Proposal for Design – Build Services

White Bear Lake Augmentation Project

Minnesota Department of Natural Resources | March 31, 2017

SEH Design|Build, Inc.
An alternative delivery company.

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RE: Minnesota Department of Natural Resources
White Bear Lake Augmentation Design-Build Proposal
SEH No. P-140516

Jason Moeckel
Project Coordinator
Minnesota Department of Natural Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

Dear Mr. Moeckel:

The Minnesota Department of Natural Resources (DNR) has selected SEH Design|Build, Inc. (SEHDB) to prepare and submit a Design-Build Proposal to provide a complete system to pump, filter and convey water from East Vadnais Lake to White Bear Lake (Project).

SEHDB is a wholly owned subsidiary of Short Elliott Hendrickson Inc. (SEH®) and offers Program Management Services to assure that the design intent, budget and schedule are maintained throughout the entire Project. SEHDB has teamed with SEH and Wenck Associates for professional services relative to the engineering design. SEHDB has also partnered with Magney Construction, Inc., Minger Construction Co., Inc. and Geislinger and Sons, Inc. for the construction elements of the Project. Our Design-Build Proposal also provides DNR with an alternative for the financing and operation of the Project by teaming with Broe Infrastructure.

In our Proposal, we have included a narrative to explain how the Project goals will be met, concept plans and details, preliminary schedule to design and construct the Project, and a cost estimate to design and construct the Project.

Our team combines the leadership of a design-build firm with engineering and construction experts to develop an implementation strategy that identifies all potential Project tasks, Project risks and related costs to develop the Project.

Thank you for the opportunity to submit our Design-Build Proposal. If there are any questions about the scope, schedule or Project approach, we would be pleased to review these items in detail.

Sincerely,

Steven J. Goraczkowski
President

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SEH may use one or more of its subsidiaries to provide the services:
SEH Design|Build, Inc.
SEH of Indiana, LLC
SEH of Michigan, LLC

Introduction

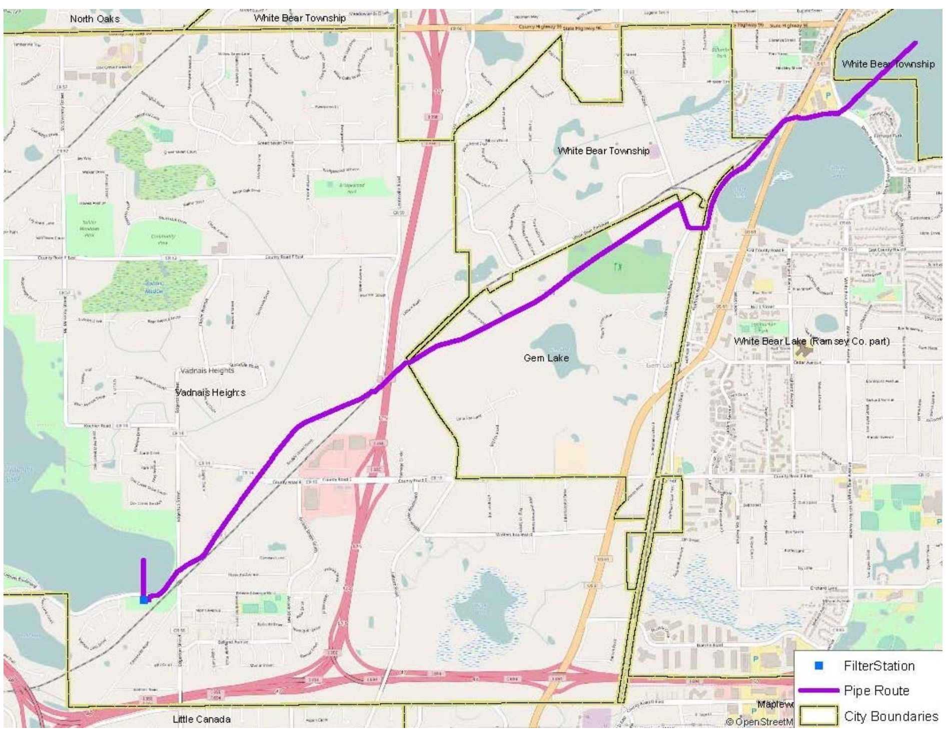
The Minnesota Department of Natural Resources (DNR) is seeking design-build proposals for a potential White Bear Lake Augmentation project. A two-phase procurement process is being used to select a design-build team. This proposal is submitted as the deliverable for Phase II as identified in the DNR's Request for Proposals dated November 3, 2016. The SEH Design|Build, Inc. (SEHDB) team was selected based upon our Phase I proposal dated December 2, 2016 to participate in the Phase II activities and initiated Phase II services in January 2017.

Project Overview

White Bear Lake is a community asset and is highly valued for its aesthetic, recreational, commercial, environmental, aquatic, fish and wildlife qualities. Several studies have been conducted over the past few years driven by concerns associated with low lake water levels. In the *Report to the Minnesota State Legislature: Concept Cost Report for Augmentation of White Bear Lake with Surface Water* (DNR, February 2016), the Department of Natural Resources (DNR) worked with the Metropolitan Council and Short Elliott Hendrickson Inc. (SEH) to conduct an analysis and report on the cost of moving water from the Vadnais Lake Chain to White Bear Lake. SEHDB based their proposed project upon the general outcomes of this and related reports.

The proposed project is located in Ramsey County, Minnesota between the cities of Vadnais Heights and White Bear Lake. The proposed project consists of an intake structure drawing water from East Vadnais Lake, a filtration system to prevent the transfer of invasive species (based on the size of the veliger stage of the zebra mussel), a pipeline (approximately 5 miles) following the alignment from the southeast corner of East Vadnais Lake near Centerville Road (County Road 59) that is generally aligned along Centerville Road, going northeast on Goose Lake Road (County Road 14) toward Goose Lake and White Bear Lake, and an outlet structure in White Bear Lake (Figure 1). The capacity of the system is designed to pump water at a rate of 6,000 gallons per minute (gpm), which provides approximately 2 billion gallons per year (BGY) of water over eight months of the year.

Figure 1 – Proposed Alignment for White Bear Lake Augmentation Project



Goals

DNR established goals for the project as listed in the table below, which we grouped into System Features and Design-Build Activities. The system features characterize the project requirements in Goals 1-7. The design-build activities of Goals 8-12 represent requirements that will be incorporated into the design of the system and also the methods for construction delivery. SEHDB is committed to meeting these goals and provides a brief response on how we will meet these goals.

Table 1 – Project Goals and Our Approach to Meet Goals

No.	Goal Description	Approach to Achieve Goal
System Features		
1	Provide a safe work environment	SEHDB and its contractors have OSHA approved safety programs and all onsite employees will have the proper safety certifications. As with all our projects, a project-specific safety program with site-specific protocols will be developed and followed with continuous updates through the course of the project. We pride ourselves on the excellent safety record of our firms.
2	Components: provide a 2 BGY water conveyance system from East Vadnais Lake to White Bear Lake	The base project is designed with a 2 BGY capacity that conveys water from East Vadnais Lake to White Bear Lake. An alternate system is presented to convey 1BGY as one innovative design feature noted for Goal 12.
3-5	Water quality: prevent invasive species, maintain clarity and do not increase phosphorus levels.	The project is designed to prevent the spread of known invasive species, using the zebra mussel veliger as the smallest organism for sizing the filter screens. The project defined in this proposal cannot guarantee that the White Bear Lake clarity will be maintained or that phosphorus levels will not increase. Additional studies are required to properly design a system to meet these goals. Stage 1 of our design-build proposal will address what's needed to meet the water quality goals.
6	Minimize annual operations and maintenance (O&M)	Equipment and materials assumed for the concept level system configuration are consistent with requirements to achieve a typical useful life for that asset and to minimize annual operations and maintenance practices. Refer to the Concept Project Description section for details.
7	Protect SPRWS water system/property and City of Vadnais Heights property and future development options	SPWRS, City of Vadnais Heights, and other entities were contacted about the preferred alignment and specific needs for location of facilities. The proposed corridor and facilities include specific needs identified by these stakeholders to minimize impacts from construction and that fit with their long-term development plans.
Design-Build Activities		
8	Minimize disruption and adverse impacts to residents and businesses	Our designers and contractors have worked on similar projects together and understand the importance of the day-day and longer-term disruptions to local communities. We will have a detailed sequencing schedule and robust public involvement program that proactively looks to meeting community needs.
9	Minimize traffic disruption	Our attention to sequencing schedules and our public involvement program will strive to minimize traffic disruption for locally affected residents/businesses and also consider nearby area impacts.
10	Fully restore disturbed infrastructure/property	It is assumed that existing infrastructure is fully restored to the same condition and/or stakeholder requirements. Restoration must meet County road requirements and other community considerations. Refer to the Concept Project Description section for details.

No.	Goal Description	Approach to Achieve Goal
11	Avoid or minimize environmental impacts	The design documents will be developed to avoid environmental impacts where possible (e.g. do not construct in contaminated soil area) and minimize environmental impacts. Construction activities will be sequenced and conducted accordingly.
12	Allow and encourage innovative design/construction ideas	For this Phase II deliverable, the option for a smaller capacity system was evaluated. Additional information provided with utility maps, soil borings, water quality sampling and modeling, and USGS hydraulic modeling will be incorporated in the Stage 1 activities of our design-build proposal to identify innovative ideas to meet project goals and minimize costs.

Proposal Contents

This design-build proposal is the SEHDB team's deliverable for the Phase II scope of work listed in the DNR's November 3, 2016 RFP. The proposal contains the following:

- **Introduction** – project background and goals
- **Project Approach** – general approach to the project, project uncertainties affecting cost estimates, and our project team
- **Concept Project Description** – description of project components and assumptions made to estimate cost for the concept system
- **Proposal** – developed for Stage 1 (preliminary/final design activities) and Stage 2 (construction) including scope and estimated costs
- **Schedule** – general implementation considerations and milestone schedule from design-build notice to proceed through construction startup
- **Alternate Delivery** – an approach to finance, design, build and operate the proposed facilities
- **Appendices** – various supporting documentation and memoranda

Project Approach

Our team will apply a design-build approach to implement a potential White Bear Lake augmentation project meeting the twelve goals listed in the RFP and in the Introduction section of this proposal.

Our team is highly skilled at project delivery for “technically complex” projects using our Engineer-Led Design Build model. SEH Design|Build (SEHDB) will lead the Project and will contract directly with Short Elliott Hendrickson Inc. (SEH) and Wenck Associates (Wenck) for engineering services, and with Magney Construction, Inc. (Magney), Minger Construction Co., Inc. (Minger) and Geislinger and Sons, Inc. (Geislinger) for the construction.

General Approach

We offer a Design-Build Proposal to complete the final engineering and perform the construction using a two-step approach:

- Stage 1: Final Design and Final Costs (Pre-Construction)
- Stage 2: Construction and Startup

Design-Build – Stage 1: Final Design and Final Costs (Pre-Construction)
When the Project funding and ownership has been determined, or alternative funding and ownership has been established (see section on Funding and Operating Alternative), then a Design-Build contract will be executed that includes all services for Project delivery and startup. We propose using an AIA A141 Owner/Design-Builder Agreement or similar agreement in which the Design-Builder (SEHDB) is obligated to complete both the design and construction of the Project.

Design-Build - Stage 2: Construction and Startup
When the final design and final costs have been established under Stage 1, then SEHDB will secure final permits, complete early equipment orders, and execute the construction and systems startup stage of the Project.

The Proposal section of this document provides our scope of services for each stage and an estimated cost. The initial Stage 1 services focus on preliminary activities to provide final project definition and reduce cost uncertainty. These activities are necessary to meet the project goals prior to proceeding with project construction as described in the next subsection.

Preliminary Activities for Final Project Definition and Costs

The system features and cost estimates presented in this proposal are based on what is known today with a concept level design. Additional study and preliminary design is needed to more fully understand conditions that are currently unknown as these factors may have a significant impact on both construction costs and operations and maintenance costs. Some of the most critical future considerations are described below.

Water Quality

Our team cannot confirm that the project facilities defined in this proposal meet the water quality goals DNR established for the project until water quality evaluations are performed. The treatment system prescribed in this proposal is designed to prevent the transfer of zebra mussels, specifically the veliger, its smallest lifecycle stage. Additional water quality sampling and modeling will determine if any other treatment is required. Additional treatment requirements will result in higher capital and operations and maintenance costs.

The preliminary water quality analysis performed for the *Report to the Minnesota State Legislature: Concept Cost Report for Augmentation of White Bear Lake with Surface Water* (DNR, February 2016) was updated to include additional water quality data and assessment for this proposal. This analysis provides the following conclusions:

- A primary concern for White Bear Lake is increased algal growth due to additional phosphorus loading from East Vadnais Lake.
  - Median total phosphorus concentrations (April through October) in the surface of East Vadnais Lake (25 µg/L) are higher than median total phosphorus concentrations in the surface of White Bear Lake (15 µg/L). Transferring surface water from East Vadnais Lake has the potential to increase the phosphorus concentrations in White Bear Lake depending on the volume of water transferred, which will vary with climatic conditions each year.
  - Median hypolimnetic (bottom water) concentrations are lower in East Vadnais Lake (30.5 µg/L) than White Bear Lake (40 µg/L). If bottom water is transferred between the lakes, water temperature differences must be considered in the design of the transfer/outlet system to avoid mixing White Bear Lake during its stratified period or entrainment of bottom sediment phosphorus may occur.
- Other water quality risks including contaminants and aquatic invasive species need to be assessed through screening of lake and Mississippi River water quality.
- Additional water quality sampling and modeling is needed:
  - To define a project with reasonable certainty that will meet the water quality goals identified in project goals 3-5.
  - To estimate the final cost of a project that meets water quality and other project goals.
  - To provide information to support the environmental review requirements for the proposed project, which includes an understanding of long-term water quality projections and related risks.

Appendix A of this report provides background on preliminary water quality assessments performed and identifies recommended water quality monitoring and water quality modeling that should be completed prior to final planning. This work will identify the treatment needed to meet regulatory requirements and water quality protection objectives.

Environmental Review

Environmental review is needed as part of the planning and engineering process. The appropriate level of environmental review will be determined early in the planning and engineering process. Our proposal assumes the environmental review services are provided by another entity, with assistance by our team through the process.

Environmental review is expected to be a requirement of this project, with the appropriate level of environmental review determined early in the planning and engineering process. The state environmental review process is outlined in Minnesota Rules 4410.4300 and 4410.4400, including thresholds for mandatory review for a wide range of project categories. As currently proposed, the augmentation project does not meet any of the mandatory environmental review requirements. The category most likely to require review is related to water appropriation, however this is only triggered for new appropriations. Provided the source water is part of existing appropriation licenses, this would not apply. Depending on how approval of the project proceeds, it may also be expressly exempt from environmental review under Minnesota Rules 4410.4600 Subpart 26. Projects enacted by the legislature, orders of government, adoption of plans by state agencies, executive orders of the governor or implementation by governmental units, or judicial orders do not require environmental review.

In consideration of the magnitude and unique aspects of the project, it is our opinion that although there are no mandatory requirements for environmental review, it is anticipated that one will ultimately be determined to be ordered to be completed. The most likely need for an environmental review is from a discretionary or voluntary review. A discretionary review is one that is offered by the applicant or sponsor as part of the project review. While this seems counterintuitive to accept a potentially costly and time consuming process that would not otherwise be required, there is often value for fully vetting the environmental concerns in advance of completion of plans, land acquisition, obtaining easements, or securing construction materials. A discretionary review is often also a condition of approval, or made a requirement of project funding. A citizen petition process may also be employed, which is designed to provide a mechanism to allow concerned citizens to identify projects that may have the potential for significant environmental effects. Otherwise exempt projects may still need to go through environmental review if the evidence presented by the petitioners demonstrates that, because of the nature or location of the proposed project, the project may have the potential for significant environmental effects. In order for a citizen petition to be deemed complete by the Environmental Quality Board (EQB), the petition must meet the requirements outlined in Minnesota Rules 4410.1100.

If it is decided that an environmental review is needed, whatever the mechanism, the Responsible Governmental Unit (RGU) will also need to be determined. This is anticipated to be the Minnesota Department of Natural Resources, but since this type of project does not require a mandatory review, the RGU has not been pre-determined. Who is determined to be the RGU may also be affected by who the project sponsor is. These determinations are not critical to the cost or schedule, but should be determined early so that accurate planning can occur.

With the augmentation project, we anticipate that if environmental review is determined to be needed, the level of effort will require at least one calendar year to complete. While the majority of information on hydrology has been collected and analyzed, the review process also includes requirements to discuss socioeconomic factors, environmental justice, and the requirement to discuss connected actions; which may include the precedent of allowing interbasin transfer. These are all subjects that are important, and may not have been studied with as great a depth as the scientific investigations that have already occurred. This project is also likely to require public participation, which can generate a significant volume of commentary. As part of the environmental review process, the RGU is obligated to provide a Response to Comments, which can easily be equal to the effort to prepare the initial document, depending on the volume and diversity of comments received. All of this should be carefully weighed, and incorporated into the anticipated project costs and schedule.

Ownership and Funding

The public sponsor responsible for construction and operations and maintenance needs to be identified. This decision may impact costs.

Planning and Engineering

Additional planning and engineering is needed to determine the final alignment and treatment facilities for an augmentation system. This work includes activities such as:

- Geotechnical exploration
- Utility mapping
- Contaminated site remediation studies
- Topographic and boundary surveys

Several additional factors may impact planning and engineering decisions including:

- Further refinement or modifications to the concept alignments
- Disruption of park space and natural settings as well as the use of those facilities
- Neighborhood, commercial and business disruption
- Construction impacts including traffic detours, property acquisitions and easements, and commercial and business impacts
- Public interest and engagement

- Design of facilities to account for periods when augmentation is not needed
- Completion of the USGS study[1] on the inter-relationships of lakes and groundwater in the Northeast Metro and subsequent modeling to provide a better understanding of long-term capacity requirements of an augmentation system

Permitting

The permits required for construction and the requirements of those permits will need to be verified as part of the environmental review and engineering process. Although a preliminary list of potential permits is included in Appendix B of this document, final determination of required permits and the specific permit requirements is beyond the scope of this proposal. Additional design features such as enhanced water treatment for phosphorus or other contaminants may be required as a part of final permitting.

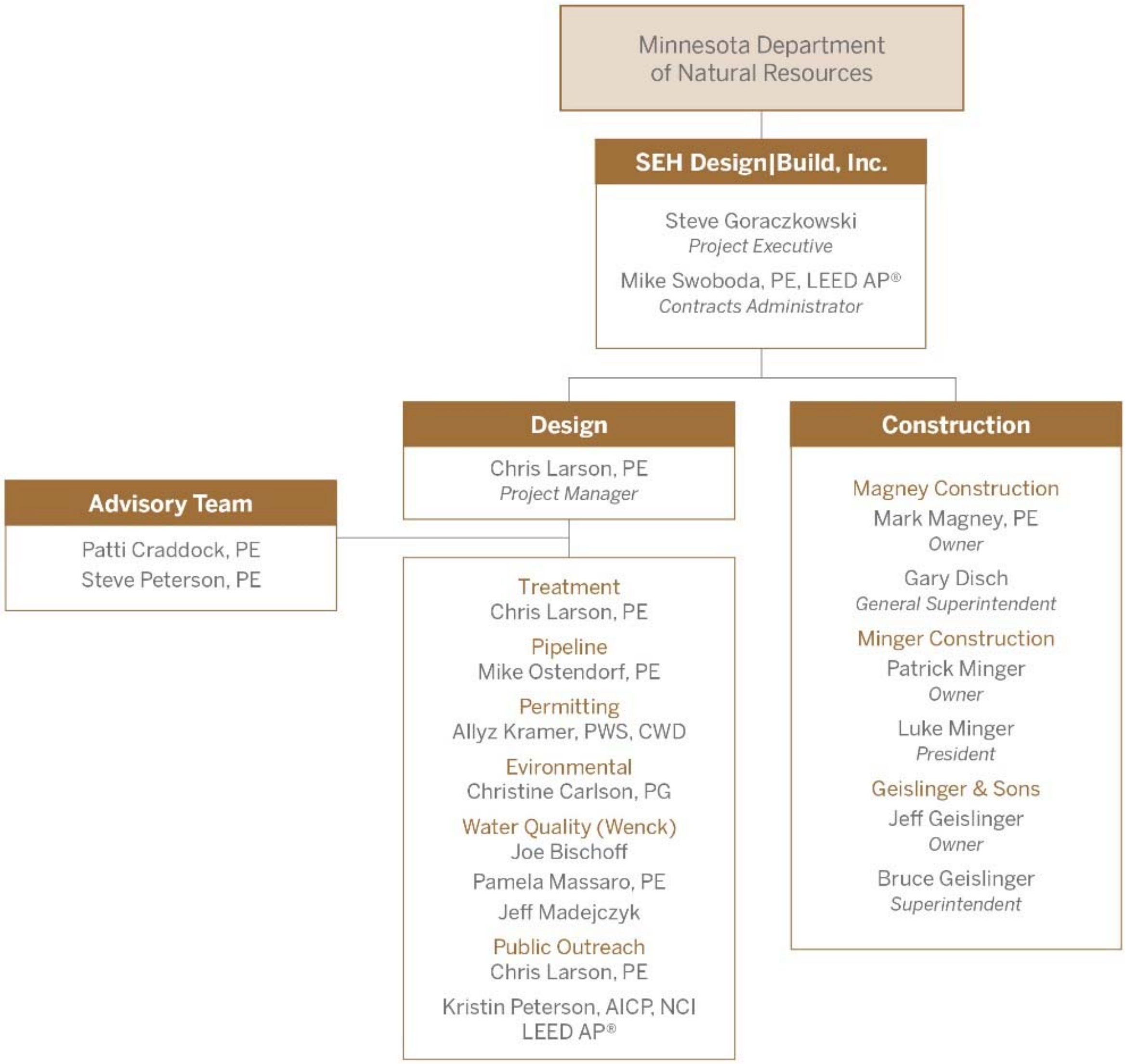
Project Team

Our collaborative approach addresses qualifications, technical capabilities and capacity, performance assurances, and other details - all critical to the success of the Project. In this subsection we present the team we propose to deliver this project.

Key Personnel

Our team combines the leadership of a design-build firm with engineering experts that performed the preliminary studies on White Bear Lake augmentation and contractors with water treatment facility and large pipeline experience in the Twin Cities Metropolitan Area. SEH Design|Build Project Executive, Steve Goraczkowski and Contracts Administrator, Mike Swoboda, bring extensive design-build experience to coordinate the talents of our design and construction teams. The design team is led by SEH's Chris Larson, project manager for previous water supply studies and water infrastructure design projects in the area. Other members include SEH discipline leaders and Wenck water quality specialists. Contractors Magney Construction, Minger Construction and Geislinger & Sons bring a wealth of construction experience with local area knowledge. This team has the design and construction experience to successfully deliver a design-build project. Our proposed project organization chart is provided below.

[1] United States Geologic Survey (in review, 2017), *Characterizing Groundwater and Surface Water Interaction in Northeast Metro Area Lakes, MN.*



The design team has designated members for the key project components: pipeline, treatment, water quality, permitting and environmental analysis. We also identify a public outreach person, who will be supported by other team members and extended SEH resources for Stage I and II activities. Our contractor team includes Magney Construction because of their excellence and extensive treatment process and pump station experience. Minger Construction and Geislinger & Sons bring a wealth of large pipeline and related utility experience in the metro area, working in congested corridors, with contaminated sites and with a variety of installation techniques. With two contractors on the team we have a broader set of experience and ideas to draw from for Stage I services. If a project progresses past Stage I, these two firms provide the capacity and backup resources to deliver a project the size and complexity of the potential White Bear Lake augmentation system.

Our team will apply our site specific knowledge of this project from both a design and construction perspective. We will look for ways to design and deliver the project while maintaining costs and meeting all project goals.

Design|Build Team

Steve Goraczkowski
Project Executive
Steve is the President of SEH Design|Build. Steve brings more than 30 years of management and leadership experience promoting the growth and expansion of design-build and commercial construction companies. His project experience includes large infrastructure and master planned communities with contract values of over $2 billion, industrial and manufacturing facilities and large building projects. He is experienced in the development and implementation of budgets, strategic planning, marketing plans, recruiting and staffing. Throughout Steve's career, he has held multiple positions in commercial construction and design-build companies nationwide including Chief Executive Officer, Division President, Senior Vice President and Operations Manager. Steve will serve as the project leader responsible for the design and contractor team's performance and project deliverables.

Mike Swoboda, PE, LEED AP®
Contracts Administrator
Mike has more than 30 years of experience in construction management and water resource engineering. Mike is a certified Leadership in Energy and Environment Design Professional (LEED Accredited). Mike has experience as a project manager, project engineer/superintendent with on-site construction management of large commercial, institutional and airport projects. For design-build projects, he has managed design teams and the construction teams on fast-track projects to maintain a steady flow of design information to construction to maintain schedules. Project management structure experience includes both single general contracts and multiple subcontracts. Projects are managed to control cost, maintain schedule and to deliver safety and quality. Mike was the Contracts Administrator and Construction Project Manager for recent design-build projects which include a $28 million processing plant for frac-sand mine, multiple wastewater treatment plants, infrastructure projects and office building projects.

Design Team

Chris Larson, PE
Project Manager | SEH
Chris is a project manager and engineer with more than 20 years of experience in development, design, construction and management of a wide variety of water projects. His experience covers pilot studies through startup and training for water treatment and supply projects. Chris was the project manager for the *Feasibility Assessment of Approaches to Water Sustainability in the Northeast Metro* (Metropolitan Council, 2014) and the technical reviewer of the *Concept Cost Report for Augmentation of White Bear Lake with Surface Water* (DNR, 2016). Through these projects and others, Chris brings a comprehensive understanding of the water quality, treatment requirements and alignment features specific to a potential White Bear Lake augmentation system. Chris has worked on water supply projects for several metro area communities, with recent projects for Apple Valley and Minnetrista and larger pipeline projects for Metropolitan Council Environmental Services. Because the Phase II services are primarily design tasks, Chris will serve as the main point of contact with DNR for the project.

Patti Craddock, PE
Project Advisor | SEH
Patti is a senior engineer and project manager with 28 years of experience on water related projects. Patti has worked on all phases of project delivery, with a focus on the front-end development of system needs and integrated planning of capital projects. Her experience includes water treatment and supply, wastewater treatment and interceptor systems, watershed management, water reuse and comprehensive planning. Patti also has experience with environmental review, permitting and stakeholder facilitation as integral elements of many of these projects. Patti served as Project Director for the *Concept Cost Report for Augmentation of White Bear Lake with Surface Water* (DNR, 2016) and presented the findings to the local legislators and to the local units of government and other interested stakeholders. Patti will serve as Project Advisor to the design team and the SEH Principal-in-Charge responsible for design team resource allocation to meet the schedule and adherence to quality assurance and control procedures.

Steve Peterson, PE
Project Advisor | SEH
Steve is a Senior Project Manager and a Regional Practice Center Leader with 30 years of experience in project management and design of municipal, potable water, and wastewater treatment facility projects. Steve brings expertise in design and planning for large diameter pipeline projects. His work with Milwaukee Metropolitan Sewerage District, WI (MMSD) included new and rehabilitated pipeline ranging from 24-in to 84-in diameter. For Racine Water & Wastewater Utility, WI he led the design of a 36-in – 4,300 ft sewer. Steve will be involved in an advisory role throughout the project and QA/QC of technical work products.

Michael Ostendorf, PE
Pipeline Team Leader | SEH
Michael is a project manager/engineer with civil and water engineering experience specializing in hydraulic conveyance projects. Michael serves as a project manager/project design leader from project planning through construction including programming system improvements to provide value engineering within conveyance systems. He has experience with large pipeline projects in the metro area including the design and construction of the MCES Hopkins Interceptor improvements through St. Louis Park, which involved contaminated soil sites. He has extensive hydraulic modeling and lift station design experience for a variety of applications.

Allyz Kramer, PWS, CWD
Permitting Leader | SEH
Allyz is a senior project scientist responsible for preparation of a variety of permit applications for public and private infrastructure projects including roads, utilities, airports, municipal/county development, mining and oil and gas clients for more than 19 years. This includes development of alternative analyses for siting infrastructure that avoids and minimizes project effects to the maximum extent practicable. Allyz regularly develops wetland replacement and vegetation management plans for mitigation efforts in compliance with federal, state and local requirements.

Christine Carlson, PG
Environmental Leader | SEH

Christine is an experienced geologist with twelve years of consulting experience. Christine manages the contaminated materials on projects from the development through construction stages. Christine reviews plans and works with the districts on incorporating contaminated materials issues into the project. At SEH, Christine is the contaminated materials team primary contract and project manager for investigations and construction monitoring. She performed the preliminary site assessment of the two alignments in the *Concept Cost Report for Augmentation of White Bear Lake with Surface Water* (DNR, 2016) and can efficiently move to the next stage of assessment. Christine was a task leader for environmental assessments of the Southwest Light Rail corridor.

Joe Bischoff
Water Quality Leader | Wenck

Joe has more than 18 years of experience in the fields of water resources and environmental assessment. He has served as project manager and technical lead for numerous multidisciplinary projects. His project and technical experience includes: water quality planning and analysis, water quality modeling, watershed assessment, wetlands ecology, stream ecology and restoration, lake restoration, nonpoint source pollution, Geographic Information Systems (GIS) and Total Maximum Daily Loads (TMDLs). Joe has experience using the P8 Urban Catchment Model, FLUX, GWLF, SWAT, QUAL2K and BATHTUB package models as well as using mass balance equations and statistics to analyze water quality. Joe was the lead scientist for the water quality review tasks for the *Concept Cost Report for Augmentation of White Bear Lake with Surface Water* (DNR, 2016). Joe will lead the water quality related tasks.

Pamela Massaro, PE
Water Quality Engineer | Wenck

Pamela's work experience with Wenck Associates, Inc. has primarily focused on water resource engineering, modeling and permitting and construction management. Her experience includes hydrologic, hydraulic and water quality modeling completing steady and unsteady state analysis for TMDL evaluations, storm water management plans, green stormwater infrastructure design, NPDES and EIS permitting and watershed modeling. As of 2016, Pamela has worked on 63 impairment studies (20 bacteria, 15 turbidity, 19 low-dissolved oxygen, 1 chloride and 8 nutrient/ eutrophication) in four states. Pamela managed the DNR's Saint Croix State Park Gulley Stabilization project (2011-12) and obtained numerous project permits from the DNR.

Jeff Madejczyk
Water Quality Scientist | Wenck

Jeff has worked as an environmental scientist on a wide variety of projects over the last 16 years. His background and education are in fisheries biology and aquatic ecology where he has conducted research on fish and invertebrate communities in lakes, streams and rivers. He serves as a both a client manager and project manager for a variety of National Environmental Policy Act (NEPA) environmental review projects including Environmental Assessments (EA), Environmental Assessment Worksheet (EAW) and Environmental Impact Statement (EIS) projects dealing with potential impacts of proposed industrial, utility, commercial and residential developments.

Kristin Peterson AICP, NCI, LEED AP®
Public Outreach Specialist | SEH
Kristin is a planner and public involvement specialist with experience in architectural design as well as community and transportation planning. Kristin's deep public involvement experience includes creating design workshop tools, facilitating public meetings, preparing online and community preference surveys, holding design charrettes and conducting workshops for clients and project stakeholders. She brings a background focused on identifying and managing community concerns and conflicts and documenting, writing and providing graphic design for the preparation of project planning reports. Kristin is experienced in managing communications with residences and businesses affected by construction projects to ensure proper access and other requirements requested by the local communities.

Contractor Team

Mark Magney, PE
Owner | Magney Construction
Mark has more than 40 years of diversified experience in general and heavy construction, projects ranging in size from $10 thousand to $25 million. His experience includes the estimating and management of projects to assure completion on time and within budget. Early career experience included working as a laborer, carpenter and quality control engineer and project superintendent. Mark was the contractor for the SEH designed Apple Valley Water Treatment Facility Expansion and the Lake Gilfillan augmentation system.

Gary Disch
General Superintendent | Magney Construction
Gary brings 35 years of diversified experience in general and heavy construction, projects ranging in size from $10 thousand to $28 million. His experience includes safety, construction and management of projects to assure completion on time. He has excellent communication and coordination with Owners, Engineers and Architects. Manages and updates AWAIR and all safety programs for Magney Construction, Inc.

Patrick Minger
Owner | Minger Construction
Patrick founded Minger Construction in 1984 and brings 38 years of experience in utility, trenchless construction, pump stations and site excavation. He has extensive experience with water conveyance system installation in the Twin Cities metro area. Recent projects include working with contaminated soil sites, as required for the installation of 18-24" pipe for the MCES Hopkins Interceptor – Contract F (St. Louis Park). For the Hennepin County TH 101 Reconstruction – forcemain reconstruction required installation of 24" forcemain underneath Grays Bay in Lake Minnetonka using directional drilling methods.

Luke Minger
President | Minger Construction
Luke brings 16 years of experience in a variety of construction projects including utility installation, trenchless construction, pump station construction and site excavation. Luke began working with Minger Construction in 2000 and currently oversees to the day-day operations of the company. Luke brings knowledge of multiple conveyance projects and will bring in the right team members to address the site specific needs of this project.

Jeff Geislinger
Owner | Geislinger & Sons
Jeff has 36 years of experience in construction. Jeff started with Barbarossa and Sons in 1980 as a laborer, then in 1984 to a foreman and by 1989 Jeff had progressed into a superintendent role until 2007 when Bob Barbarossa retired and dissolved Barbarossa and Sons. At that time, Jeff and his two brothers started Geislinger and Sons, Inc., where they construct residential and municipal sewer and water projects including deep sewer excavations, forcemains, watermains and lift stations. Jeff will bring his experience on large pipe projects and road construction from across the Midwest. Relevant firm experience includes: metro area projects such as the Hennepin County Road Construction CSAH 9 that involved installation of 24” sanitary sewer, 15-36” RCP storm sewer and 24” watermain; 48”-84” RCP storm sewers for West Fargo, ND; and 30” sanitary forcemain for the City of Marshalltown, IA.

Scott Geislinger
Superintendent | Geislinger & Sons
Scott started his career as a laborer for Barbarossa in 1981. In 1986 he became a foreman and in 1989 he was promoted to superintendent. He held this position until 2007 when he became a partner in Geislinger and Sons. Scott continues to perform superintendent duties on a daily basis. He has been the superintendent for MCES projects, such as the Mahtomedi interceptor improvements project. Scott will bring the experience of team members to address site specific features of this project.

Concept Project Description

The project consists of augmenting White Bear Lake with up to 2 billion gallons of water per year from East Vadnais Lake. A capacity of 2 billion gallons per year was required in the Request for Proposals and is consistent with historic annual augmentation rates. A brief discussion of the cost impact of a 1 billion gallon per year augmentation system is included in the Proposal section.

Treatment Assumptions

The costs and layouts in this proposal assume that physical screening (0.001" slot) of the augmentation water will prohibit the transfer of the veliger stage of the zebra mussel. It will also remove particulate matter of similar or greater size. To meet the project water quality goals, additional study is necessary to determine if other treatment technologies are required. This proposal does not include treatment for phosphorus or other constituents.

Augmentation System Components

The following sections describe the augmentation system components and design assumptions including the intake, filter building, pipeline, and outfall.

Intake

A 36" intake is located approximately 1,000 feet into East Vadnais Lake where it will draw water from a depth of 15 feet. A submerged screen is located on the intake (similar to a well screen). The maximum velocity of water in the intake pipe is approximately 1.9 ft/s. A small air pipe inside the intake pipe will be include to blow compressed air onto the screen to remove zebra mussels and other debris.

Filtration Building

The filtration building (Appendix C) is a 3,500 square foot building constructed in a small park on St. Paul Regional Water Services land on the south side of Vadnais Boulevard East. The augmentation water will enter a sump beneath the pumps by gravity. Features of the filtration building include:

- Two 3,500 gallon per minute, 200 hp, high efficiency, vertical turbine pumps with variable frequency drives
- Cavity wall masonry construction with brick exterior (to fit into park location)
- Hollow core and double tee precast concrete ceilings
- Fluid Engineering® filtration system with 6,000 gpm capacity
- Automatic pump controls and monitoring (SCADA)
- Control room, bathroom, and electrical rooms
- Overhead bridge crane for maintaining filters
- Overhead door for maintenance access
- Magnetic flowmeter
- Water connection to City system for backwash supply
- Backwash discharge piping
- Sanitary sewer connection

Augmentation Pipeline

A 24” augmentation pipe line exits the filtration building and has the alignment shown in Appendix C. The pipeline is approximately 4.2 miles long and travels through the Cities of Vadnais Heights, Gem Lake, and White Bear Lake. Design features and assumptions of the pipeline are as follows:

- Pipeline is 24” C900 PVC pipe
- Maximum water velocity of 4.3 ft/s
- 8 feet of cover to the top of the pipe
- Pipeline is under the road surface and not in right-of-way
- Half of the road will receive full depth reconstruction. The other half will be milled and overlaid with new bituminous. The entire road surface will be new.
- A bituminous path (8 ft wide) will be added along Centerville Road, between Edgerton Street and County Road E in Vadnais Heights
- Pipeline will be tunneled under County Road E
- At Interstate 35E, the pipeline will be tunneled under the railroad tracks and tunneled under Interstate 35E
- Pipeline will be tunneled under Highway 61 and White Bear Avenue

Outfall

A 24” outfall is located approximately 2,500 feet into White Bear Lake where it will discharge the water at a depth of approximately 15 feet. The majority of the outfall will be tunneled from a pit in White Bear Avenue.

Assumptions

The augmentation pipeline construction includes the following assumptions:

- Ramsey County will allow the pipeline under their road. Ramsey County would likely prefer the pipe be located in the right-of-way (not selected at this concept stage due to utility conflicts).
- The existing road construction is 6-inch bituminous with 12-inch gravel base roadway (i.e. not concrete under existing bituminous or likewise).
- Intake and outfall depths are appropriate. If water quality analysis changes the recommendations, it could affect the length of pipe and the outfall configuration.
- Costs for disposal of contaminated and unsuitable soils are based on the quantities identified in Appendix D. An allowance is also included in the Stage 2 cost table.
- A utility relocation allowance was included in the pipeline cost estimate and was based on maps provided by the utility companies through a Gopher State One Call design locate.
- The cost estimates are based on the alignments in Appendix C and quantities in Appendix D.

Proposal

We offer a Design-Build Proposal to complete the preliminary through final engineering and perform the construction using a two-step approach:

- Stage 1: Final Design and Final Costs (Pre-Construction)
- Stage 2: Construction and Startup

One goal of Stage 1 is to reduce the level of uncertainty in the Project's design requirements and the Project costs. To achieve this goal, SEHDB will conduct additional water sampling, perform water quality modeling and capacity modeling, finalize pipe alignment, survey the route, and perform environmental and geotechnical investigations. Stage 1 includes engineering to complete the design and prepare the Final Price Proposal.

The goal of Stage 2 is to secure permits, execute the construction, and complete the Project start up.

The costs and layouts in this proposal are based on a 2 BGY capacity system conveying water from East Vadnais Lake to White Bear Lake. Treatment is provided by a filtration facility designed to remove the veliger stage of the zebra mussel and particulate matter of similar or greater size. It is not designed to remove phosphorus or other constituents.

Stage 1 – Scope of Work

The following sections describe the scope of work for Stage 1 of this proposal. The final deliverable of Stage 1 will include the Final Price Proposal to complete construction and start-up of the Project (Stage 2).

Task 1.1 – Project Management

SEHDB will manage the overall project including the following activities:

- Conduct and record monthly progress meetings with Project stakeholders and Owner (up to 36 meetings)
- Track design progress and coordinate the design-build subcontractor tasks
- Develop and maintain Project's master schedule
- Prepare invoicing and manage disbursements

Task 1.2 – QA/QC

Each of the deliverables in Stage 1 will receive a complete Quality Assurance/Quality Control (QA/QC) review by an independent technical reviewer that is not involved in the project. QA/QC checklists will be prepared to ensure that comments are addressed.

Task 1.3 – Water Quality Analysis

Water quality impacts due to the proposed augmentation process will be modeled in East Vadnais Lake and White Bear Lake. Additional water quality sampling will be conducted to build the model as described in the Appendix A memorandum. These processes will be evaluated through the use of a two-dimensional model to evaluate design scenarios and long term impacts of augmentation operation. Two likely model choices include CE-QUAL-W2 or AEM3D which can handle stratification and sediment diagenesis. The water modeling activities will include data collection, sampling, building and calibrating the model, and report preparation.

Task 1.4 – Routing and Capacity Analysis

The forthcoming USGS report on surface water/groundwater interaction in the region will be reviewed and an analysis will be performed to determine the recommended capacity of the augmentation system. In addition, although a route has been assumed for this proposal, other potential routes exist. Meetings will be held with stakeholders to finalize the augmentation pipeline route. Stakeholders include the cities of Vadnais Heights, Gem Lake, and White Bear Lake; Ramsey County, St. Paul Regional Water Services, and BNSF railroad.

Task 1.5 – Facilitate Environmental Review

SEHDB will assist the responsible government unit (RGU) in facilitating environmental review by providing water quality results and design details. SEHDB will attend environmental review meetings for purposes of describing the project. Environmental review activities and document preparation shall be by others.

Task 1.6 – Preliminary Design

Once the water quality analysis has been completed, pipeline route has been finalized, capacity has been determined, and the level of environmental review has been established, SEHDB will conduct design activities including:

- Phase I Environmental Site Assessment (ESA) of the entire pipeline route and filtration facility site.
- Phase II ESA. Based on the results of the Phase I ESA, a Phase II ESA will be conducted to identify the presence and extent of potential soil and groundwater contamination. Because the extent of the Phase II ESA work is not known, an allowance will be established.
- Contact Gopher State One Call to mark utilities.
- Perform a topographic survey of pipeline route and filtration building site.
- Identify preliminary easement requirements.
- Conduct a geotechnical investigation, including the following:
  - 46 borings to 15’
  - 9 borings to 30’
  - Traffic control during drilling
  - Laboratory testing
  - Geotechnical report
- Prepare 30% design documents, including the following:
  - Filtration building layout
  - Architectural renderings of filtration building
  - Intake and outfall layouts
  - Pipeline alignment
  - Preliminary easement analysis
- Review 30% design documents with stakeholders including Owner, City of Vadnais Heights, City of Gem Lake, City of White Bear Lake, Ramsey County, and regulatory agencies.

Task 1.7 – Final Design

Upon stakeholder acceptance of overall Project components including pipeline alignment, construction methods, and building features and aesthetics, SEHDB will complete the design. Final design will be completed in Stage 1 to reduce the amount of construction contingency required in the Final Price Proposal.

- Prepare 60% design documents including plans, specifications, and cost opinion
- Review 60% design documents with Owner
- Prepare final plans and specifications necessary for the Final Price Proposal
- Assist Owner in obtaining easements (Note that the Stage 1 proposal does not include costs of procuring easements)

Task 1.8 – Prepare Construction Price Proposal

At the conclusion of Stage 1, SEHDB will prepare the Final Price Proposal to manage, construct and startup the Project (Stage 2).

Stage 1 Cost Proposal

The table below presents our estimate of Stage 1 services. Appendix D contains the line item costs for the pipeline and the filtration facility.

Task	Description	Proposed Cost
1.1	**Project Management and CM Fees**	$193,000
1.2	**QA/QC**	$30,000
1.3	**Water Quality Analysis**	$415,000
1.4	**Routing and Capacity Analysis**	
	Capacity Analysis	$10,000
	Routing Analysis	$30,000
1.5	**Facilitate Environmental Review***	$10,000
1.6	**Preliminary Design**	
	Phase I ESA	$30,000
	Phase II ESA (allowance)	$50,000
	Topographic Survey	$40,000
	Geotechnical Investigation	$150,000
	Preliminary Easement Review	$10,000
	Preliminary Design	$400,000
1.7	**Final Design**	$800,000
	Undeveloped Design Details	$300,000
1.8	**Prepare the Final Price Proposal**	$10,000
	Total Stage 1 Fees:	**$2,478,000**

*Environmental review services performed by others. Costs by others are not included and could range from $50,000 - $2,000,000. SEHDB will provide design details for Environmental Review performed by others.

Stage 2 – Scope of Work

When the final design and the Final Price Proposal have been established under Stage 1, SEHDB will secure final permits, place equipment orders, execute the construction, and complete the systems startup of the Project.

Task 2.1 – Construction Management

Throughout the construction and startup phases of the project, the SEHDB team will perform the following tasks:

- Develop and manage the Project's Procurement Schedule
- Conduct the Construction Kickoff Meeting with all contractors and Project stakeholders
- Manage contract logs, insurance logs and performance and payment bond logs
- Conduct and record all Owner/Contractor Meetings and Owner/Designer Meetings
- Develop and manage Quality Control and Quality Assurance Plans
- Develop and manage Project Safety Plans, OSHA logs, and emergency plans
- Develop and manage Site Security Plan
- Maintain Request for Information Logs and Change Order Logs
- Maintain Master Schedule including tasks for Owner, Design Team CM, and Contractors
- Coordinate applications for payment, collection of lien waivers, and contractor disbursements

Task 2.2 – Construction Engineering, Observation, Testing

Throughout the construction and startup phases of the project, the SEHDB team will perform the following construction engineering tasks:

- Review and manage shop drawing and product submittal logs
- Perform special structural observation
- Provide full time construction observation
- Coordinate soils and materials testing
- Prepare record plans

Task 2.3 – Construct Pipeline

SEHDB will perform the following tasks for construction of the augmentation pipeline, intake, and outfall:

- Obtain construction permits
- Perform soils and bituminous testing
- Construct intake pipe and screen into East Vadnais Lake
- Construct pipeline, including traffic control and restoration with bituminous path
- Construct outfall into White Bear Lake

Task 2.4 – Construct Filtration Building

SEHDB will perform the following tasks for construction of the filtration building:

- Obtain building permits
- Construct filtration building

Task 2.5 – Startup and Post Construction

SEHDB will perform the following startup and post construction activities:

- Conduct and disburse all punch lists, manage punch list logs and manage systems start up
- Coordinate, manage and record all systems startups
- Conduct contract closeouts, collect as-built drawings, and assemble warranty & maintenance books

Stage 2 Cost Estimate

The Stage 2 cost estimate is for purposes of establishing a project budget and is not the Final Price Proposal. The Final Price Proposal for Stage 2 will be established at the conclusion of Stage 1.

Task	Description	Proposed Cost
2.1	**Construction Management**	**$1,900,000**
2.2	**Construction Engineering, Observation, Testing**	**$1,500,000**
2.3	**Construct Augmentation Pipeline**	
	Contractor Mobilization/Supervision	$1,200,000
	Pipeline and Restoration	$10,924,000
	Tunnels	$2,787,000
	Intake/Screen	$2,935,000
	Outfall	$2,875,000
	Pipeline Subtotal:	$20,721,000
	Pipeline Contingency (20%):	$4,144,000
	Unknown Subsurface Conditions	$1,000,000
	Pipeline Total:	**$25,865,000**
2.4	**Construct Filtration Building**	
	Contractor Mobilization/Supervision	$330,000
	Site Work	$202,000
	Building Components	$1,007,000
	Process Components/Piping/Filters/Electrical	$2,416,000
	Filtration Building Subtotal:	$3,955,000
	Filtration Building Contingency (20%):	$791,000
	Filtration Building Total:	**$4,746,000**
2.5	**Startup and Post Construction**	**$50,000**
	Stage 2 Total:	**$34,061,000**
	Cost at Midpoint of Construction - 2024 (assume 2.5% inflation)*:	**$40,488,000**

*Does not include costs for easements, permits, environmental review and owner's legal and administration.

Easements

The project will require the purchase of temporary and permanent easements. In addition, the proposed filtration facility is located on St. Paul Regional Water Services land which will require a lease. The proposed pipeline alignment is primarily under the roadway which would require minimal easements; however, if the alignment changed, significant easement costs could be incurred. The cost of the easements could range from **$300,000 to $2,000,000**. The cost of easement writing and procuring easements is not included in the SEHDB proposal.

Environmental Review

The environmental review process can be expensive and time consuming depending on the type of project, the extent of environmental impacts anticipated, the project complexity, and the extent of public participation. Small Environmental Assessment Worksheets can be completed in a few months for less than $20,000. Large-scale Environmental Impact Statements can take several years and accumulate hundreds of thousands of dollars in costs.

With the augmentation project, we anticipate that if environmental review is determined to be needed, the level of effort will likely be in the hundreds of thousands of dollars, and will require at least one calendar year to complete. This project is also likely to require public participation, which can generate a significant volume of commentary. As part of the environmental review process, the Responsible Government Unit (RGU) is obligated to provide a Response to Comments, which can easily be equal to the effort to prepare the initial document, depending on the volume and diversity of comments received. All of this should be carefully weighed, and incorporated into the anticipated project costs and schedule. The Project Approach section provided additional items for consideration in the environmental review process.

Our proposal assumes the environmental review services are provided by others. This work must be considered in the total project costs. We will provide support as identified in our scope of work.

Total Capital Project Costs

The table below lists the SEHDB and other owner estimated costs based on the assumptions detailed in this proposal.

Item	Cost
SEHDB	
Stage 1	$2,478,000
Stage 2 (at midpoint of construction)	$40,488,000
SEHDB Total:	**$42,966,000**
Environmental Review	$50,000 - $2,000,000
Easements/Permits	$350,000 - $2,000,000
Owner Legal/Admin	$1,000,000
Project Total:	**$44,366,000 - $47,966,000**

Operation and Maintenance Costs

The Owner of this project will incur ongoing operation and maintenance (O&M) costs for the augmentation system. These costs include purchasing water from SPRWS, electricity, labor, equipment repair, heat, city water, and insurance. The following table identifies the estimated annual O&M costs and assumptions. The O&M costs are based on pumping 2 billion gallons of water per year.

Item	Annual O&M Cost	Assumption
Purchase Water from SPRWS	$200,000	$0.10 per 1,000 gallons
Electricity	$110,000	230 kW of pumping and building load, $0.08/kWh, 8 months continuous operation
Operator	$43,000	$90/hr 12 hours per week, 34 weeks (pumping) 4 hours per week, 18 weeks (not pumping)
Equipment Maintenance	$40,000	2% of equipment cost ($2,000,000) annually
City Water	$10,000	20,000 gallons of water per day for backwashing while pumping @ $2/1,000 gallons
Heat	$5,000	
Insurance	$5,000	
Total Annual O&M:	**$413,000**	

It should be noted that most of the O&M costs are directly proportional to the amount of water that is pumped. The augmentation system may not need to be operated at 2 billion gallons every year.

Cost Impact of 1 Billion Gallon per Year Augmentation System

If the capacity of the augmentation project were reduced to 1 billion gallons per year (in lieu of 2 billion gallons), the project components would be smaller and somewhat less expensive. Instead of a 24" augmentation pipeline, a 16" augmentation pipeline could be constructed. Even though the pipeline would be smaller, the construction methods and restoration would not change. The only cost savings would be in the pipe material and smaller diameter tunnels. The filtration building would also be smaller. The estimated cost savings of a 1 billion gallon per year augmentation project would be approximately $4,000,000.

Potential Alternate Route

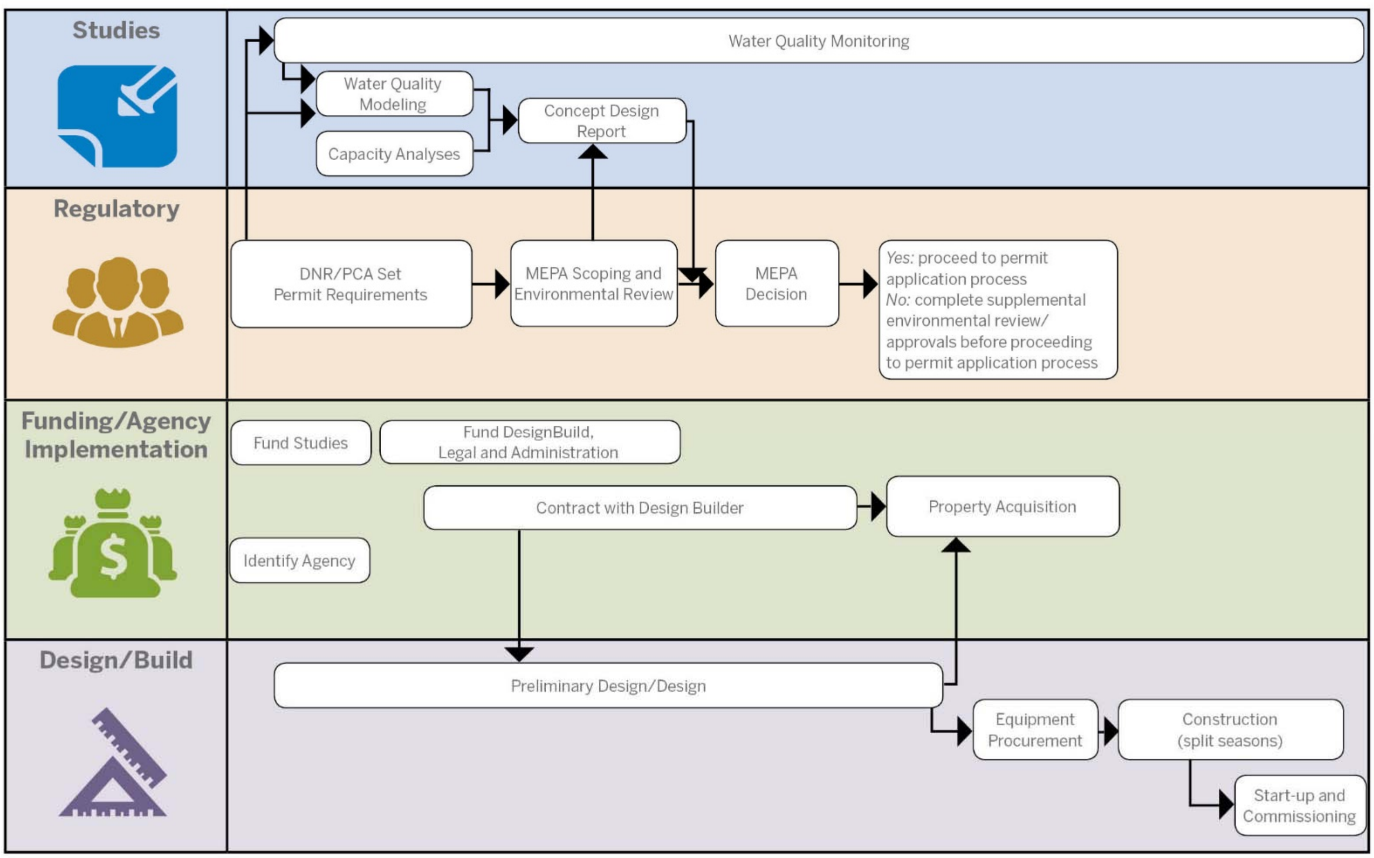
The proposed pipeline alignment is along existing roads which requires extensive road reconstruction. There is a BNSF railroad alignment that runs from the proposed filtration basin all of the way to Highway 61 in White Bear Lake. If the augmentation pipeline were routed along the BNSF railroad alignment, up to $3,000,000 in road removal and reconstruction could be avoided. Communications with BNSF Railroad in a previous augmentation study by SEH indicated that they would require the pipe to include a secondary steel casing pipe the entire length, which made this route more expensive.

Schedule

Implementation Considerations

It was important for us to understand the full implementation process to develop the proper scope of service and to adequately address a project schedule. In the Project Approach section we identified items needing more project definition to provide a cost estimate with reasonable certainty. Our scope of services provided in the Proposal section detailed the tasks for preliminary analysis/design that need to be performed prior to moving to final design and providing a final project cost.

The implementation flowchart below shows the relationship of major project elements for the proposed augmentation project. We envision several studies including: water quality monitoring, water quality modeling and updated capacity analyses (to coordinate with the completed USGS and other models). Completion of this work requires knowing any permit requirements for water quantity or quality. With the results from these studies and water permit requirements established, and preliminary design investigations of subsurface conditions, environmental assessments and utility mapping complete, a facility plan or concept design report can be completed, establishing a preferred system configuration and system requirements. This document will provide information necessary for the Minnesota Environmental Policy Act (MEPA) process, funding needs and design-build procurement process.



As described in the Project Approach and Proposal sections, if this project triggers an Environmental Impact Statement (EIS), years could be added to the schedule. While this flowchart does not indicate ‘time duration’ – typically, environmental review (e.g. an environmental assessment worksheet (EAW), or if needed, scoping EAW for an EIS) would be completed in conjunction with a facility plan or a concept design report. The outcome of the MEPA process would dictate timing of the subsequent implementation steps.

The funding and contractual process to perform the engineering and construction can be handled in several ways. In our proposal we offer a two-stage process that includes studies through project startup. We also identify an alternative delivery processes with public-private partnerships. The sooner the funding and owner are established, the sooner the project can be initiated with a focused effort.

Milestones

The following tables present a potential schedule for the Stage 1 and Stage 2 project. The project timeline could be expedited by starting the water quality analysis in 2017. The level of environmental review necessary can also greatly affect the schedule.

Stage 1 Proposed Schedule

Task	Start Date	Completion Date	Duration
Water Quality Analysis	July 2018	December 2020	30 months
Environmental Review (by others)	January 2021	June 2022	18 months
Routing and Capacity Analysis	July 2020	December 2020	6 months
Preliminary Design	January 2021	December 2021	12 months
Final Design	July 2022	February 2023	8 months
Construction Proposal	March 2023	April 2023	1 month

Stage 2 Proposed Schedule

Task	Start Date	Completion Date	Duration
Construct Pipeline	May 2023	November 2024	18 months
Construct Filtration Building	April 2024	March 2025	12 months
Startup	April 2025	May 2025	1 month

Proposed Schedule

Task	Start - Completion Dates	2018	2019	2020	2021	2022	2023	2024	2025
Stage 1									
Water Quality Analysis	Jul 2018 - Dec 2020								
Environmental Review (by others)	Jan 2021 - Jun 2022								
Routing and Capacity Analysis	Jul 2020 - Dec 2020								
Preliminary Design	Jan 2021 - Dec 2021								
Final Design	Jul 2022 - Feb 2023								
Construction Price Proposal	Mar 2023 - Apr 2023								
Stage 2									
Construct Pipeline	May 2023 - Nov 2024								
Construct Filtration Building	Apr 2024 - Mar 2025								
Startup	Apr 2025 - May 2025								

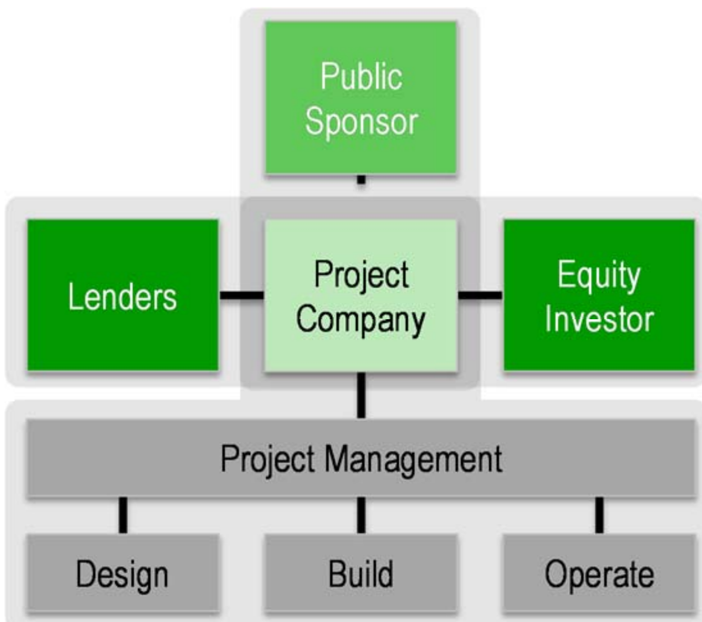
Funding and Operating Alternative

Denver-based Broe Infrastructure is an experienced project developer and capital partner that brings decades of quality and discipline to the infrastructure market. Broe Infrastructure executes projects using a public-private partnership (P3) delivery platform, as well as other privately financed delivery platforms, in the water, energy, transportation and other infrastructure sectors. The Broe Group currently directs a portfolio of assets valued at over US$5 billion, built over four decades of managing risk and investing in communities across the country.

Public-Private Partnerships (P3) are contractual agreements between a public agency and a private sector entity that allow for greater private sector participation in the financing and delivery of infrastructure projects. The bundling of a project's design, construction, and financing elements encourages efficiencies that are not possible through a delivery model that pursues each element separately. In addition, a P3 delivery model allows risks to be allocated to the party most capable of managing them, typically resulting in the transfer of many project risks from the Public Sponsor (i.e., DNR) to the private partners.

Private Financing Structure

Through a transparent and stepwise fashion, Broe Infrastructure works with the Public Sponsor or agency to determine the optimum project delivery and financing structure requirements. A typical finance, delivery and commercial structure is shown below. This approach aligns the interests of the private partner with those of the public entity, guaranteeing a win-win solution.



The structure includes a contract between the Public Sponsor and private partners, represented by a project company whose purpose is to finance and deliver the project.

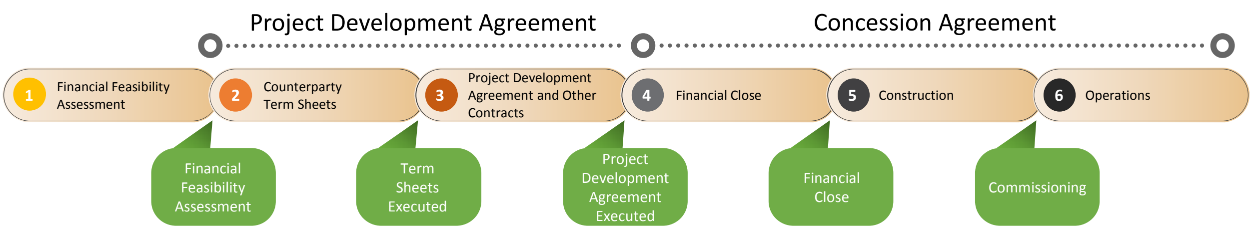
Source of Private Capital

Private institutional investors represent a major source of capital to finance public infrastructure assets. These institutional investors include pension funds, insurance companies and university endowments, and they typically invest in a portfolio of diverse financial and physical assets, including infrastructure.

How Can Financing and Operations be Accomplished for White Bear Lake?

Through the Progressive P3 process, Broe Infrastructure, SEHDB and the Public Sponsor work together to assess the commercial, financial, and technical questions associated with the use of a P3 alternative delivery platform. The Progressive P3 process allows the Public Sponsor to gain a better understanding of the expected outcomes from using an alternative delivery platform for a specific project, prior to making the final commitment to deliver the project as a P3.

The Progressive P3 process begins with an analysis of the life-cycle cost of service from the infrastructure asset using a public funding approach, and the cost of service using the privately financed, P3 delivery platform that is under consideration. This allows the Public Sponsor to assess project financial, commercial, and performance scenarios using alternative delivery platforms.



If the initial analysis shows that a P3 alternative delivery platform appears to meet the goals of the Public Sponsor, then the private partner works with the project team and the Public Sponsor to determine the cost and technical features of project delivery for the infrastructure asset.

As development activities advance, more details are defined regarding engineering, potential construction methods, permitting and environmental studies, financial analysis, costing models, commercial agreements, and terms with equipment and service providers. Some development activities, such as environmental studies and permitting, may be performed by the Project Sponsor or its consultants, while other development activities are undertaken and/or supported by the private partners.

Once the project proceeds to financial closing, the P3 project company is capitalized and in a position to execute and operate the project over the term of the Concession Agreement. At the end of that term, in most cases, the infrastructure asset is transferred to the ownership of the Public Sponsor.

Risk Management

A key benefit of a Public-Private Partnership is the transfer of risk from the public sector to the private project company under the contract to finance and deliver the infrastructure asset. By taking on responsibility for managing key risks, the private partner brings significant value to the public sector partner.
The Concession Agreement that embodies the commercial and legal terms of the partnership typically specifies the pricing elements for the services to be delivered from the asset over the life of the agreement. The private project company is therefore under contract to deliver infrastructure services at the negotiated prices, and it is up to the private project company to manage most risks that might otherwise

Appendices

Appendix A – Water Quality Memorandum

Appendix B – Permitting Memorandum

Appendix C – Detailed Alignments and Building Layouts

Appendix D – Detailed Cost Estimates

Appendix A — Water Quality Memorandum

Technical Memo

To: Chris Larson, Project Manager SEH, Inc.

From: Joe Bischoff, Wenck Associates, Inc.
Brian Beck, Wenck Associates, Inc.

Date: March 29, 2017

Subject: Water Quality Considerations for White Bear Lake Augmentation

Introduction

One of the key risks associated with augmenting water levels in White Bear Lake using water from the Saint Paul Regional Water System, specifically East Vadnais Lake, are potential water quality impacts. The purpose of this technical memorandum is to review water quality data in the two lakes and evaluate water quality risks associated with augmenting White Bear Lake with water from East Vadnais Lake. The following tasks were completed for this scope of work:

i. Review water quality data from East Vadnais Lake and White Bear Lake
    a. Review phosphorus data from East Vadnais Lake and White Bear Lake
    b. Review availability of other water quality data for the Mississippi River, St. Paul Regional Water Supply (SPRWS) chain, and White Bear Lake.

ii. Develop a modeling approach to support the design of the augmentation facility

iii. Develop a modeling approach to assess long term impacts to the SPRWS chain of lakes and White Bear Lake under long term operation of the augmentation facility.

Saint Paul Regional Water System

The Saint Paul Regional Water System (SPRWS) supplies drinking water to the City of Saint Paul and neighboring communities. SPRWS manages a complex chain of lakes as a raw water source for drinking water (Figure 1). To manage water demands, water can be withdrawn from the Mississippi River, treated with a coagulant and then transported through a chain of lakes. SPRWS actively manages water quality in these lakes to protect raw water quality for water treatment. However, as the amount of Mississippi River water drawn into the system is increased, adjustments may be required to maintain the high quality raw water currently in the chain of lakes.

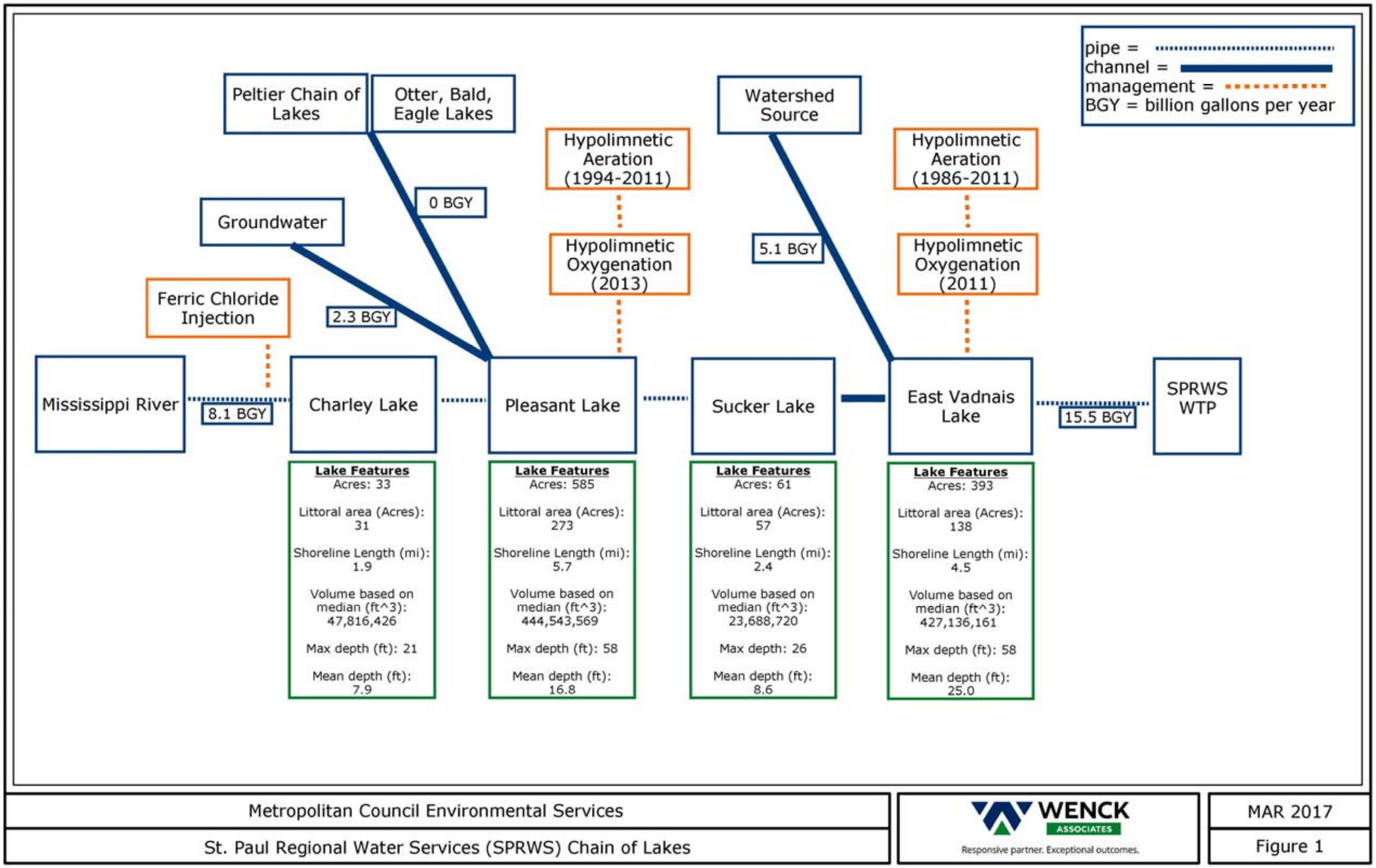


Figure 1. Diagram of St. Paul Regional Water Services chain of lakes (Flow Chart from MNDNR 2016).

Phosphorus Data from East Vadnais Lake and White Bear Lake

The purpose of this review is to provide a basic risk assessment of potential water quality impacts from transferring water from East Vadnais Lake to White Bear Lake to augment water levels. The primary concern for White Bear Lake is increased algal growth due to additional phosphorus loading from East Vadnais Lake. The focus of this analysis is on phosphorus since it is typically the limiting element that drives algal productivity in freshwater lakes.

The goal of the augmentation project is to maintain White Bear Lake levels without significantly increasing surface water total phosphorus (TP) concentrations. The lake epilimnion (surface water) is the depth where algal growth occurs. Therefore, increasing surface water TP concentrations would likely result in greater algal productivity. Median total phosphorus concentrations in the surface of East Vadnais Lake (25 µg/L) are significantly higher than median phosphorus concentrations in the surface of White Bear Lake (15 µg/L; Figure 2 and Figure 3). Median hypolimnetic (bottom water) concentrations are lower in East Vadnais Lake (30.5 µg/L) than White Bear Lake (40 µg/L).

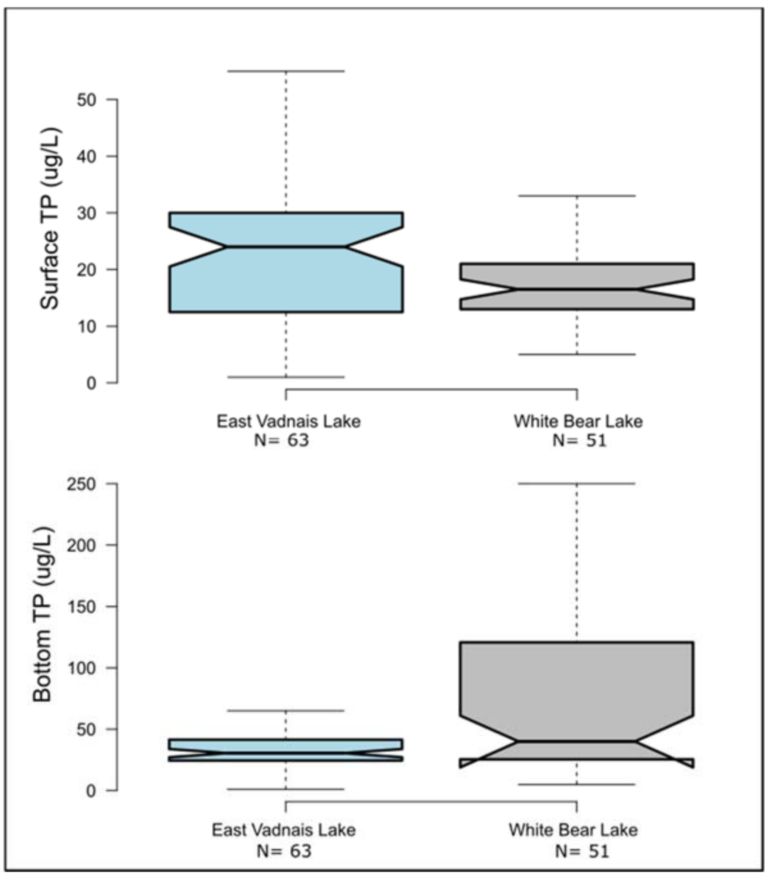


Figure 2. Five year (2011-2016) surface water (top panel) and bottom water (bottom panel) total phosphorus boxplots for East Vadnais Lake and White Bear Lake. Water quality monitoring period for White Bear Lake and East Vadnais Lake is from April to October.

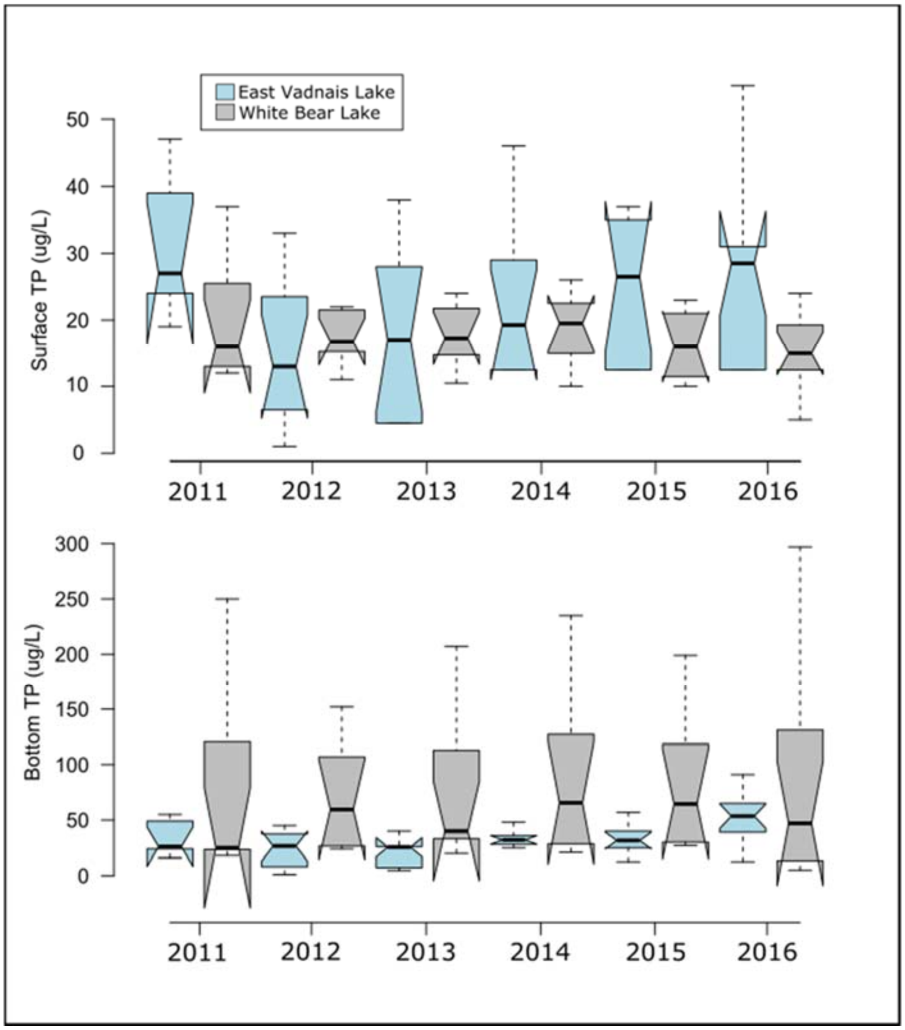


Figure 3. Annual total phosphorus boxplots for East Vadnais Lake and White Bear Lake surface (top panel) bottom water (bottom panel). Water quality monitoring period for White Bear Lake and East Vadnais Lake is from April to October.

Surface Water Augmentation

An initial water quality analysis, summarized by boxplots, suggests that using surface water from East Vadnais Lake for water level augmentation may cause increased phosphorus concentrations in White Bear Lake (Figure 2 and 3). It is important to note that augmentation water will only be a fraction of the total overall water budget in White Bear Lake. We conducted a basic phosphorus mass balance analysis based on augmentation volume from East Vadnais Lake and corresponding the epilimentic volume in White Bear Lake. Table 1 contains the phosphorus mass balance augmentation results, which suggest that the phosphorus concentrations could increase from 16.5 to 19 µg/L if 5 ft of water level augmentation occurred. We recommend a more detailed modeling exercise to understand total phosphorus cycling impacts in White Bear Lake. However, this analysis does indicate that the potential exists for phosphorus concentrations to increase in White Bear Lake if surface water from East Vadnais Lake is used for water level augmentation.

Table 1. White Bear Lake augmentation scenarios based on mass balance total phosphorus additions from East Vadnais Lake to White Bear Lake. These calculations assumed that augmentation water from East Vadnais would only mix with the mixed surface layer of White Bear Lake (upper 10 meters)

White Bear Lake Augmentation Depth (ft)	White Bear Lake Final Phosphorus Concentration (µg/L)
0	16.5
1	17.1
2	17.6
5	19.0
7	19.8
10	20.9
12	21.5
15	22.2

Hypolimnetic Water Augmentation

Another option is to use bottom water from East Vadnais Lake to augment water levels in White Bear Lake by injecting East Vadnais hypolimnetic water (areas deeper than 8 meters) into hypolimnetic waters of White Bear Lake (areas deeper than 15 m). Since hypolimnetic phosphorus concentrations in East Vadnais Lake are lower than White Bear Lake, the overall effect would be to lower hypolimnetic TP concentrations in White Bear Lake. However, care must be taken to avoid mixing White Bear Lake during its stratified period or entrainment of bottom phosphorus may occur.

Augmentation of White Bear Lake hypolimnetic water must also take temperature into account since White Bear Lake regularly stratifies. This means that warm, low density surface waters in White Bear Lake do not mix with cool, high density bottom waters during the summer and fall. If bottom water augmentation is used for White Bear Lake augmentation, then the temperature of water from East Vadnais Lake must be a similar temperature or cooler than the bottom water of White Bear Lake. Temperature profiles from East Vadnais Lake and White Bear Lake indicate that bottom water from East Vadnais Lake (average = 8.7 ºC) are marginally cooler than the bottom waters of White Bear Lake (9.3 ºC; Figure 4). More detailed modeling is required to fully understand the physics of thermal mixing properties in White Bear Lake; however, it appears that hypolimnetic augmentation is feasible without artificially mixing White Bear Lake.

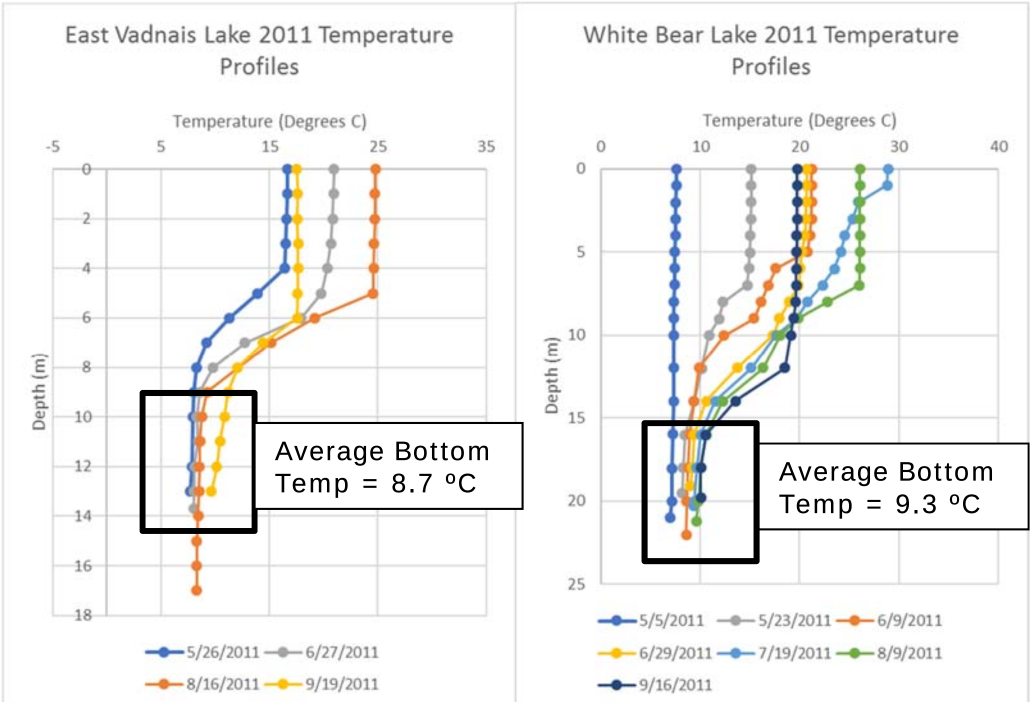


Figure 4. Temperature profiles from East Vadnais Lake (Left Panel) and White Bear Lake (Right Panel) from 2011.

Other Water Quality Risks

Other water quality risks exist, especially since the SPRWS will likely have to draw additional water from the Mississippi River into its supply chain to make up for transferred water. Therefore, we ultimately need to know changes in water quality in East Vadnais Lake since it will be the primary source for water augmentation. A risk assessment can be developed using Mississippi River water quality data. However, we cannot assess the fate and transport of contaminants through the SPRWS chain of lakes without monitoring data on the contaminants of concern and some basic mass balance modeling. We recommend the completion of a risk assessment using Mississippi River monitoring data to screen for potential issues. The risk assessment would screen the Mississippi River source water for constituents in high enough concentrations to pose a threat to the source water and then develop a mass balance for the chain of lakes to determine risk under varied flow conditions.

To facilitate the screening, we developed a list of parameter groups, available data in the Mississippi River, fate and transport considerations, and potential issues. It is important to note that this list is not comprehensive and data in the Mississippi River were not evaluated for completeness or detection limits. However, it provides some thoughts on potential issues that should be evaluated during the system design. The focus of this monitoring will be on contaminants (metals and organics), aquatic invasive submerged vegetation, and zebra mussels.

Table 2. Risks associated with each parameter group sampled in the Mississippi River

Parameter Group	Data Availability (Mississippi River)	Fate and Transport	Potential Impacts and Mitigation
Bacteria	4 bacteria parameters sampled from 1976 to 2015	Some settling and dilution may occur in early lakes	The SPRWS lakes are recreational and the Mississippi River may exceed bacteria standards periodically to protect human health. However, it is unlikely to be an ongoing issue in Sucker and Vadnais Lakes (a few exceedances on the standard did occur in East Vadnais Lake).
General Chemistry	6 general chemistry parameters have been sampled from 1976 to 2015	Hardness in the Mississippi River and the Water Treatment Plant are similar (around 160 mg/L as CaCO3), but one sample in White Bear Lake suggests it is much lower (83 mg/L as CaCO3) Surface water temperatures are not significantly different in the River and White Bear Lake	Hardness affects fish habitat and inflow water may increase the hardness of White Bear Lake. A mass balance to predict future lake hardness should be conducted. While temperatures appear similar in source water lakes and White Bear Lake, the depth of withdrawal and discharge is critical to prevent artificial mixing or destratification.
Nutrients and Phytoplankton	28 nutrient and phytoplankton parameters have been sampled from 1976 to 2015	Organic and particulate nutrients will settle out in Charley Lake and dissolved constituents may be removed through reaction and settling processes a result of ferric chloride injection. MCES memorandum demonstrated significant differences in TP between the potential source water and White Bear Lake.	Increased flow in the chain of lakes may decrease the ability of the lakes to settle out phosphorus. However, the increased P mass may increase sediment P concentrations leading to sediment P release and ultimately increased lake management (increased iron dosing and oxygenation in more lakes). TP may increase in White Bear Lake since Sucker Lake and Vadnais Lake have higher TP concentrations (25-32 µg/L) than White Bear Lake and TP may increase in Sucker Lake and East Vadnais Lake long term with increased Mississippi River water (72 µg/L). Concentrations are seasonally higher suggesting a greater impact in the growing season. Nutrients can be removed through treatment (which is part of SPRWS' current practice); however, these are low levels which may increase the cost of removal.

Parameter Group	Data Availability (Mississippi River)	Fate and Transport	Potential Impacts and Mitigation
Oxygen and Oxygen Demand	20 parameters have been sampled	Most biological oxygen demand (BOD) will settle out in Charley or Pleasant Lake.	Although data were not reviewed, increases in oxygen demanding substances in the chain can result in greater doses of oxygen to the hypolimnion and the need for oxygenation in other lakes.
Ions	12 ionic substances or conductivity have been collected from 1976 to 2015	Most ions of concern are conservative and will flow through each system, however, they may interact with sediments. Median sulfate concentrations in Mississippi River are 16 mg/L, which is higher than sulfate concentrations measured by USGS in White Bear Lake of 3.9 mg/L. If this translates to increased sulfate concentrations in East Vadnais Lake and White Bear Lake, the need to consider fish consumption advisories for mercury may be required.	Elevated sulfate can increase methylmercury if the receiving system is sulfate limited (< 5 mg/L sulfate). Sulfate removal is difficult and may require reverse osmosis. Elevated sulfate may increase internal loading by scavenging free iron. Sulfide scavenging of iron can be mitigated by increased iron dosing in SPRWS.

Parameter Group	Data Availability (Mississippi River)	Fate and Transport	Potential Impacts and Mitigation
Metals/Trace	15 metals sampled in MS River quarterly over 10 years for 40 samples	Metals associated with particulates may settle in Charley Lake while dissolved metals will flow through each lake until they become associated with particulate matter or are taken up by biota. Long term buildup of metals in sediments from increased Mississippi River inflows may lead to rerelease of metals in the long term. The median concentration of iron in the Mississippi River (260 µg/L) is similar to historic iron concentrations in White Bear Lake (275 µg/L). It is unclear how injection of ferric chloride to the chain of lakes system impacts downstream iron concentrations but the drinking water standard for iron is 300 µg/L and EPA criterion for aquatic life is 1,000 µg/L	Increased metal concentrations in sediments can lead to aquatic toxicity in macroinvertebrates, fish and plants that interact with the sediments. The lakes earlier in the chain are at the greatest risk. Redox sensitive metals may diffuse into the water column and increase metal concentrations in the source water over the long term. A review of metals in the Mississippi River should be conducted to assess risk. Manganese and iron would decrease the amount of phosphorus released from sediments. Sediment anoxia may result in sediment release of metals. Metals previously deposited through particulate settling may re-release during periods of anoxia. This may result in increased metal toxicity for macroinvertebrates and fish.
Organics Contaminants	102 Organic parameters were sampled since 1981 or 1993 depending on parameter	Organic contaminants typically are strongly adsorbed to particulates. Most will settle out as particulate material in Charley Lake or Pleasant Lake.	May result in high sediment organic contaminant concentrations that may impact lake biota. Polycyclic aromatic hydrocarbons (PAHs) are regularly a concern for stormwater pond dredging projects and may build up in chain of lake sediments.

Parameter Group	Data Availability (Mississippi River)	Fate and Transport	Potential Impacts and Mitigation
Invasive Species	N/A	The SPRWS provides a conduit for invasive species to move from the Mississippi River into the source water chain of lakes.	While the current study focuses on filtration to prevent zebra mussel veligers from moving from the source water lakes to White Bear Lake and is likely protective of all species, it does not address risk to the entire chain and does not address other potentially small species such as the spiny water flea. A review of all species is necessary to ensure filtration is adequate.

Water Quality Modeling Analysis

Purpose

There are two primary purposes for conducting water quality modeling in the SPRWS chain of lakes, which include:

- Building a water quality model to support the design of the White Bear Lake augmentation system to minimize water quality impacts
- Expanding the design level model to predict water quality changes in the SPRWS chain of lakes to minimize long term water quality impacts.

The purpose of a design level model is to support the design of the augmentation system including inflow and discharge pipe location and depth, size, and type of intake and discharge system, and any other water quality mitigating design criteria. The design model will be used for short-term estimates of the impact of design options on water quality and physical lake processes.

The purpose of an operational level model for the SPRWS is to forecast long term changes in water quality in the SPRWS chain of lakes and White Bear Lake. Long term impacts may occur due to increased flows to the chain of lakes from the Mississippi River. For example, increased metal concentrations from the Mississippi River may initially be mitigated by settling; however, sediment release of dissolved forms of the metals may increase over time as sediment concentrations increase. Modeling efforts can provide insight into long-term changes in nutrient cycling, sediment diagenetic processes, water column contaminant changes (metals and organics), and thermal stratification.

Model Specifications

The design level model will need to incorporate nutrient cycling, primary productivity, dissolved oxygen, and thermal stratification. Some commonly used lake water quality models are presented in Table 3. BATHTUB is not capable of modeling to the required specifications but it has been provided for reference due to its wide acceptance. The design level model will focus on potential nutrient cycling and physical mixing changes in White Bear Lake because of water level augmentation from East Vadnais Lake. Therefore, all models besides BATHTUB and DYRESM-CAEDYM provide inputs that could support the design level modeling effort.

The primary difference between the operational level model and design level is the need to include long term changes in sediment diagenesis and contaminant transport. The design model is focused exclusively on developing design parameters based on current water quality conditions. Therefore, nutrient dynamics, redox dynamic, and stratification are the only necessary components to assess. The operational level model needs to assess the long-term impact on nutrient dynamics, redox process, stratification, and contaminant transport to predict long term changes in the SPRWS chain of lakes and ultimately the raw water used to augment White Bear Lake. Therefore, the model used for operational level modeling analysis must take into account settling and burial of organics and inorganics, fate and transport of contaminants, and changes in sediment chemistry.

A contaminant screening step must be taken prior to model selection. This step will determine if there are potential contaminants that may negatively impact the SPRWS chain of lakes due to greater use of water from the Mississippi River in the SPRWS. If organic contaminants of concern are identified in this process, then models that incorporate contaminant fate and transport will need to be considered (WASP-EFDC or AQUATOX). If the water quality screening does not identify contaminants of concern, then models such as AEM3D or CE-QUAL-W2 would be sufficient to model long term water quality changes. Therefore, model selection should be based on the results of a mass balance screening for potential water quality issues.

Table 3. Common lake and reservoir water quality models that could be used to support the design of the augmentation facility.

Model	Model Dimension	Nutrient Cycling	Redox	Sediment Diagenesis	Thermal Stratification	Contaminant Fate / Transport
BATHTUB	1-D	TP, Chl-a	No	No	No	No
WASP/EFDC-WASP	1 to 3-D	TP, Chl-a, N, OM	Yes	Yes	Yes	Yes
DYRESM-CAEDYM	1-D	TP, Chl-a, N, OM	Yes	Yes	No	No
CE-QUAL-W2	2-D	TP, Chl-a, N, OM	Yes	Yes	Yes	No
AQUATOX	3-D*	TP, Chl-a, N, OM	Yes	Yes	Yes	Yes
AEM3D (ELCOM-CAEDYM)	3-D	TP, Chl-a, N, OM	Yes	Yes	Yes	No

TP=Total Phophorus
N=Nitrogen
N=Organic Matter
* AQUATOX does model stratification, however, it only models one hypolimnetic and epilimnetic cell. Other 3D models have several vertical layers to model detailed stratification processes.

Implementation Costs

Two and three-dimensional water quality models require significant amounts data for model calibration and validation. A basic set of nutrient and redox parameters is routinely collected from White Bear Lake and Vadnais Lake; however, this dataset will need supplemental data to support a complex multidimensional model. For this modeling effort, there will likely need to be more data collected to ensure a robust dataset exists for model calibration and validation. Table 4 contains a range of costs for data collection, model calibration and validation, and model scenarios. Tasks 2a and 2b of Table 4 outline the costs associated with collecting metals, organics, and nutrient related water column and sediment parameters to support the modeling effort. Labor and equipment required for monitoring has also been included in these costs.

Costs are based on two years of monitoring for the following parameters at a variety of sites to be evaluated: priority pollutant scans (5 metals, PAHs, and VOCs); sulfate, total dissolved solids, electrical conductivity, dissolved oxygen, oxidation reduction potential; TSS, total phosphorus, dissolved phosphorus, orthophophorus, nitrate+nitrite, TKN, chlorophyll a, and zebra mussels.

Wenck recommends utilizing the same model package when building the design level and operational level water quality model. Selecting a model that can be utilized for design and operation should lower the overall cost of modeling. However, it is possible that a model parameter necessary for the design process may not be available in an operational level model.

Table 4 represents a range of potential costs to conduct water quality modeling and monitoring for the SPWRS. Also, the costs for building the design level and operational level model has been separated so that these efforts could be split into multiple phases if necessary.

Table 4. Costs for building design and operational level water quality models for the SPRWS chain of lakes and White Bear Lake.

Subtask	Lab cost	Labor Cost	Total cost
Task 1 Compile Existing Data	$0	$10,000	$10,000
Task 2a Water Quality Data Collection (2-years) [1]	$100,000	$100,000	$200,000
Task 2b Sediment Data Collection[2]	$50,000	$10,000	$60,000
Task 2c AIS Data Collection (2-years) [3]	$15,000	$15,000	$30,000
Task 3 Build and Calibrate Design Level Model	$0	$50,000	$50,000
Task 4 Develop and Model Design Scenarios	$0	$10,000	$10,000
Task 5 Build and Calibrate Operational Level Model	$0	$25,000	$25,000
Task 6 Model Operational Level Scenarios	$0	$10,000	$10,000
Task 7 Report	$0	$20,000	$20,000
Total	$165,000	$250,000	$415,000

[1]Water quality data collection assumes two water quality scientists
[2]Sediment analysis will be conducted by Pace Analytical and the University of Wisconsin Stout
[3]Assumes AIS monitoring is conducted in conjunction with water quality sampling

Conclusions

Differences in total phosphorus in the surface water of East Vadnais Lake and White Bear Lake suggest that augmenting White Bear Lake water levels with East Vadnais Lake water could degrade water quality in White Bear Lake. However, these differences can be mitigated in facility design by transferring water between the hypolimnions of the lakes. This assumes that the SPRWS continues to mitigate sediment phosphorus release in East Vadnais Lake, water temperatures between the lakes remain similar, and long term changes in sediment chemistry from potential sedimentation of metals from the Mississippi River don't significantly change sediment redox processes and diagenesis. These processes should be evaluated through the use of a two-dimensional model to evaluate design scenarios and long term impacts of augmentation facility operation.

Two likely model choices include CE-QUAL-W2 or AEM3D which can handle stratification and sediment diagenesis. If screening of water quality through the chain suggests that organic contaminants may be an issue, AQUATOX or WASP-EFDC might be required to estimate contaminant fate and transport. This screening should be completed prior to selection of a water quality model. Construction and implementation of the design level model will be approximately $140,000 to $170,000. It should be noted that the SPRWS may already have a two- or three-dimensional model for East Vadnais Lake which would reduce the model costs. Long term estimates of changes in sediment chemistry (redox and sediment diagenesis) may be required for an operations scenario to evaluate long term impacts. These can be accomplished by adding the sediment model to the design level model which would cost an additional $55,000.

References

Minnesota Department of Natural Resources. February 2016. Report to the Minnesota Legislature: Concept Cost Report for Augmentation of White Bear Lake with Surface Water. Technical Report.

Appendix B — Permitting Memorandum

Building a Better World for All of Us®

TECHNICAL MEMORANDUM

TO: Chris Larson, SEH

FROM: Patti Craddock, PE

DATE: March 30, 2017

RE: Permitting Requirements
SEH No. 140516

This technical memorandum provides an update to the December 8, 2016 memorandum addressed to Sam Paske, Assistant General Manager – Environmental Quality Division of Metropolitan Council Environmental Services, serving as Appendix P to the *Report to the Minnesota State Legislature: Concept Cost Report for Augmentation of White Bear Lake with Surface Water* (Minnesota Department of Natural Resources, February 2016).

The purpose of this technical memorandum is to summarize the permitting requirements associated with a project involving the augmentation of White Bear Lake with surface water from East Vadnais Lake. Permits will be required from federal, state, local and private agencies for construction of the proposed augmentation system. The following agencies and affiliated permits will be involved:

- Federal
  - U.S. Army Corps of Engineers
    - Section 10/ Section 404 Permit – assuming coverage under General Permit RGP-003-MN
  - U.S. Fish & Wildlife Service Threatened & Endangered Species Review
- State
  - Minnesota Wetland Conservation Act
    - Wetland Conservation Act Permit
  - Minnesota Department of Natural Resources
    - Public Waters Work Permit
    - Water Appropriation Permit
    - Invasive Species Permit
    - Utility Crossing License
  - Minnesota Pollution Control Agency
    - Section 401 Water Quality Certification
    - National Pollutant Discharge Elimination System/State Disposal System General Stormwater Discharge Permit (MN R100001) for Construction Activities
    - Notice to Manage Dredged Material

    - Environmental Assessment Worksheets (EAW) - may lead to an Environmental Impact Statement (EIS) requirement
  - Minnesota Department of Transportation
    - Right of Way Permit
  - Minnesota Department of Health
    - Water Supply Infrastructure Review
- Local
  - Rice Creek Watershed District
    - Wetland Mitigation Permit
    - Erosion Control Permit
  - Vadnais Lake Area Water Management Organization
    - Wetland Mitigation Permit
    - Erosion Control Permit
  - Ramsey-Washington Metro Watershed District
    - Wetland Mitigation Permit
    - Erosion Control Permit
  - Ramsey County
    - Erosion Control Permit
  - MS4 Permits for: City of White Bear Lake, City of Vadnais Heights, and City of Gem Lake
- Private
  - Burlington Northern Santa Fe Railroad
    - Pipeline Permit
  - Landowners – utility easements

Wetland Conservation Act

The Wetland Conservation Act (WCA) basic requirement is that “a wetland must not be drained or filled, wholly or partially, unless replaced by restoring or creating wetland areas of at least equal public value under an approved replacement plan.” The responsibility for administration of the WCA is shared by local and state government. The local government unit (LGU) is responsible for making the initial regulatory determinations for the program, while the Minnesota Board of Water and Soil Resources (BWSR) is at the aid of the LGU and serves as technical resource for complying with determinations set forth by the WCA. LGUs responsible for the administration of WCA include: Vadnais Lake Area Water Management Organization, Ramsey-Washington Metro Watershed District, and Rice Creek Watershed District. Temporary or permanent impacts to wetlands in the project area are subject to wetland permitting under WCA. The extent of permitting needed is dependent on the quantity and location of wetland impacts. Alteration requires replacement of 1:2 – 1:2.5 ratio to ensure no loss of wetland quantity, quality, or biological diversity.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) serves as the federal regulatory review agency for permits regarding work, in or affecting, navigable waters. A Section 404 permit is required for work activities involving the construction or modification of outfall structures and associated intake structures. No intake structure will be authorized unless directly associated with an authorized outfall structure. The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity.

Wetland restoration and enhancement will be required when wetland areas are to be modified during construction.

Temporary construction, access and dewatering work necessary for construction activities will be authorized provided that the associated primary construction is authorized by USACE. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must consist of materials and placed in a manner that will not be eroded by expected flows. The use of dredged material may be allowed if the USACE district engineer determines that it will not cause more than minimal adverse effects on aquatic resources. Upon completion of construction, temporary fill will need to be entirely removed to an area that has no Waters of the United States. Dredged material must be returned to its original location, and affected areas must be restored to pre-construction elevations. The affected areas must be revegetated to original conditions.

Mitigation requirements through the USACE district engineer will need to be considered when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal. The project must be designed and constructed to avoid and minimize adverse effects to waters of the United States. Avoiding, minimizing, rectifying, reducing, or compensating for resource losses will be required to the extent necessary to ensure that the adverse effects to the aquatic environment in proposed work area are minimal. A mitigation bank or in-lieu fee programs are an option to be proposed to the USACE instead of constructing artificial wetlands for wetland losses.

Pre-construction notification (PCN), required by the terms of the NWP, state that the prospective permittee must submit construction plans to the USACE district engineer as early as possible. The district engineer has 30 days to determine if the PCN is complete. If deemed incomplete, the USACE district engineer has 30 days to notify the permittee to request additional information or clarification. Construction cannot begin until 45 days from when the USACE district engineer received the complete PCN or the permittee has received written notification that construction may proceed by the USACE district engineer. The PCN must include general information on the project such as name, address, contact information of the prospective permittee, location, and a detailed description of the proposed project. The district engineer's decision will determine whether the activity will be authorized by the NWP and result in minimal individual and cumulative adverse environmental effects, or may be contrary to the public interest.

Minnesota Department of Natural Resources

Vadnais Lake, Sucker Lake, and White Bear Lake are listed in the Department of Natural Resources (DNR) Public Waters Inventory (PWI) program and therefore require a Public Waters Work Permit when work is performed in the water body. This permit regulates water development activities below the ordinary high water level (OHWL) which alter the course, current, or cross section of public waters. Applications for all DNR permits shall be made through the MNDNR electronic Permitting and Reporting System (MPARS).

Construction of the White Bear Lake Augmentation system requires a Public Waters Work Permit be submitted for review of both the intake and outlet structure components. The purpose of this permit is to enable the DNR, as well as other regulatory agencies, to review the plans for construction. The Conservation Assistance and Regulations (CAR) Section of the DNR oversees the administration of the Public Waters Work Permit Program. It is recommended to apply for the permit a minimum of 6 months prior to construction. Basic information such as the project location, purpose for construction are required for application, no additional documentation is needed to apply for this permit.

An Infested Waters Diversion or Transportation Permit is necessary when water is moved, diverted or removed from a water body listed as "infested" with aquatic invasive species. Sucker, Vadnais and White

Bear Lake all contain zebra mussels, which constitutes the DNR to list each lake as "infested waters." The DNR regulates activities in infested waters to reduce the risk of spreading aquatic invasive species. The permit will include conditions that will reduce the risk of spreading the invasive species such as: seasonal or other timing restrictions, filtering requirements, or treatment requirements to prevent spread of the invasive species. Filtration will be required at the intake to prevent the spread of invasive species through the augmentation system.

The Minnesota DNR Division of Lands and Minerals is responsible for granting permission to cross state land or public waters with utility infrastructure projects. This permission comes by means of a utility crossing license which is granted for 25 to 50 years and may be renewed when expired. An application shall be submitted showing the pipeline layout and how it effects the state land or water.

Minnesota Pollution Control Agency

During the construction phase of the augmentation project, a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit will be required through the Minnesota Pollution Control Agency (MPCA). The purpose of this permit is to control soil erosion and reduce the amount of sedimentation and other pollutants being transported into public waters by runoff from construction sites. The owner and operator must create a stormwater pollution prevention plan (SWPPP) that explains the proposed actions to control stormwater runoff from the construction site. The permit application shall be completed electronically prior to beginning construction.

At this time, there does not appear to be another NDPES permit requirements. In 2008 EPA published a final rule (40 CFR Part 122, [EPA–HQ–OW–2006–0141; FRL–8579–3]) that excludes water transfers from the NPDES permitting program. However a number of states along with conservation groups have sued the EPA (source: https://www.law360.com/articles/881977/2nd-circ-restores-epa-s-water-transfer-exemption-rule).

"EPA believes that Congress intended for water transfers to be subject to oversight by water resource management agencies and state non-NPDES authorities, rather than the NPDES permitting program. The final rule defines a water transfer as an activity that conveys or connects waters of the United States without subjecting the transferred water to intervening industrial, municipal, or commercial use. This does not apply to pollutants introduced by the water transfer activity itself to the water being transferred."

Minnesota Department of Transportation

The Minnesota Department of Transportation (MnDOT) provides support for utility accommodation and coordination on or crossing MnDOT right of way (ROW) throughout all project stages. MnDOT regulates the approval for the use and occupancy of highway ROW. Before beginning work, a utility owner must receive an approved permit from MnDOT, and the contractor must carry a copy of this permit at all times while working on the highway ROW. Permit applications must include detailed drawings of the planned right of way crossing. After the miscellaneous work permit has been approved, notification will be given by MnDOT and a security deposit will be required. The security deposit ensures that work is completed to MnDOT's satisfaction and the actual amount required will depend on the specific situation. Upon completion of construction, the applicant must notify the MnDOT District Permit Office for final inspection.

Minnesota Department of Health

The Minnesota Department of Health (MDH) Environmental Health Division works on many environmental issues including water quality. Minnesota State Rules state that prior to installation of any water supply infrastructure, plans and specifications be submitted to the MDH for review and approval. The purpose of review by the MDH is to protect public health, verify that the design complies with rules and standards that are enforced by the MDH, and to allow changes to be made before construction begins. There is no cost associated with this review, however it is very important that plans and specifications for the proposed forcemain be submitted to the MDH for review at least 3-4 months prior to construction.

Rice Creek Watershed District

The Rice Creek Watershed District (RCWD) will regulate wetland alterations that are not subject to the WCA rules and do not qualify for an exemption from the Minnesota state rules. Explanation and justification of each individual wetland alteration area in terms of impact avoidance and minimization alternatives considered must be included in the application. Upon receipt of a complete application, the WCA LGU will review and act on the application in accordance with its procedural rules and WCA procedures. An erosion and sediment control plan must be submitted for surface soil disturbance or removal of vegetative cover. Any disturbance of surface soils, removal of vegetative cover on more than 5,000 square feet of land, or stockpiling on-site more than fifty cubic yards of earth requires a permit. The permit applicant must demonstrate that the standards are met by submitting design criteria to comply with permit requirements.

Vadnais Lake Area Water Management Organization

The Vadnais Lake Area Water Management Organization (VLAWMO) Watershed Management Policy regulates activities that disturb, remove, or cover surface vegetation or appropriation of water from public water basins within the VLAWMO jurisdiction. All other projects that affect lakes, streams, and wetlands within the VLAWMO are also regulated under the watershed management policy. Required exhibits must be submitted a minimum of 60 days prior to construction and includes the following: names and contact information for proposed project owner and engineer, a location map, plat drawing including buffer boundaries identified as conservation easements, grading plan, hydrologic and water quality design exhibits, as well as erosion and sediment control exhibits. The VLAWMO will conduct reviews within a 60 day period.

Ramsey-Washington Metro Watershed District

The Ramsey-Washington Metro Watershed District (RWMWD) is located in the eastern portion of Ramsey County and the western edge of Washington County. The RWMWD's regulatory program includes erosion and sediment control from stormwater runoff of active construction sites, and is designed to allow contractors and developers to work with the district staff to address and prevent erosion issues. The RWMWD issues certificates of exemption or replacement as part of its review and approval process where applicable. Wetland buffer protection is required as well as pretreatment of stormwater prior to discharging to a wetland is also required.

Ramsey County

The location of the intake and outlets as well as forcemain infrastructure for both options of the augmentation project are located in Ramsey County. For the purpose of health, safety, and welfare of its citizens, the County requires a right of way permit to review work to be done within County right of way. The ROW ordinance imposes regulation on the placement and maintenance of facilities within the County right of way. Under this ordinance, the persons excavating and obstructing the right of way will bear financial responsibility for their work. The County shall establish an excavation ROW permit fee schedule specifying fees that are adequate to recover the management costs, degradation costs, and mapping costs. Permit fees are established by the County Board and may be amended at any public meeting.

BNSF Railroad

Installation of a pipeline for water, natural gas, sewage, oil or petroleum on Burlington Northern Santa Fe (BNSF) Railroad property will require a Pipeline or Wire Line Permit through BNSF. A utility license agreement is required when utility facilities are installed, relocated, removed or maintained along BNSF property. Liability insurance may also be required as part of this permit. Applications for utility license agreements shall be submitted with plans for the proposed installation a minimum of four months prior to construction. Pipelines shall be installed to avoid or minimize the need for adjustments to future railroad improvements.

Utilities that parallel the railroad property must be located on uniform alignment within 10 feet or less of the property line to preserve space for future railroad improvements or other utility installation. BNSF engineering must approve installations over one mile along the railroad right of way. BNSF specifications for water utilities call that the utilities shall conform to “American Waterworks Association Specifications.” All underground utility installations shall be located on top of the back slope at the outer limits of the railroad property. If the pipeline is to be located 40 feet or less from the centerline of the track, the pipeline must be encased in a steel pipe with a minimum cover of three feet subject to approval by BNSF engineering. No pipe shall be placed closer than 25 feet from the centerline of the track.

Preliminary permit application estimated costs are presented below in Table 1. These values include labor costs associated with preparing applications up to the submittal, further costs may be involved if revisions are required throughout the process. They are subject to change depending on the area of land disturbed during construction, as well as the amount of wetlands and shoreline affected by construction.

Table 1. Construction Permit Cost Estimate

Permit	Cost
DNR Public Waters Work Permits	$1,500
DNR Water Appropriation Permit	$1,350
DNR Invasive Species Permits	$1,400
Wetland Conservation Act Permits	$3,400
U.S. Army Corps of Engineer Section 404 Permit	$3,400
MnDOT Utility Accommodation on Trunk Highway Right of Way	$2,500
Ramsey-Washington Metro Watershed District Erosion Control	$2,700
Ramsey County Right of Way Permit	$1,000
Rice Creek Watershed District Permits	
- Erosion Control Plans	$2,000
- Floodplain Alteration	$2,000
- Wetland Alteration	$500
VLAWMO Wetland Replacement Plan	$1,800
Construction SWPPP & NPDES/SDS Permit	$3,200
BNSF Pipeline Permit	$20,000
Total Permit Application Estimate	**$46,750**

The permitting requirements listed in this report have been determined with data available at the time of research. Any findings based on future work that yields different information may result in a change in permitting requirements.

References

United States Army Corps of Engineers. Permits for Structures or Work in or Affecting Navigable Waters of the United States. U.S. Army Corps of Engineers Website. Available at: http://www.usace.army.mil/Portals/2/docs/civilworks/nwp/2012/NWP2012_corrections_21-sep-2012.pdf. Accessed October 27th, 2015.

Minnesota Board of Water & Soils Resources. Wetlands Regulation in Minnesota. BWSR Website. Available at: http://www.bwsr.state.mn.us/wetlands/wca/. Accessed October 27th, 2015.

Department of Natural Resources. DNR Water Permits. Minnesota DNR Website. Available at http://www.dnr.state.mn.us/permits/water/index.html. Accessed October 26th, 2015.

Minnesota Pollution Control Agency. Stormwater Program for Construction Activity. MPCA Website. Available at: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html. Accessed on November 3rd, 2015.

MnDOT. Utility Agreements and Permits MnDOT Land Management Website. Available at: http://www.dot.state.mn.us/utility/construction.html. Accessed November 5th, 2015.
Ramsey-Washington Metro Watershed District. Rules and Application Materials Website. Available at: http://www.rwmwd.org/index.asp?Type=B_BASIC&SEC={467DE917-013D-4DCF-B6CE-B12BEFCC897C}. Accessed November 2nd, 2015.

Minnesota Department of Health. Plan Review for Watermain. MDH Website. Available at: http://www.health.state.mn.us/divs/eh/water/planreview/watermains.html. Accessed on November 3rd, 2015.

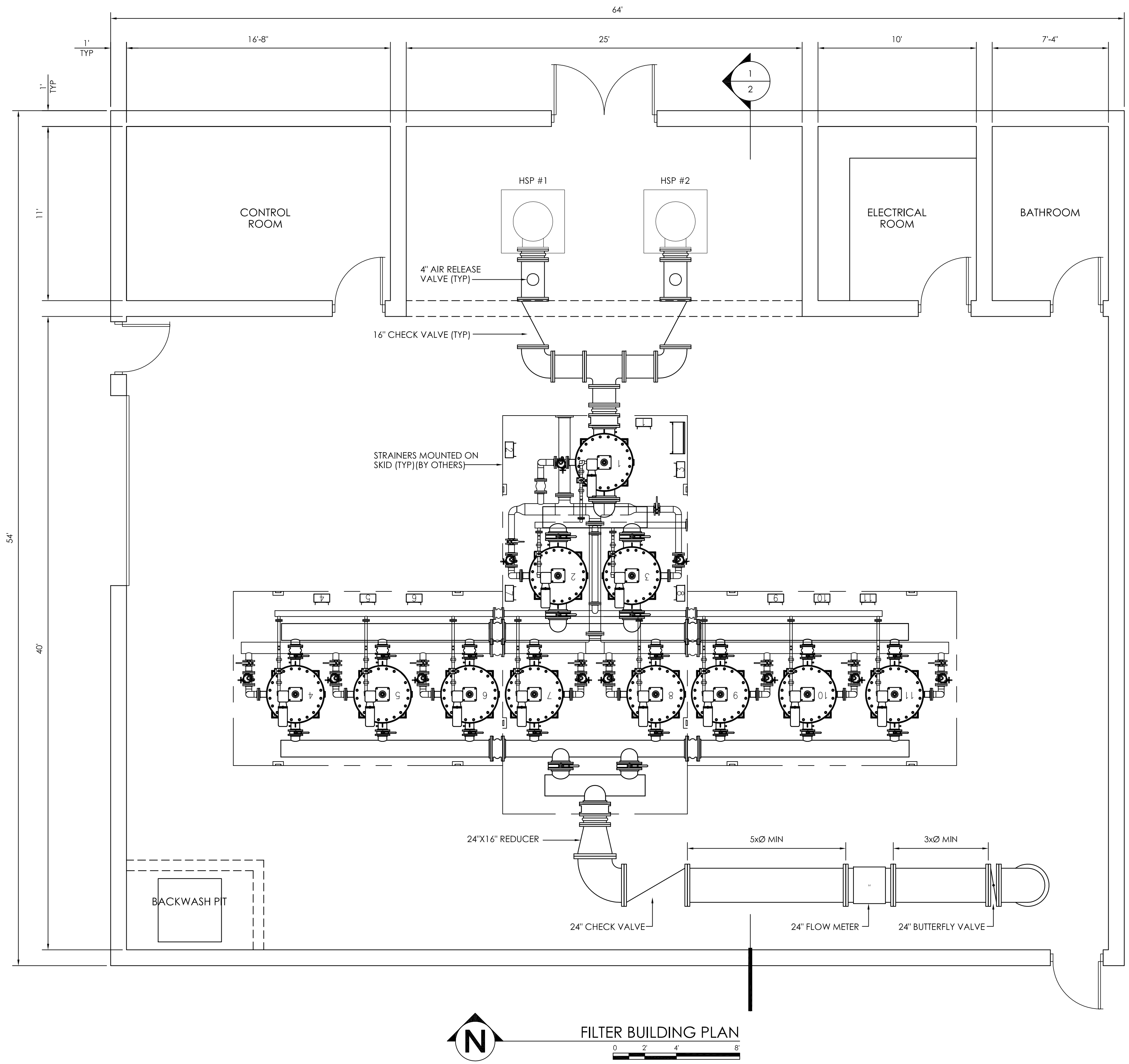
Rice Creek Watershed District. Rule F: Wetland Alteration. Rice Creek Watershed District Website. Available at: http://www.ricecreek.org/vertical/Sites/%7BF68A5205-A996-4208-96B5-2C7263C03AA9%7D/uploads/Rule_F_-_Final_adopted_RCWD_rule_11-12-2014-5.pdf. Accessed November 2nd, 2015.

Vadnais Lake Watershed Management Organization. Permit Applications for Most Projects Involving Lakes, Wetlands, Rivers and Streams. VLWMO Website. Available at: http://www.vlawmo.org/files/1213/9698/6541/PERMIT_APPLICATIONS_FOR_MOST_PROJECTS_INVOLVING_LAKES.pdf. Accessed on November 2nd, 2015.

Ramsey County. Ramsey County Right-Of-Way Ordinance for the Management of Utilities in the Public Right-Of-Way. Ramsey County Website. Available at: https://www.co.ramsey.mn.us/NR/rdonlyres/F840563B-4B9E-4A20-82F0-CB4C29E3D9A8/33556/RightofWayOrdinancerevised2010.pdf. Accessed on November 9th, 2015.

Burlington Northern Santa Fe. Utility Accommodations. BNSF Website. Available at: http://www.bnsf.com/communities/faqs/pdf/utility.pdf. Accessed November 5th, 2015.

Appendix C — Detailed Alignments and Building Layouts



WHITE BEAR LAKE AUGMENTATION

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

SEH

SHEET TITLE

PROPOSED FILTER BUILDING PLAN

FILE NO.
MNDNR140516

FIGURE
1

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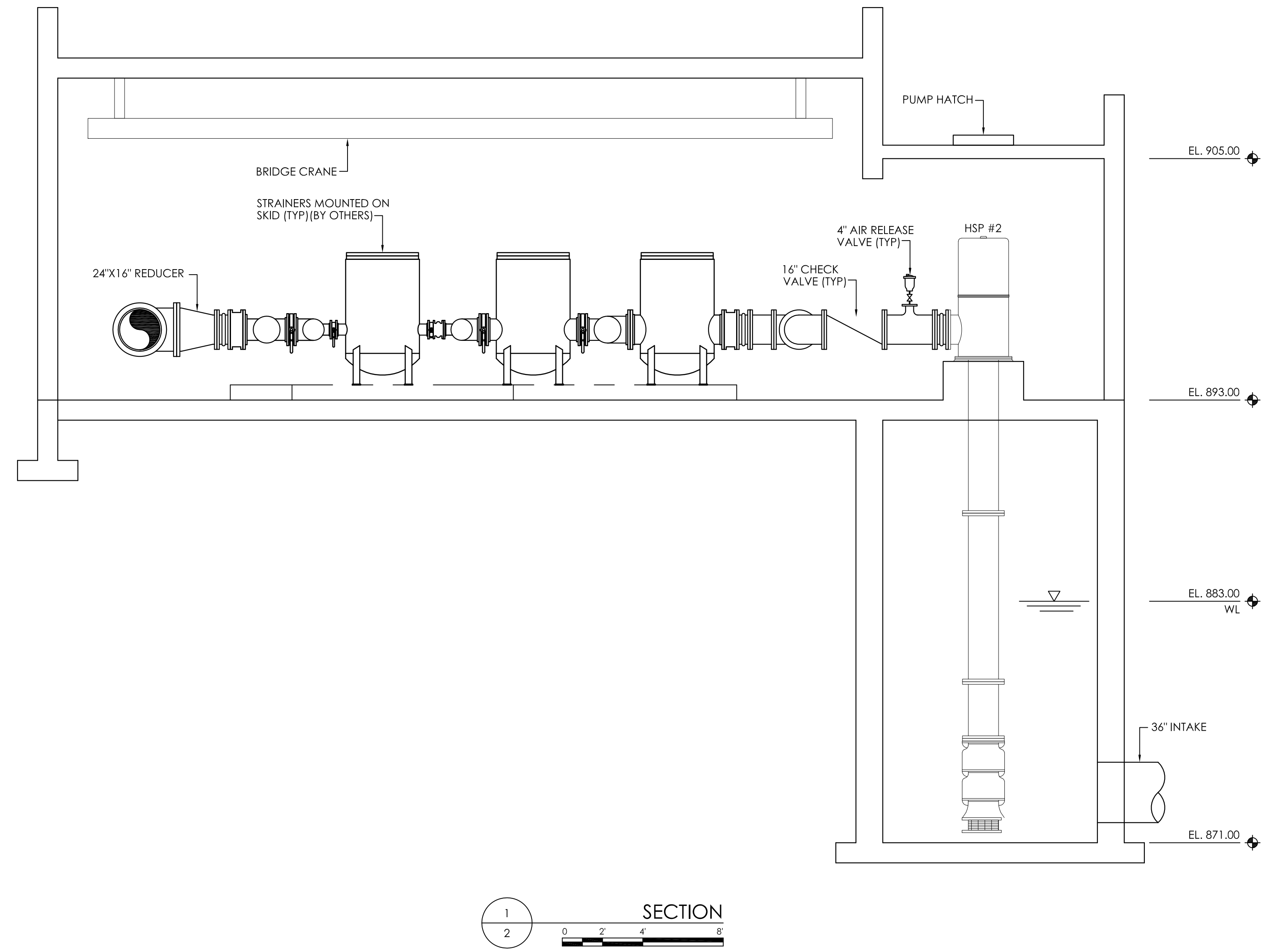

WHITE BEAR LAKE AUGMENTATION MINNESOTA DEPARTMENT OF NATURAL RESOURCES	SEH	SHEET TITLE PROPOSED FILTER BUILDING SECTION	FILE NO. MNDNR140516 FIGURE 2

Appendix C detailed alignments are not included in this copy of the proposal.

Available from Minnesota DNR upon request.

Appendix D — Detailed Cost Estimates

White Bear Lake Augmentation - Design Build
Pipeline Construction Cost Estimate
SEHDB Proposal
March 2017

Item Number	Description	Quantity	UM	Unit Bid Price	Total Bid Price
1	Mobilization, General Conditions, Overhead & Profit	1	LS	$1,200,000.00	$1,200,000.00
2	Traffic Control: Barricades and Lights	1	LS	$375,000.00	$375,000.00
3	Erosion Control	22,370	LF	$12.00	$268,440.00
4	Tree Removal and Replacement	50	EACH	$1,000.00	$50,000.00
6	Bituminous Trail New Construction	3,150	SY	$35.00	$110,250.00
7	Concrete Sidewalk	1,000	SY	$90.00	$90,000.00
8	Asphalt Removal (6" Thick)	40,000	SY	$4.00	$160,000.00
9	Asphalt Sawcutting	19,060	LF	$3.00	$57,180.00
10	Concrete Sawcutting	600	LF	$10.00	$6,000.00
11	Concrete Pavement Removal	500	SY	$30.00	$15,000.00
12	Common Excavation (CV)	9,000	CY	$25.50	$229,500.00
13	Class 5 Aggregate Base (8" Thickness)	18,000	TON	$22.50	$405,000.00
14	Pavement Milling - 2"	40,000	SY	$2.00	$80,000.00
15	Apshalt Pavement (Per Ton) Including Overlay	18,000	TON	$70.00	$1,260,000.00
16	Driveway Restoration (Remove And Replace)	1,000	SY	$90.00	$90,000.00
17	Bike Trail Removal/Replacement	35	SY	$100.00	$3,500.00
18	Concrete Pavement	500	SY	$120.00	$60,000.00
19	Concrete Curb and Gutter B618	1,000	LF	$25.00	$25,000.00
20	Pavement Striping Allowance	1	LS	$75,000.00	$75,000.00
21	Electrical/ Signal Allowance	1	LS	$100,000.00	$100,000.00
22	Dewatering (Wells/Well Points)	1	LS	$625,000.00	$625,000.00
23	Trucking to Waste	10,000	CY	$15.00	$150,000.00
24	Trucking to Waste (Contaminated)	3,000	CY	$38.00	$114,000.00
25	CLSM Backfill	1,200	CY	$121.00	$145,200.00
26	Select Fill	15,000	CY	$17.50	$262,500.00
27	Granular Foundation Material	3,000	CY	$50.50	$151,500.00
28	3" Crushed Rock & Fabric	2,500	CY	$52.00	$130,000.00
30	Precast Utility Vault - Cleanout MH	2	LS	$65,000.00	$130,000.00
31	72" Manhole - Air Release (10' Deep)	8	EACH	$25,000.00	$200,000.00
32	Top Soil	6,450	CY	$30.00	$193,500.00
33	Landscape and Turf Restoration	27,880	SY	$4.00	$111,520.00
34	36" Lake Intake	1,000	LF	$2,500.00	$2,500,000.00
35	Intake Connection to Building	1	EACH	$260,000.00	$260,000.00
36	36" Intake Screen	1	EACH	$175,000.00	$175,000.00
37	24" Lake Outfall	2,700	LF	$1,000.00	$2,700,000.00
38	24" Outfall Connection Pit	1	EACH	$175,000.00	$175,000.00
39	24" Open Cut Forcemain	20,425	LF	$225.00	$4,595,625.00
41	24" Plug Valve	8	EACH	$20,000.00	$160,000.00
42	24" DIP Fittings	30	EACH	$4,000.00	$120,000.00
45	12" HDPE Backwash Return Drain Pipe	500	LF	$250.00	$125,000.00
46	Utility Relocation	1	LS	$250,000.00	$250,000.00
47	CTY Road E Tunnel (36" Steel Casing GBM)	150	LF	$1,950.00	$292,500.00
48	Railroad Tunnel @ 35-E (42" Steel Casing Pipe Ram)	50	LF	$2,500.00	$125,000.00
49	35-E Tunnel (42" Steel Casing Pipe Ram)	360	LF	$1,750.00	$630,000.00
50	Railroad Tunnel @ Hoffman Road (42" Steel Casing Pipe Ram)	60	LF	$2,500.00	$150,000.00
51	HWY 61 and White Bear Ave Tunneling (36" Steel Casing GBM)	1,325	LF	$1,200.00	$1,590,000.00
					$20,721,215.00
				Contingency (20%)	$4,144,243.00
				Total:	**$24,865,458.00**

White Bear Lake Augmentation
Filtration Building Construction Cost Estimate
SEHDB Proposal
March 2017

1000	Mobilization, General Conditions, Overhead & Profit	$330,000.00
32000	Concrete Reinforcing	$70,000.00
33000	CIP Concrete	$166,000.00
34100	Plant-Precast Structural Concrete - Hollow Core	$20,000.00
34100	Plant-Precast Structural Concrete - Double Tees	$71,000.00
42000	Unit Masonry Assemblies	$256,000.00
55000	Metal Fabrications	$5,200.00
61053	Misc. Rough Carpentry	$4,400.00
75323	EPDM Membrane Roofing	$50,000.00
76200	Sheet Metal Flashing & Trim	$5,000.00
77233	Roof & Floor Hatches	$11,000.00
78400	Firestopping	$600.00
79200	Joint Sealants	$13,300.00
81113	Hollow Metal Doors & Frames & Hardware(Commercial)	$17,600.00
88000	Windows (assumed 2 @ office)	$5,500.00
83613	Sectional Steel Overhead Doors	$5,500.00
88000	Glazing	$400.00
89000	Louvers & Vents	$2,000.00
93000	Tiling	$2,700.00
95113	Acoustical Panel Ceilings	$2,600.00
96519	Resilient Tile Flooring & Base	$2,400.00
99721	Coating Systems for Water Facilities	$75,000.00
101419	Dimensional Letter Signage & Plaque	$2,900.00
102813	Toilet Accessories	$1,500.00
104400	Safety Specialties	$500.00
122116	Window Blinds	$1,000.00
123000	Manufactured Casework / Furniture	$6,200.00
211313	Fire Protection Systems	$40,000.00
Div. 22	Plumbing	$25,000.00
220719	Plumbing Piping Insulation	$3,500.00
Div. 23	HVAC	$55,000.00
Div. 26	Electrical	$250,000.00
312316	Structure Excavations and Backfill - EARTHWORK	$91,000.00
312333	Trench Excavation and Backfill - SITE UTILITIES	$50,000.00
321122	Aggregate Base	$5,300.00
321216	Plant-Mixed Asphalt Pavement	$48,800.00
329212	Establishing Turf and Controlling Erosion	$3,000.00
329300	Exterior Plants / Landscaping	$3,800.00
332831	High Service Pump & Motor	$228,600.00
402301	Process Water & Waste Piping, Valves, Supports, etc..	$133,000.00
409000	I & C for Process Systems	$200,000.00
412200	Bridge Crane	$80,000.00
432252	Magnetic Flowmeters	$14,900.00
444210	Packaged Compressed Air System	$15,000.00
444219	Blower - Screen Cleaning	$20,000.00
444474	Fluid Engineering Skid Package	$1,474,100.00
	Building Permits	$30,000.00
	SAC / WAC Fees	$10,000.00
	ROW Permits	$500.00
	Sewer & Water Connections	$5,000.00
	Electrical Utility Connections	$25,000.00
	Natural Gas Utility Connections	$15,000.00
	Construction Subtotal	**$3,954,800.00**
	Contingency (20%)	$790,960.00
	Construction Total:	**$4,745,760.00**

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