sochacki Park: the least darter. It is recommended that construction activities within the ponds occur outside of the least darter spawning period (March – May). If the project will require a state permit, a Natural Heritage Review request should be submitted through the MDNR Minnesota Conservation Explorer to obtain concurrence that the Project is not likely to impact any state-protected species.

3.8 Cultural and Historical Resources

Barr completed a cultural resources literature review of the project area and a 1-mile buffer in June 2023. The literature review was directed toward identifying previously recorded archaeological sites, historic architectural resources, and other cultural resources. Barr's examination included a review of data provided by the Minnesota State Historic Preservation Office (SHPO) on previously recorded archaeological sites and historic architectural resources located within one mile of the project area. The Minnesota OSA Portal for archaeological sites was also reviewed.

Data provided by the Minnesota SHPO indicates that no previously documented cultural resources have been identified within the boundaries of Sochacki Park. Within one mile of the project area, 353 historic architectural resources have been documented. These consist primarily of houses, but also include several churches, bridges, apartment buildings, and various commercial and industrial buildings. The OSA Portal as well as data from the Minnesota SHPO identified three previously recorded archaeological sites within one mile of the project area; all three sites are located south of the project area. The archaeological sites are each precontact in nature and represent a single recovered artifact.

Four historic architectural resources are located in proximity to the project area, on the west side of the park. Additional information regarding these four properties is included in Table 3-3. These resources are located on the opposite side of June Ave N from Sochacki Park, and a thick tree line visually screens these properties from the park.

Table 3-3 Historic Architectural Resources Adjacent to the Project Area

Resource Number	Resource Name/Address	Resource Age	NRHP[1] Eligibility
HE-GVC-389	House; 2741 June Ave N	1965	Considered Not Eligible
HE-GVC-390	House; 2811 June Ave N	1965	Considered Not Eligible
HE-GVC-391	House; 2835 June Ave N	1963	Considered Not Eligible
HE-GVC-392	House; 4300 Culver Rd	1959	Considered Not Eligible

[1]National Register of Historic Places

The project area does not appear to have been previously surveyed for cultural resources. If the project constitutes an undertaking subject to Section 106 of the National Historic Preservation Act through federal funding or permitting, the lead federal agency will determine whether additional work to identify significant cultural resources is required.

4 Stakeholder and Public Engagement

4.1 Technical Stakeholder Meeting

A technical stakeholder meeting with regulatory agencies was held virtually on July 10, 2023, to discuss the proposed project. Attendees included representatives from Three Rivers Park District, BCWMC, the City of Golden Valley, the City of Robbinsdale, US Army Corps of Engineers, Metropolitan Council, the Minnesota Department of Natural Resources (MnDNR), and the Minnesota Pollution Control Agency (MPCA). The anticipated permitting requirements as discussed at the meetings/calls outlined below are summarized in Section 6.3 of this feasibility study.

Background on the wetland water quality and ecological goals/objectives and design concepts for the Sochacki Park Water Quality Improvement Project were presented, which was followed by discussion related to technical feedback and permitting input. The items discussed included:

- Review of project background and history
- Review of site information compiled to date and site investigation work completed/underway
- Review of potential design concepts
- Discussion of regulatory issues and potential permit requirements
- Discussion of project sequencing
- Discussion of feasibility study

4.2 Public Stakeholder Meeting

A public stakeholder open house was held on July 26, 2023, at Robbinsdale City Hall. Approximately 20-25 residents attended the open house, where Three Rivers Park District, BCWMC, Barr and City staff were available to talk with park users and area residents about the wetland water quality and ecology and discuss the proposed feasibility study for the Sochacki Park water quality improvement project. Residents asked questions and provided comments on their use and the conditions of the current Sochacki and South Halifax parks and their thoughts/concerns/desires about the proposed project. In addition, an online input form was developed and used to collect input from residents that may not have been able to attend or provide written comments at the open house.

The comments received by City staff were grouped into several themes including the following:

- General support for improving water quality and wetland ecology, as well as preservation of parkland uses
- Desire for trail accessibility and maintenance
- Management of debris, litter, and trash
- Cleanup of dumped construction materials
- Tree preservation and screening
- Concerns about stagnant water and sedimentation
- Concerns about lighting, safety and security
- Concerns about pond shoreline management

- Special assessment for property owners
- Questions about park maintenance, improvements, storm drains, fertilizers and street sweeping.

These comments were considered as part of the development of the feasibility study concepts and will continue to be considered as the project progresses through final design.

5 Potential Improvements

5.1 Suggested Improvements and Overall Recommendations

5.1.1 Grimes Pond potential improvements

Suggested improvements to Grimes Pond include:

- Remove, treat, and control non-native invasive species, including submerged species in the wetland, and upland species in the immediately adjacent upland buffer.
- Remove accumulated sediment and fill materials within and immediately adjacent to the study wetland.
- Maintain pretreatment protection measures to prevent future sediment delivery and reduce nutrient loading into the wetland.
- Encourage community involvement in the protection and appreciation of the wetland and surrounding park, which may include:
    - coordinating seasonal community clean up events and invasive species removal
    - native planting projects
    - educational signage documenting restoration areas in progress with inspiration for park users to pick up trash and prevent damage
    - hold community education events such as birding and wildlife observation, cultural education, etc.
- Control soil erosion and re-vegetate bare soil areas along shoreline and immediately adjacent upland buffer including maintenance of erosion control measures found at the north inlet location near the railroad tracks.

5.1.2 North Rice Pond potential improvements

Suggested improvements to North Rice Pond include:

- Remove, treat, and control non-native invasive species, including curly-leaf pondweed, narrowleaf cattail, purple loosestrife, common buckthorn, and reed canary grass in the wetland, and common buckthorn, sweet clover, and honeysuckle in the immediately adjacent upland buffer.
- Remove accumulated sediment and fill materials within and immediately adjacent to the study wetland.

- Install pretreatment protection measures to prevent future sediment delivery and reduce nutrient loading into the wetland.
- Encourage community involvement in the protection and appreciation of the wetland and surrounding park, which may include:
  - coordinating seasonal community clean up events and invasive species removal
  - native planting projects
  - educational signage documenting restoration areas in progress with inspiration for park users to pick up trash and prevent damage
  - hold community education events such as birding and wildlife observation, cultural education, etc.
- Control soil erosion and re-vegetate bare soil areas along shoreline and immediately adjacent upland buffer including eroding soil found at the north inlet location near the paved trail.

Implementation of some or all proposed improvements could result in the overall wetland management classification increase from Manage 2 to Manage 1 and the following functional rating improvements:

- change in maintenance of hydrologic regime from low to moderate
- change in maintenance of wetland water quality from low to moderate
- change in maintenance of wildlife habitat structure from moderate to high
- change in aesthetics/recreation/education/cultural from moderate to high
- change in overall weighted average vegetative diversity and integrity from low to high

5.1.3 South Rice Pond potential improvements

Suggested improvements to South Rice Pond include:

- Remove, treat, and control non-native invasive species, including curly leaf pondweed, narrowleaf cattail, purple loosestrife, common buckthorn, and reed canary grass in the wetland, and common buckthorn, sticktight, and garlic mustard in the immediately adjacent upland buffer.
- Remove accumulated sediment and fill materials within and immediately adjacent to the study wetland.
- Install pretreatment protection measures to prevent future sediment delivery and reduce nutrient loading into the wetland.

- Clear clogged debris from inlet and outlet structures.
- Re-build boardwalk and steps.
- If mountain bike activity in the adjacent upland area is intended to continue, consider isolating potential soil disturbance and adjacent vegetation improvements to prevent erosion into surrounding wetland areas.
- Control soil erosion and re-vegetate bare soil areas along shoreline and immediately adjacent upland buffer. Consider defining designated specific trails and maintaining them to prevent bare soil and erosion disturbance that occurs from meandering undesignated trails along the slope of the pond buffer. These can be further defined with wood rails or designated rock placement to allow access to the water edge at specific locations.
- Encourage adjacent residential property owners to provide wider naturalized wetland buffer protection by avoiding mowing near the shoreline and establishing native vegetation in their back yards.
- Encourage community involvement in the protection and appreciation of the wetland and surrounding park, which may include:
    - coordinating seasonal community clean up events and invasive species removal
    - native planting projects
    - educational signage documenting restoration areas in progress with inspiration for park users to pick up trash and prevent damage
    - hold community education events such as birding and wildlife observation, cultural education, etc.

Implementation of some or all proposed improvements could result in the overall wetland management classification increase from Manage 2 to Manage 1 and the following functional rating improvements:

- change in maintenance of wetland water quality from low to moderate
- change in maintenance of characteristic fish habitat structure from moderate to high
- change in aesthetics/recreation/education/cultural from moderate to high
- change in overall weighted average vegetative diversity and integrity from low to high

5.1.4 Overall Recommendations

Based on the wetland assessment and calibrated watershed and pond water quality modeling, the following watershed BMPs and in-pond management options are recommended to substantially improve water quality and to enhance vegetative diversity and ecological health for each pond and to reduce downstream phosphorus loadings and enhance biological integrity in Bassett Creek:

- Clear clogged debris and develop an annual maintenance plan for all inlet and outlet structures. Remove accumulated sediment and fill materials from BMPs and within, and adjacent to, each wetland.
- Reconfigure discharge outfall and stabilize erosion from stormwater conveyance entering northwest corner of Grimes Pond.
- Re-vegetate and control soil erosion from bare soil areas within the upland buffer areas. If mountain bike activity in the adjacent upland area is currently supported, isolate potential soil disturbance and adjacent vegetation improvements to prevent erosion into surrounding wetland areas.
- Conduct controlled water level drawdowns in each wetland prior to the winter season to ensure that curly-leaf pondweed is decreased to less than 20 percent cover and to enhance overall vegetative diversity and integrity. Remove, treat, and control other non-native invasive species, where possible, and remove fill material and trash.
- Initiate, or increase the frequency of, street sweeping and fall leaf litter removal programs, with emphasis in subwatersheds that have direct drainage to the wetlands.
- Install structural BMPs and/or pretreatment protection measures to prevent future sediment delivery and reduce nutrient loading into the pond with design(s) intended to meet water quality goals. Untreated stormwater runoff from two discharge outfalls each to South Rice Pond (Pond SR-3 and Pond SR-4) and Grimes Pond (BMP GR-6), as well as one outfall to North Rice Pond (Pond NR-1), are prioritized for implementation.
- Complete in-pond alum treatment in all three ponds to control summer sediment phosphorus release, following implementation of watershed BMPs, to improve water clarity and support submersed aquatic plant growth.

5.2 Conceptual Design

Figure 5-1 shows the location of the four proposed structural BMPs in the watershed which are further described in Table 5-1. Figures 5-2, 5-3, 5-4 and 5-5 show the proposed BMP footprints for Pond NR-1, Pond SR-3, BMP GR-6 and Pond SR-4, respectively. The proposed BMP at GR-6 involves the installation of a permeable filtration system that contains a type of crushed limestone (CC17) for total phosphorus removal. The proposed BMP located at SR-4 involves dredging and expansion of an existing stormwater pond and pretreatment cell, as well as downstream channel stabilization (see Figure 5-6), while the other two proposed BMPs would involve construction of new stormwater ponds at each of the other three locations shown in Figure 5-1.

Figure 5-7 includes a photo and schematic as examples of the important elements of the stormwater ponds envisioned for future implementation. The expectation is that the pretreatment provided by these two-cell pond systems will ensure that most of the ongoing operation and maintenance effort will not need to involve dredging, due to excess sedimentation in the main treatment cell. Both outfalls entering the GR-6 BMP location currently have Continuous Deflective Separation (CDS) proprietary treatment units that have recently been maintained and can be available for stormwater pretreatment of the respective subwatersheds. In addition, the City of Robbinsdale performs enhanced street sweeping approximately five to six times per year in the tributary drainage area.

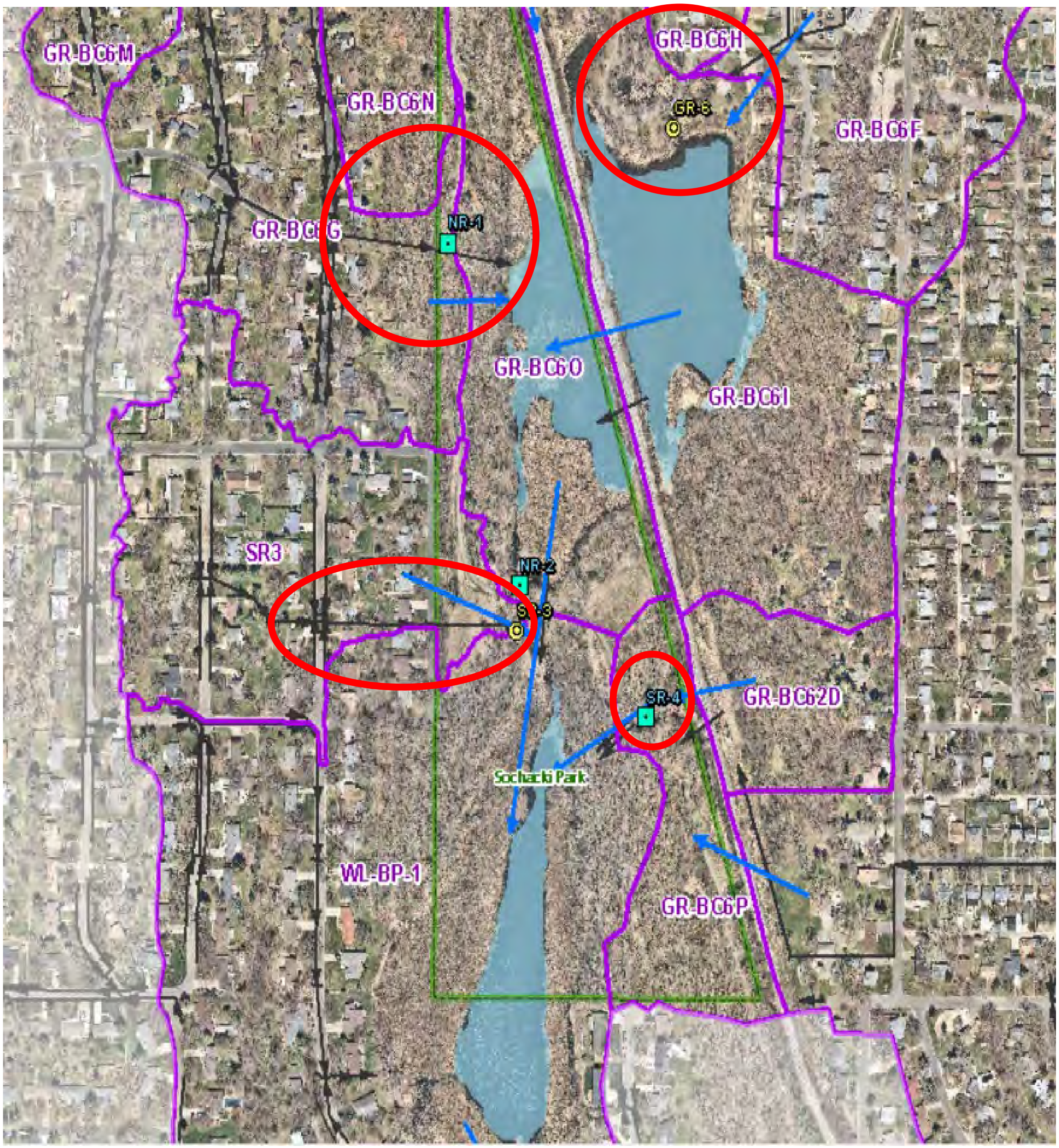


Figure 5-1 Recommended Sochacki Park Subwatershed Locations for Structural BMPs

Table 5-1 Proposed Structural BMP Descriptions

BMP ID/Name	BMP Location	BMP Description	Approximate Number of Tree Removals	Wetland/ Prairie Impacts	Annual TP Removal (lbs/yr)
Pond NR-1	Northwest portion of Sochacki Park, tributary to North Rice Pond	Construct new stormwater pond for untreated runoff from City of Golden Valley	70	None. Disturbance is limited to upland area.	3.6
Pond SR-3	West portion of Sochacki Park, tributary to South Rice Pond	Construct new stormwater pond for untreated runoff from City of Golden Valley	60	Negligible. Pond will be developed from wooded upland area.	3.3
BMP GR-6	South Halifax Park, tributary to Grimes Pond	Construct permeable filtration system with CC17 crushed limestone to better treat runoff from City of Robbinsdale	10	Approximately 0.2 acres of wetland area, below MnDNR OHWL, would be used to install permeable filtration system.	15.5
Pond SR-4	East portion of Sochacki Park, tributary to South Rice Pond	Dredge and expand existing pond to better treat runoff from City of Robbinsdale and stabilize outlet channel	100	None. Pond expansion is occurring in wooded upland area.	38.9

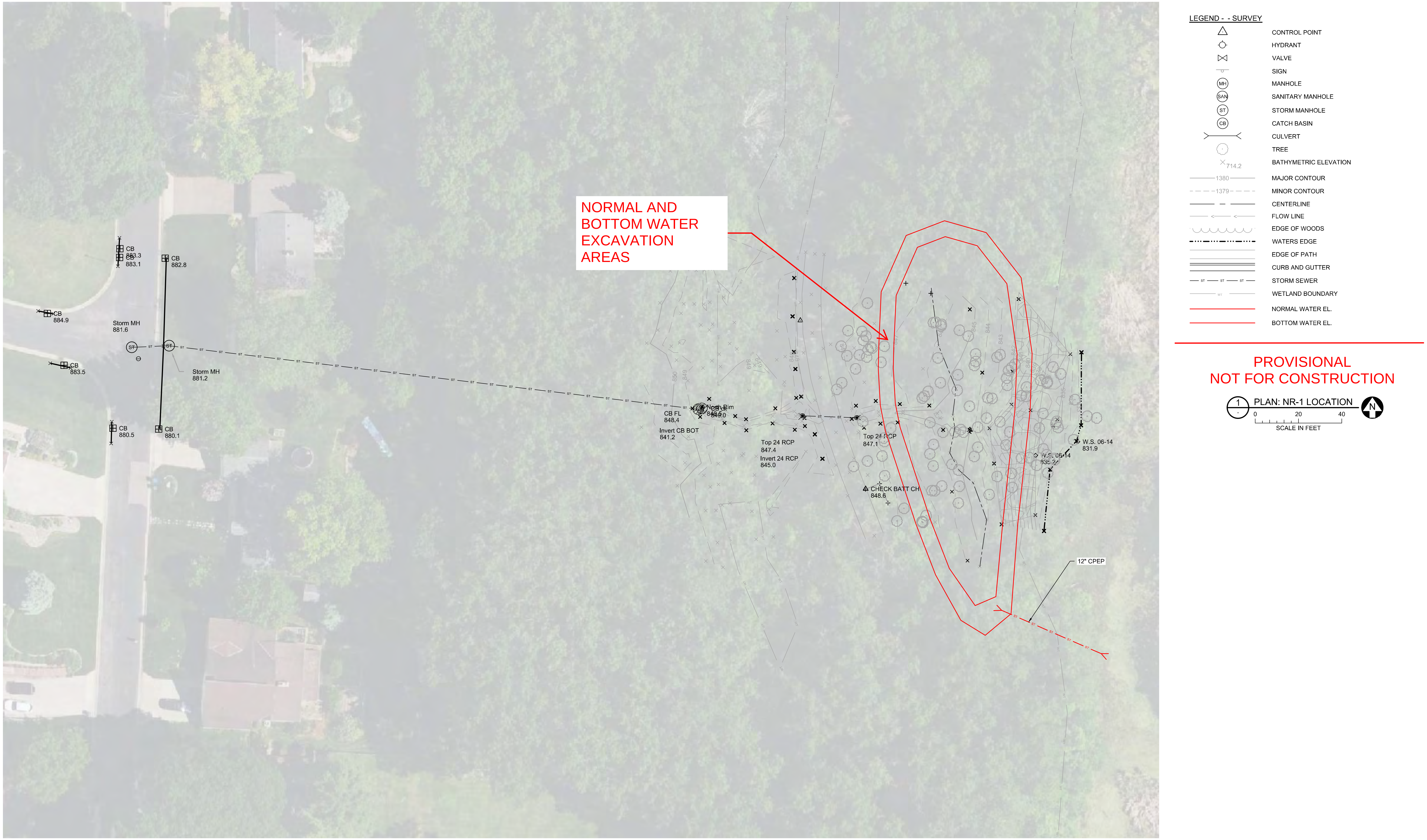
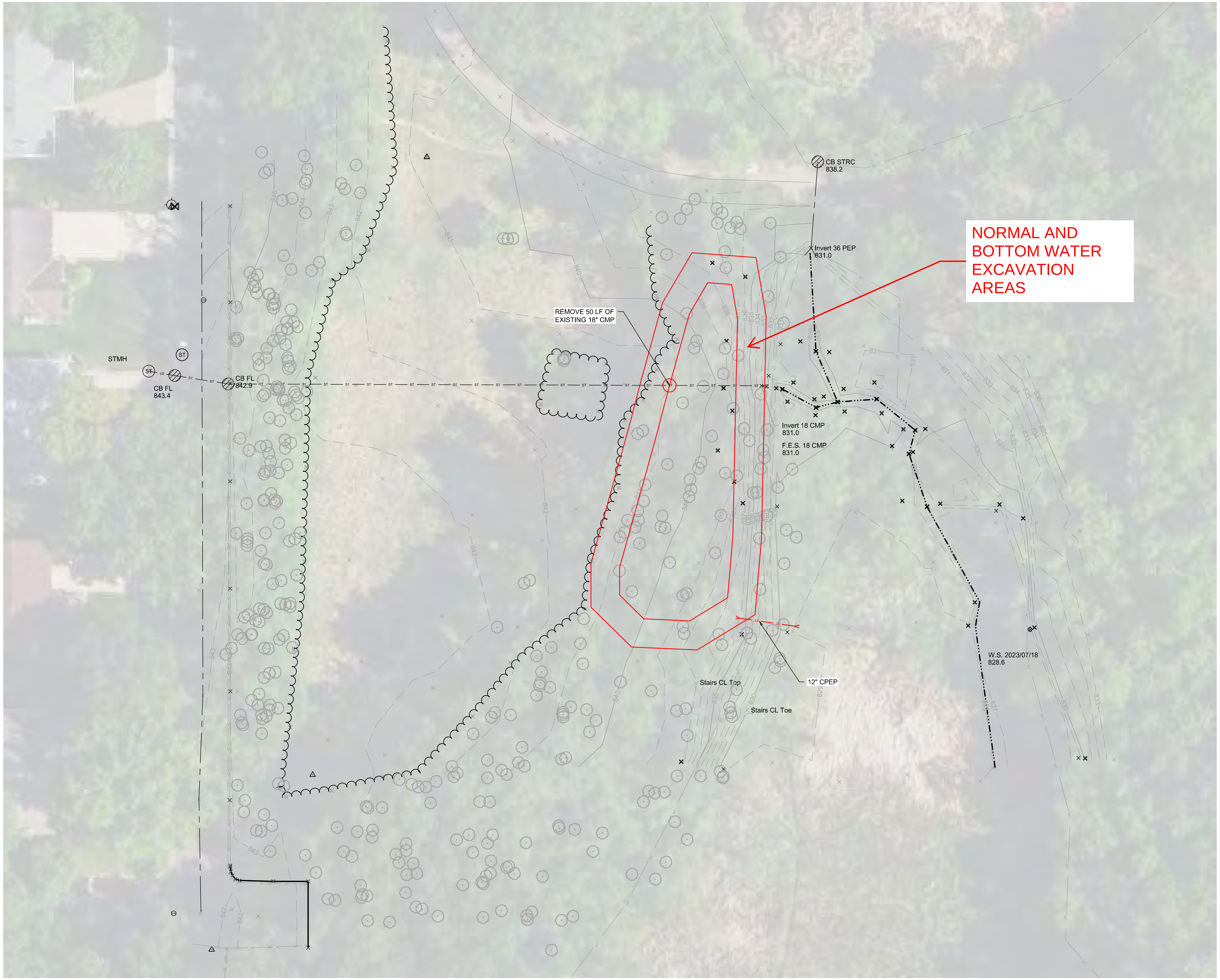


Figure 5-2 Proposed Pond NR-1 (North Rice Pond)



LEGEND - - SURVEY

CONTROL POINT
HYDRANT
VALVE
SIGN
MANHOLE
SANITARY MANHOLE
STORM MANHOLE
CATCH BASIN
CULVERT
TREE
714.2 BATHYMETRIC ELEVATION
1380 MAJOR CONTOUR
1379 MINOR CONTOUR
CENTERLINE
FLOW LINE
EDGE OF WOODS
WATERS EDGE
EDGE OF PATH
CURB AND GUTTER
STORM SEWER
WETLAND BOUNDARY
NORMAL WATER EL.
BOTTOM WATER EL.

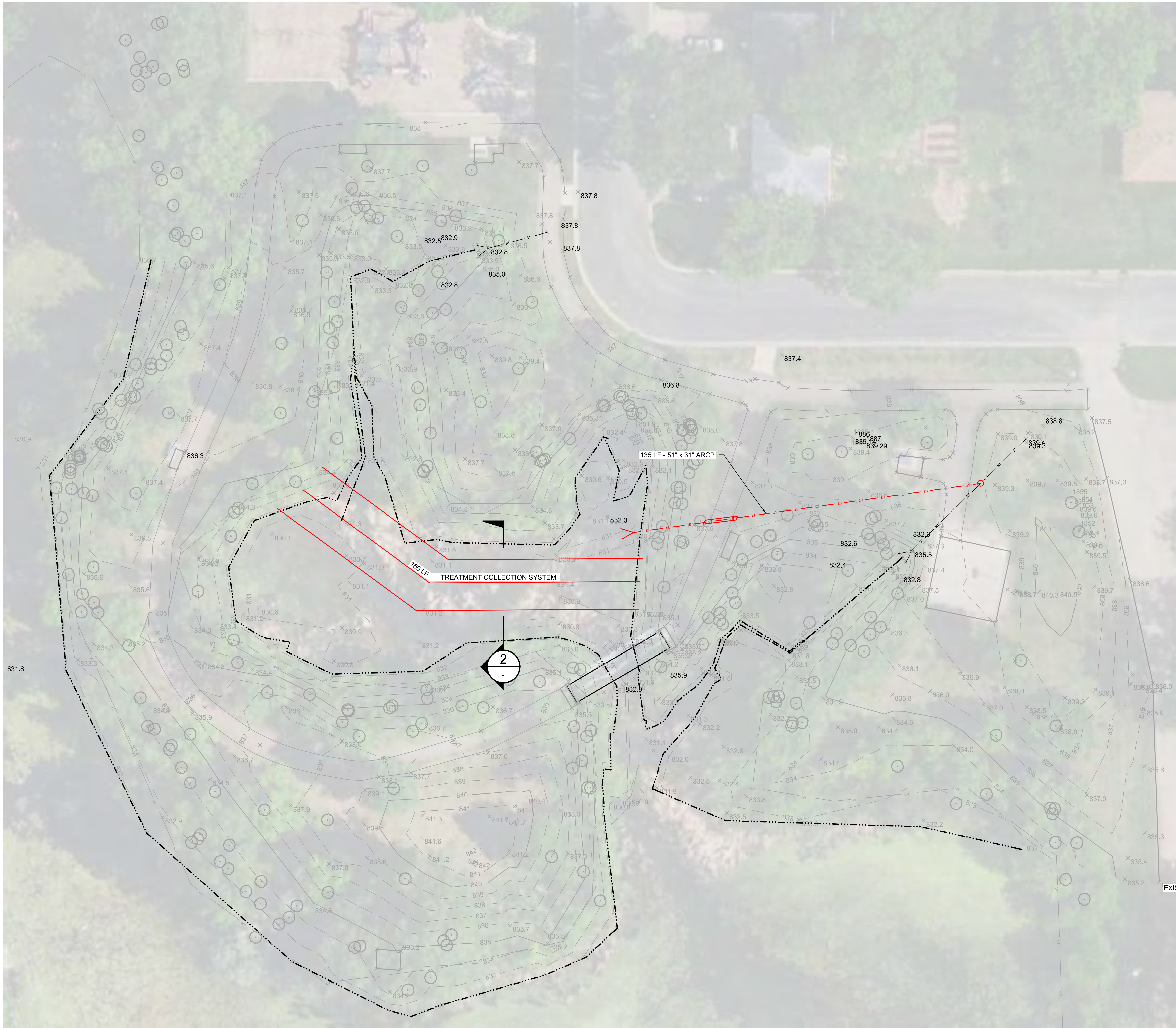
PROVISIONAL
NOT FOR CONSTRUCTION

1 PLAN: SR-3 LOCATION

0 20 40
SCALE IN FEET

N

Figure 5-3 Proposed Pond SR-3 (South Rice Pond)



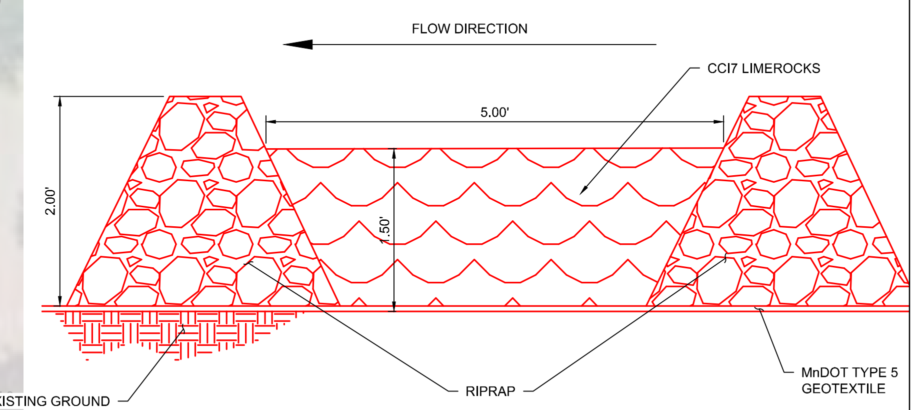
LEGEND - - SURVEY

- CONTROL POINT
- HYDRANT
- VALVE
- SIGN
- MANHOLE
- SANITARY MANHOLE
- STORM MANHOLE
- CATCH BASIN
- CULVERT
- TREE
- BATHYMETRIC ELEVATION
- MAJOR CONTOUR
- MINOR CONTOUR
- CENTERLINE
- FLOW LINE
- EDGE OF WOODS
- WATERS EDGE
- EDGE OF PATH
- CURB AND GUTTER
- STORM SEWER
- WETLAND BOUNDARY

PROVISIONAL
NOT FOR CONSTRUCTION

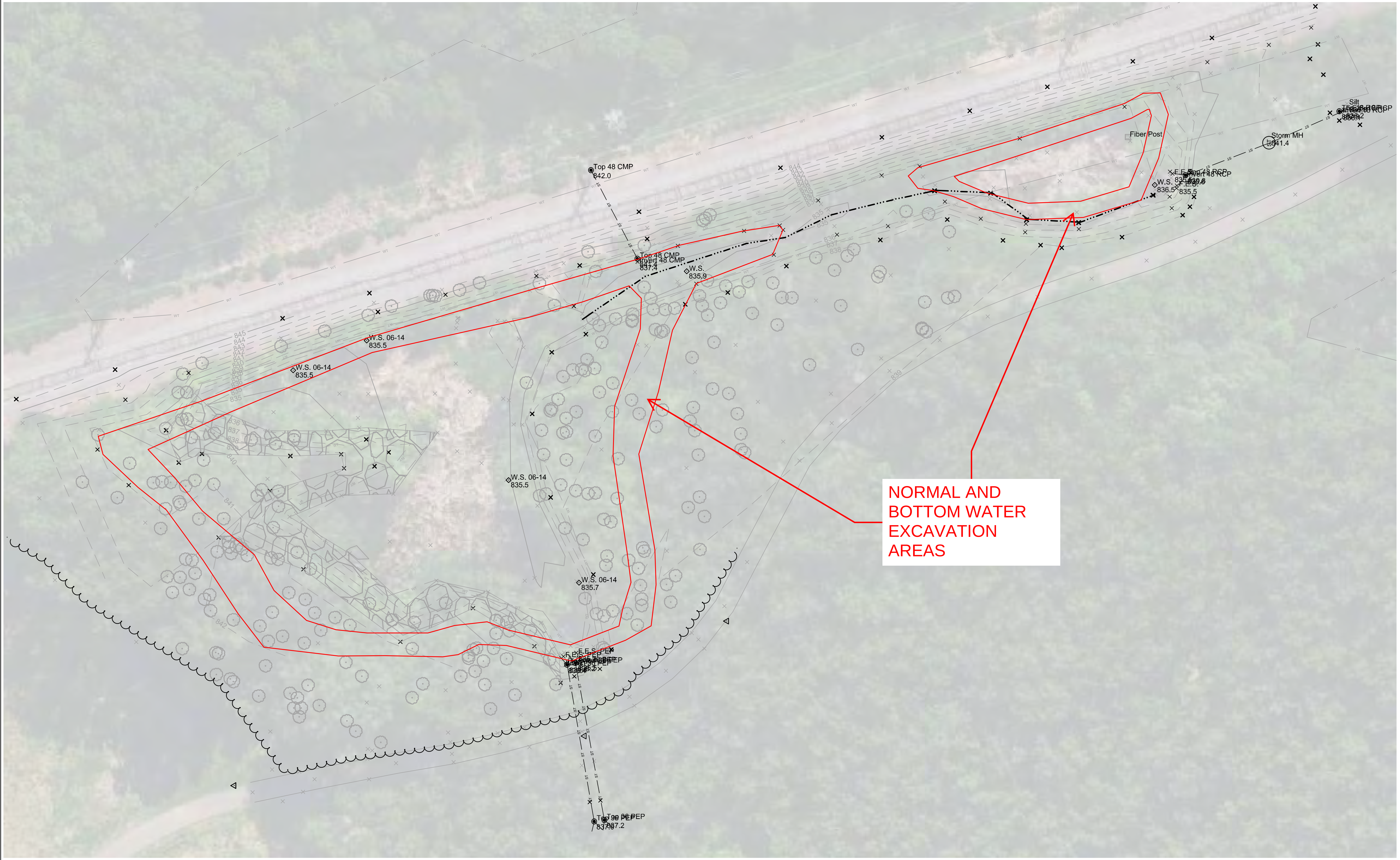
1 PLAN: GR-6 LOCATION

0 20 40
SCALE IN FEET



2 SECTION: TREATMENT COLLECTION SYSTEM

Figure 5-4 Proposed BMP GR-6 (Grimes Pond)



LEGEND - - SURVEY

△	CONTROL POINT
	HYDRANT
	VALVE
	SIGN
MH	MANHOLE
SAN	SANITARY MANHOLE
ST	STORM MANHOLE
CB	CATCH BASIN
	CULVERT
	TREE
× 714.2	BATHYMETRIC ELEVATION
1380	MAJOR CONTOUR
1379	MINOR CONTOUR
	CENTERLINE
	FLOW LINE
	EDGE OF WOODS
	WATERS EDGE
	EDGE OF PATH
	CURB AND GUTTER
ST	STORM SEWER
WT	WETLAND BOUNDARY
	NORMAL WATER EL.
	BOTTOM WATER EL.

PROVISIONAL
NOT FOR CONSTRUCTION

1 PLAN: SR-4 LOCATION

0 25 50
SCALE IN FEET

Figure 5-5 Proposed Pond SR-4 (South Rice Pond)

Figure 5-6 Pond SR-4 Downstream Outlet Channel Erosion and Construction Debris

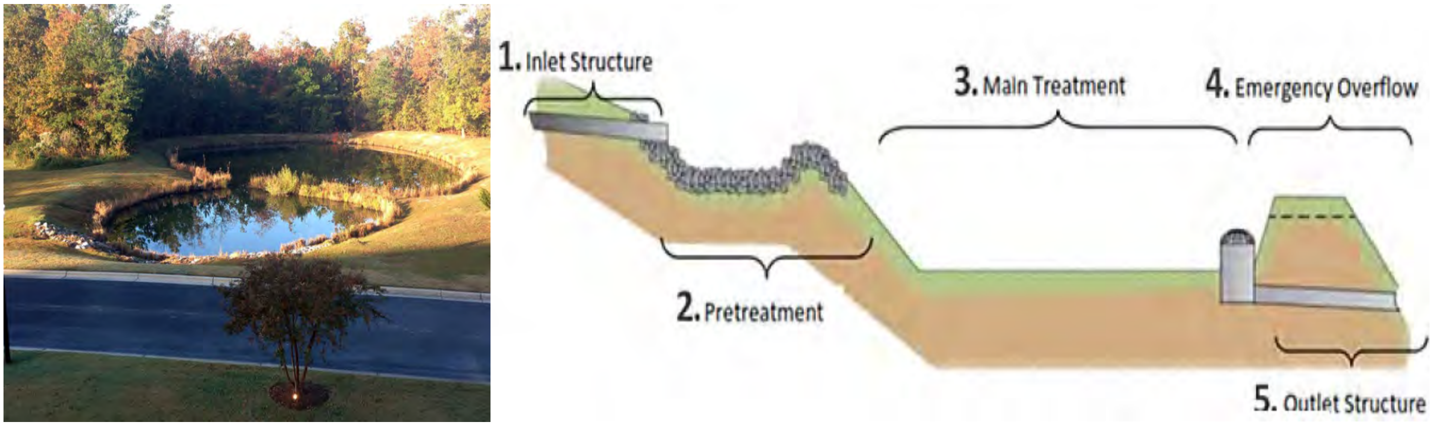


Figure 5-7 Example Stormwater Pond Treatment Elements

6 Project Modeling Results and Potential Impacts

6.1 Water Quality Modeling and Estimated Water Quality Benefits

To better understand and evaluate the water quality treatment performance of the existing best management practices (BMPs) in the Sochacki Park subwatershed, Barr revised the existing Bassett Creek Watershed Management Commission's (BCWMC) P8 watershed model to reflect GIS subwatershed delineations and modeling inputs for each subwatershed and respective BMPs. The revised BCWMC P8 model was then updated with 2020 and 2021 growing-season climate data (hourly precipitation and daily temperatures) to develop the phosphorus (total and dissolved) and total suspended solids (TSS) loadings for the period. The available in-wetland water quality monitoring and watershed stormwater monitoring data of inflows and outflows were used to calibrate the watershed modeling, where possible.

We used the updated P8 modeling results and GIS mapping to identify high priority areas for implementing watershed BMPs. P8 modeling completed for the summers of 2020 and 2021 indicates that 20 and 17 percent of the current overall phosphorus load, in respective years, receives stormwater treatment before discharge to the three wetlands. Approximately 22 percent of the runoff phosphorus load in the Grimes Pond watershed receives stormwater treatment, while the respective levels of treatment in the direct drainage to North and South Rice Ponds are approximately 39 and 30 percent. Figure 6-1 highlights (in teal) the subwatershed areas that currently receiving some level of stormwater treatment with structural BMPs. Most of the subwatersheds that drain directly into the three ponds are not receiving stormwater treatment that would substantially reduce annual total phosphorus loadings.

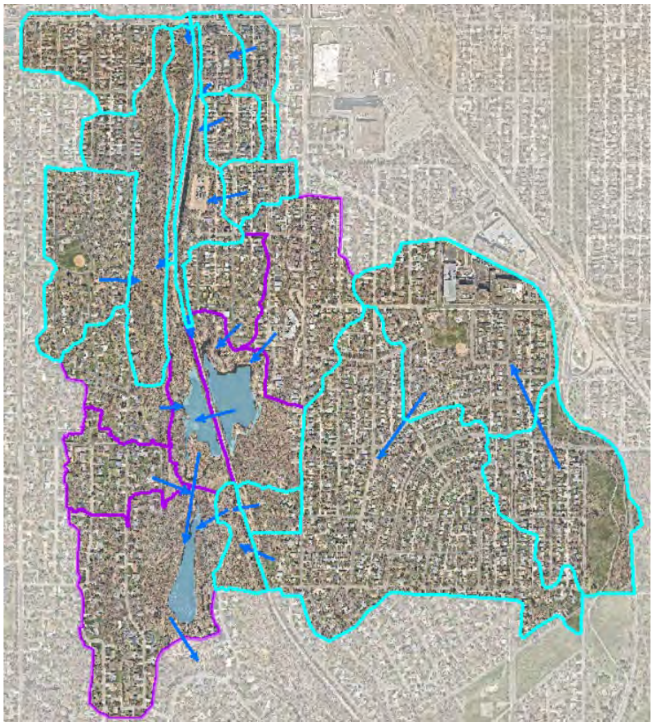


Figure 6-1 Existing Subwatersheds (Highlighted) Receiving Stormwater Treatment

The watershed modeling was calibrated and used to concurrently develop the water and phosphorus budgets that optimized the daily pond water quality modeling fit to the summer monitoring data associated with each pond. Figure 6-2 shows how the predicted pond water quality would ordinarily correspond with the water quality monitoring observations for each pond in 2020 and 2021, based on the calibrated watershed phosphorus load modeling, alone. Figure 6-2 shows that, except for Grimes Pond in 2021, each pond experienced two or more monitoring events where the monitored TP concentrations greatly exceeded the predicted TP concentration, based only on the watershed modeling. The difference in the TP concentrations during each of these pond monitoring events can be attributed to internal phosphorus loading from sediment phosphorus release. The mass balance modeling results were used to estimate and summarize the total internal phosphorus load during each summer for each pond.

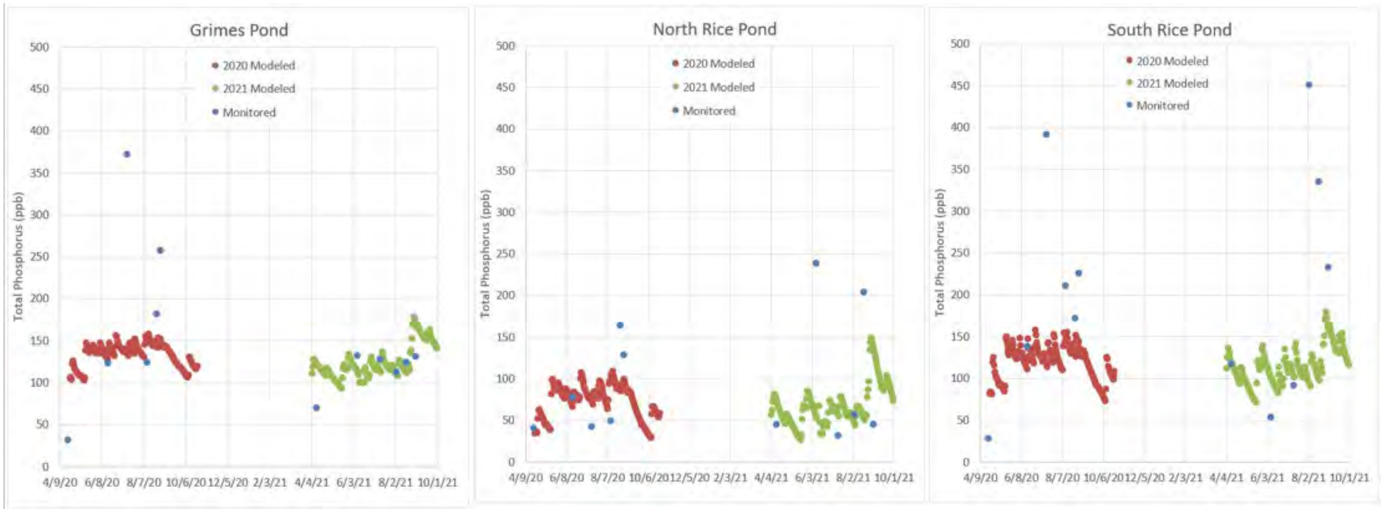


Figure 6-2 Calibrated Water Quality Monitoring and Modeling Results

A detailed analysis of the dissolved oxygen data, combined with the pond water quality modeling, confirmed that internal phosphorus loading can be an important source of phosphorus input to each pond during the summer. Internal phosphorus loading represented 32 percent of the summer phosphorus budget for Grimes Pond in 2020, as well as 6 and 24 percent of the respective summer phosphorus budgets for North Rice Pond in 2020 and 2021 (see Figure 6-3). Figure 6-3 shows that discharge from Grimes Pond represented 34 and 29 percent of the respective summer phosphorus budgets for North Rice Pond in 2020 and 2021. Internal phosphorus loading represented 8 and 9 percent of the respective summer phosphorus budgets for South Rice Pond in 2020 and 2021. Discharge from North Rice Pond represented 11 and 14 percent of the respective summer phosphorus budgets for South Rice Pond in 2020 and 2021.

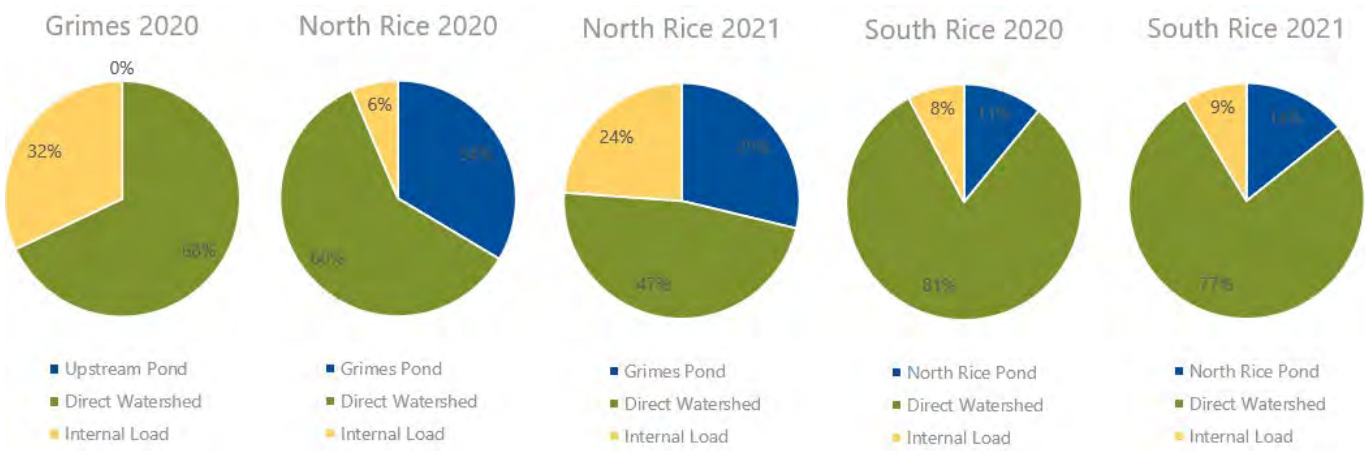


Figure 6-3 Modeled Annual TP Sources for Each Pond

The calibrated water quality modeling was used to assess the implications for the summer assimilation capacity (i.e., nutrient uptake and/or sedimentation) of each pond, and the water and phosphorus budgets were used to identify and develop implementation strategies for improving wetland water-quality. The short water residence times estimated for the watershed wetlands (averaging 38 days for Grimes Pond, 20 days for North Rice Pond and 8 days for South Rice Pond) limit the capacity to assimilate the summer runoff phosphorus loads from each direct drainage area, as well as the overall watershed.

The calibrated water quality modeling was used to simulate how implementation of watershed BMPs, combined with in-lake alum treatment, would improve water quality in each of the three ponds. For the majority of the BMPs evaluated, the updated P8 modeling was used to evaluate the proposed BMPs and estimate the annual total phosphorus removals. The model was run for the same water years that cover the monitored two-year consecutive climatic period (2020 and 2021 water years: 10/1/2019 – 9/30/2021). To evaluate the potential impact of an alum treatment, it was assumed that a combined alum and sodium aluminate treatment would reduce the estimated internal phosphorus load in each wetland by 80 percent. The water quality modeling does not account for the water quality benefits that would be achieved from a pond drawdown. It is expected that the drawdowns will help control curly-leaf pondweed, and the associated phosphorus load that comes with plant die-off, while flipping the floating-plant dominated system to help minimize sediment phosphorus release. It is expected that the perceived water quality benefit will be greater than the percentages shown, after factoring in reduced plant growth and odor. As a result, the modeling provides a conservatively low estimate of the overall water quality benefits for each pond and Bassett Creek.

Table 6-1 shows how much the average summer total phosphorus concentrations would improve following implementation of the recommended watershed structural BMPs and in-lake alum treatment in each pond (further discussed in Section 7). Table 6-1 also shows that the predicted average TP load reduction to Bassett Creek would be 68.3 lbs/yr and the predicted flow-weighted mean TP concentration entering the creek would be very close to the BCWMC water quality standard of 100 µg/L for a Priority 1 stream, following BMP implementation, which is 53 percent lower than existing conditions.

Table 6-1 Average Summer Monitored and Modeled TP Following BMP Implementation

Monitoring/Modeling Scenario	Grimes Pond Avg. Summer TP	North Rice Pond Avg. Summer TP	South Rice Pond Avg. Summer TP	Avg. TP Entering Bassett Creek
Existing 2020 and 2021 Summer Average TP (µg/L)	168	104	230	230
Predicted Summer TP Concentration Following BMP Implementation (µg/L)	128	75	107	107
Percent TP Reduction Following BMP Implementation	24%	28%	53%	53%
Predicted Annual TP Load Reduction Following BMP Implementation (lbs/yr)				68.3

6.2 Easement Acquisition

All the proposed work for structural BMPs is located on City of Robbinsdale property, right of way, or within existing drainage and utility easements obtained by the City of Robbinsdale.

6.3 Permits Required for the Project

The proposed project is expected to require the following permits/approvals, regardless of the selected concepts (Table 6-2 shows the wetland permitting considerations and implications for implementation at each of the BMP locations discussed in Section 5-2):

- Clean Water Act Section 404 Permit from the U.S. Army Corps of Engineers
- Public Waters Work Permit from the Minnesota Department of Natural Resources (MnDNR)
- Section 401 Water Quality Certification from the Minnesota Pollution Control Agency (MPCA)
- Construction Stormwater General Permit from the MPCA
- Compliance with the MPCA's guidance for managing dredged material
- Compliance with the MPCA's guidance for managing contaminated material and debris-containing fill, including an environmental covenant for South Halifax Park
- Compliance with the Minnesota Wetland Conservation Act (City of Golden Valley and BCWMC [in City of Robbinsdale])
- City of Robbinsdale permits (where applicable)

Table 6-2 Wetland Permitting Considerations and BMP Implementation Implications

BMP Location	LGU/WCA	MnDNR	USACE
NR-1 (East of Trail)	No Loss (8420.0415 Subp. E) Excavation or removal of contaminated substrate	Not a public water; no permit required	Assume non-jurisdictional; no permit required
SR-3	No permitting required	Work in public waters permit required if work extends below OHWL	Nationwide Permit would be required for work occurring below OHWL of North Rice Pond
SR-4	No Loss (8420.0415 Subp. E) Excavation or removal of contaminated substrate	Not a public water; no permit required	Assume non-jurisdictional; no permit required
GR-6	Permitting under WCA for placement of fill from filter installation. Mitigation may be required for increased water elevation. Coordination with the LGU would be required to confirm the affected wetland is natural and would be regulated under the WCA.	A work in public waters permit would be required for installation of the filter below the OHWL of the wetland.	Assume non-jurisdictional; no permit required

6.3.1 Section 404 Permit and Section 401 Certification

According to Section 404 of the Clean Water Act (CWA), the USACE regulates the placement of fill and certain dredging activities in jurisdictional wetlands and other waters of the United States. Jurisdictional wetlands and other waters are those that the USACE determines to have a significant nexus with navigable waters. Some of the proposed project concepts are hydrologically connected to Bassett Creek, which is expected to trigger the need for a Section 404 permit.

6.3.2 MnDNR Public Waters Work Permit

The MnDNR regulates development activities below the ordinary high water level (OHWL) in public waters and public waters wetlands. Public waters regulated by the MnDNR are identified on published public waters inventory maps. Grimes, North Rice and South Rice Ponds are identified as MnDNR public waters wetlands; therefore, the proposed project will require a MnDNR Public Waters Work Permit for the work completed in the public waters.

6.3.3 Section 401 Water Quality Certification

To issue a Section 404 permit, the USACE must ensure that the proposed project does not violate established water quality standards under Section 401 of the CWA. In Minnesota, Section 401 Water Quality Certification is administered by the MPCA. Section 401 certification may be issued as part of the Section 404 permit or may require independent coordination, depending on the type of Section 404 permit the proposed project qualifies for.

6.3.4 Construction Stormwater General Permit

A National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Construction Stormwater General Permit from the MPCA authorizes stormwater runoff from construction sites. A Construction Stormwater General Permit is required as the proposed project will disturb more than one acre of soil. Preparation of a stormwater pollution prevention plan explaining how stormwater will be controlled within the project area during construction will be required as part of this permit.

6.3.5 Guidance for Managing Dredged Material

Dredged material is defined as waste by Minnesota Statute 115.01, and its management and disposal are regulated by the MPCA. It is anticipated that sediment dredged as part of the proposed project would be removed from the project site and disposed of at an appropriate landfill, in compliance with the MPCA's guidance for managing dredged materials.

6.3.6 Guidance for Managing Contaminated Soils and Debris-Containing Fill

The past Phase II and our Phase I investigations indicate the soils in the project area meet the MPCA's guidelines for unregulated fill, except for debris-containing fill, which should be disposed at a permitted landfill. Debris-free soils with no field evidence of environmental impacts must be managed in accordance with MPCA's Best Management Practices for the Off-Site Reuse of Unregulated Fill (MPCA, 2012) and the provisions of the Response Action Plan and Site Contingency Plan (Barr, 2015). In addition, an environmental covenant for exists for South Halifax Park that will require MPCA approval for any grading or disturbance at the site.

6.3.7 Minnesota Wetland Conservation Act

The Minnesota Wetland Conservation Act (WCA) was enacted to protect wetlands not protected under the MnDNR's public waters work permit program. The WCA regulates filling and draining of all wetlands and regulates excavation within Type 3, 4, and 5 wetlands. The WCA is administered by a local governmental unit (LGU), and it is expected that BCWMC will be the LGU for WCA-regulated wetland impacts associated with the proposed project. Impacts that may be regulated under the WCA include excavation in wetland areas above the MnDNR's ordinary high water level, and any access to or across the project area that goes through wetland areas.

6.3.8 City of Robbinsdale Permits

It is likely that this project will also trigger applicable City of Robbinsdale Permits, such as the Right-of-Way (ROW) permit (for any disturbance or work within the ROW) and/or stormwater management permit.

6.4 Other Project Impacts

6.4.1 Temporary Closure of Park Trails

The existing and proposed ponds are located within Sochacki Park and/or a walking nature area that contains a paved trail at South Halifax Park. Since a portion of the trails will be impacted by the construction activities, it will be necessary to temporarily close some portions of trails during construction activities. Trail closure signs and barricades will be installed, and a pedestrian detour route will be determined during final construction. Every effort will be made to minimize the duration of the trail closure, including considering winter construction to minimize impacts to park users.

6.4.2 Tree Removals

For the proposed conceptual designs many of the surveyed trees are estimated for removal (those located within the project disturbance/grading limits). While a good portion of these trees are < 6" in diameter or are dead/dying, many classified as significant (by Robbinsdale ordinance) will be removed or impacted. It is expected that residents and community members may have concerns about the tree removals. It will be essential to show and describe the restoration efforts that will be put in place to mitigate the tree losses. Specific details on site restoration will be included in project design.

6.4.3 Impacts to Bats

The northern long-eared was recently listed as endangered and is listed as potentially occurring within the project area. The primary reason for decline of the species is the White Nose Syndrome (WNS) which has attributed to the deaths of millions of bats in recent years across the United States, and all four species that hibernate in Minnesota are susceptible to the disease (MnDNR, 2023). Bats typically hibernate in sheltered areas such as caves, but some bats nest in trees during summer months. To avoid adverse impacts to bat species it is recommended that tree removals are to be during the bats active season (April 15– September 30) so that nests or forging areas are not inadvertently destroyed while they are present in the project area. During final design, there should be additional consultation with the US Fish and Wildlife Service or MnDNR regarding the timing of any tree removals and the potential impacts to bats.

7 Project Cost Considerations

7.1 Opinion of Cost

Planning level cost estimates were developed for each of the BMPs based on the conceptual design of each BMP. Although the point estimate of cost was used for the cost-benefit analysis, there is cost uncertainty and risk associated with this concept-level cost estimate. The costs reported for the BMPs include engineering, design, and permitting (20-30 percent), construction management (15 percent), and estimated legal costs (5 percent). In addition, an estimated $100,000 in total combined costs for Phase II environmental investigations is included for the BMPs. The costs do not include any wetland mitigation costs, assume that the excavated soils are contaminated, and the BMPs do not require significant utility modifications or relocations. The range of probable costs presented reflects the level of uncertainty, unknowns, and risk due to the concept nature of the individual project designs. Based on the current level of design (planning level estimate), the cost range is expected to vary by -20 percent to +40 percent from the planning level point opinion of cost.

Appendix F includes the itemized planning level cost estimates for most of the water quality improvement options evaluated. These more detailed cost estimates should be reviewed and considered when planning and budgeting for the larger CIP projects and/or applications for grant funding.

A cost-benefit assessment was completed for each BMP to assist with prioritizing and selecting the preferred and most cost-effective BMPs to help achieve the necessary phosphorus load reductions. The capital costs (engineering, design, and construction) were annualized assuming a 30-year life span at a 6 percent interest rate. Although this timeframe is commonly used for these cost-benefit assessments, the actual lifespan of ponds, other BMPs, and infrastructure can be significantly longer if maintained regularly. Annual operation and maintenance costs were estimated for each project, assuming 1 percent of the capital cost. The benefit was estimated as an annualized cost per pound of total phosphorus removed per year.

7.2 Cost-Benefit and Project Sequencing

Table 7-1 summarizes the potential pond improvement options, estimated annual total phosphorus removal, planning level capital cost estimate, annualized cost-benefit, and recommended sequence for implementation of each improvement option. Items marked with “NA” in Table 7-1 are associated with options that are intended to address wetland habitat and are not applicable or quantified for TP load reductions. It is assumed that enhanced street sweeping in untreated subwatersheds would be incorporated into each City’s operations, so planning level costs for this improvement option were not estimated.

Table 7-1 Summary of Potential Improvement Benefits and Planning Level Costs by Option

BMP ID/Location	Annual TP Removal (lbs/yr)	Planning Level Capital Cost Estimate	Annualized Cost-Benefit ($/lb TP Removed/yr)	Recommended Sequence for Implementation
Revegetate/control upland soil erosion	NA	$10,000	NA	1a
Street sweeping in untreated subwatersheds	NA	NA	NA	1b
Clear inlet/outlet debris, remove sediment deltas and stabilize erosion	NA	$100,000	NA	1c
Conduct pond water level drawdowns	NA	$182,000	NA	1d
Dredge/expand existing SR-4 pond and stabilize outlet channel	38.9	$471,000	$1,000	2a
Construct permeable filtration system at GR-6	15.5	$333,000	$1,800	2b
Construct stormwater pond at NR-1	3.6	$255,000	$5,900	2c
Construct stormwater pond at SR-3	3.3	$307,000	$7,700	2d
Alum treatment of Grimes, North and South Rice Ponds	11.2	$245,000	$1,800	3
Total	**72.5**	**$1,903,000**	**$2,200**	

7.3 Funding Sources

It is expected that the following funding sources are likely be available for implementation of some of the recommended improvement options:

- BCWMC CIP Funds ($600,000)
- BWSR Clean Water Fund grant
- Conservation Partners Legacy Grant Program (for habitat components)
- Hennepin County Opportunity or Stewardship grants
- Hennepin County Environmental Response Fund
- Minnesota Department of Employment and Economic Development (DEED) Contamination Investigation and Response Action Plan Development Grant program
- MPCA grants and MN Public Facilities Authority funds
- MnDNR short term action request grants
- Partner CIP funds (for potential grant match)

8 Alternatives Assessment and Recommendations

Based on the predicted water quality and other project benefits, we recommend implementing the following watershed BMPs and in-pond management options to substantially improve water quality, enhance vegetative diversity and integrity for each pond, and to reduce downstream phosphorus loadings and enhance biological integrity in Bassett Creek (according to the implementation sequence recommended in Table 7-1):

- Clear clogged debris and develop an annual maintenance plan for all inlet and outlet structures. Remove accumulated sediment and fill materials from BMPs and within, and adjacent to, each wetland. Reconfigure discharge outfall and stabilize erosion from stormwater conveyance entering northwest corner of Grimes Pond.
- Re-vegetate and control soil erosion from bare soil areas within the upland buffer areas. If mountain bike activity in the adjacent upland area is currently supported, isolate potential soil disturbance and adjacent vegetation improvements to prevent erosion into surrounding wetland areas.
- Conduct controlled water level drawdowns in each wetland prior to the winter season to ensure that curly-leaf pondweed is decreased to less than 20 percent cover and to enhance overall vegetative diversity and integrity. Remove, treat, and control other non-native invasive species, where possible, and remove fill material and trash.
- Initiate, or increase the frequency of, street sweeping and fall leaf litter removal programs, with emphasis in subwatersheds that have direct drainage to the wetlands.
- Install structural BMPs and/or pretreatment protection measures to prevent future sediment delivery and reduce nutrient loading into the pond with design(s) intended to meet water quality goals. Untreated stormwater runoff from two discharge outfalls each to South Rice Pond and Grimes Pond, as well as one outfall to North Rice Pond, are prioritized for implementation.
- Complete in-pond alum treatment in all three ponds to control summer sediment phosphorus release, following implementation of watershed BMPs, to improve water clarity and support submersed aquatic plant growth.

9 References

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