HERMANTOWN ECONOMIC DEVELOPMENT AUTHORITY

AGENDA

Tuesday, February 1, 2022 at 11:30 a.m.
Council Chambers
Governmental Services Building

1. ROLL CALL

2. MINUTES – Approval or correction

A. January 24, 2022 HEDA Minutes

3. RESOLUTION

A. **RESOLUTION 2022-01H** **Resolution Approving The Independent Producer Agreement With Story North Productions, Llc And Authorizing And Directing The Execution By Hermantown Economic Development Authority**

4. WORK SESSION –

A. Hwy 53 Business Park Desktop review and discussion of next steps.

5. RECESS

HERMANTOWN ECONOMIC DEVELOPMENT AUTHORITY
January 24, 2022
5:00 p.m.

MEETING CONDUCTED IN PERSON

ROLL CALL: Commissioners Geissler, Haapanen, Nelson, Peterson, Ronchetti, Mayor Boucher

CITY STAFF: John Mulder, City Administrator; Eric Johnson, Community Development Director; Joe Wicklund, Communications and Community Engagement Director, Gunnar Johnson City Attorney

ABSENT: Councilor Hauschild

VISITORS: Heidi Timm-Bijold, Elissa Hansen, Karl Schuettler, Steve Overom

MINUTES

Motion made by Commissioner Ronchetti, seconded by Commissioner Boucher to approve the October 28, 2021 HEDA Minutes. Motion carried on a voice vote. Commissioner Hauschild, absent. Motion carried.

WORK SESSION

Elissa Hansen of Northspan led the Commission in a review of the Strategic Plan and an exercise to focus on the next steps to take during the first quarter of 2022.

RECESS

Motion made by Commissioner Peterson, seconded by Commissioner Geissler to recess at 7:26 p.m. Motion carried.

Recorded by:

_____
John Mulder, Executive Director

Hermantown Economic Development Authority
Resolution No. 2022-___

HEDA Commissioner _____ introduced the following resolution and moved its adoption:

RESOLUTION APPROVING THE INDEPENDENT PRODUCER AGREEMENT WITH STORY NORTH PRODUCTIONS, LLC AND AUTHORIZING AND DIRECTING THE EXECUTION BY HERMANTOWN ECONOMIC DEVELOPMENT AUTHORITY

WHEREAS, the Hermantown Economic Development Authority ("HEDA") desires to highlight the City of Hermantown by developing two storytelling videos featuring interviews with City residents and highlights of the City's landscape; and

WHEREAS, Story North Productions, LLC ("Producer") is in the business of producing creative video production to meet HEDA's requirements; and

WHEREAS, HEDA and Producer desire to enter into an Independent Producer Agreement in form and substance of the one attached hereto as Exhibit A; and

WHEREAS, the HEDA Commissioners have reviewed the Independent Producer Agreement and hereby believes that it is in the best interests of HEDA that the Independent Producer Agreement be approved.

NOW THEREFORE, BE IT RESOLVED by the Commissioners of HEDA as follows:

1. The Independent Producer Agreement is hereby approved.

2. The President and Secretary are hereby authorized to execute the Independent Producer Agreement attached hereto as Exhibit A and any other documents necessary to effectuate the release on behalf of the HEDA.

The motion for the adoption of the foregoing resolution was duly seconded by HEDA Commissioner _____ and, after full discussion thereof and upon a vote being taken thereon, the following HEDA Members voted in favor thereof:

and the following voted against the same:

Whereupon said resolution was declared duly passed and adopted.

Dated this _____ day of _____, 2022.

_____
HEDA Administrator

Independent Producer Agreement

BY AND BETWEEN

STORY NORTH PRODUCTIONS,

LLC AND

HERMANTOWN ECONOMIC DEVELOPMENT AUTHORITY

THIS AGREEMENT, by and between Story North Productions, LLC, 705 High St., Duluth, MN, 55805 ("Producer"), and Hermantown Economic Development Authority, an economic development authority organized under the laws of the State of Minnesota, 5105 Maple Grove Road, Hermantown, Minnesota 55811 ("Client"), collectively referred to herein as "the Parties," is made effective as of the date of all Parties' signatures and execution as provided below.

WHEREAS, Producer is a creative video production company specializing in story-driven content for companies and individuals; and

WHEREAS, Client desires to retain Producer to provide video production services in accordance with the terms and conditions set forth below;

NOW THEREFORE, based on the consideration, mutual covenants and conditions contained herein (the receipt, adequacy and sufficiency of which being mutually acknowledged and agreed upon by each party), and subject to all terms and conditions set forth herein, the parties now covenant and agree as follows:

1. **Term**

1.1. The term of this Agreement shall commence on January 7, 2022 and shall continue until completion of Services (the "Termination Date"), unless terminated earlier in accordance with Section 10 (the "Term").

2. **Services**

2.1. Producer shall provide Services to Client and its duly authorized representatives, personally or through Producer's own employees or subcontractors, as set forth in Schedule A attached hereto (the "Services")

2.2. Producer shall determine the manner or means by which it performs the Services for the Client, including, without limitation, optimal time and place for performance of Services, except as agreed to between the parties or set forth in **Schedule A.**

2.3. Except as otherwise specified in **Schedule A**, Producer shall furnish, at its own expense, the equipment, supplies, tools or other materials used to perform the Services.

2.4. Client shall provide Producer with access to its premises and equipment to the extent necessary for Producer's performance of the Services. Producer shall comply with all applicable Client policies and procedures relating to Client's business, including those related to occupational health and safety and use of Client's facilities, supplies, information technology, equipment, networks or other resources.

2.5. Producer shall make itself available for consultation with Client at such times and places as mutually agreed upon between the parties. Upon request, Producer agrees to prepare and submit to Client periodic reports regarding performance of the Services.

3. Independent Contractor Relationship

3.1. Producer is and shall remain at all times an independent contractor and not an employee or dependent contractor of Client. Nothing in this Agreement shall be construed to create any association, partnership, joint venture, agency, fiduciary or employment relationship between Producer and Client, for any purpose, and neither party has the authority to contract for or bind the other party in any manner whatsoever.

3.2. Producer shall provide the Services to Client on a non-exclusive basis, and shall be free to provide its services to third parties during the Term of this Agreement provided that Producer shall not provide such services in a way that is inconsistent with any of the provisions of this Agreement.

3.3. Without limiting Section 3.1, Producer and Producer's employees shall not be eligible to participate in any benefit or compensation plans offered by Client to its own employees, including, without limitation, any payments under any public or private employment standards regulations or agreements.

3.4. Client shall have no liability or responsibility for withholding or remitting any income, payroll, or other federal or state taxes, including state or federal health care or pension contributions or worker's compensation, for Producer or Producer's employees. Producer is responsible for any and all of these withholding or remittance obligations, and shall indemnify Client from and against any order, penalty, interest, taxes or contributions that may be assessed against Client due to the failure or delay of Producer in making any such withholdings or remittances on behalf of Producer's employees, or to file such other information as may be required by law.

4. Payment Terms; Expenses

4.1. Client agrees to pay Producer $17,000 in consideration for provision of the Services set forth herein and the attached **Schedule A.**

4.2. At the time of execution of this Agreement, Client shall pay Producer a non-refundable deposit equal to 30% of the total consideration to be paid for Producer's Services. The deposit will be subtracted from the final total amount due and owing to Producer upon completion of Services.

4.3. Client shall reimburse Producer for reasonable expenses incurred in the provision of Services under this Agreement, as may be modified or set out with greater detail in the attached **Schedule A**, or as the parties may otherwise agree in writing.

4.4. Producer shall issue invoice Client upon completion of agreed-upon project milestones or completion of Services under this Agreement, in accordance with the payment plan set forth in **Schedule A**.

4.5. Client shall pay invoices within ten (10) days of receipt, except as otherwise modified or agreed upon in writing by the parties. At the discretion of Producer, failure to remit timely payment of invoices may result in suspension or termination of the project.

5. Intellectual Property

5.1. For the purposes of this Agreement, Project Materials means copyrights and all works developed in the performance of this Agreement, including, but not limited to, the finished product and any deliverables, including any software or data. Project Materials do not include any materials that Producer developed, acquired or otherwise owned or had a license to use prior to the date of this Agreement. All Project Materials are agreed by Producer to be "works made for hire" as defined under 17 U.S.C. §101, for which Client has the sole and exclusive right, title and interest, including all rights to ownership and copyright and/or patent. In addition, Producer hereby assigns all right, title and interest, including rights of ownership and copyright in the Project Materials to Client. Producer shall provide Client, at no additional cost to Client, with copies of all Project Materials. Upon request by Producer, Client may authorize Producer to use specified Project Materials to evidence Producer's professional capabilities. In all such uses of Project Materials by Producer, reference shall be made to Client and the Project and that the Project Materials are owned by Client. Producer also acknowledges and agrees that all names and logos provided to Producer by Client for use in connection with the Project are and shall remain the sole and exclusive property of Client. Producer agrees not to use the name, logo, or any other marks owned by or associated with Client or the name of any representative of Client in any sales promotion work or advertising, or in any form of publicity, without the prior written permission of Client in each instance. However, Producer may use the name of Client in a document required to be filed with, or provided to, any governmental authority or regulatory agency to comply with applicable legal or regulatory requirements. Producer agrees to provide Client with a copy of any such document.

6. Data Practices Act

6.1. Producer acknowledges that Client is subject to the provisions of the Minnesota Government Data Practices Act. Producer must comply with the Minnesota Government Data Practices Act, Minnesota Statutes, Chapter 13, as it applies to all data provided by Client in accordance with this Agreement and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by Producer in accordance with this Agreement. The civil remedies of Minnesota Statutes § 13.08, apply to Producer and Client. Minnesota Statutes, Chapter 13, provides that all government data are public unless otherwise classified. If Producer receives a request to release the data referred to in this Section, Producer must immediately notify Client and consult with Client as to how Producer should respond to the request. Producer's response shall comply with applicable law, including that the response is timely and, if Producer denies access to the data, that Producer's response references the statutory basis upon which Producer relied. Producer does not have a duty to provide public data to the public if the public data is available from Client.

7. Confidential Information

7.1. Producer acknowledges that in the course of providing the Services, Producer may create or have access to information that is treated as confidential and proprietary by Client, including, without limitation, information pertaining to any Deliverables, and in each case whether spoken, written, printed, electronic or in any other form or medium (collectively, "Confidential Information").

7.2. Producer shall treat all Confidential Information as strictly confidential and only use Confidential Information for purposes of providing Services. Producer shall not, without prior written authorization of Client, either during the Term or after termination of this Agreement, use or disclose any Confidential Information for the benefit or purposes of Producer or any other person, company or organization.

7.3. Confidential Information shall not include information that is or subsequently becomes generally available to the public.

8. Representations & Warranties

8.1. Producer represents and warrants that it:

8.1.1. has the required skill, experience and qualifications to perform the Services; and

8.1.2. shall perform the Services in a professional and workmanlike manner in accordance with generally recognized industry standards for similar services, and in compliance with all applicable federal, state, and local laws and regulations.

8.2. Client represents and warrants that:

8.2.1. Client has the full right, power and authority to enter into this Agreement and to perform its obligations hereunder; and

8.2.2. the execution of this Agreement by its representatives, whose signature or signatures are set forth below, has been duly authorized by all necessary individual, corporate, nonprofit or governmental action.

9. **Standard Performance and Insurance; Indemnity.** All services to be performed by Producer hereunder shall be performed in a skilled, professional and non-negligent manner. Producer shall obtain and maintain at his/her/its cost and expense:

9.1. Comprehensive general liability insurance that covers the Producer services performed by Producer for Client with a combined single limit of liability of at least Two Million Dollars ($2,000,000.00).

9.2. Errors and omissions or equivalent insurance that covers the Producer services performed by Producer for Client with a combined single limit of liability of at least Two Million Dollars ($2,000,000.00).

9.3. Worker's compensation insurance covering Producer (if an individual) all of Producer's employees with coverages and limits of coverage required by law.

Producer shall indemnify and hold harmless Client from and against all errors, omissions and/or negligent acts causing claims, damages, liabilities and damages arising out of the performance of his/her/its services hereunder.

Producer certifies that Producer is in compliance with all applicable worker's compensation laws, rules and regulations. Neither Producer (if an individual) nor Producer's employees and agents will be considered Client employees. Any claims that may arise under any worker's compensation laws on behalf of any employee of Producer and any claims made by any third party as a consequence of any act or omission on the part of Producer or any employee of Producer are in no way Client's obligation or responsibility. By signing this Addendum, Producer certifies that Producer is in compliance with these laws and regulations.

Producer shall deliver to Client, concurrent with the execution of this Addendum, one or more certificate(s) of insurance evidencing that Producer has the insurance required by this Addendum in full force and effect. Client shall be named as additional insured under such Producer's comprehensive general liability policy. The insurer will provide at least thirty (30) days prior written notice to Client, without fail, of any cancellation, non-renewal, or modification of any of the Producer's comprehensive general liability policy or coverage evidenced by said certificate(s) for any cause, except for nonpayment of premium. The insurer will provide at least ten (10) days prior written notice to Client, without fail, of any cancellation of any of the Producer's comprehensive general liability policy or coverage evidenced by said certificate(s) for nonpayment of premium. Producer shall provide Client with appropriate endorsements to Producer's comprehensive general liability policy reflecting the status of Client as an additional

insured and requiring that the foregoing required notice of cancellation, material alteration or non-renewal be provided Client by the insurance company providing such insurance policy to Producer.

The Producer shall require any subcontractor permitted by Client to perform work for Producer to have in full force and effect the insurance coverage required of the Producer under this Agreement before any subcontractor(s) begin(s) work. Producer shall require any such subcontractor to provide to Producer a Certificate of Insurance evidencing that such subcontractor has the insurance required by this Agreement in full force and effect. The Producer and Client shall be named as additional insureds under such policies. The insurer will provide 30 day written notice to Client and Producer, without fail, of any cancellation, non-renewal, or modification of the subcontractor's comprehensive general liability policy or coverage evidenced by said certificate(s) for any cause, except for nonpayment of premium. The insurer will provide at least ten (10) days prior written notice to Client and Producer, without fail, of any cancellation of any of the subcontractor's comprehensive general liability policy or coverage evidenced by said certificate(s) for nonpayment of premium. Client and Producer shall also be provided with appropriate endorsements to subcontractor's comprehensive general liability policy reflecting the status of Client and Producer as an additional insured and requiring that the foregoing required notice of cancellation, material alteration or non-renewal be provided Client by the insurance company providing subcontractor's comprehensive general liability policy.

10. Termination

10.1. During the Term, either Party may terminate this Agreement, with or without cause, upon ten (10) days' written advance notice to the other Party.

10.2. In the event of termination by Client pursuant to this clause, Client shall pay the Producer for any Services completed up to and including the effective date of such termination.

11. Alternative Dispute Resolution

11.1. The Client and Producer shall attempt to resolve any disagreements under this Agreement. If such efforts do not resolve such disagreement within thirty (30) calendar days, then the Client and Producer shall enter into mediation through a mediator authorized to conduct mediation under the Minnesota Supreme Court Alternative Dispute Resolution System. If mediation does not resolve such disagreements within thirty (30) calendar days after the matter is submitted to mediation, then the Client and Producer shall be entitled to take whatever action is necessary or appropriate to seek redress of any disagreements. The venue and jurisdiction for any such further proceedings shall be in the District Court for St. Louis County, Minnesota..

12. General Terms & Conditions

12.1. Any alterations, variations, modifications or waivers of terms of this Agreement shall be binding on Producer and Client only upon reduction to writing and signature by all Parties.

12.2. Producer agrees not to assign any rights under this Agreement without the prior and express written authorization of Client.

12.3. This Agreement, together with all attachments, addendums, schedules, paragraphs, terms, provisions, modifications, and amendments, is made in the State of Minnesota and shall be construed and interpreted in accordance with the laws of the State of Minnesota.

12.4. Producer shall not be liable for any failure of, or delay in, performance of its obligations under this Agreement to the extent such failure or delay is due to circumstances beyond its reasonable control, including, without limitation, acts of God, viral pandemic, acts of a public enemy, fires, floods, wars, civil disturbances, sabotage, accidents, insurrections, blockades, embargoes, storms, explosions, labor disputes, acts of any governmental body (whether civil or military, foreign or domestic), failure or delay of third parties or governmental bodies from whom a party is obtaining or must obtain approvals, franchises or permits, or inability to obtain labor, materials, equipment, or transportation.

12.5. In the event any provision herein shall be deemed invalid or unenforceable, the remaining provision shall continue in full force and effect and shall be binding upon the Parties to this Agreement.

12.6. It is understood and agreed that the entire agreement of the Parties is contained herein and that this Agreement supersedes all oral agreements and negotiations between the parties relating to the subject matter hereof. Any amendment to this Agreement shall be in writing and shall be executed by the same Parties who executed the original agreement or their successors in office.

12.7. The Parties acknowledge and agree that each of them has been advised to seek, had the opportunity to seek, or was otherwise not prevented from seeking independent legal counsel prior to execution and delivery of this Agreement and that, to the extent any Party did not avail itself of such counsel prior to executing the Agreement, said Party did so voluntarily without any pressure or influence by any other.

12.8. This Agreement may be executed in two or more counterparts, each of which shall be deemed to be an original as against any Party whose signature appears thereon, but all of which together shall constitute but one and the same instrument. Signatures to this Agreement transmitted by facsimile, by electronic mail in “portable document format” (“.pdf”), or by any other electronic means which preserves the original graphic and pictorial appearance of the Agreement, shall have the same effect as physical delivery of the paper document bearing the original signature.

IN WITNESS WHEREOF, the undersigned Parties hereby execute this Agreement, including associated Schedule A addendum, as follows:

STORY NORTH PRODUCTIONS, LLC

By:_____
Its:_____
Date: _____

HERMANTOWN ECONOMIC DEVELOPMENT AUTHORITY

By:_____
Its: President

And by:_____
Its: Secretary

Date: _____

SCHEDULE A

By and Between Story North Productions, LLC, and
Hermantown Economic Development Authority

THIS ADDENDUM ("Schedule A"), by and between Story North Productions, LLC, 705 High St., Duluth, MN, 55805 ("Producer"), and Hermantown Economic Development Authority, an economic development authority organized under the laws of the State of Minnesota, 5105 Maple Grove Road, Hermantown, Minnesota 55811 ("Client"), collectively referred to herein as "the Parties," is attached to, and fully incorporated in, the Parties' related Independent Producer Agreement effective January 7, 2022.

1. Services

1.1 Pre-production, production, and post-production services for two storytelling videos for the Hermantown Economic Development Authority to be used online and on-air.

2. Deliverables

2.1 2-to-3-minute video highlighting the Hermantown Economic Development Authority and its residents. Video will feature interviews with residents and b-roll of residents taking part in activities, along with beauty shots of the city.

2.2 2-to-3-minute cinematic video highlighting Hermantown's passion for sports, whether you're 13 or 65. The "mini film" will feature various athletes – from a young hockey player to a participant in the Y's Silver Sneakers Program.

2.3 Each 2-to-3-minute project will include two short (:30-:45) edits for digital platforms and for broadcast.

2.4 All deliverables will be made available for review and download on the Vimeo platform

3. Timeline

3.1 Pre-production meeting with key stakeholders will occur in early January to identify interview subjects, b-roll opportunities, scheduling & deadlines

3.2 Production on both projects will occur during the months of January, February, and March

3.3 Post-production will occur during mid-February to mid-March. Client will have up to two rounds of editing revisions per project.

4. Cost of Project

4.1 $8,500 per video

4.2 $17,000 total

4.3 Additional client revisions beyond 2 rounds will be billed $150/hour

5. Payment

5.1 30% deposit ($5,100) invoiced at signing of contract

5.2 Remaining total ($11,900) will be invoiced upon approval of each full-length deliverable

DESKTOP REVIEW SUMMARY
CITY OF HERMANTOWN – PROPOSED FUTURE BUSINESS PARK

DATE: **December 16, 2021**

TO: **John Mulder – City of Hermantown**
Eric Johnson – City of Hermantown

CC: **Heidi Timm-Bijold – HTB Project Navigation, LLC**

FROM: **Joseph Butler, PE, Business Unit Manager, Senior Engineer - Braun Intertec**
Kenneth Larsen, PE, PG, Vice President, Principal Engineer - Braun Intertec
Jennifer Wolff, PG, Senior Consultant - Braun Intertec
David Bolf, PE, Principal Partner - Northland Consulting, LLC

RE: **Proposed Future Business Park**
Hermantown, Minnesota

A. INTRODUCTION

Braun Intertec Corporation and Northland Consulting, LLC have prepared memorandum summarizing the results of the geotechnical and environmental desktop review services completed for the proposed future business park located near the Intersection of Trunk Highway 53 and Lavaque Bypass Road in Hermantown, Minnesota. The desktop review services described in this document were completed in manner consistent with proposals prepared by the respective firms dated September 9, 2021 (Braun Intertec) and September 15, 2021 (Northland Consulting). The completed services were selected to help the City of Hermantown's project team to better understand the "big picture" geotechnical, environmental, wetland and civil engineering challenges related to future development of the business park based on available existing information, and also provide the City with options and cost estimates for likely additional geotechnical and environmental services needed to advance and further refine the project.

B. BACKGROUND INFORMATION

B.1. SITE DESCRIPTION

The City of Hermantown is evaluating a proposed future business park. The area of the proposed park is composed of nine individual tax parcels (parcels) located between Abrahamson Road and Lavaque Bypass Road on the north side of Trunk Highway (TH) 53 in Hermantown, Minnesota (the proposed business park). The parcels are a mix of commercial/light industrial or undeveloped land. A site location map is provided as **Figure 1,** a site diagram showing the indiviual parcels comprising

the future businesss park is provided as **Figure 2,** and a concept diagram showing the locations of possible future development lots and infrastructure lcoations is provided as **Figure 3**.

B.2. SCOPE DESCRIPTION

The desktop review focused on available existing information containing relevant information on geotechnical and environmental conditions and related considerations for development of the business park. The desktop information review completed by Braun Intertec included the following:

- Ordered and reviewed historical aerial photographs covering the entire proposed business park area to observe past land uses and related changes over time.

- Reviewed publicly available information available from St. Louis County and the City of Hermantown for information regarding land use and ownership within the proposed business park.

- Reviewed the Minnesota Pollution Control Agency (MPCA) What's in My Neighborhood database to identify known exiting sites of regulatory interest within (and adjacent to) the proposed business park.

- Reviewed existing documents on the former Arrowhead Refinery Superfund Site that are available online to identify data providing information on historical soil, sediment and groundwater contamination, completed corrective actions, locations and details regarding clean backfill placement, and institutional controls/deed restrictions placed on the proposed business park that will be relevant to future development.

- Requested and reviewed additional files available at the MPCA for the former Arrowhead Refinery Superfund Site. Contacted and interviewed MPCA staff with knowledge of the former Arrowhead Refinery Superfund Site for additional insight on site conditions and documents of interest.

- Reviewed soil boring logs and laboratory analytical results representative of post cleanup soil and groundwater conditions to the degree they provided insight on current geotechnical and environmental conditions requiring consideration for future development.

- Queried the Minnesota Department of Natural Resources (DNR) Natural Heritage Information System (NHIS) and the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool for data related to known occurrences of threatened, endangered, or special concern species located within or near the proposed business park.

- Reviewed available public resources for boring logs, geological atlas, and other available subsurface data with the intent of defining the overall geological conditions that may impact potential future development activities.

In addition to the above, David Bolf of Northland Consulting, LLC conducted desktop information reviews related to selected wetlands and civil engineering topics important to redevelopment planning.

C. DESKTOP INFORMATION REVIEW

C.1. OVERVIEW

A review of aerial photographs, threatened and endangered species, and other publicly available documents were reviewed for the parcels within the proposed business park. This information is summarized for each parcel on individual parcel data sheets, which are included as **Appendix A**. Refer to the parcel data sheets for specific information regarding the eleven parcels within the proposed business park.

C.2. ENVIRONMENTAL REVIEW

Based on review of the information, a portion of the proposed business park is a superfund site, known as the Arrowhead Superfund Site (SR0000067), which was delisted from the Federal and State Superfund programs early in 2021. Five of the parcels within the proposed business park (395-0010-00822, 395-0010-00820, 395-0010-00854, 395-0010-00850, and 395-0010-00853) are within the Arrowhead Superfund site.

The former Arrowhead Superfund Site was approximately 26 acres in size and was used by a company for re-tinning milk cans prior to 1945. From 1945 to 1977, the former Superfund Site was utilized by the Arrowhead Refining Company who operated a business that refined used oils using an acid-clay process. This process produced three waste streams: 1) metals-contaminated acidic sludge; 2) filter cake; and 3) wastewater. The historical information indicates that the filter cake waste stream was disposed of on-site in a wetland that became a sludge lagoon, and wastewater was disposed of on-site in a ditch. These waste management practices resulted in soil and groundwater contamination including oil and grease, heavy metals, cyanide, phenols, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). The Site was initially investigated by the U.S. Environmental Protection Agency (EPA) in 1976 and they ordered Arrowhead Refinery to cease operations in 1984. In 1986, EPA issued a Record of Decision that approved a cleanup approach that included excavation of impacted soils and sludge to industrial levels and installation of a groundwater extraction system. The groundwater extraction system was installed in 1993 and required soil/sediment removal cleanup actions were completed in 1995. Site investigation and monitoring activities continued into the early 2000's, and the groundwater extraction system was turned off in 2007. Post shutdown ground water monitoring continued until 2014 when the wells were allowed to be sealed. The information indicates that the full extent of groundwater contamination was not determined. However, the MPCA felt that the extraction system was protective and that no additional remediation would be required at that time.

As part of a long-term stewardship plan for the Site, the Minnesota Pollution Control Agency required the filing of an Environmental Covenant for the Site that was filed in February 2021 addressing requirements for contamination remaining in place. The Arrowhead Superfund Site was recently delisted from both the EPA and MPCA Superfund programs on September 14, 2021. A copy of the Environmental Covenant dated February 3, 2021 is provided in **Appendix B**. The Environmental Covenant restricts land use on two parcels: 395-0010-00854 and 395-0010-00853.

Outside of the Arrowhead Superfund area, the area of the proposed business park was undeveloped until the 1960s, when some commercial/light-industrial development began on some of the parcels. Information regarding the past and current land uses is included on the parcel summary sheets, attached as **Appendix A**.

C.2.a. Recommendations for Future Environmental Investigations

There is a gerenal lack of current and relevant environmental data available for the area of the future business park site, and additional Phase I and Phase II environmental site assessment work will be needed for development planning, environmental due diligence, and to satisfy the requirements of the existing Environmental Easement that is in-place for the Former Arrowhead Refinery Superfund Site. The previous environmental investigation and cleanup activities for the Former Arrowhead Refinery Superfund Site focused on addressing known contamiantion source areas to the degree necessary to mitigate risks to public health at that time; however, residual soil and groundwater contamination remains in place and needs to be considered for redevelopment. Furthermore, any prospective purchaser of a parcel that is part of (or near) a former Superfund Site will require Phase II investigaiton simply due to proximity to that Site. To the degree practical, it is recommended that the future Phase II environmental site assessments be coordinated with the future recommended geotechnical investigtions to promote drilling and data collection efficencies.

Construction of a new industrial, commercial, warehouse, or light industrial facility may trigger Minnesota Environmental Review Rules, depending on the size of the development. Specifically, in Minnesota, construction of new warehouses or light industrial buildings 300,000 square feet (sf) or larger, or other commercial/industrial buildings of 200,000 sf or larger, will require an environmental assessment worksheet (EAW) provided that no federal funding will be used. If federal funding is involved, an environmental review which follows the specific federal agency's guidelines would be necessary, in addition to the EAW. The timeframe to prepare a formal EAW takes approximately 4 to 6 months to complete. However, there is an alternative Minnesota environmental review approach available for projects involving large areas such as this project. This approach is called an Alternative Urban Area Review (AUAR) and allows for a more limited and high-level scope that is, in most cases, faster to complete and is ideal for projects or larger properties that may be redeveloped progressively over time.

For this project, it is recommend that the Alternate Urban Areawide Review (AUAR) be completed to assist in planning the proposed business park and guide in assessing future site-specific development scenarios . In addition to meeting the environmental review requirement, the AUAR will also help to promote and attract industrial development in this area and will also act as a planning tool for the City of Hermantown to guide future site-specific development scenarios. While additional environmental review (beyond the AUAR) may be necessary for future individual site-specific projects (depending on the size and type of projects), the completion of an AUAR will reduce the amount of environmental review that will be necessary for each individual development thus expediting the speed with which land acquisition and construction can occur.

C.3. THREATENED AND ENDANGERED SPECIES REVIEW

A Protected Species Evaluation was conducted on the proposed business park. A copy of the complete evaluation is included as **Appendix C**.

Four federally listed species were identified for the proposed business park in the IPaC database. In addition, the project area is located within a critical habitat zone for the Canada Lynx. Three state listed species were identified for the site in the NHIS database.

C.3.a. Protected Species Evaluation Conclusions

With a lack of surface water features and apparent limited floral resources for pollinators, the proposed business park does not provide suitable habitat for the Floating Marsh Marigold, Piping Plover or Monarch Butterfly. With forested land covering large portions of the area, it is possible, but unlikely the Rusty Patched Bumble Bee or Soapberry are present due other habitat requirements of these species. The proposed business park is located within a critical habitat zone for the Canada Lynx and forested portions of the area may provide habitat for the species. Due to its history of disturbance, surrounding development and the type of forest (mixed conifer-hardwood) present, it is unlikely resident lynx occupy the proposed business park. However, lynx may forage on and travel through the proposed business park between areas of nearby preferred habitat (boreal forest/ coniferous bogs). Additionally, trees within the proposed business park may provide nesting habitat for migratory birds and potential summer roosting habitat for the Northern Long-eared bat.

C.3.b. Protected Species Evaluation Recommendations

As development is proposed for the proposed business park, additional consultation with the U.S. Fish and Wildlife Service (USFWS) and Minnesota Department of Natural Resources (MnDNR) regarding the suitability of Canada Lynx habitat present and potential impacts to the species is recommended. Also, if required for any proposed development, it is recommended to conduct vegetation and tree clearing from September 1-April 30 to avoid impacts to nesting migratory birds (nesting season is typically May-August). Additionally, any potential development projects for the proposed business park should consider timing tree clearing work from November-March to avoid any impacts to the Northern Long-eared bat.

C.4. GEOTECHNICAL REVIEW

C.4.a. General

Based on our experience in the area, a review of publically available geologic maps and a review of a exsiting borings discovered in our research, it appears the general geologic conditions in the project area consist of a glacial till over igneous bedrock. The thickness of the glacial till layer typically ranges from 10 to 30. Bedrock can be as shallow as a few feet, we are not aware of ourcroppings on the subject parcels.

The glacial tills generally consist of silty sand to sandy silt. Groundwater is generally perched within the till or on top of the bedrock.The glacial till is typically overlain by organic materials, either topsoil or swamp deposits, or existing fill (materials placed by man rather than by nature).

C.4.b. Geotechnical Considerations

- Organic Materials: Topsoils and swamp soil contain organic materials, organic materals hold water, become weak, frost susceptible and compressible. We generally recommend that organic materials not be relied upon for support of structures. We typically recommend organic materials be stripped from below pavement and structures and replaced with engineered fill. In pavement areas, leaving organic materials in place can be considered if the risk of settlement is accepted by the project team. Minimum thickness of engineered fills over the organic materials will be needed for support of pavments.

- Existing Fills: Existing fill materials are typically unknown in orgin and are not homogeneous in compostion or relative density. We generally recommend existing fills not be relied upon for support of structures. Existing fills can be considered suitable for support of pavements; relatively thick pavement sections may be reqired to mitigate the risk of differential settlement or heave.

  Existing fill mitigation techniques generally depend on depth of fill. Shallower fills can generally be completely removal and replacement; deep foundations or ground improvement techniques are generally most economical for deeper fills.

- Frost Susceptible Soils: Silty and clayey soils are likely to support exterior pavements and slabs; these materials are considered frost susceptable. Relatively thick pavement sections will be required.

- Groundwater: Groundwater is common in the area. It is typically perched loose zones of soils, within exsisting fill or on top of denser materials such as dense glacial till or bedrock.

C.4.c. Parcel Specific Geotechncial Data

The only site specific geotechnical data we found during our review was for a proposed retail store on the former Arrowhead Refinery site. A geotechnical evaluation was completed in 2002, for the proposed construction of a retail building.

The results of the evaluation were summarized in a Report of Geotechnical/Environmental Exploration and Review prepared by American Engineering Testing, dated December 6, 2002. Six standard penetration test borings were completed for the project. The borings generally encountered existing fill materials, over swamp deposits, over native glacial tills. A copy of this previous report is included as **Appendix D**.

C.4.d. Recommendations for Future Geotechncial Investigation

The is a gerenal lack of geotechncial soil boring information available for the future business park site. Consequently, additional geteicnical investiaton will be recommended for all of the future busness park parcels that may include future buildings, parking lots and related roads/infrstructure.

To the degree practical, it is recommended that the future geotechnical investigtions be coordinated with the future recommended Phase II environmental site assessments to promote drilling and data collection efficencies.

C.5. WETLAND REVIEW

C.5.a. Desktop Delineation

WSP Completed a desktop review for the Highway 53 Business Park site by reviewing and analyzing a variety of available information to identify the presence or absence of wetlands. Resources reviewed include:

- U.S. Fish and Wildlife Service National Wetland Inventory (NWI)
- Minnesota Department of Natural Resources (MNDNR) Public Waters Inventory (PWI)
- Natural Resources Conservation Service (NRCS) Web Soil Survey
- U.S. Geological Survey (USGS) Topographic base map
- Aerial photos
- Light Detection and Ranging (LiDAR) Data

The Highway 53 Business Park map included in **Appendix E** depicts the potential site wetlands based on the desktop review (shaded in blue).

C.6. CIVIL ENGINEERING REVIEW

C.6.a. Background

The City of Hermantown is considering the creation of a new business park near the intersection of Miller Trunk Highway 53 (TH 53) and Lavaque Bypass Road. This area is being considered due to the Environmental Protection Agency's (EPA) recent delisting efforts related to an approximate 26-acre federal and state superfund site that is part of the area. The attached exhibit shows the location of the proposed business park which is comprised of 25 future lots and comprising approximately 137 acres.

C.6.b. Site Evaluation

The business park is bounded by TH 53 to the south, Lavaque Bypass Road to the east, Abrahamson Road to the west, and state-owned tax forfeit land to the north. Northland Consulting Engineers (NCE) met with St. Louis County (SLC) and the Minnesota Department of Transportation (MNDOT) to discuss access points to the future park. MNDOT's preference is the (3) existing driveways on the north side of TH 53 be removed and access be provided from Abrahamson Road and Lavaque Bypass Road. SLC's initial response is to use the current field entrance on the west side of Lavaque Bypass Road approximately 1,400 feet north of the intersection with TH 53. Both MNDOT and SLC stated that some level of traffic study along with an Intersection Control Evaluation (ICE) report will be necessary. Each agency would then review and approve the document. The city or developer would be responsible for cost of any improvements once the access points are established. We envision an interior network of city streets and utilities being established.

C.6.c. Site Constraints

Like most sites that remain undeveloped, this site has constraints that affect the feasibility. This 137-acre park has both a power line easement and a snowmobile trail that run through the middle of the property. We propose to leave this easement in place and develop around it. Another site constraint is the large areas of wetlands that exist across the parcels (shaded blue on map). The desktop delineation completed by WSP

indicates approximately 47 acres of wetlands within the park boundary. If the park gets developed, we anticipate a small square footage of wetlands will be impacted.

C.6.d. Zoning

The property considered to be included in the new business park currently has (4) different zoning districts including high density and low density commercial, heavy industrial, and office/light industrial/adult. The creation of a new business park will likely include a new zoning district to accommodate existing business and attract new businesses (see attached zoning map provided in **Appendix F**). The new business park is within the airport zoning district. Most of the business park falls within the airport zoning district #2. Any potential business will need to adhere to the requirements within that district. A map depicting the airport safety zones and related zone definitions is provided in **Appendix G**.

C.6.e. Utilities

- Sanitary Sewer: Currently all parcels have individual on site treatment systems. The closest sanitary sewer is about 500' south of TH 53. To serve the business park, the sanitary sewer will need to be directionally drilled under TH 53. The interior will be served with a new public gravity system. This will flow to a centrally located municipal lift station. The lift station will pump the sanitary sewer south across TH 53.

- Water Main: Currently none of the parcels are served by public water supply. The closest water main runs along the south side of TH 53. To serve the business park there will likely be (2) water main crossings bored under TH 53. One at Abrahamson Road and one at Lavaque Bypass Road. These (2) crossing will create a water main loop through the business park. A loop is a desired option in laying out new water distribution systems.

- Storm Sewer: No storm exists within the site. None of the existing developments have stormwater treatment devices. When developed we envision a new storm sewer system and a system of regional ponds to treat both the roadways and part of each lot.

- Power: Minnesota power has power on (3) sides of the business park. As the planning for this moves forward, we will engage Minnesota Power for laying out new electric services.

- Gas: Minnesota Energy Resources has gas main running along TH 53. New services will need to be coordinated as lots develop.

- High Speed Internet: In recent years this has been a business attractor. Now this is a business necessity. The city has and continues to be an active participant working with local providers to serve the Hermantown Community. Bringing high-speed broadband service to all of Hermantown is a Council priority. A Broadband Task Force has been formed with a mission of developing a strategic plan to be successful in the deployment of broadband throughout the community. This includes partnering with the State's Office of Broadband Development to assess current availability of service and to determine the most financially feasible plan for new and existing providers to invest in building broadband infrastructure. The Hermantown City Council has appropriated $400,000 of American Rescue Act (ARA) funding to this effort. Further, the Hermantown Economic Development Authority (HEDA) has identified the provision of broadband infrastructure is a top economic development priority, which ensures that service to the proposed Highway 53 Business Park will be a Task Force priority.

C.6.f. Roadways

The business park will include two separated roadways. One accessing the business park from Lavaque Bypass Road and the other from Abrahamson Road. These roadways will be disconnected from each other. Both will have the same typical section. The pavement section will be designed as a 10-ton roadway and will take into consideration the geotechnical recommendations. The roadways will be 32 feet wide with curb and gutter on both sides. The roadways will also have a system of catch basins and manholes to collect stormwater runoff. A five-foot-wide sidewalk would also be included on one side of the roadway.

C.6.g. Wetlands

As noted in section C.5.a, a desktop delineation of wetlands within the boundary has been prepared. The project will impact wetlands in several locations. Prior to design a formal wetland delineation will need to be prepared, reviewed, and approved by the local governing unit (LGU). Impacts to wetlands that are cumulatively less than 10,000 square feet can be submitted to the LGU and Army Corp as a de minimus exemption. A de minimus exemption would not require mitigation or wetland credit purchase. Any impacts over 10,000 square feet will require wetland mitigation and wetland credit purchase through a wetland bank. Since this is a common plan of development, if the 10,000 square foot de minimus is used as part of the initial public improvements, any new development within wetlands would be required to mitigate wetlands and purchase credits. As referenced in Section C.5, the map included in **Appendix E** depicts the potential site wetlands (shaded in blue) relative to the planned Business Park area.

D. FUTURE TECHNICAL SERVICES/COST ESTIMATES

Additional environmental, geotechnical and civil engineering services will be needed to support the establishment of the future business park. On November 1, 2021, the Hermantown Economic Development Authority (HEDA) submitted a grant application to the Minnesota Department of Employment and Economic Development (DEED) for environmental investigation and response action plan preparation for the five parcels in the proposed business park that were part of the recently delisted Arrowhead Superfund site (395-0010-00822, 395-0010-00820, 395-0010-00854, 395-0010-00850, and 395-0010-00853). If the grant is awarded, Phase I and Phase II an environmental investigation will be completed that will address the respective parcels. The Phase II investigation will include completion of soil borings and testing of soil, groundwater, and soil vapor samples for contamination that could affect planned redevelopment. The response action plan (RAP) prepared under the grant will address requirements for addressing any soil, groundwater, and or soil gas contamination identified at levels requiring consideration for future development. Although the tasks completed under the grant would focus on environmental issues, the soil borings for the Phase II investigation will provide relevant geotechnical information that will be useful for development planning on those parcels. The estimated total cost of the environmental technical services to be completed under the DEED grant is approximately **$67,000** (applies to the five parcels comprising the former Superfund Site).

Any prospective purchaser of a parcel outside the former Superfund Site boundary will require completion of a Phase I ESA for environmental due diligence, and will aslo likely require completion of a Phase II investigation due to proximity to the former Superfund Site. As dicscussed in Section C.3 (Geotechnical Review), parcel-specific geotechncial investigattion will also be required to assess soil conditions affecting future construction of buidlings, roadways and other infrastructure. To the degree practical, it is the future

Phase II environmental site assessments should be coordinated with the future recommended geotechnical investigtions to promote drilling and data collection efficencies.

Anticipated cost ranges for parcel-specifc environmental and geotechnical investigations are summarized below:

- Geotechnical – Preliminary Geotechnical Evaluation **$5,000** – $**10,000** per parcel
- Environmental – Phase I ESAs **$2,200** - **$2,600** per parcel
- Environmental – Phase II Investigations **$10,000** - **$15,000** per parcel
- Environmental - Response Action Plan (if needed) **$5.000** - **$9,000** per parcel

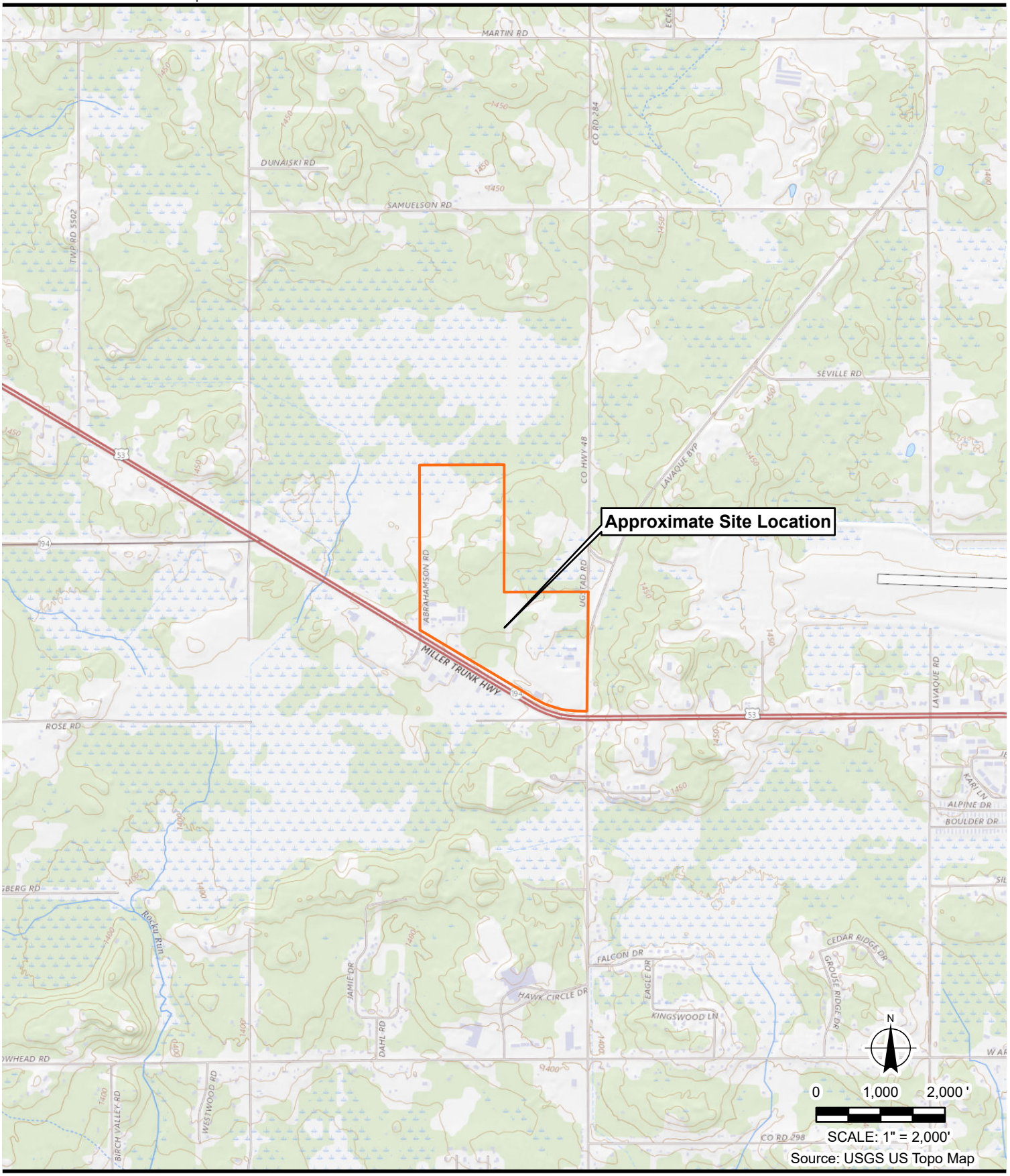
Cost estimate ranges for other future technical services discussed in this memo are summarized below:

- Endangered Species Reviews **$5,000** – **$10,000** entire business park
- Wetland Delineations **$20,000**– **$30,000** entire business park
- AUAR and Related Support **$50,000** – **$100,000** entire business park
- Civil Engineering Design **$250,000 - $400,000** entire business park
    - Existing Conditions and Removals
    - Roadway Plan and Profile
    - Utility Plan and Profile
    - Stormwater Management Plan
    - Stormwater Pollution Prevention Plan
    - Permitting
        - Sanitary Sewer (MPCA and WLSSD)
        - Water Main (MN Department of Health)
        - Highway Access Permits (MNDOT and St. Louis County
        - Stormwater Management (MPCA and City of Hermantown)

The cost estimate ranges provide are intended for preliminary budgeting purposes and based on the preliminary information reviewed for this desktop study. Costs for civil engineering design can vary considerably depending on how the future development is laid out and sequenced, as well as final decisions/requirements made in relation to site access, traffic flow and utility infrastructure connections. Proposals with detailed scopes of services and cost estimates will be prepared for the future environmental, geotechnical and civil engineering services at appropriate junctures of the project.

FIGURES

F:\2021\B2109165\GIS\B2109165.aprx



BRAUN INTERTEC
The Science You Build On.

11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Project No:	B2109165
Drawing No:	B2109165_Fig 1
Drawn By:	ZS
Date Drawn:	10/8/2021
Checked By:	JBW
Last Modified:	11/1/2021

Future Business Park

Near Intersection of TH 53 and Lavaque Bypass Road

Hermantown, Minnesota

Site Location Map

Figure 1

F:\2021\B2109165\GIS\B2109165.aprx

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The Science You Build On.

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Minneapolis, MN 55438
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braunintertec.com

Project No:	B2109165
Drawing No:	B2109165_Fig 2 Letter
Drawn By:	ZS
Date Drawn:	10/8/2021
Checked By:	JBW
Last Modified:	11/1/2021

Future Business Park

Near Intersection of TH 53 and Lavaque Bypass Road

Hermantown, Minnesota

Site Diagram

Figure 2

TOTAL AREA	137.28 ACRES
WETLAND AREA	46.74 ACRES
CURRENTLY DEVELOPED	29.74 ACRES
PROPOSED RIGHT OF WAY	9.70 ACRES
RESIDUAL AREA	51.10 ACRES
BUILDING COVERAGE	10.22 ACRES
NO. OF LOTS	25 LOTS
ROADWAYS	5,435 LINEAL FEET
WATER MAIN	8,966 LINEAL FEET
SANITARY MAIN	5,388 LINEAL FEET

ZONE 2 BOUNDARY

ZONE 1 BOUNDARY

N

W E

S

LOT 1
10.60 ACRES

LOT 2
7.18 ACRES

LOT 3
5.20 ACRES

LOT 4
4.84 ACRES

LOT 5
5.00ACRES

LOT 6
5.00 ACRES

LOT 7
3.74 ACRES

LOT 8
3.74 ACRES

LOT 9
5.72 ACRES

LOT 10
14.08 ACRES

LOT 11
3.64 ACRES

LOT 12
15.69 ACRES

LOT 13
4.72 ACRES

LOT 14
3.64 ACRES

LOT 15
3.53 ACRES

LOT 16
4.29 ACRES

LOT 17
3.40 ACRES

LOT 18
2.96 ACRES

LOT 19
2.53 ACRES

LOT 20
2.82 ACRES

LOT 21
2.97 ACRES

LOT 22
5.02 ACRES

LOT 23
3.93 ACRES

LOT 24
2.32 ACRES

LOT 25
2.83 ACRES

MINNESOTA POWER AND
SNOWMOBILE TRAIL EASEMENT

ST. LOUIS COUNTY
PREFERRED ACCESS POINT

MNDOT PREFERRED
ACCESS POINT.

REMOVE
ACCESS POINT.

REMOVE
ACCESS POINT.

REMOVE
ACCESS POINT.

REMOVE
ACCESS POINT.

SANITARY SEWER
LIFT STATION

ABRAHAMSON ROAD

UGSTAD ROAD

LAVAQUE BYPASS ROAD

TRUNK HIGHWAY 53

ROSE ROAD

City of Hermantown Minnesota

GOVERNMENT SERVICES BUILDING
5105 MAPLE GROVE ROAD
HERMANTOWN, MN 55811
PHONE: (218) 729-3600

HIGHWAY 53 BUSINESS PARK

DATE: NOVEMBER 3, 2021
REVISED: DECEMBER 8, 2021

LEGEND

- BUSINESS PARK LIMITS
- RIGHT-OF-WAY LINE
- LOT LINE
- SECTION LINE
- WATER MAIN
- SANITARY MAIN
- DESKTOP WETLAND BOUNDARIES
- AIRPORT ZONE 1 BOUNDARY
- AIRPORT ZONE 2 BOUNDARY

0' 50' 100' 200'

Northland Consulting Engineers L.L.P.
Structural, Civil and Forensic Engineering Services
Voice: (218)727-7999
Fax: (218)727-7778
www.nce-engineers.com

APPENDIX A

SITE SUMMARY SHEETS

Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00650	**Address**	No address assigned

Parcel location map

St. Louis County, County Land Explorer Photograph

Summary

Based on review of aerial photographs, the parcel has not been developed. Forested areas of the parcel may provide potential habitat for threatened and endangered species and migratory birds.

Parcel Information

Site Name: Carlson Parcel
Historical Site Name(s): N/A
Current Site Use: Undeveloped
Property Type: Undeveloped
Lot Size: 40 acres
Site Address: No address assigned
Parcel ID Number: 395-0010-00650
Partial Legal Description: SW ¼ of NE ¼, Section 4, Township 50, Range 15
Owner Name: Gerald E & Carol Carlson
Zoning District M2-Heavy Industrial

Site Features

Noted during review of information:	**Yes**	**No**
Current structures	☐	☒
Evidence of demolished/removed structures	☐	☒
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒
Wells	☐	☒
Septic system or cistern	☐	☒
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☐	☒

Site Summary Sheet
TH53 Business Park

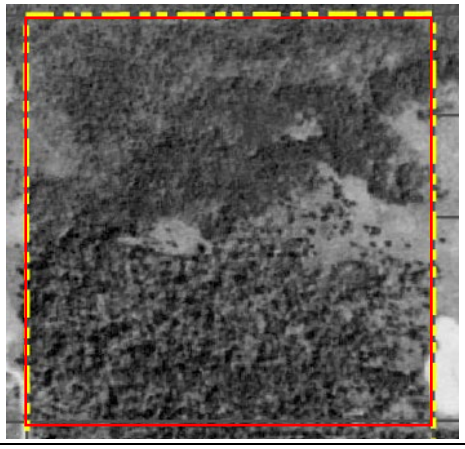
Noted during review of information:	Yes	No
Evidence of dumping, landfilling, or non-native fill	☐	☒
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☐	☒
Unpaved roads/paths with no outlet	☐	☒
Outdoor storage	☐	☒
Surface water features	☐	☒
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Site specific geotechnical information	☐	☒
Threatened and Endangered Species potentially present	☒	☐
Previous environmental investigation	☐	☒
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there are no buildings on the site.

Historical Aerial Photograph Summary

Year	Use	Source
1940 – 1951	Undeveloped, wooded	Aerial photographs
1953 – 1989	Undeveloped, wooded, some trails enter site along eastern border from property to west	Aerial photographs
1991 – 2003	Undeveloped trails from east no longer visible. Utility line cuts off northwest corner	Aerial photographs
2008 – 2019	Central portion has been cleared and is no longer wooded. Utility line still present in northwest, rest of site undeveloped.	Aerial photographs

Historical Information



1940 Aerial Photograph

2008 Aerial Photograph

Site Summary Sheet
TH53 Business Park

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) did not identify any wells registered to, or plotted at, the site.

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website did not identify the site.

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

No site specific geotechnical information was available for this parcel.

Threatened and Endangered Species Review

Forested areas may provide potential habitat for the Canada Lynx, Northern-Long Eared Bat, and migratory birds.

Detailed Regulatory File Review

No Minnesota Pollution Control Agency (MPCA) or Minnesota Department of Agriculture (MDA) files were reviewed for this site.

Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00820	**Address**	No address assigned

Parcel location map

St Louis County, County Land Explorer Photograph

Summary

Based on aerial photographs, this parcel has been undeveloped. Wetlands and potential fill activities were identified on some photographs. This parcel is part of the Arrowhead Refinery Company, which is a delisted Superfund site. While remediation was not conducted on this parcel, activities on the parcel may be connected to activities on parcels to the south associated with the Arrowhead Refinery Company.

Parcel Information

Site Name:	Bill & Irv Central Parcel	**Site Address:**	No address assigned
Historical Site Name(s):	---	**Parcel ID Number:**	395-0010-00820
Current Site Use:	Undeveloped	**Partial Legal Description:**	Part of NE ¼ of SE ¼, Section 4, Township 50, Range 15
Property Type:	Undeveloped	**Owner Name:**	Bill & Irv's Properties Inc.
Lot Size:	11.18 acres	**Zoning District**	C-General Commercial

Site Features

Noted during review of information:	**Yes**	**No**
Current structures	☐	☒
Evidence of demolished/removed structures	☐	☒
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒
Wells	☐	☒
Septic system or cistern	☐	☒
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☐	☒

Site Summary Sheet
TH53 Business Park

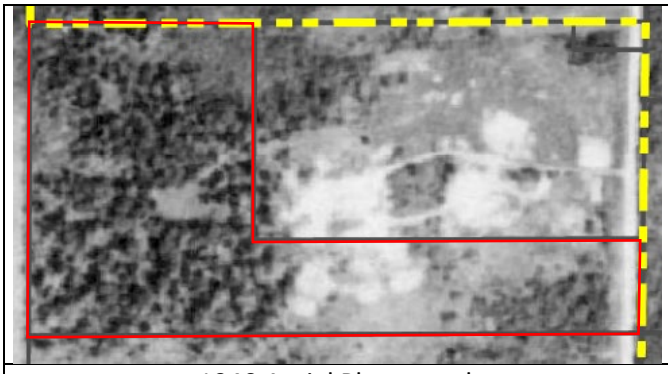
Noted during review of information:	Yes	No
Evidence of dumping, landfilling, or non-native fill	☒	☐
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☐	☒
Unpaved roads/paths with no outlet	☒	☐
Outdoor storage	☐	☒
Surface water features	☒	☐
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Site specific geotechnical information	☐	☒
Threatened and Endangered Species potentially present	☒	☐
Previous environmental investigation	☐	☒
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there are no buildings on the site.

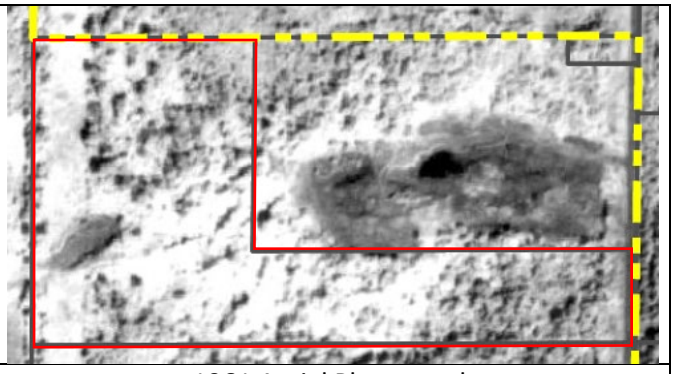
Historical Aerial Photograph Summary

Year	Use	Source
1940 – 1953	The site is undeveloped with a cleared area in the central portion.	Aerial photographs
1961	A small area, which appears to be a pond, is present on the western edge with a trail or canal connected.	Aerial photograph
1972 – 2003	The small pond area is not visible. A pond or wetland area appears in the central portion of the site. The size of the area varies by year.	Aerial photographs
2008 – 2019	The site appears to have been graded with roads leading to the south. No ponds or wetlands are visible.	Aerial photograph

Historical Information

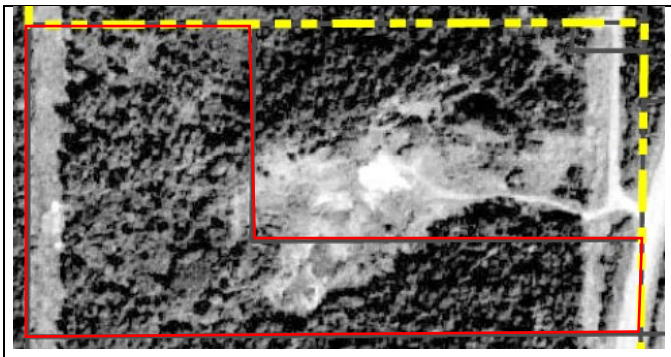


1940 Aerial Photograph



1961 Aerial Photograph

Site Summary Sheet
TH53 Business Park



1975 Aerial Photograph

2008 Aerial Photograph

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) did not identify any wells registered to, or plotted at, the site.

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website did not identify the site.

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

No site-specific geotechnical information was available for this parcel, however, based on data available on the adjacent parcel, we anticipate the subsurface conditions at this site consist of existing fil materials, over swamp deposits, over native glacial tills.

The existing fills and swamp soils should be considered unsuitable for support of buildings. Mitigation techniques include removal and replacement, soil improvement, or deep foundations.

In pavement areas, a minimum of 3 to 4 feet of select grading materials (sand) should be provided over swamp soils to support traffic loads. The existing fills and swamp soils are potentially compressible under fill loads. If grades are raised, or if swamp soils are removed and replaced with sand, consolidation of the swamps soils is likely. Mitigation measures to minimize the impact of settlements include complete removal and replacement of swamp soils, construction delays and surcharges.

Threatened and Endangered Species Review

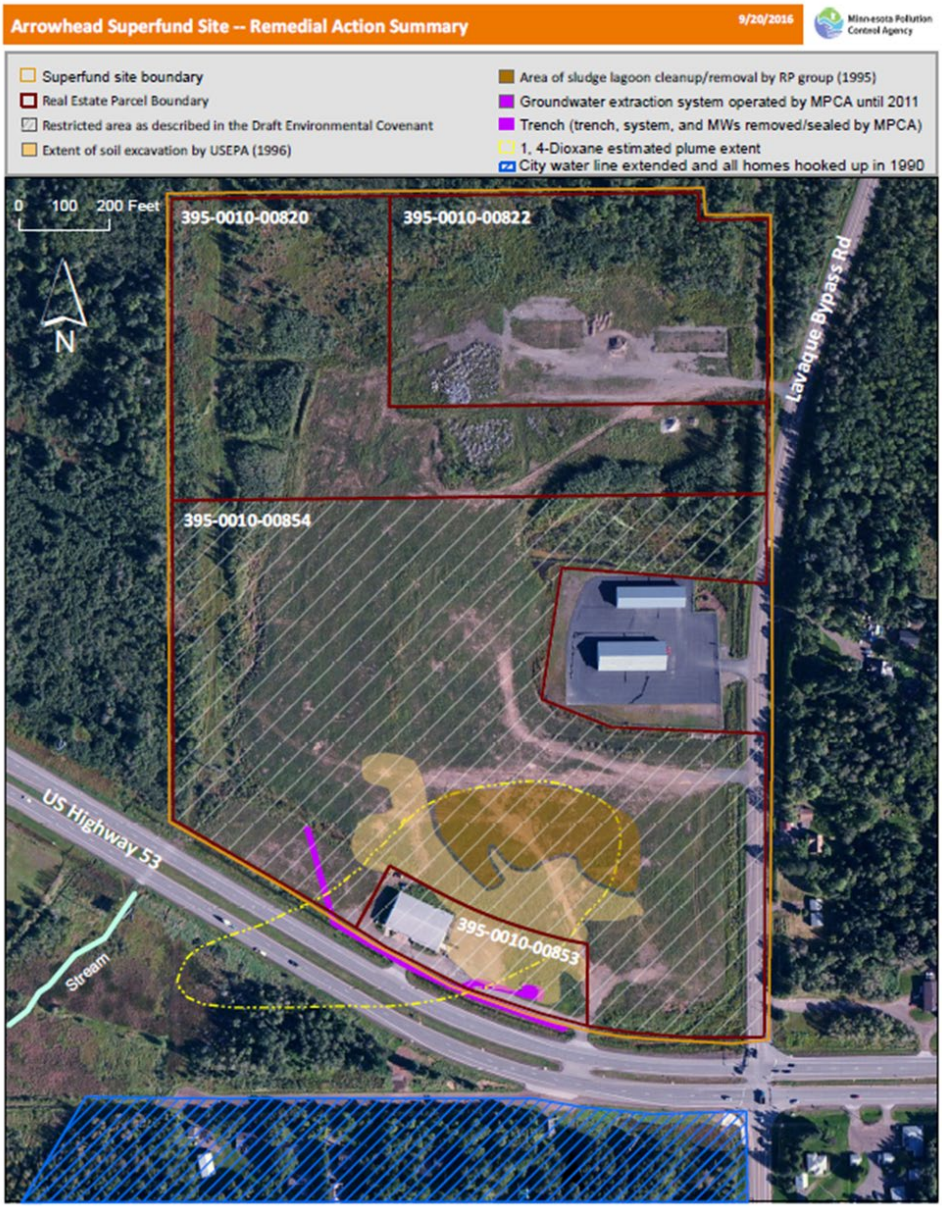
Suitable habitat for the protected species identified in state or federal databases is unlikely to be present, but may be present in undeveloped areas.

Detailed Regulatory File Review

This parcel is part of the Arrowhead Refinery Company site. The Minnesota Pollution Control Agency (MPCA) files for the Arrowhead Refinery Company site were reviewed. A full summary of the information is provided on the parcel sheet for parcel 395-0010-00854. Soil and groundwater remediation was conducted on the area to the

south, but do not appear have occurred on this parcel. However, based on aerial photographs, activities from the Arrowhead Refinery Company appear to have also occurred on this parcel. The Arrowhead Refinery Company was delisted from Superfund on September 14, 2021.

A copy of the map included in the Environmental Covenant, which shows the extent of the Arrowhead Refinery Company site and the areas of remediation, is provided below.



Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00822	**Address**	No address assigned

Parcel location map

St Louis County, County Land Explorer Photograph

Summary

Based on aerial photographs, this parcel has been undeveloped. Wetlands and potential fill activities were identified on some photographs. This parcel is part of the Arrowhead Refinery Company, the activities observed on this parcel may be connected to activities associated with the Arrowhead Refinery Company.

Parcel Information

Site Name:	Bill & Irv North Parcel	**Site Address:**	No address assigned
Historical Site Name(s):	----	**Parcel ID Number:**	395-0010-00822
Current Site Use:	Undeveloped	**Partial Legal Description:**	Part of NE ¼ of SE ¼, Section 4, Township 50, Range 15
Property Type:	Commercial	**Owner Name:**	Bill & Irv's Properties, Inc.
Lot Size:	8.61 acres	**Zoning District**	C-General Commercial

Site Features

Noted during review of information:	**Yes**	**No**
Current structures	☐	☒
Evidence of demolished/removed structures	☐	☒
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒
Wells	☐	☒
Septic system or cistern	☐	☒

Site Summary Sheet
TH53 Business Park

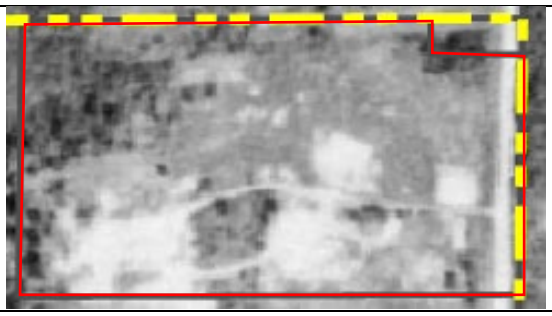
Noted during review of information:	Yes	No
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☐	☒
Evidence of dumping, landfilling, or non-native fill	☒	☐
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☐	☒
Unpaved roads/paths with no outlet	☒	☐
Outdoor storage	☒	☐
Surface water features	☐	☒
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Site specific geotechnical information	☐	☒
Threatened and Endangered Species potentially present	☐	☒
Previous environmental investigation	☐	☒
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there are no buildings on the site.

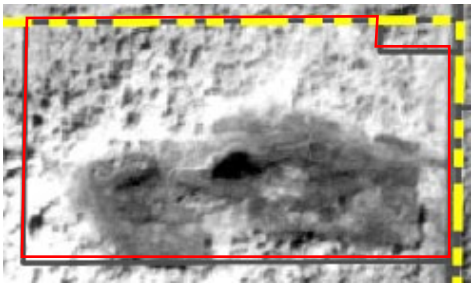
Historical Aerial Photograph Summary

Year	Use	Source
1940	Site is cleared with areas of disturbed soil.	Aerial photograph
1948 – 1951	Portions of the site are cleared, but no indications of recent activities	Aerial photographs
1953	Piles of soil or other materials are present in the central area of the site, in the areas previously noted as cleared.	Aerial photograph
1961 – 1997	The central portion appears to be a wetland/pond in most years, with some years drier and no water is noted.	Aerial photographs
2003 – 2019	No wetland/pond is noted, and the central portion appears graded. Some debris or piles of material are visible on the 2019 photograph.	Aerial photographs

Historical Information



1940 Aerial Photograph



1961 Aerial Photograph

Site Summary Sheet
TH53 Business Park

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) did not identify any wells registered to, or plotted at, the site.

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website did not identify the site.

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

No site-specific geotechnical information was available for this parcel, however, based on data available on the adjacent parcel, we anticipate the subsurface conditions at this site consist of existing fil materials, over swamp deposits, over native glacial tills.

The existing fills and swamp soils should be considered unsuitable for support of buildings. Mitigation techniques include removal and replacement, soil improvement, or deep foundations.

In pavement areas, a minimum of 3 to 4 feet of select grading materials (sand) should be provided over swamp soils to support traffic loads. The existing fills and swamp soils are potentially compressible under fill loads. If grades are raised, or if swamp soils are removed and replaced with sand, consolidation of the swamps soils is likely. Mitigation measures to minimize the impact of settlements include complete removal and replacement of swamp soils, construction delays and surcharges.

Threatened and Endangered Species Review

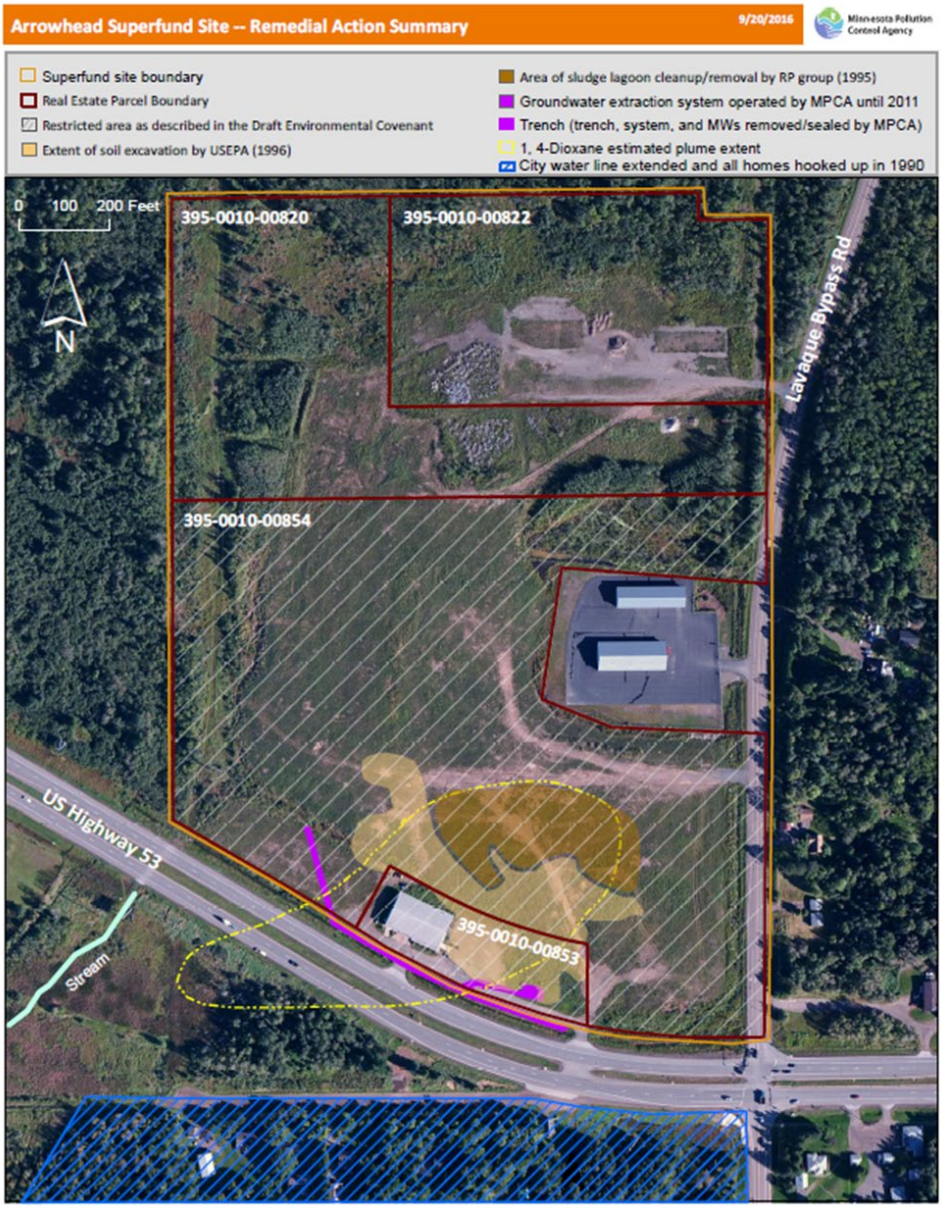
Suitable habitat for the protected species identified in state or federal databases is unlikely to be present but may be present in undeveloped areas.

Detailed Regulatory File Review

This parcel is part of the Arrowhead Refinery Company site. The Minnesota Pollution Control Agency (MPCA) files for the Arrowhead Refinery Company site were reviewed. A full summary of the information is provided on the parcel sheet for parcel 395-0010-00854. Soil and groundwater remediation was conducted on the area to the south, but do not appear have occurred on this parcel. However, based on aerial photographs, activities from the Arrowhead Refinery Company appear to have also occurred on this parcel.

A copy of the map included in the Environmental Covenant, which shows the extent of the Arrowhead Refinery Company site and the areas of remediation, is provided below.

Site Summary Sheet
TH53 Business Park



Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00825	**Address**	No address assigned

Parcel location map

St Louis County, County Land Explorer Photograph

Summary

Based on aerial photographs, a small building was present in the 1940s. The parcel appears to have been undeveloped since that time. Forested areas may provide potential habitat for threatened and endangered species.

Parcel Information

Site Name:	Northwest Bell	**Site Address:**	No address assigned
Historical Site Name(s):	List name(s)	**Parcel ID Number:**	395-0010-00825
Current Site Use:	Undeveloped	**Partial Legal Description:**	Part of NE ¼ of SE ¼, Section 4, Township 50, Range 15
Property Type:	Commerical/Undeveloped	**Owner Name:**	Northwest Bell Telephone Co
Lot Size:	0.21 acres	**Zoning District**	C1a-Sexually Oriented Uses

Site Features

Noted during review of information:	**Yes**	**No**
Current structures	☐	☒
Evidence of demolished/removed structures	☒	☐
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒
Wells	☐	☒
Septic system or cistern	☐	☒

Site Summary Sheet
TH53 Business Park

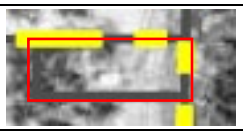
Noted during review of information:	Yes	No
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☐	☒
Evidence of dumping, landfilling, or non-native fill	☐	☒
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☐	☒
Unpaved roads/paths with no outlet	☐	☒
Outdoor storage	☐	☒
Surface water features	☐	☒
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Site specific geotechnical information	☐	☒
Threatened and Endangered Species potentially present	☒	☐
Previous environmental investigation	☐	☒
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there are no buildings on the site.

Historical Aerial Photograph Summary

Year	Use	Source
1940	The site appears to be occupied by one small building or trees. A road is present along the eastern boundary of the site.	Aerial photograph
1948 – 1989	The site is undeveloped. The site becomes more wooded through the years.	Aerial photographs
1991	One small building is present on the site.	Aerial photograph
1997 – 2019	The site appears to be undeveloped.	Aerial photograph

Historical Information

	
1940 Aerial Photograph	1991 Aerial Photograph

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) did not identify any wells registered to, or plotted at, the site.

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website did not identify the site.

Site Summary Sheet
TH53 Business Park

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

No site-specific geotechnical information was available for this parcel.

Threatened and Endangered Species Review

Forested areas may provide potential habitat for the Canada Lynx, Northern-Long Eared Bat, and migratory birds.

Detailed Regulatory File Review

No Minnesota Pollution Control Agency (MPCA) or Minnesota Department of Agriculture (MDA) files were reviewed for this site.

Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00830	**Address**	5389 Miller Trunk Highway

Parcel location map

St Louis County, County Land Explorer Photograph

Summary

Based on review of aerial photographs, the parcel was undeveloped until around 1953, when commercial buildings were constructed. These buildings were no longer present by 1961. A road or drainage ditch was present running from the southern portion to the eastern border and on to a small pond on the adjacent parcel on the 1961 photograph. Additional commercial buildings were constructed between 1990 and 2016. A drinking water well was identified for the parcel. The parcel was identified on the hazardous waste generator as Acuren Inspection. Suitable habitat for the protected species identified in state or federal databases is unlikely to be present but may be present in undeveloped areas of the parcel.

Parcel Information

Site Name:	Golden Eagle Parcel	**Site Address:**	5389 Miller Trunk Hwy
Historical Site Name(s):	----	**Parcel ID Number:**	395-0010-00830
Current Site Use:	Economy Garage, Amity Creek Homes, Economy Mini-Storage, residence	**Partial Legal Description:**	Portion of NW ¼ of SE ¼, Section 4, Township 50, Range 15
Property Type:	Commercial/ Light Industrial	**Owner Name:**	Golden Eagle Parcel
Lot Size:	46.18 acres	**Zoning District**	C1A-Sexually Oriented Uses and C1-Office/Light Industrial

Site Summary Sheet
TH53 Business Park

Site Features

Noted during review of information:	Yes	No
Current structures	☒	☐
Evidence of demolished/removed structures	☒	☐
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒
Wells	☒	☐
Septic system or cistern	☐	☒
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☒	☐
Evidence of dumping, landfilling, or non-native fill	☐	☒
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☐	☒
Unpaved roads/paths with no outlet	☒	☐
Outdoor storage	☐	☒
Surface water features	☐	☒
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Site specific geotechnical information	☐	☒
Threatened and Endangered Species potentially present	☒	☐
Previous environmental investigation	☐	☒
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there are 11 buildings on the site. The following information was available regarding the buildings:

Building #	Building Type/Use	Gross Area (sq ft)	Year Built	Foundation
1	Office	2,400	1990	Foundation
2	Warehouse	12,240	1996	Floating slab
3	Warehouse	216	2005	Floating slab
4	Warehouse	576	2016	Floating slab
5	Mini-Warehouse	16,320	2002	Floating slab
6	Utility	280	2017	Foundation
7	Storage Building	120	Not provided	Post on Ground
8	Storage Building	96	Not provided	Post on Ground
9	Warehouse	5,040	1992	Floating slab
10	Warehouse	5,080	1998	Floating slab
11	Warehouse	1,440	Not provided	Floating slab

Site Summary Sheet
TH53 Business Park

Historical Aerial Photograph Summary

Year	Use	Source
1940 – 1951	Site is undeveloped, with wooded areas to the north.	Aerial photographs
1953	Three small buildings are present along the southern portion of the site.	Aerial photograph
1961	The buildings are no longer visible. A road or drainage ditch is present running from the southern portion to the eastern border and on to a small pond on the adjacent parcel.	Aerial photograph
1972 – 1991	The road or drainage ditch is no longer present and the site is again undeveloped.	Aerial photographs
1997	One commercial building is present near the south west corner of the site. A second commercial building is present closer to the northwest corner.	Aerial photograph
2003	Two additional buildings are present near the northern building noted previously. Ten buildings are present near the southern building noted previously.	Aerial photograph
2008 – 2019	Additional buildings are present in the southern portion of the site.	Aerial photographs

Historical Information

1953 Aerial Photograph

1961 Aerial Photograph

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) identified the following well(s) registered to, or plotted at, the site:

Site Summary Sheet
TH53 Business Park

Unique Well #	Well Name	Total Depth (ft)	Depth to Water (ft)	Aquifer	Listed Use	Date Well Completed	Status
497301	Tobias, Craig	225	8	Layered series	Domestic	05/19/1992	Active

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website identified the site on the following database(s):

Name	Activity/Database	Regulatory ID	Remarks
Acuren Inspection, 4566 Abrahamson Road	Hazardous Waste	MNS000205013	Minimal quantity generator. Last report year 2018: 110 gallons of x-ray fixer, sewered

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

No site specific geotechnical information was available for this parcel.

Threatened and Endangered Species Review

Suitable habitat for the protected species identified in state or federal databases is unlikely to be present but may be present in undeveloped areas of the parcel.

Detailed Regulatory File Review

No Minnesota Pollution Control Agency (MPCA) or Minnesota Department of Agriculture (MDA) files were reviewed for this site.

Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00831	**Address**	5393 Miller Trunk Highway

Parcel location map

St Louis County, County Land Explorer Photograph

Summary

Based on aerial photographs, the parcel was undeveloped until 1965 when a commercial building was constructed. Additional buildings were added between 1978 and 2019. A drinking water well was identified for the parcel. The parcel was identified on the hazardous waste generator database.

Parcel Information

Site Name:	Tamarack Materials	**Site Address:**	5393 Miller Trunk Highway
Historical Site Name(s):	---	**Parcel ID Number:**	395-0010-00831
Current Site Use:	Commercial	**Partial Legal Description:**	Part of the W ½ of the SE ¼, Section 4, Township 50, Range 15
Property Type:	Commercial/Light Industrial	**Owner Name:**	Tamarack Materials Northland Inc
Lot Size:	3.62 acres	**Zoning District**	C1-Office/Light Industrial and C1A-Sexually Oriented Uses

Site Features

Noted during review of information:	**Yes**	**No**
Current structures	☒	☐
Evidence of demolished/removed structures	☐	☒
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒

Site Summary Sheet
TH53 Business Park

Noted during review of information:	Yes	No
Wells	☒	☐
Septic system or cistern	☐	☒
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☒	☐
Evidence of dumping, landfilling, or non-native fill	☐	☒
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☐	☒
Unpaved roads/paths with no outlet	☐	☒
Outdoor storage	☐	☒
Surface water features	☐	☒
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Site specific geotechnical information	☐	☒
Threatened and Endangered Species potentially present	☐	☒
Previous environmental investigation	☐	☒
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there are six buildings on the site. The following information was available regarding the buildings:

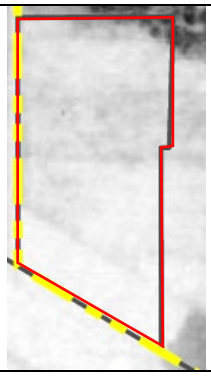
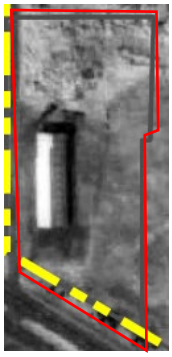
Building #	Building Type/Use	Gross Area (sq ft)	Year Built	Foundation
1	Warehouse	11,520	1965	Floating slab
2	Materials Storage	12,240	1998	Floating slab
3	Materials Storage	3,240	1992	Floating slab
4	Utility	576	1990	Floating slab
5	Office	2,028	1965	Foundation
6	Parking lot	49,600	Not provided	Asphalt

Historical Aerial Photograph Summary

Year	Use	Source
1940 – 1961	The site appears to be cultivated farmland and undeveloped	Aerial photographs
1972 – 1975	One commercial building is present in the southwest portion of the site.	Aerial photographs
1978 – 1997	Two additional buildings are present to the east of the building noted previously. Additional outdoor areas have been cleared and used for outdoor storage of materials.	Aerial photographs
2003 – 2019	An additional building is present on the northern portion of the site. The remainder of the site appears unchanged.	Aerial photographs

Site Summary Sheet
TH53 Business Park

Historical Information

	
1940 Aerial Photograph	1972 Aerial Photograph

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) identified the following well(s) registered to, or plotted at, the site:

Unique Well #	Well Name	Total Depth (ft)	Depth to Water (ft)	Aquifer	Listed Use	Date Well Completed	Status
555943	5391 Miller Trunk Hwy	335	28	Aquifer	Domestic	05/20/1996	Active

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website identified the site on the following database(s):

Name	Activity/Database	Regulatory ID	Remarks
Economy Garage, 5391 Miller Trunk Hwy	Hazardous waste	MND981959745	Inactive. Most recent report year 1994: 15 gallons of pesticides/herbicides, 240 pounds arsenic, 150-pound pentachlorophenol.

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

No site-specific geotechnical information was available for this parcel.

Threatened and Endangered Species Review

Suitable habitat for the protected species identified in state or federal databases does not appear to be present.

Detailed Regulatory File Review

No Minnesota Pollution Control Agency (MPCA) or Minnesota Department of Agriculture (MDA) files were reviewed for this site.

Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00850	**Address**	5309 Miller Trunk Highway

Parcel Location Map

St Louis County, County Land Explorer Photograph

Summary

Based in aerial photographs, this parcel was undeveloped until 2004, when two commercial buildings and paved parking areas were constructed. An additional building was added around 2016. The buildings have been used as self-storage since construction. This parcel is part of the Arrowhead Refinery Company. However, based on aerial photographs, the activities associated with the Arrowhead Refinery Company do not appear to have occurred on this parcel.

Parcel Information

Site Name:	Redstone Properties Parcel	**Site Address:**	5309 Miller Trunk Highway
Historical Site Name(s):	Access Storage	**Parcel ID Number:**	395-0010-00850
Current Site Use:	Self storage facility	**Partial Legal Description:**	Part of SE ¼ of SE ¼, Section 4, Township 50, Range 15
Property Type:	Commercial	**Owner Name:**	Redstone Properties Duluth LLC
Lot Size:	3.58 acres	**Zoning District**	C1A-Sexually Oriented Uses

Site Features

Noted during review of information:	**Yes**	**No**
Current structures	☒	☐
Evidence of demolished/removed structures	☐	☒
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒
Wells	☐	☒
Septic system or cistern	☐	☒
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☐	☒
Evidence of dumping, landfilling, or non-native fill	☐	☒

Site Summary Sheet
TH53 Business Park

Noted during review of information:	Yes	No
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☐	☒
Unpaved roads/paths with no outlet	☐	☒
Outdoor storage	☒	☐
Surface water features	☐	☒
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Threatened and Endangered Species potentially present	☐	☒
Site specific geotechnical information	☐	☒
Previous environmental investigation	☐	☒
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there are six buildings on the site. The following information was available regarding the buildings:

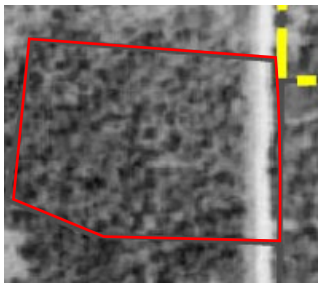
Building #	Building Type/Use	Gross Area (sq ft)	Year Built	Foundation
1	Warehouse	4,800	2016	Not provided
2	Mini-Warehouse	8,700	2004	Floating slab
3	Mini-Warehouse	6,090	2004	Floating slab
4	Parking lot	70,700	2004	Not provided
5	Multiple storage buildings	1,776	Not provided	Post on ground
6	Office	420	Not provided	Basement

Historical Aerial Photograph Summary

Year	Use	Source
1940 – 1997	The site is undeveloped and wooded.	Aerial photographs
2003	The site is undeveloped but is no longer wooded.	Aerial photograph
2008 – 2015	The site has been developed with two commercial buildings with paved areas.	Aerial photograph
2019	A third building has been added, along the southern edge of the site. Outdoor storage is visible around the buildings.	Aerial photograph

Site Summary Sheet
TH53 Business Park

Historical Information

	
1940 Aerial Photograph	2013 Aerial Photograph

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) did not identify any wells registered to, or plotted at, the site.

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website did not identify the site.

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

No site specific geotechnical information was available for this parcel, however, based on data available on the adjacent parcel, we anticipate the subsurface conditions at this site consist of existing fill materials, over swamp deposits, over native glacial tills.

The existing fills and swamp soils should be considered unsuitable for support of buildings. Mitigation techniques include removal and replacement, soil improvement, or deep foundations.

In pavement areas, a minimum of 3 to 4 feet of select grading materials (sand) should be provided over swamp soils to support traffic loads. The existing fills and swamp soils are potentially compressible under fill loads. If grades are raised, or if swamp soils are removed and replaced with sand, consolidation of the swamps soils is likely. Mitigation measures to minimize the impact of settlements include complete removal and replacement of swamp soils, construction delays and surcharges.

Threatened and Endangered Species Review

Suitable habitat for the protected species identified in state or federal databases does not appear to be present.

Detailed Regulatory File Review

No Minnesota Pollution Control Agency (MPCA) or Minnesota Department of Agriculture (MDA) files were reviewed for this site. The parcel is part of the former Arrowhead Refinery Company, which was delisted from

Superfund on September 14, 2021. Based on aerial photograph review, and review of the MPCA files, this parcel does not appear to have been part of the activities on the Arrowhead Refinery Company.

Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00853	**Address**	5315 Miller Trunk Highway

Parcel Location Map

St Louis County, County Land Explorer Photograph

Summary

Based on the information reviewed, this parcel was part of a larger property known as the Arrowhead Refinery Company property. The property was used for re-tinning milk cans prior to 1945. From 1945 – 1977, it was used as a re-refiner of used oil. Soil and groundwater contamination were identified from these prior uses. Soil contamination exceeding commercial/industrial criteria was removed. A groundwater extraction system was installed in 1993 and operated until 2007. The full extent of groundwater contamination was not determined.

Parcel Information

Site Name:	Bill & Irv South Parcel	**Site Address:**	5315 Miller Trunk Highway
Historical Site Name(s):	Arrowhead Refinery Co.	**Parcel ID Number:**	395-0010-00853
Current Site Use:	Commercial	**Partial Legal Description:**	Part of SE ¼ of SE ¼, Section 4, Township 50, Range 15
Property Type:	Commercial	**Owner Name:**	Bill & Irv's Properties Inc.
Lot Size:	1.88 acres	**Zoning District**	C-General Commercial

Site Features

Noted during review of information:	**Yes**	**No**
Current structures	☒	☐
Evidence of demolished/removed structures	☒	☐
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒

Site Summary Sheet
TH53 Business Park

Noted during review of information:	Yes	No
Wells	☐	☒
Septic system or cistern	☐	☒
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☒	☐
Evidence of dumping, landfilling, or non-native fill	☒	☐
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☒	☐
Unpaved roads/paths with no outlet	☐	☒
Outdoor storage	☐	☒
Surface water features	☐	☒
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Threatened and Endangered Species potentially present	☐	☒
Site specific geotechnical information	☐	☒
Previous environmental investigation	☒	☐
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there is one building on the site. The following information was available regarding the building:

Building #	Building Type/Use	Gross Area (sq ft)	Year Built	Foundation
1	Warehouse	10,000	1980	Floating slab

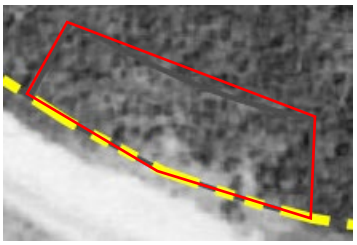
Historical Aerial Photograph Summary

Year	Use	Source
1940	One small building is present near the southeast portion of the site. The remainder of the site is wooded.	Aerial photograph
1948	A drainage ditch or disturbed area is present on the south side of the site. The remainder of the site appears unchanged.	Aerial photograph
1951	The site is more developed with cleared areas.	Aerial photograph
1953 – 1961	The building has been expanded or replaced with a larger commercial building. The site is mainly cleared. Outdoor storage or dumping is visible along the northern portion of the site and onto the adjacent parcel.	Aerial photographs
1972	An additional building is present. Outdoor storage or dumping is still visible.	Aerial photograph
1975 – 1978	The buildings on the site have expanded or been replaced with larger buildings. An additional building is present along the southern portion of the site.	Aerial photographs

Site Summary Sheet
TH53 Business Park

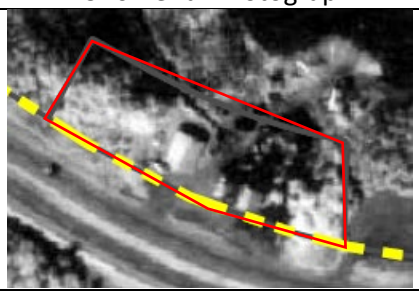
Year	Use	Source
1981 – 1991	An additional commercial building is present on the western portion of the site. Outdoor storage or dumping is still visible.	Aerial photographs
1997 – 2019	All but one of the buildings have been removed and outdoor activities are no longer visible.	Aerial photograph

Historical Information

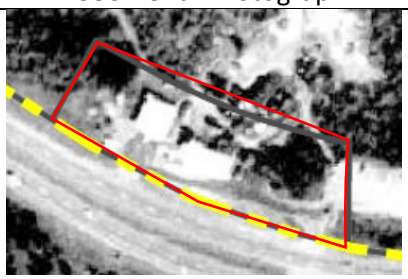


1940 Aerial Photograph

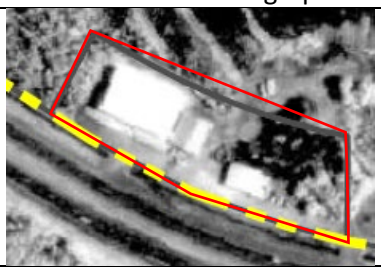
1953 Aerial Photograph



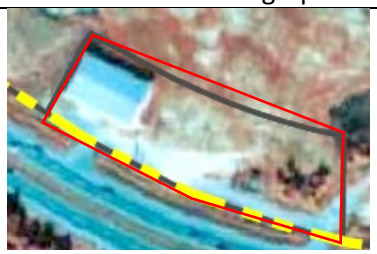
1972 Aerial Photograph



1975 Aerial Photograph



1981 Aerial Photograph



1997 Aerial Photograph

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) did not identify any wells registered to, or plotted at, the site.

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website identified the site on the following database(s):

Name	Activity/Database	Regulatory ID	Remarks
Collins Collision Repair, 5309 Miller Trunk Highway	Hazardous Waste	MN000061614	Inactive. Last report year 1994: parts washer solvent and paints/thinners.

Site Summary Sheet
TH53 Business Park

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

No site-specific geotechnical information was available for this parcel, however, based on data available on the adjacent parcel, we anticipate the subsurface conditions at this site consist of existing fil materials, over swamp deposits, over native glacial tills.

The existing fills and swamp soils should be considered unsuitable for support of buildings. Mitigation techniques include removal and replacement, soil improvement, or deep foundations.

In pavement areas, a minimum of 3 to 4 feet of select grading materials (sand) should be provided over swamp soils to support traffic loads. The existing fills and swamp soils are potentially compressible under fill loads. If grades are raised, or if swamp soils are removed and replaced with sand, consolidation of the swamps soils is likely. Mitigation measures to minimize the impact of settlements include complete removal and replacement of swamp soils, construction delays and surcharges.

Threatened and Endangered Species Review

Suitable habitat for the protected species identified in state or federal databases does not appear to be present.

Detailed Regulatory File Review

This parcel is part of the Arrowhead Refinery Company site. The Minnesota Pollution Control Agency (MPCA) files for the Arrowhead Refinery Company site were reviewed. The following is the summary provided the Environmental Covenant for the adjacent parcel (395-0010-00854), which was filed on February 19, 2021, and contains a summary of the work completed for the Arrowhead site:

The Property, which occupies approximately 26 acres, was used for re-tinning milk cans prior to 1945. From 1945 to 1977, the property operated as a re-refiner of used oil. From 1961 until 1977, the Arrowhead Refinery Company re-refined oil on the property using an acid-clay process. This process produced three waste streams: metal-contaminated acidic sludge, filter cake, and wastewater. Site operators disposed of the acidic sludge in a wetland that became a sludge lagoon. The company disposed of filter cake over the native peat in the wetland. Wastewater from the re-refining process was discharged to a wastewater ditch. These improper waste management practices resulted in soil and groundwater contamination including oil and grease, heavy metals, cyanide, phenols, polynuclear aromatic hydrocarbons (“PAHs”), and polychlorinated biphenyls (“PCBs”).

In 1976, the MPCA conducted its initial investigation of the Property and ordered Arrowhead Refinery to cease activities. In 1984, United States Environmental Protection Agency ("EPA") placed the Property on the National Priorities List ("NPL"). EPA's cleanup plan included removal and proper disposal of sludge, filter cake, and contaminated soil as well as the installation, operation and maintenance of a groundwater treatment system. Additionally in 1984, the EPA conducted a remedial investigation and feasibility study ("RI/FS"). In 1986, the EPA issued a Record of Decision ("ROD") that approved the excavation of impacted soils and sludge and the installation of a groundwater extraction system.

The EPA installed the groundwater extraction system in 1993. The system consisted of an interceptor trench and French drain system approximately 850 feet long and 25 feet deep. Groundwater was pumped from the trench at an average rate of approximately 45 to 50 gallons per minute ("gpm"). Recovered groundwater was pumped

directly into the Western Lake Superior Sanitary District ("WLSSD") sanitary sewer system. In 1996, the MPCA assumed long term operation and maintenance of the groundwater extraction system.

In an amended ROD ("AROD") dated February 9, 1994, the response actions for source material, soils, and sediments were amended. The AROD also clarified that operation and maintenance of the groundwater extraction system would continue until the extraction system discharge and the groundwater at the Property's southern boundary met the Safe Drinking Water Act Maximum Contaminant Levels ("MCLs").

On May 24, 1995, the responsible parties filed a judicial Consent Decree ("Decree") in federal district court. The excavation of source material began in June 1995 with approximately 4,600 tons of material removed for off-Site disposal. In June 1996, under the EPA's direction, 24,783 tons of soil and sediment were excavated, treated as necessary, and disposed of at a Subtitle D Landfill. The excavation was backfilled with 48,050 tons of soil and the excavation area was restored.

On August 16, 2002, Saint Louis County filed the Decree with the Saint Louis County Recorder's office. In general, the Decree requires that any deed, title, or interest in the Property contain a notice stating that the property is subject to the conditions of the Decree, that there is an access obligation, and that the property is subject to certain restrictions. These conditions were established because contamination above residential health risk levels is still present in soil on-site. Institutional controls ("ICs") are required to restrict certain development activities at the Property, and MPCA approval is required if there are any changes from the final remedy.

In the Second Five-Year Review Report, dated September 2002, the need to sample for the possible presence of 1,4-dioxane, a substance that is commonly used as a solvent stabilizer, was discussed. This additional requirement arose as a result of the Minnesota Department of Health ("MDH") establishing a new health-based value ("HBV") of 30 micrograms per liter ("µg/L") for 1,4-dioxane because of improved laboratory analytical methods that lowered the method detection limit. The Second Five Year Review Report also recommended confirmatory sampling for arsenic, hexavalent chromium, vanadium, zinc, and 4-methylphenol at the source area monitoring wells and at the extraction system discharge. To address total lead concentrations that periodically exceeded the EPA action level of 15 µg/L, sampling the extraction system discharge and select monitoring well locations for both dissolved lead and total lead was also recommended to evaluate whether lead was in the dissolved phase or associated with particulate matter present in the samples.

Between June 21 and June 28, 2005, West Central Environmental Consultants ("WCEC") advanced 23 direct push borings under the direct supervision of Bay West in an attempt to delineate the extent of the 1,4-dioxane, arsenic, and DRO in groundwater in the vicinity of the suspected historical source area on-site (i.e., monitoring well nests MPCA-4A/4B and MPCA-5A/5B). Soil and groundwater samples were collected from 22 of the 23 borings for 1,4-dioxane, arsenic and/or DRO analyses. The direct push investigation was successful at more accurately delineating the extent of 1,4-dioxane, arsenic, and DRO in soil and groundwater in the vicinity of the suspected historical source area on-site. The extent of dissolved arsenic and 1,4-dioxane in the groundwater was determined to be further west of well nest MPCA-4A/4B than previously assumed. While the lateral extent of 1,4-dioxane, arsenic, and DRO were not completely encompassed by soil borings advanced during the direct push investigation, data available from up-gradient, cross-gradient and down-gradient monitoring wells, and the interceptor trench, in combination with analytical results from the direct push investigation, generally delineated the lateral extent of these analytes. Based on these factors, additional investigation of soil and/or groundwater for 1,4-dioxane, arsenic, and DRO impacts was not warranted at that time.

In 2006, the MPCA performed an internal evaluation of surface water receptors and applicable groundwater criteria to protect area receptors. Surface water on-site drains to both a wetland on the southwest portion of the Property and to a drainage ditch located immediately north of United States ("U.S.") Highway 53. Both the wetland and the drainage ditch were classified as a Class 2B chronic surface waters in accordance with Minnesota Administrative Rules. Groundwater standards/criteria/guideline values were then determined, based on the most restrictive classification for the wetland and drainage ditch (Class 2B chronic surface water values). Compliance monitoring points were also established for monitoring groundwater concentrations up-gradient of the wetland and drainage ditch. The compliance monitoring points include monitoring wells MW-3A, MW-3B, MPCA-3S, MW-9A, MW-9B, MW-10A, MW-10B, MW-17B, MW-17E, and MW-P-17S and manholes MH-2, MH-3, and MH-4.

On March 22, 2007, the WLSSD turned off the groundwater extraction system, to allow for testing and repairs to be made on the forced sewer main in the area. At approximately the same time, the MPCA approved the Trial Groundwater Extraction System Shut Down Report (April 2007). As a result, the system was left off and the trial system shutdown monitoring was initiated. Groundwater monitoring was conducted during the trial shutdown to monitor for potential concentration rebound in the historic source area and the migration of groundwater containing elevated concentrations of chemicals of concern towards possible down-gradient receptors. Based on these objectives, a sampling plan for the trial shutdown was developed. A performance monitoring schedule was developed based on a six-month travel time estimate. A baseline groundwater monitoring event was conducted approximately three months after the system was shut down (June 2007). Thirteen additional groundwater monitoring events have been performed since June 2007: October 2007, December 2007, April 2008, June 2008, September 2008, May 2009, December 2009, April 2010, May 2011, September 2011, April 2012, January 2013, and April 2013.

Trigger criteria and contingency action items were developed in the event plume migration was observed during performance monitoring associated with the trial shutdown. Trigger criteria and action items were summarized as follows:

1. In the event increasing concentration trends are observed at monitoring wells MW-9A, MW-9B, MW-10A or MW-10B, groundwater monitoring at appropriate contingency monitoring wells will commence during the next groundwater monitoring event. Contingency wells include MW-P- 16S, MW-P-16B, MW-P-17S, MW-P-21S, MW-P-218, MW-P-22 and MPCA-P-23.

2. In the event a MCL or Health Based Value ("HBV") exceedance is observed at monitoring well MW-9A, MW-9B, MW-10A or MW-10B, groundwater monitoring at appropriate contingency monitoring wells will commence during the next groundwater monitoring event.

3. In the event increasing concentration trends are observed at any contingency monitoring well, MPCA staff shall be notified and an immediate assessment made regarding a possible restart of the groundwater extraction system.

4. In the event increasing concentration trends are observed at any residential well, MPCA staff shall be notified and an immediate assessment made regarding a possible restart of the groundwater extraction system.

5. In the event increasing concentration trends are observed at any monitoring well location which suggests groundwater containing a chemical of concern at a concentration greater than the Class 2B water quality

standards/criteria/guideline values may discharge to a surface water body, MPCA staff shall be notified and an immediate assessment made regarding a possible restart of the groundwater extraction system.

Two of the criteria were triggered during the June and September 2008 sampling events. First, an increasing 1,4-dioxane concentration trend was observed at MW-10A. Second, the concentration at MW-10A exceeded the 1,4-dioxane 1993/1994 HBV. As a result, the MPCA added contingency wells P- 21B, P-21S, P-22, P-16B and P-16S to the sampling list in 2009 to provide further analytical data down- gradient of MW-10A.

The direct push soil and groundwater investigation conducted at the Property in June 2005 did not fully define the extent and magnitude of 1,4-dioxane, dissolved arsenic, and DRO in groundwater to the west and southwest of the source area (MPCA-4A/4B). To complete the delineation of these compounds in groundwater and in accordance with a request from the MPCA, 14 push probe borings were advanced at the Property in May 2009. The collection and analysis of groundwater samples from push probe borings advanced at the Property in May 2009 defined the extent of 1,4-dioxane and dissolved arsenic, but not the extent of DRO, in shallow groundwater to the northwest of the 2005 push probe borings. Groundwater samples analyzed from the base of the sand unit (deeper samples), indicated that dissolved arsenic, 1,4-dioxane and DRO are not fully defined in groundwater at depth to the northwest; however, groundwater flow direction is consistently to the southwest, and therefore additional delineation of these constituents was not warranted due to the lack of risk to receptors in this area. Bay West submitted the Final 2009 Annual Monitoring Report and Additional Direct Push Groundwater Investigation Report in June 2010.

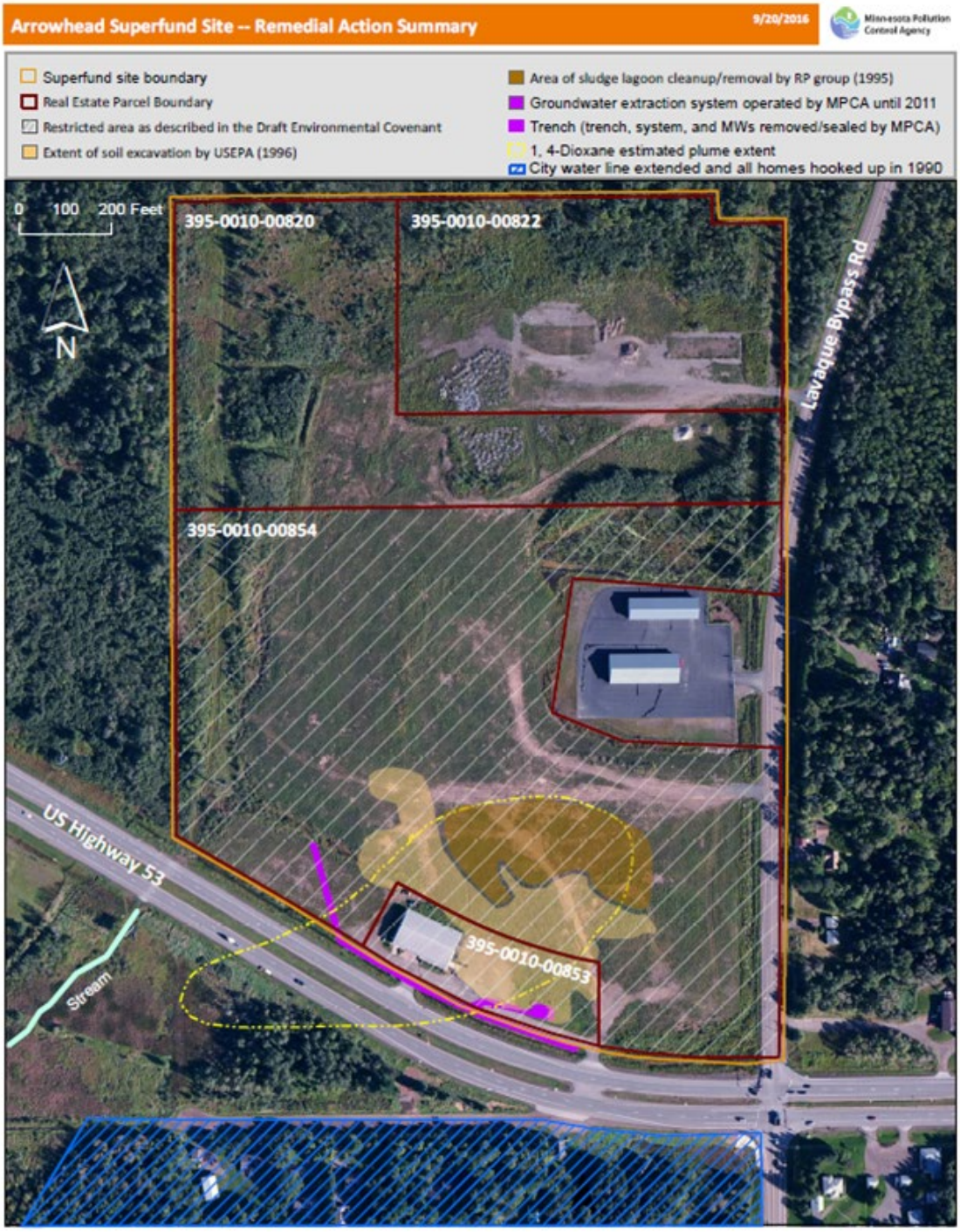
Bay West completed an institutional control evaluation, monitoring well abandonment of some of the wells, system decommissioning, and three groundwater monitoring events during 2010 and 2011. Three additional groundwater monitoring events were completed during 2012 and 2013. Final results of the groundwater sampling at these monitoring wells demonstrated that the residual lead, DRO, dissolved arsenic, and trichloroethene ("TCE") as well as the associated degradation products were at levels below cleanup standards in the subsurface soils and groundwater. 1,4-dioxane remains in groundwater at the Property at levels exceeding state drinking water standards. However, there are no drinking water receptors at risk from the low levels of 1,4-dioxane migrating off-site. Any remaining impacted groundwater discharges to the wetlands immediately down gradient of the Property area at levels well below MPCA aquatic life standards for surface waters. Because groundwater and surface water receptors are adequately protected, no additional corrective actions or groundwater monitoring are required. Therefore, the remaining groundwater monitoring wells were sealed in accordance with a MOH permit in June 2014. Consequently, based on this information, the MPCA directed Bay West to develop a long-term stewardship plan for the Property. The plan proposed that the Property be managed by two institutional control ("IC") measures:

1. an interview with the owner and a Property inspection in May and November of each year; and

2. drafting and mailing/emailing advisories to entities associated with the Property through ownership, proximity, or regulatory oversight.

In summary, response actions conducted by EPA, the MPCA and responsible parties have addressed Property contamination and the remedy is protective of commercial use. The Property's remedy required the removal of contaminated soils and former lagoon sludge, treatment of contaminated groundwater at the Property and institutional controls to restrict residential use and groundwater use at the Property. The Property was delisted from Superfund on September 14, 2021.

A copy of the map included in the Environmental Covenant, which indicates the area of previous remediation, is provided below.



Site Summary Sheet
TH53 Business Park

Parcel Number	395-0010-00854	**Address**	No address assigned

Parcel location map

St Louis County, County Land Explorer Photograph

Summary

Based on the information reviewed, this parcel was part of a larger property known as the Arrowhead Refinery Company property. The property was used for re-tinning milk cans prior to 1945. From 1945 – 1977, it was used as a re-refiner of used oil. Soil and groundwater contamination were identified from these prior uses. Soil contamination exceeding commercial/industrial criteria was removed. A groundwater extraction system was installed in 1993 and operated until 2007. The full extent of groundwater contamination was not determined. Institutional Controls have been placed on the property limiting the use and activities without prior approval of the Minnesota Pollution Control Agency (MPCA).

Parcel Information

Site Name:	Bill & Irv Main Parcel	**Site Address:**	No address assigned
Historical Site Name(s):	Arrowhead Refinery Company	**Parcel ID Number:**	395-0010-00854
Current Site Use:	Undeveloped	**Partial Legal Description:**	Part of SE ¼ of SE ¼, Section 4, Township 50, Range 15
Property Type:	Commercial/Undeveloped	**Owner Name:**	Bill & Irv's Properties, Inc.
Lot Size:	24.19 acres	**Zoning District**	C-General Commercial

Site Features

Noted during review of information:	**Yes**	**No**
Current structures	☐	☒
Evidence of demolished/removed structures	☒	☐

Site Summary Sheet
TH53 Business Park

Noted during review of information:	Yes	No
Tanks	☐	☒
Unidentified containers (drums, cylinders, etc.)	☐	☒
Wells	☒	☐
Septic system or cistern	☐	☒
Use/storage/disposal of petroleum products, hazardous materials, or other chemicals	☒	☐
Evidence of dumping, landfilling, or non-native fill	☒	☐
Evidence of spill or release of petroleum products, hazardous materials, or other chemicals	☒	☐
Unpaved roads/paths with no outlet	☐	☒
Outdoor storage	☐	☒
Surface water features	☐	☒
Stained soil or stressed vegetation	☐	☒
PCB-containing equipment	☐	☒
Odors	☐	☒
Poor housekeeping	☐	☒
Past structure use or property ownership	☐	☒
Threatened and Endangered Species potentially present	☒	☐
Site specific geotechnical information	☒	☐
Previous environmental investigation	☒	☐
Other: describe below	☐	☒

Comments:
According to the St. Louis County website, there are no buildings on the site.

Historical Aerial Photograph Summary

Year	Use	Source
1940 – 1951	The site is undeveloped and wooded.	Aerial photographs
1953	Some areas of outside storage or dumping are present. The remainder of the site appears undeveloped.	Aerial photograph
1961 – 1972	A lagoon or pond is present in the area where outside storage was previously noted. The remainder of the site appears undeveloped. By 1972, the pond area is larger and a small building is present.	Aerial photographs
1975 – 1981	The area of disturbance is larger and includes some areas in the center of the site.	Aerial photographs
1989 – 1991	The disturbed area appears more vegetated, and the building noted earlier appears smaller.	Aerial photographs
1997 – 2008	The southern and central portion of the site appear to have been graded and a road or ditch is present around some areas.	Aerial photographs
2013 – 2015	The road or ditch is no longer present and the site appears graded and vegetated.	Aerial photographs
2019	A parking lot is present along the southern boundary of the site. The remainder of the site appears unchanged.	Aerial photograph

Site Summary Sheet
TH53 Business Park

Historical Information

1940 Aerial Photograph

1972 Aerial Photograph

1975 Aerial Photograph

1981 Aerial Photograph

1997 Aerial Photograph

2013 Aerial Photograph

Site Summary Sheet
TH53 Business Park

Water Well Search

A search of the Minnesota Department of Health (MDH) Minnesota Well Index (MWI) identified the following well(s) registered to, or plotted at, the site:

Unique Well #	Well Name	Total Depth (ft)	Depth to Water (ft)	Aquifer	Listed Use	Date Well Completed	Status
1000021903	MW-6C	34.7	Not Provided (NP)	NP	NP	NP	Unknown
330813	MPCA	25	10	NP	Other	05/21/2009	Sealed
1000021900	MW-B4B	21.8	NP	NP	NP	NP	Unknown
1000021897	MW-2A	15	NP	NP	NP	NP	Unknown
1000021898	MW-3A1	15	NP	NP	NP	NP	Unknown
1000021899	MW-3B	24	NP	NP	NP	NP	Unknown
1000021910	MW-14C	31.5	NP	NP	NP	NP	Unknown
1000021909	MW-14B	24.4	NP	NP	NP	NP	Unknown
100021908	MW-14A	15	NP	NP	NP	NP	Unknown
597357	MPCA-97-2A	15	10	Quat. Water Table	Monitor	06/12/1007	Active
597360	PCA-97-5A	15	13.5	Quat Water Table	Monitor	06/12/1997	Active
1000021902	MW-B5	17	NP	NP	NP	NP	Unknown

Database Search Listings

A search of the Minnesota Pollution Control Agency's What's In My Neighborhood website identified the site on the following database(s):

Name	Activity/Database	Regulatory ID	Remarks
Arrowhead Refinery Co, 5301 – 5315 Miller Trunk Highway	Voluntary Investigation and Cleanup (VIC)	VP17160	Inactive
		VP17161	Inactive
	CERCLIS Site	MND980823975	Listed on CERCLIS/SEMS 01/01/1987
	Superfund	SR0000067	Active
Arrowhead Refinery Superfund, 5315 Miller Trunk Highway	Hazardous Waste	MNR000013185	Inactive. Last report year 1996: lead contaminated soil/wood chips/debris, lead contaminated tires
Lucia George Trucking Inc, 5301 Miller Trunk Highway	Hazardous Waste	MNR000011197	Inactive.

Registered Tanks

No registered tanks were identified for the site.

Available Geotechnical Information

A geotechnical evaluation was completed in 2002, for the proposed construction of a retail building. The results of the evaluation were summarized in a Report of Geotechnical/Environmental Exploration and Review prepared

by American Engineering Testing, dated December 6, 2002. Six standard penetration test borings were completed for the project. The borings generally encountered existing fill materials, over swamp deposits, over native glacial tills.

The existing fills and swamp soils should be considered unsuitable for support of buildings. Mitigation techniques include removal and replacement, soil improvement, or deep foundations.

In pavement areas, a minimum of 3 to 4 feet of select grading materials (sand) should be provided over swamp soils to support traffic loads. The existing fills and swamp soils are potentially compressible under fill loads. If grades are raised, or if swamp soils are removed and replaced with sand, consolidation of the swamps soils is likely. Mitigation measures to minimize the impact of settlements include complete removal and replacement of swamp soils, construction delays and surcharges.

Threatened and Endangered Species Review

Suitable habitat for the protected species identified in state or federal databases is unlikely to be present but may be present in undeveloped areas.

Detailed Regulatory File Review

The Minnesota Pollution Control Agency (MPCA) files for the Arrowhead Refinery Company site were reviewed. The following is the summary provided the Environmental Covenant for the site, which was filed on February 19, 2021:

The Property, which occupies approximately 26 acres, was used for re-tinning milk cans prior to 1945. From 1945 to 1977, the property operated as a re-refiner of used oil. From 1961 until 1977, the Arrowhead Refinery Company re-refined oil on the property using an acid-clay process. This process produced three waste streams: metal-contaminated acidic sludge, filter cake, and wastewater. Site operators disposed of the acidic sludge in a wetland that became a sludge lagoon. The company disposed of filter cake over the native peat in the wetland. Wastewater from the re-refining process was discharged to a wastewater ditch. These improper waste management practices resulted in soil and groundwater contamination including oil and grease, heavy metals, cyanide, phenols, polynuclear aromatic hydrocarbons (“PAHs”), and polychlorinated biphenyls (“PCBs”).

In 1976, the MPCA conducted its initial investigation of the Property and ordered Arrowhead Refinery to cease activities. In 1984, United States Environmental Protection Agency ("EPA") placed the Property on the National Priorities List ("NPL"). EPA's cleanup plan included removal and proper disposal of sludge, filter cake, and contaminated soil as well as the installation, operation and maintenance of a groundwater treatment system. Additionally in 1984, the EPA conducted a remedial investigation and feasibility study ("RI/FS"). In 1986, the EPA issued a Record of Decision ("ROD") that approved the excavation of impacted soils and sludge and the installation of a groundwater extraction system.

The EPA installed the groundwater extraction system in 1993. The system consisted of an interceptor trench and French drain system approximately 850 feet long and 25 feet deep. Groundwater was pumped from the trench at an average rate of approximately 45 to 50 gallons per minute ("gpm"). Recovered groundwater was pumped directly into the Western Lake Superior Sanitary District ("WLSSD") sanitary sewer system. In 1996, the MPCA assumed long term operation and maintenance of the groundwater extraction system.

In an amended ROD ("AROD") dated February 9, 1994, the response actions for source material, soils, and sediments were amended. The AROD also clarified that operation and maintenance of the groundwater extraction

system would continue until the extraction system discharge and the groundwater at the Property's southern boundary met the Safe Drinking Water Act Maximum Contaminant Levels ("MCLs").

On May 24, 1995, the responsible parties filed a judicial Consent Decree ("Decree") in federal district court. The excavation of source material began in June 1995 with approximately 4,600 tons of material removed for off-Site disposal. In June 1996, under the EPA's direction, 24,783 tons of soil and sediment were excavated, treated as necessary, and disposed of at a Subtitle D Landfill. The excavation was backfilled with 48,050 tons of soil and the excavation area was restored.

On August 16, 2002, Saint Louis County filed the Decree with the Saint Louis County Recorder's office. In general, the Decree requires that any deed, title, or interest in the Property contain a notice stating that the property is subject to the conditions of the Decree, that there is an access obligation, and that the property is subject to certain restrictions. These conditions were established because contamination above residential health risk levels is still present in soil on-site. Institutional controls ("ICs") are required to restrict certain development activities at the Property, and MPCA approval is required if there are any changes from the final remedy.

In the Second Five-Year Review Report, dated September 2002, the need to sample for the possible presence of 1,4-dioxane, a substance that is commonly used as a solvent stabilizer, was discussed. This additional requirement arose as a result of the Minnesota Department of Health ("MDH") establishing a new health-based value ("HBV") of 30 micrograms per liter ("µg/L") for 1,4-dioxane because of improved laboratory analytical methods that lowered the method detection limit. The Second Five Year Review Report also recommended confirmatory sampling for arsenic, hexavalent chromium, vanadium, zinc, and 4-methylphenol at the source area monitoring wells and at the extraction system discharge. To address total lead concentrations that periodically exceeded the EPA action level of 15 µg/L, sampling the extraction system discharge and select monitoring well locations for both dissolved lead and total lead was also recommended to evaluate whether lead was in the dissolved phase or associated with particulate matter present in the samples.

Between June 21 and June 28, 2005, West Central Environmental Consultants ("WCEC") advanced 23 direct push borings under the direct supervision of Bay West in an attempt to delineate the extent of the 1,4-dioxane, arsenic, and DRO in groundwater in the vicinity of the suspected historical source area on-site (i.e., monitoring well nests MPCA-4A/4B and MPCA-5A/5B). Soil and groundwater samples were collected from 22 of the 23 borings for 1,4-dioxane, arsenic and/or DRO analyses. The direct push investigation was successful at more accurately delineating the extent of 1,4-dioxane, arsenic, and DRO in soil and groundwater in the vicinity of the suspected historical source area on-site. The extent of dissolved arsenic and 1,4-dioxane in the groundwater was determined to be further west of well nest MPCA-4A/4B than previously assumed. While the lateral extent of 1,4-dioxane, arsenic, and DRO were not completely encompassed by soil borings advanced during the direct push investigation, data available from up-gradient, cross-gradient and down-gradient monitoring wells, and the interceptor trench, in combination with analytical results from the direct push investigation, generally delineated the lateral extent of these analytes. Based on these factors, additional investigation of soil and/or groundwater for 1,4-dioxane, arsenic, and DRO impacts was not warranted at that time.

In 2006, the MPCA performed an internal evaluation of surface water receptors and applicable groundwater criteria to protect area receptors. Surface water on-site drains to both a wetland on the southwest portion of the Property and to a drainage ditch located immediately north of United States ("U.S.") Highway 53. Both the wetland and the drainage ditch were classified as a Class 2B chronic surface waters in accordance with Minnesota Administrative Rules. Groundwater standards/criteria/guideline values were then determined, based on the most restrictive classification for the wetland and drainage ditch (Class 2B chronic surface water values). Compliance

monitoring points were also established for monitoring groundwater concentrations up-gradient of the wetland and drainage ditch. The compliance monitoring points include monitoring wells MW-3A, MW-3B, MPCA-3S, MW-9A, MW-9B, MW-10A, MW-10B, MW-17B, MW-17E, and MW-P-17S and manholes MH-2, MH-3, and MH-4.

On March 22, 2007, the WLSSD turned off the groundwater extraction system, to allow for testing and repairs to be made on the forced sewer main in the area. At approximately the same time, the MPCA approved the Trial Groundwater Extraction System Shut Down Report (April 2007). As a result, the system was left off and the trial system shutdown monitoring was initiated. Groundwater monitoring was conducted during the trial shutdown to monitor for potential concentration rebound in the historic source area and the migration of groundwater containing elevated concentrations of chemicals of concern towards possible down-gradient receptors. Based on these objectives, a sampling plan for the trial shutdown was developed. A performance monitoring schedule was developed based on a six-month travel time estimate. A baseline groundwater monitoring event was conducted approximately three months after the system was shut down (June 2007). Thirteen additional groundwater monitoring events have been performed since June 2007: October 2007, December 2007, April 2008, June 2008, September 2008, May 2009, December 2009, April 2010, May 2011, September 2011, April 2012, January 2013, and April 2013.

Trigger criteria and contingency action items were developed in the event plume migration was observed during performance monitoring associated with the trial shutdown. Trigger criteria and action items were summarized as follows:

1. In the event increasing concentration trends are observed at monitoring wells MW-9A, MW-9B, MW-10A or MW-10B, groundwater monitoring at appropriate contingency monitoring wells will commence during the next groundwater monitoring event. Contingency wells include MW-P- 16S, MW-P-16B, MW-P-17S, MW-P-21S, MW-P-218, MW-P-22 and MPCA-P-23.

2. In the event a MCL or Health Based Value ("HBV") exceedance is observed at monitoring well MW-9A, MW-9B, MW-10A or MW-10B, groundwater monitoring at appropriate contingency monitoring wells will commence during the next groundwater monitoring event.

3. In the event increasing concentration trends are observed at any contingency monitoring well, MPCA staff shall be notified, and an immediate assessment made regarding a possible restart of the groundwater extraction system.

4. In the event increasing concentration trends are observed at any residential well, MPCA staff shall be notified, and an immediate assessment made regarding a possible restart of the groundwater extraction system.

5. In the event increasing concentration trends are observed at any monitoring well location which suggests groundwater containing a chemical of concern at a concentration greater than the Class 2B water quality standards/criteria/guideline values may discharge to a surface water body, MPCA staff shall be notified and an immediate assessment made regarding a possible restart of the groundwater extraction system.

Two of the criteria were triggered during the June and September 2008 sampling events. First, an increasing 1,4-dioxane concentration trend was observed at MW-10A. Second, the concentration at MW-10A exceeded the 1,4-dioxane 1993/1994 HBV. As a result, the MPCA added contingency wells P- 21B, P-21S, P-22, P-16B and P-16S to the sampling list in 2009 to provide further analytical data down- gradient of MW-10A.

The direct push soil and groundwater investigation conducted at the Property in June 2005 did not fully define the extent and magnitude of 1,4-dioxane, dissolved arsenic, and DRO in groundwater to the west and southwest of the source area (MPCA-4A/4B). To complete the delineation of these compounds in groundwater and in accordance with a request from the MPCA, 14 push probe borings were advanced at the Property in May 2009. The collection and analysis of groundwater samples from push probe borings advanced at the Property in May 2009 defined the extent of 1,4-dioxane and dissolved arsenic, but not the extent of DRO, in shallow groundwater to the northwest of the 2005 push probe borings. Groundwater samples analyzed from the base of the sand unit (deeper samples), indicated that dissolved arsenic, 1,4-dioxane and DRO are not fully defined in groundwater at depth to the northwest; however, groundwater flow direction is consistently to the southwest, and therefore additional delineation of these constituents was not warranted due to the lack of risk to receptors in this area. Bay West submitted the Final 2009 Annual Monitoring Report and Additional Direct Push Groundwater Investigation Report in June 2010.

Bay West completed an institutional control evaluation, monitoring well abandonment of some of the wells, system decommissioning, and three groundwater monitoring events during 2010 and 2011. Three additional groundwater monitoring events were completed during 2012 and 2013. Final results of the groundwater sampling at these monitoring wells demonstrated that the residual lead, DRO, dissolved arsenic, and trichloroethene ("TCE") as well as the associated degradation products were at levels below cleanup standards in the subsurface soils and groundwater. 1,4-dioxane remains in groundwater at the Property at levels exceeding state drinking water standards. However, there are no drinking water receptors at risk from the low levels of 1,4-dioxane migrating off-site. Any remaining impacted groundwater discharges to the wetlands immediately down gradient of the Property area at levels well below MPCA aquatic life standards for surface waters. Because groundwater and surface water receptors are adequately protected, no additional corrective actions or groundwater monitoring are required. Therefore, the remaining groundwater monitoring wells were sealed in accordance with a MOH permit in June 2014. Consequently, based on this information, the MPCA directed Bay West to develop a long-term stewardship plan for the Property. The plan proposed that the Property be managed by two institutional control ("IC") measures:

1. an interview with the owner and a Property inspection in May and November of each year; and

2. drafting and mailing/emailing advisories to entities associated with the Property through ownership, proximity, or regulatory oversight.

In order to protect human health, welfare, and the environment, as well as to define and clarify the measures taken at the Property without undue burden to the Owners so that the Property can be put to its best use, the MPCA required the filing of this Environmental Covenant setting forth use limitations, activity limitations, and affirmative obligations of the Owner.

In summary, response actions conducted by EPA, the MPCA and responsible parties have addressed Property contamination and the remedy is protective of commercial use. The Property's remedy required the removal of contaminated soils and former lagoon sludge, treatment of contaminated groundwater at the Property and institutional controls to restrict residential use and groundwater use at the Property. The Site was delisted from Superfund on September 14, 2021.

According to the Environmental Covenant, the following use limitations have been placed on the property:

The Property shall be used solely for industrial or commercial purposes and shall not be used for residential, recreational, commercial/residential mixed, or other purposes that may provide exposure routes for sensitive subpopulations, including children, the elderly, the infirm, or others.

The Covenant also contains activity limitations, which include no disturbance or alteration of soils, water table, surface water drainage, ditches, or infiltration, without prior approval of the MPCA.

A copy of the map included in the Environmental Covenant is provided below.

APPENDIX B

ENVIRONMENTAL COVENANT

ENVIRONMENTAL COVENANT AND EASEMENT

This Environmental Covenant and Easement ("Environmental Covenant") is executed pursuant to the Uniform Environmental Covenants Act, Minn. Stat. ch. 114E (2018) ("UECA") in connection with an environmental response project approved by the Minnesota Pollution Control Agency ("MPCA").

1. Grantor and Property Description.

A. Owner and Legal Description of Property.

Bill & Irv's Properties, Inc., a Minnesota corporation ("Bill & Irv's"), is the fee owner of two parcels of real property, located at or about 5315 Miller Trunk Highway, Hermantown, Saint Louis County, Minnesota 55811 (the "Property"), shown on **Exhibit 1** and legally described as follows:

> All that part of the SE ¼ of SE ¼, Section 4, Township 50 North, Range 15 West, which lies Northerly of U.S. Highway #53, EXCEPT that part described as follows:
>
> Commencing at the southeast corner of said Section 4; thence North 00 degrees 40 minutes 26 seconds East, along the east line of said SE ¼ SE ¼ a distance of 797.90 feet to the point of beginning; thence North 87 degrees 14 minutes 19 seconds West a distance of 338.83 feet; thence North 67 degrees 27 minutes 49 seconds West a distance of 165.41 feet; thence North 09 degrees 05 minutes 43 seconds East a distance of 291.59 feet; thence South 85 degrees 07 minutes 56 seconds East a distance of 450.62 feet to the east line of said SE ¼ SE ¼; thence South 00 degrees 40 minutes 26 seconds West, along said east line a distance of 329.43 feet to the point of beginning. Subject to the existing C.S.A.H. No. 48 along the east line.

The Property consists of two parcels with Saint Louis County property identification numbers of 395-0010-00854 and 395-0010-00853.

B. Grantor.

Bill & Irv's is the Grantor of this Environmental Covenant.

2. Grant of Covenant; Covenant Runs With The Land.

Grantor does hereby Covenant and Declare that the Property shall be subject to the Activity and Use Restrictions and associated terms and conditions set forth in this Environmental Covenant including the Easement in Paragraph 9, and that these Activity and Use Restrictions and associated terms and conditions constitute covenants which run with the Property and which shall be binding on Grantor, its heirs, successors and assigns, and on all present and future Owners of the Property and all persons who now or hereafter hold any right, title or interest in the Property. An Owner is bound by this Environmental Covenant during the time when the Owner holds fee title to the Property. Any other person that holds any right, title or interest in or to the Property is bound by this Environmental Covenant during the time the person holds the right, title or interest. An Owner ceases to be bound by this Environmental Covenant when the Owner conveys fee title to another person, and any other person that holds any right, title or interest in or to the Property ceases to be bound when the person conveys the right, title or interest to another person.

3. Environmental Agency; Grantee and Holder of Environmental Covenant; Acceptance of Interest in Real Property.

A. Environmental Agency.

The MPCA is the environmental agency with authority to approve this Environmental Covenant under UECA.

B. Grantee and Holder; Acceptance of Interest in Property.

The MPCA is the Grantee and Holder of the interest in real property conveyed by this Environmental Covenant. MPCA has authority to acquire an interest in real property, including an Environmental Covenant, for response action purposes under Minn. Stat. § 115B.17, subd. 15. MPCA's signature on this Environmental Covenant constitutes approval of this Environmental Covenant under UECA and acceptance of the interest in real property granted herein for purposes of Minn. Stat. § 115B.17, subd. 15.

4. Environmental Response Project.

The Property was the location of releases or threatened releases of hazardous substances, or pollutants or contaminants that were addressed by an environmental response project under the MPCA Superfund Program pursuant to Minn. Stat. §§ 115B.01-115B.20. MPCA has determined that an Environmental Covenant is needed for the Property because there are residual soil and groundwater impacts remaining at the Property. The residual soil and groundwater contaminants include lead, diesel range organics ("DRO"), 1,4-dioxane, and arsenic.

5. Statement of Facts.

A. Facts about the Release and Response Actions.

The Property, which occupies approximately 26 acres, was used for re-tinning milk cans prior to 1945. From 1945 to 1977, the property operated as a re-refiner of used oil. From 1961 until 1977, the Arrowhead Refinery Company re-refined oil on the property using an acid-clay process. This process

produced three waste streams: metal-contaminated acidic sludge, filter cake, and wastewater. Site operators disposed of the acidic sludge in a wetland that became a sludge lagoon. The company disposed of filter cake over the native peat in the wetland. Wastewater from the re-refining process was discharged to a wastewater ditch. These improper waste management practices resulted in soil and groundwater contamination including oil and grease, heavy metals, cyanide, phenols, polynuclear aromatic hydrocarbons ("PAHs"), and polychlorinated biphenyls ("PCBs").

In 1976, the MPCA conducted its initial investigation of the Property and ordered Arrowhead Refinery to cease activities. In 1984, United States Environmental Protection Agency ("EPA") placed the Property on the National Priorities List ("NPL"). EPA's cleanup plan included removal and proper disposal of sludge, filter cake, and contaminated soil as well as the installation, operation and maintenance of a groundwater treatment system. Additionally in 1984, the EPA conducted a remedial investigation and feasibility study ("RI/FS"). In 1986, the EPA issued a Record of Decision ("ROD") that approved the excavation of impacted soils and sludge and the installation of a groundwater extraction system.

The EPA installed the groundwater extraction system in 1993. The system consisted of an interceptor trench and French drain system approximately 850 feet long and 25 feet deep. Groundwater was pumped from the trench at an average rate of approximately 45 to 50 gallons per minute ("gpm"). Recovered groundwater was pumped directly into the Western Lake Superior Sanitary District ("WLSSD") sanitary sewer system. In 1996, the MPCA assumed long term operation and maintenance of the groundwater extraction system.

In an amended ROD ("AROD") dated February 9, 1994, the response actions for source material, soils, and sediments were amended. The AROD also clarified that operation and maintenance of the groundwater extraction system would continue until the extraction system discharge and the groundwater at the Property's southern boundary met the Safe Drinking Water Act Maximum Contaminant Levels ("MCLs").

On May 24, 1995, the responsible parties filed a judicial Consent Decree ("Decree") in federal district court. The excavation of source material began in June 1995 with approximately 4,600 tons of material removed for off-Site disposal. In June 1996, under the EPA's direction, 24,783 tons of soil and sediment were excavated, treated as necessary, and disposed of at a Subtitle D Landfill. The excavation was backfilled with 48,050 tons of soil and the excavation area was restored.

On August 16, 2002, Saint Louis County filed the Decree with the Saint Louis County Recorder's office. In general, the Decree requires that any deed, title, or interest in the Property contain a notice stating that the property is subject to the conditions of the Decree, that there is an access obligation, and that the property is subject to certain restrictions. These conditions were established because contamination above residential health risk levels is still present in soil on-site. Institutional controls ("ICs") are required to restrict certain development activities at the Property, and MPCA approval is required if there are any changes from the final remedy.

In the Second Five-Year Review Report, dated September 2002, the need to sample for the possible presence of 1,4-dioxane, a substance that is commonly used as a solvent stabilizer, was discussed. This additional requirement arose as a result of the Minnesota Department of Health ("MDH") establishing a new health-based value ("HBV") of 30 micrograms per liter ("µg/L") for 1,4-dioxane because of improved laboratory analytical methods that lowered the method detection limit. The Second Five Year

Review Report also recommended confirmatory sampling for arsenic, hexavalent chromium, vanadium, zinc, and 4-methylphenol at the source area monitoring wells and at the extraction system discharge. To address total lead concentrations that periodically exceeded the EPA action level of 15 µg/L, sampling the extraction system discharge and select monitoring well locations for both dissolved lead and total lead was also recommended to evaluate whether lead was in the dissolved phase or associated with particulate matter present in the samples.

Between June 21 and June 28, 2005, West Central Environmental Consultants ("WCEC") advanced 23 direct push borings under the direct supervision of Bay West in an attempt to delineate the extent of the 1,4-dioxane, arsenic, and DRO in groundwater in the vicinity of the suspected historical source area on-site (i.e., monitoring well nests MPCA-4A/4B and MPCA-5A/5B). Soil and groundwater samples were collected from 22 of the 23 borings for 1,4-dioxane, arsenic and/or DRO analyses. The direct push investigation was successful at more accurately delineating the extent of 1,4-dioxane, arsenic, and DRO in soil and groundwater in the vicinity of the suspected historical source area on-site. The extent of dissolved arsenic and 1,4-dioxane in the groundwater was determined to be further west of well nest MPCA-4A/4B than previously assumed. While the lateral extent of 1,4-dioxane, arsenic, and DRO were not completely encompassed by soil borings advanced during the direct push investigation, data available from up-gradient, cross-gradient and down-gradient monitoring wells, and the interceptor trench, in combination with analytical results from the direct push investigation, generally delineated the lateral extent of these analytes. Based on these factors, additional investigation of soil and/or groundwater for 1,4-dioxane, arsenic, and DRO impacts was not warranted at that time.

In 2006, the MPCA performed an internal evaluation of surface water receptors and applicable groundwater criteria to protect area receptors. Surface water on-site drains to both a wetland on the southwest portion of the Property and to a drainage ditch located immediately north of United States ("U.S.") Highway 53. Both the wetland and the drainage ditch were classified as a Class 2B chronic surface waters in accordance with Minnesota Administrative Rules. Groundwater standards/criteria/guideline values were then determined, based on the most restrictive classification for the wetland and drainage ditch (Class 2B chronic surface water values). Compliance monitoring points were also established for monitoring groundwater concentrations up-gradient of the wetland and drainage ditch. The compliance monitoring points include monitoring wells MW-3A, MW-3B, MPCA-3S, MW-9A, MW-9B, MW-10A, MW-10B, MW-17B, MW-17E, and MW-P-17S and manholes MH-2, MH-3, and MH-4.

On March 22, 2007, the WLSSD turned off the groundwater extraction system, to allow for testing and repairs to be made on the forced sewer main in the area. At approximately the same time, the MPCA approved the Trial Groundwater Extraction System Shut Down Report (April 2007). As a result, the system was left off and the trial system shutdown monitoring was initiated. Groundwater monitoring was conducted during the trial shutdown to monitor for potential concentration rebound in the historic source area and the migration of groundwater containing elevated concentrations of chemicals of concern towards possible down-gradient receptors. Based on these objectives, a sampling plan for the trial shutdown was developed. A performance monitoring schedule was developed based on a six month travel time estimate. A baseline groundwater monitoring event was conducted approximately three months after the system was shut down (June 2007). Thirteen additional groundwater monitoring events have been performed since June 2007: October 2007, December 2007, April 2008, June 2008, September 2008, May 2009, December 2009, April 2010, May 2011, September 2011, April 2012, January 2013, and April 2013.

Trigger criteria and contingency action items were developed in the event plume migration was observed during performance monitoring associated with the trial shutdown. Trigger criteria and action items were summarized as follows:

1. In the event increasing concentration trends are observed at monitoring wells MW-9A, MW-9B, MW-10A or MW-10B, groundwater monitoring at appropriate contingency monitoring wells will commence during the next groundwater monitoring event. Contingency wells include MW-P-16S, MW-P-16B, MW-P-17S, MW-P-21S, MW-P-21B, MW-P-22 and MPCA-P-23.

2. In the event a MCL or Health Based Value ("HBV") exceedance is observed at monitoring well MW-9A, MW-9B, MW-10A or MW-10B, groundwater monitoring at appropriate contingency monitoring wells will commence during the next groundwater monitoring event.

3. In the event increasing concentration trends are observed at any contingency monitoring well, MPCA staff shall be notified and an immediate assessment made regarding a possible restart of the groundwater extraction system.

4. In the event increasing concentration trends are observed at any residential well, MPCA staff shall be notified and an immediate assessment made regarding a possible restart of the groundwater extraction system.

5. In the event increasing concentration trends are observed at any monitoring well location which suggests groundwater containing a chemical of concern at a concentration greater than the Class 2B water quality standards/criteria/guideline values may discharge to a surface water body, MPCA staff shall be notified and an immediate assessment made regarding a possible restart of the groundwater extraction system.

Two of the criteria were triggered during the June and September 2008 sampling events. First, an increasing 1,4-dioxane concentration trend was observed at MW-10A. Second, the concentration at MW-10A exceeded the 1,4-dioxane 1993/1994 HBV. As a result, the MPCA added contingency wells P-21B, P-21S, P-22, P-16B and P-16S to the sampling list in 2009 to provide further analytical data down-gradient of MW-10A.

The direct push soil and groundwater investigation conducted at the Property in June 2005 did not fully define the extent and magnitude of 1,4-dioxane, dissolved arsenic, and DRO in groundwater to the west and southwest of the source area (MPCA-4A/4B). To complete the delineation of these compounds in groundwater and in accordance with a request from the MPCA, 14 push probe borings were advanced at the Property in May 2009. The collection and analysis of groundwater samples from push probe borings advanced at the Property in May 2009 defined the extent of 1,4-dioxane and dissolved arsenic, but not the extent of DRO, in shallow groundwater to the northwest of the 2005 push probe borings. Groundwater samples analyzed from the base of the sand unit (deeper samples), indicated that dissolved arsenic, 1,4-dioxane and DRO are not fully defined in groundwater at depth to the northwest; however, groundwater flow direction is consistently to the southwest, and therefore additional delineation of these constituents was not warranted due to the lack of risk to receptors in this area. Bay West submitted the Final 2009 Annual Monitoring Report and Additional Direct Push Groundwater Investigation Report in June 2010.

Bay West completed an institutional control evaluation, monitoring well abandonment of some of the wells, system decommissioning, and three groundwater monitoring events during 2010 and 2011. Three additional groundwater monitoring events were completed during 2012 and 2013. Final results of the groundwater sampling at these monitoring wells demonstrated that the residual lead, DRO, dissolved arsenic, and trichloroethene ("TCE") as well as the associated degradation products were at levels below cleanup standards in the subsurface soils and groundwater. 1,4-dioxane remains in groundwater at the Property at levels exceeding state drinking water standards. However, there are no drinking water receptors at risk from the low levels of 1,4-dioxane migrating off-site. Any remaining impacted groundwater discharges to the wetlands immediately down gradient of the Property area at levels well below MPCA aquatic life standards for surface waters. Because groundwater and surface water receptors are adequately protected, no additional corrective actions or groundwater monitoring are required. Therefore, the remaining groundwater monitoring wells were sealed in accordance with a MDH permit in June 2014. Consequently, based on this information, the MPCA directed Bay West to develop a long-term stewardship plan for the Property. The plan proposed that the Property be managed by two institutional control ("IC") measures:

1. an interview with the owner and a Property inspection in May and November of each year; and
2. drafting and mailing/emailing advisories to entities associated with the Property through ownership, proximity, or regulatory oversight.

In order to protect human health, welfare, and the environment, as well as to define and clarify the measures taken at the Property without undue burden to the Owners so that the Property can be put to its best use, the MPCA required the filing of this Environmental Covenant setting forth use limitations, activity limitations, and affirmative obligations of the Owner.

In summary, response actions conducted by EPA, the MPCA and responsible parties have addressed Property contamination and the remedy is protective of commercial use. The Property's remedy required the removal of contaminated soils and former lagoon sludge, treatment of contaminated groundwater at the Property and institutional controls to restrict residential use and groundwater use at the Property.

B. Facts Constitute Affidavit under Minn. Stat. § 115B.16, subd. 2.

The facts stated in Paragraph 5.A. are stated under oath by the person signing this Environmental Covenant on behalf of the Grantor, and are intended to satisfy the requirement of an affidavit under Minn. Stat. § 115B.16, subd. 2. In the event of a material change in any facts stated in Paragraph 5.A. requiring the recording of an additional affidavit under Minn. Stat. § 115B.16, subd. 2, the additional affidavit may be made and recorded without amending this Environmental Covenant.

6. Definitions.

The terms used in this Environmental Covenant shall have the meanings given in UECA, and in the Minnesota Environmental Response and Liability Act (MERLA), Minn. Stat. § 115B.02. In addition, the definitions in this Paragraph 6 apply to the terms used in this Environmental Covenant.

A. "Commissioner" means the Commissioner of the Minnesota Pollution Control Agency, the Commissioner's successor, or other person delegated by the Commissioner to act on behalf of the Commissioner.

B. "MPCA" means the Minnesota Pollution Control Agency, an agency of the State of Minnesota, or its successor or assign under any governmental reorganization.

C. "Owner" means a person that holds fee title to the Property and is bound by this Environmental Covenant as provided in Paragraph 2. When the Property is subject to a contract for deed, both the contract for deed vendor and vendee are collectively considered the Owner.

D. "Political Subdivision" means the county, and the statutory or home rule charter city or township, in which the Property is located.

E. "Property" means the real property described in Paragraph 1 of this Environmental Covenant.

7. Activity and Use Limitations.

The following Activity and Use Limitations shall apply to the Property:

A. Use Limitations.

The Property shall be used solely for industrial or commercial purposes and shall not be used for residential, recreational, commercial/residential mixed, or other purposes that may provide exposure routes for sensitive subpopulations, including children, the elderly, the infirm, or others.

B. Activity Limitations.

The following activities within the Property are prohibited except as provided in Paragraph 8:

i. There shall be no disturbance or alteration of soils on the Property of any nature whatsoever, specifically including, but not limited to, grading, excavation, boring, drilling or construction, except in accordance with an MPCA-approved plan as allowed by Section 8.A.

ii. No change shall be made to the water table, surface water drainage, ditches, or infiltration to the water table in such a manner that may mobilize the Property contamination.

iii. Except as required as part of an MPCA-approved environmental response project, there shall be no extraction of groundwater from beneath the Property for any purpose and no installation of any wells, borings, trenches or drains which could be used to extract such groundwater.

iv. No activity shall be permitted that adversely affects the protectiveness of the response actions at the Property.

C. Affirmative Obligations of Owner.

The Activity and Use Limitations imposed under this Environmental Covenant include the following affirmative covenants and obligations:

i. Owner shall comply with the terms and conditions of the Consent Decree entitled UNITED STATES OF AMERICA v. ARROWHEAD REFINING COMPANY and ARROWHEAD REFINING COMPANY v. RODNEY A. ANDERSON, dated February 13, 1995, and filed at the Saint Louis County Recorder's Office on February 20, 1995 as Document No. 257313, and will fulfill all terms and conditions of the Decree, including the provision of access for MPCA to operate, maintain, improve, and remove remedial actions.

ii. Owner shall cooperate with MPCA staff and EPA staff to conduct periodic future reviews, including EPA Five-Year Reviews.

8. Prior MPCA Approval Required For Activities Limited Under Environmental Covenant.

A. Approval Procedure.

Any activity subject to limitation under Paragraph 7.B. shall not occur without the prior written approval of the Commissioner. The Commissioner's approval may include conditions which the Commissioner deems reasonable and necessary to protect public health or welfare or the environment, including submission to and approval of a contingency plan for the activity. Within 60 days after receipt of a written request for approval to engage in any activities subject to a limitation under Paragraph 7.B., the MPCA shall respond, in writing, by approving such request, disapproving such request, or requiring that additional information be provided. A lack of response from the Commissioner shall not constitute approval by default or authorization to proceed with the proposed activity.

B. Emergency Procedures.

Owner shall follow the procedures set forth in this Paragraph 8.B. when an emergency requires immediate excavation affecting contaminated soil or other media in the Restricted Area to repair utility lines or other infrastructure on the Property, or to respond to other types of emergencies (e.g., fires, floods):

i. Notify the Minnesota Duty Officer, or successor officer, immediately of obtaining knowledge of such emergency conditions; the current phone numbers for the Duty Officer are 1-800-422-0798 (Greater Minnesota only); 651-649-5451 (Twin Cities Metro Area and outside Minnesota); fax (any location) 651-296-2300 and TDD 651-297-5353 or 800-627-3529;

ii. Assure that the persons carrying out the excavation limit the disturbance of contaminated media to the minimum reasonably necessary to adequately respond to the emergency;

iii. Assure that the persons carrying out the excavation prepare and implement a site-specific health and safety plan for excavation and undertake precautions to minimize

exposure to workers, occupants and neighbors of the Property to contaminated media (e.g., provide appropriate types of protective clothing for workers conducting the excavation, and establish procedures for minimizing the dispersal of contaminated dust); and

iv. Assure preparation and implementation of a plan to restore the Property to a level that protects public health and welfare and the environment. The plan must be submitted to and approved by the MPCA prior to implementation of the plan, and a follow-up report must be submitted to MPCA after implementation so that the MPCA can determine whether protection of the public health and welfare and the environment has been restored.

9. Easement; Right of Access to the Property.

Owner grants to the MPCA, Saint Louis County and the City of Hermantown an easement to enter the Property from time to time, to conduct Five-Year Reviews as mandated by EPA, inspect the Property, and to evaluate compliance with the Activity and Use Limitations set forth in Paragraph 7. In addition, for the purpose of evaluating compliance, Owner grants to the MPCA the right to take samples of environmental media such as soil, groundwater, surface water, and air, and to install, maintain and close borings, probes, wells or other structures necessary to carry out the sampling.

Owner further grants to the MPCA an easement to enter the Property to operate, maintain and monitor response actions on the Property connected to the MPCA-approved response action project, to take further response actions deemed reasonable and necessary by the MPCA to protect public health and welfare and the environment from the Identified Release of hazardous substances, pollutants, contaminants, and petroleum, and to dismantle and close such response actions including closure of monitoring wells in accordance with State law and rules.

The MPCA, Saint Louis County, and the City of Hermantown, and their employees, agents, contractors and subcontractors, may exercise the rights granted under this Paragraph 9 at reasonable times and with reasonable notice to the then-current owner, conditioned only upon showing identification or credentials by the persons seeking to exercise those rights.

10. Duration; Amendment or Termination of Environmental Covenant.

A. Duration of Environmental Covenant.

This environmental covenant is perpetual as provided in Minn. Stat. § 114E.40 (a).

B. Amendment or Termination by Consent.

i. This Environmental Covenant may be amended or terminated in writing by the Owner and the MPCA. An amendment is binding on the Owner but does not affect any other interest in the Property unless the person holding that interest has consented to the amendment or agreed to waive its right to consent.

ii. The Grantor of this Environmental Covenant agrees that, upon conveying fee title to the Property to any other person, the Grantor waives the right to consent to amendment or termination of this Environmental Covenant.

C. Termination, Reduction of Burden, or Modification by MPCA.

The MPCA may terminate, reduce the burden of, or modify this Environmental Covenant as provided in Minn. Stat. § 114E.40.

11. Disclosure in Property Conveyance Instruments.

Notice of this Environmental Covenant, and the Activity and Use Limitations and Compliance Reporting Requirements set forth in Paragraphs 7, 8, or 18 of this Environmental Covenant, shall be incorporated in full or by reference into all instruments conveying an interest in and/or a right to use the Property (e.g., easements, mortgages, leases). The notice shall be substantially in the following form:

> THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ENVIRONMENTAL COVENANT UNDER MINN. STAT. CH. 114E, DATED _____, RECORDED IN THE OFFICIAL PROPERTY RECORDS OF SAINT LOUIS COUNTY, MINNESOTA AS DOCUMENT NO. _____.

12. Recording and Notice of Environmental Covenant, Amendments and Termination.

A. The Original Environmental Covenant.

Within 30 days after the MPCA signs and delivers to Grantor this Environmental Covenant, the Grantor shall record this Environmental Covenant in the office of the County Recorder or Registrar of Titles of Saint Louis County.

B. Termination, Amendment or Modification.

Within 30 days after MPCA signs and delivers to Owner any termination, amendment or modification of this Environmental Covenant, the Owner shall record the amendment, modification, or notice of termination of this Environmental Covenant in the office of the County Recorder or Registrar of Titles of Saint Louis County.

C. Providing Notice of Covenant, Termination, Amendment or Modification.

Within 30 days after recording this Environmental Covenant, the Grantor shall transmit a copy of the Environmental Covenant in recorded form to:

i. the MPCA;

ii. each person holding a recorded interest in the Property;

iii. each person in possession of the Property;

iv. the environmental officer of each political subdivision in which the Property is located; and

v. any other person the environmental agency requires.

Within 30 days after recording a termination, amendment or modification of this Environmental Covenant, the Owner shall transmit a copy of the document in recorded form to the persons listed in items i to v above.

13. Notices to Grantor and Environmental Agency.

A. Manner of Giving Notice.

Any notice required or permitted to be given under this Environmental Covenant is given in accordance with this Environmental Covenant if it is placed in United States first class mail postage prepaid; or deposited cost paid for delivery by a nationally recognized overnight delivery service; or transmitted by facsimile if followed by mailed notice or overnight delivery as above required.

B. Notices to the Grantor.

Notices to the Grantor shall be directed to:

Bill & Irv's Properties, Inc.
Attention: Bill Wilson
P.O. Box 3027
Duluth, Minnesota 55803-3027
Phone: (218) 348-1800
Email: bill@5west.org

C. Notices to MPCA.

All notices, including reports or other documents, required to be submitted to the MPCA shall reference the MPCA Superfund Program project number SR67, and be submitted to:

Minnesota Pollution Control Agency
Attention: Remediation Division Institutional Controls Coordinator
Project Number SR0000067
520 Lafayette Road North, 5th Floor
Saint Paul, Minnesota 55155-4194
Phone: 651-757-2697
Email: instcontrols.pca@state.mn.us

14. Enforcement and Compliance.

A. Civil Action for Injunction or Equitable Relief.

This Environmental Covenant may be enforced through a civil action for injunctive or other equitable relief for any violation of any term or condition of this Environmental Covenant, including violation of the Activity and Use Limitations under Paragraph 7 and denial of Right of Access under Paragraph 9. Such an action may be brought by:

i. the MPCA;

ii. a political subdivision in which the Property is located;

iii. a person whose interest in the Property or whose collateral or liability may be affected by the alleged violation;

iv. a party to the covenant, including all holders; or

v. any person to whom the covenant expressly grants power to enforce.

B. Additional Rights of Enforcement by MPCA.

In addition to its authority under subparagraph A of this Paragraph 14, the MPCA may enforce this Environmental Covenant using any remedy or enforcement measure authorized under UECA or other applicable law, including remedies pursuant to Minn. Stat. §§ 115.071, subds. 3 to 5, or 116.072.

C. No Waiver of Enforcement.

Failure or delay in the enforcement of this Environmental Covenant shall not be considered a waiver of the right to enforce, nor shall it bar any subsequent action to enforce, this Environmental Covenant.

D. Former Owners And Interest Holders Subject to Enforcement.

Subject to any applicable statute of limitations, an Owner, or other person holding any right, title or interest in or to the Property that violates this Environmental Covenant during the time when the Owner or other person is bound by this Environmental Covenant remains subject to enforcement with respect to that violation regardless of whether the Owner or other person has subsequently conveyed the fee title, or other right, title or interest, to another person.

E. Other Authorities of MPCA Not Affected.

Nothing in this Environmental Covenant affects MPCA's authority to take or require performance of response actions to address releases or threatened releases of hazardous substances or pollutants or contaminants at or from the Property, or to enforce a consent order, consent decree or other settlement agreement entered into by MPCA, or to rescind or modify a liability assurance issued by MPCA, that addresses such response actions.

15. Administrative Record.

Subject to the document retention policy of the MPCA, reports, correspondence and other documents which support and explain the environmental response project for the Property are maintained by the MPCA Superfund Program at the MPCA's office at 520 Lafayette Road North, Saint Paul, Minnesota in the files maintained for Arrowhead Refinery Co. site, project number SR0000067.

16. Representations and Warranties.

Grantor hereby represents and warrants to the MPCA and any other signatories to this Environmental Covenant that, at the time of execution of this Environmental Covenant:

A. Every fee owner of the Property has been identified;

B. Grantor holds fee simple title to the Property which is subject to the interests and encumbrances identified in Exhibit 2 that certain mortgage granted by Bill & Irv's Properties, Inc., to M&I Marshall & Ilsley Bank, dated March 28, 2002, recorded in the Office of the Saint Louis County Recorder on May 3, 2002, as Document No. 0054723.

C. Grantor has authority to grant the rights and interests and carry out the obligations provided in this Environmental Covenant;

D. Nothing in this Environmental Covenant materially violates, contravenes, or constitutes a default under any agreement, document or instrument that is binding upon the Grantor.

E. Except as otherwise directed by MPCA, Grantor has obtained, from each person holding an interest and encumbrance in the Property identified in Exhibit 2, a Subordination Agreement, or other agreement satisfactory to the Commissioner, assuring that such person is bound by this Environmental Covenant and that this Environmental Covenant shall survive any foreclosure or other action to enforce the interest. Such an agreement may include a waiver of that person's right to consent to any amendment of this Environmental Covenant. The executed agreement(s) is attached as **Exhibit 3** to this Environmental Covenant and incorporated herein.

17. Governing Law.

This Environmental Covenant shall be governed by and interpreted in accordance with the laws of the State of Minnesota.

18. Compliance Reporting.

The Owner shall submit to MPCA on an annual basis a written report confirming compliance with the Activity and Use Limitations provided in Paragraph 7 and summarizing any actions taken pursuant to Paragraph 8 of this Environmental Covenant. Reports shall be submitted on the first July 1 that occurs at least six months after the effective date of this Environmental Covenant, and on each succeeding July 1 thereafter.

Owner shall notify the MPCA as soon as possible of any actions or conditions that would constitute a breach of the Activity and Use Limitations in Paragraph 7.

19. Notice of Conveyance of Interest in Property.

Owner shall provide written notice to MPCA within 30 days after any conveyance of fee title to the Property or any portion of the Property. The notice shall identify the name and contact information of the new Owner, and the portion of the Property conveyed to that Owner.

20. Severability.

In the event that any provision of this Environmental Covenant is held by a court to be unenforceable, the other provisions of this Environmental Covenant shall remain valid and enforceable.

21. Effective Date.

This Environmental Covenant is effective on the date of acknowledgement of the signature of the MPCA.

THE UNDERSIGNED REPRESENTATIVE OF THE GRANTOR REPRESENTS AND CERTIFIES THAT HE/SHE IS AUTHORIZED TO EXECUTE THIS ENVIRONMENTAL COVENANT.

IN WITNESS WHEREOF, THIS INSTRUMENT HAS BEEN EXECUTED ON THE DATES INDICATED BELOW:

FOR THE GRANTOR:
BILL & IRV'S PROPERTIES, INC., A MINNESOTA CORPORATION

By _____ (signature)

Bill Wilson, Owner
Bill & Irv's Properties, Inc., a Minnesota Corporation

State of Minnesota)
) ss.
County of Saint Louis)

On February 3, 2021, this instrument was acknowledged before me, and the facts stated herein were sworn to or affirmed by, Bill Wilson, the Owner of Bill & Irv's Properties, Inc., a Minnesota corporation, on behalf of Bill & Irv's Properties, Inc., a Minnesota corporation.

_____ (signature)

Notary Public
My Commission Expires _____

TAMMY L ANDERSON
NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 01/31/2025

FOR THE ENVIRONMENTAL AGENCY AND HOLDER:

MINNESOTA POLLUTION CONTROL AGENCY

By _____(signature)

Tom Higgins, Interim-Manager
Site Remediation & Redevelopment Section
Remediation Division
Delegate of the Commissioner of the
Minnesota Pollution Control Agency

STATE OF MINNESOTA)
) SS.
COUNTY OF RAMSEY)

This instrument was acknowledged before me on February 5, 2021, by Tom Higgins, Interim-Manager of the Site Remediation & Redevelopment Section of the Remediation Division, and a Delegate of the Commissioner of the Minnesota Pollution Control Agency, on behalf of the Minnesota Pollution Control Agency.

Amy K. Hadiaris (signature)

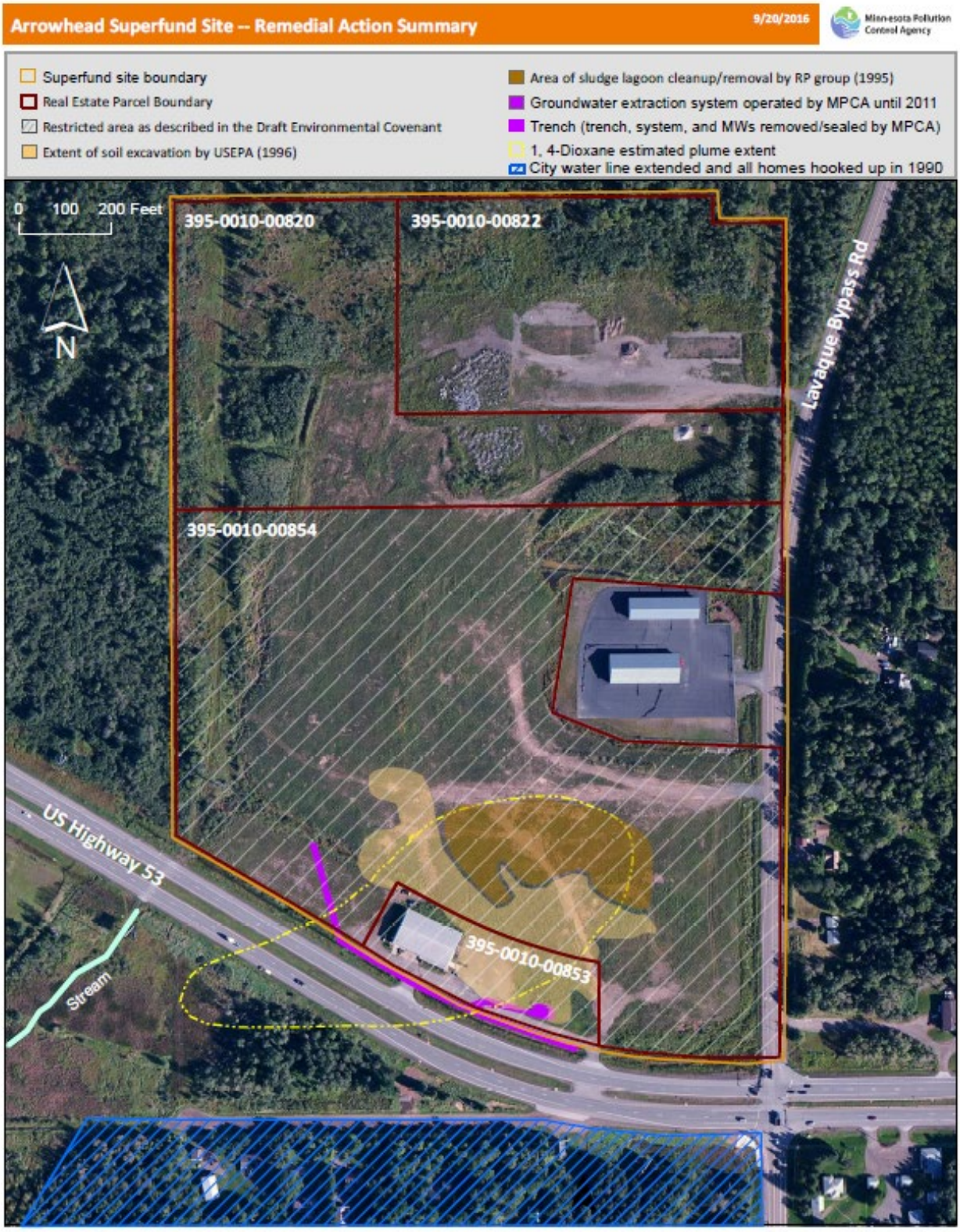
Notary Public

My Commission Expires 1/31/2025

AMY K. HADIARIS
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2025

THIS INSTRUMENT WAS DRAFTED BY
AND WHEN RECORDED RETURN TO:

Minnesota Pollution Control Agency
Attention: Tom Reppe
520 Lafayette Road North
Saint Paul, MN 55155


Arrowhead Superfund Site -- Remedial Action Summary
9/20/2016
Minnesota Pollution Control Agency
Superfund site boundary
Real Estate Parcel Boundary
Restricted area as described in the Draft Environmental Covenant
Extent of soil excavation by USEPA (1996)
Area of sludge lagoon cleanup/removal by RP group (1995)
Groundwater extraction system operated by MPCA until 2011
Trench (trench, system, and MWs removed/sealed by MPCA)
1, 4-Dioxane estimated plume extent
City water line extended and all homes hooked up in 1990
0 100 200 Feet
N
395-0010-00820
395-0010-00822
395-0010-00854
395-0010-00853
Lavaque Bypass Rd
US Highway 53
Stream

APPENDIX C

THREATENED AND ENDANGERED SPECIES INFORMATION

BRAUN INTERTEC

Protected Species Evaluation

Project Name:	Future Business Park	**Date:**	October 15, 2021
Site Address:	Intersection of TH 53 & Lavaque Bypass Rd	**Project No.:**	B2109165
Client:	City of Hermantown	**Evaluator:**	B. Ruhme
County:	St. Louis	**TRS:**	50N 15W 3&4
Lat/Long:	46.841732, -92.243220		

Resource	Description	Evaluation
Aerial Photo	Historical Aerial Photographs (1940-2019)	Historically, the Site consisted of forested land with a few small clearings and apparent crop land in the southwest portion (1940 aerial photo). An apparent gravel pit in the southeast corner is visible in the 1948 aerial photo. Small buildings are initially apparent in the southeast and southwest portions of the site by the 1972 aerial photo. Tree clearing in the southcentral portion of the Site and additional buildings in the southeast and southwest corners are apparent in the 1997 aerial photo. Significant earthwork in the southcentral and tree clearing in the northwest portions of the Site are apparent in the 2008 aerial photo. Little change is apparent in the 2013-2019 aerials except for increased tree cover in the northwest corner.
Federal (IPaC)	Query of IPaC Database	Four federally listed species were identified for the site in the IPaC database. The project area is located within a critical habitat zone for the Canada Lynx.
State	MnDNR NHIS Database	Three state listed species were identified for the site in the NHIS database.
National Wetland Inventory	MnDNR NWI Wetland Finder	Shrub wetland (Type 6- Shrub Swamp) and portions of forested wetland (Type 7- hardwood swamp) are mapped within the Site boundaries. Coniferous bogs (Type 8 wetland), often favored by the Canada Lynx, are also mapped within 1-mile of the Site.

Field Survey Conducted No

Conclusion: Not likely to adversely affect protected species.

With a lack of surface water features and apparent limited floral resources for pollinators, the Site does not provide suitable habitat for the Floating Marsh Marigold, Piping Plover or Monarch Butterfly. With forested land covering large portions of the Site, it is possible, but unlikely the Rusty Patched Bumble Bee or Soapberry are present due other habitat requirements of these species. The Site is located within a critical habitat zone for the Canada Lynx and forested portions of the site may provide habitat for the species. Due to its history of disturbance, surrounding development and the type of forest (mixed conifer-hardwood) present, it is unlikely resident lynx occupy the Site. However, lynx may forage on and travel through the Site between areas of nearby preferred habitat (boreal forest/ coniferous bogs). Additionally, trees on Site may provide nesting habitat for migratory birds and potential summer roosting habitat for the Northern Long-eared bat.

Further Action Recommended: Yes

If development is proposed for the Site, additional consultation with the U.S. Fish and Wildlife Service (USFWS) and Minnesota Department of Natural Resources (MnDNR) regarding the suitability of Canada Lynx habitat present and potential impacts to the species is recommended. Also, if required for any proposed development, it is recommended to conduct vegetation and tree clearing from September 1-April 30 to avoid impacts to nesting migratory birds (nesting season is typically May-August). Additionally, any potential development projects for the Site should consider timing tree clearing work from November-March to avoid any impacts to the Northern Long-eared bat.

Signed: 

Attachments: Yes IPaC output and table of listed species attached.

Common Name	Scientific Name	Federal Status[1]	State Status[1]	Habitat	Impact	Comment
Canada Lynx	*Lynx canadensis*	T	SPC	Boreal forest, mixed hardwood conifer forest and coniferous bogs	Potential to adversely affect	The Site is located within a designated critical habitat zone for the lynx and forested areas may provide potential habitat. With the Site's history of disturbance and nearby development (including the Duluth airport), resident lynx are unlikely to occupy the Site. However, the species may forage and travel through the Site on its way to preferred nearby habitat (boreal forest/ coniferous bogs).
Floating Marsh Marigold	*Caltha natans*	none	E	Shallow, slow moving water-lakes, small streams, creeks, pools, ditches, swamps and beaver ponds	No effect	Plant is extremely rare in Minnesota and unlikely to be present due to a lack of open water features at the Site.
Monarch Butterfly	*Danaus plexippus*	C	None	Meadows, open fields and clearings with nectaring plants, particularly milkweed.	No effect	Suitable habitat is not present within the Site.
Northern Long-eared Bat	*Myotis septentrionalis*	T	SPC	caves, mesic-hardwood and floodplain forests	Not likely to adversely affect-not prohibited	This project may affect the threatened Northern long-eared bat; therefore, consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.) is required. However, based on the information provided, this project may rely on the Service's January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions to fulfill its Section 7(a)(2) consultation obligation. No further action is needed. Any take that may occur is incidental and not prohibited. The project site is not located within a township containing known roost trees or hibernacula.
Piping Plover	*Charadrius melodus*	E	E	Beaches with gravel or pebble substrate, sparsely vegetated lakeshore areas.	No effect	Suitable habitat is not present within the Site.

Rusty-patched Bumble Bee	*Bombus affinis*	E	Watchlist	Variety of native herbaceous and woody plant species and urban gardens that provide floral resources April through October. It nests and winters underground.	Not likely to adversely affect	Since the Site is dominantly forested or developed land, the presence of floral resources for pollinators appears to be limited. This provides poor foraging habitat for the bee. Nesting/overwintering habitat is present within the forested portions of the Site. Additionally, the last documented sighting of the Bee within 3-miles of the Site was in 1913. Considering these factors, the bee is unlikely to be present.
Soapberry	*Shepherdia canadensis*	none	SPC	Fire dependent forests, often on steep rocky bluffs, rock ledges & outcrops.	Not likely to adversely affect	Only small populations exist within Minnesota, primarily along the Canadian border and the plant is unlikely to be present as a result.
Migratory birds		MBTA		Various	May affect - not prohibited	Various migratory birds may nest in shrubs and trees on the Site. Avoidance should be considered by clearing vegetation outside the migratory bird breeding season (May- August for most species).

[1] T = Threatened, E = Endangered, C = Candidate, SPC = Special Concern, NEP = Non-Essential Population (experimental); MBTA = protected under Migratory Bird Treaty Act

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
4101 American Blvd E
Bloomington, MN 55425-1665
Phone: (952) 252-0092 Fax: (952) 646-2873
http://www.fws.gov/midwest/Endangered/section7/s7process/step1.html

In Reply Refer To: October 13, 2021
Consultation Code: 03E19000-2022-SLI-0189
Event Code: 03E19000-2022-E-00631
Project Name: Hermantown Business Park

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq*.).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS IPaC website at regular intervals during project planning and implementation

for updates to species lists and information. An updated list may be requested through the ECOS IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance

Please refer to the Midwest Region S7 Technical Assistance website for step-by-step instructions for making species determinations and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of "There are no listed species found within the vicinity of the project," then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species through the S7 Technical Assistance website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **No Effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.
3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

Northern Long-Eared Bats

Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

This species hibernates in caves or mines only during the winter. In Minnesota and Wisconsin, the hibernation season is considered to be November 1 to March 31. During the active season (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas,
- Trees found in highly developed urban areas (e.g., street trees, downtown areas),
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A stand of eastern red cedar shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:

- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or

- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.

If any of the above activities are proposed, please use the northern long-eared bat determination key in IPaC. This tool streamlines consultation under the 2016 rangewide programmatic biological opinion for the 4(d) rule. The key helps to determine if prohibited take might occur and, if not, will generate an automated verification letter. No further review by us is necessary. Please visit the links below for additional information about "may affect" determinations for the northern long-eared bat.

NLEB Section 7 consultation

Key to the NLEB 4(d) rule for federal actions that may affect

Instructions for the NLEB 4(d) assisted d-key

Maternity tree and hibernaculum locations by state

Other Trust Resources and Activities

Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

State Department of Natural Resources Coordination

While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.

Minnesota

Minnesota Department of Natural Resources - Endangered Resources Review Homepage

Email: Review.NHIS@state.mn.us

Wisconsin

Wisconsin Department of Natural Resources - Endangered Resources Review Homepage

Email: DNRERReview@wi.gov

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Attachment(s):

- Official Species List
- Migratory Birds

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Minnesota-Wisconsin Ecological Services Field Office
4101 American Blvd E
Bloomington, MN 55425-1665
(952) 252-0092

Project Summary

Consultation Code: 03E19000-2022-SLI-0189
Event Code: Some(03E19000-2022-E-00631)
Project Name: Hermantown Business Park
Project Type: DEVELOPMENT
Project Description: Location of proposed business park. No development plans are currently proposed. The City is evaluating the existing conditions of the parcels.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.84208205,-92.24334562533238,14z

Counties: St. Louis County, Minnesota

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Canada Lynx *Lynx canadensis* Population: Wherever Found in Contiguous U.S. There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3652	Threatened
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Great Lakes watershed DPS] - Great Lakes, watershed in States of IL, IN, MI, MN, NY, OH, PA, and WI and Canada (Ont.) There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/6039	Endangered

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Canada Lynx *Lynx canadensis* https://ecos.fws.gov/ecp/species/3652#crithab	Final

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

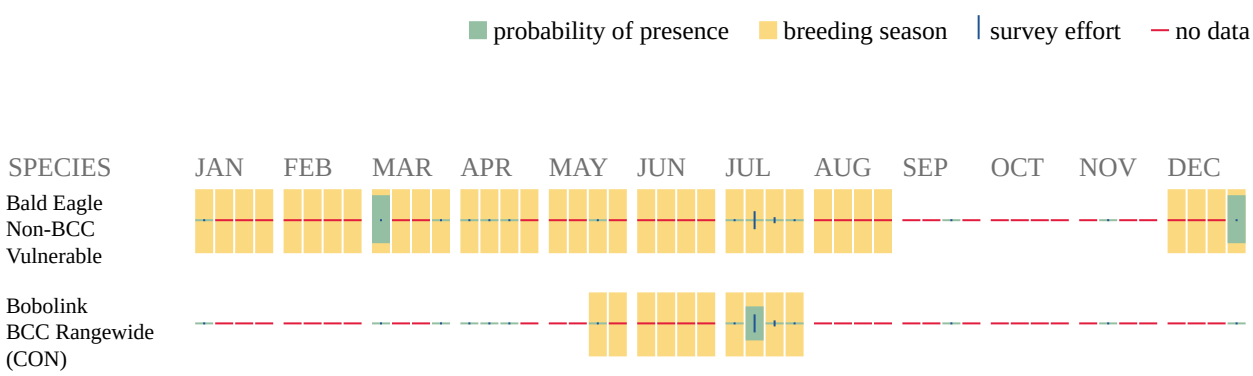
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as

occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can

implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

APPENDIX D

PREVIOUS GEOTECHNICAL REPORT

REPORT OF GEOTECHNICAL/ENVIRONMENTAL EXPLORATION AND REVIEW

Proposed Schneiderman's Building
Hermantown, Minnesota

AET #07-01807

Date:

December 6, 2002

Prepared For:

Larry Schneiderman
1763 Juniper Path
Lakeville, Minnesota 55044

AMERICAN
ENGINEERING
TESTING, INC.

CONSULTANTS
• GEOTECHNICAL
• ENVIRONMENTAL
• MATERIALS

December 6, 2002

Mr. Larry Schneiderman
17630 Juniper Path
Lakeville, Minnesota 55044

Re: Geotechnical Exploration/Review
Proposed Schneiderman's Building
Hermantown, Minnesota
AET #07-01807

Dear Mr. Schneiderman:

American Engineering Testing, Inc. (AET) has completed a subsurface exploration and geotechnical engineering review for your proposed building. In addition, a limited environmental assessemnt was completed in the area of the proposed building. We are sending you three copies of our attached report. This report documents the exploration/review results and provides our opinions and recommendations to aid you and your design team in planning and construction of the project.

AET appreciates this opportunity to serve you. As your project proceeds, we remain interested in providing additional consulting or testing services. If you have questions about the report, or if we can provide additional services for you, please contact me at (218) 628-1518 or asmith@amengtest.com.

Sincerely,

Amy Smith, PE
Project Engineer

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GEOTECHNICAL EXPLORATION/REVIEW
PROPOSED SCHNEIDERMAN'S BUILDING
HERMANTOWN, MINNESOTA
AET #07-01807

SUMMARY

Purpose

The purpose of our work on this project is to obtain subsurface information at the proposed building site and provide recommendations to assist you in the planning and construction of the project.

Scope

To accomplish the above purpose, you have authorized our firm to drill six (6) standard penetration test borings, collect and analyze soil samples for chemical laboratory testing within the proposed development area, and to furnish a geotechnical exploration report.

Findings

The test borings encountered 4 to 12½ feet fill and/or organic swamp deposits overlying the native inorganic soils. Measurable groundwater was encountered in most of the borings at depths ranging from 7 to 21 feet below existing ground surface.

The field screening results did not indicate the presence of contamination in the subsurface at the borehole locations. The analytical laboratory detected several metals at concentrations that are less than the generic Tier 1 Soil Leaching Value (SLV) and Tier 1 Residential Soil Reference Values (SRVs). Diesel range organics (DRO) were detected as well, however, the concentrations were relatively low and generic SLV and SRV concentrations have not been published by the Minnesota Pollution Control Agency (MPCA).

Recommendations

These recommendations are in a condensed form for your convenience. It is important that you study our entire report for detailed recommendations.

- Grading in the building area should include the complete removal of all existing fill and organics, as well as any other soft, wet or disturbed soils. The organic soils are not suitable for reuse as backfill. The silty sand fill soils may be suitable for reuse as backfill. The proposed structure can be supported on conventional spread or strip footings bearing on the undisturbed native inorganic soils or on engineered fill.

- Grading in the parking area should allow a minimum section of 36 inches of inorganic soil. The depth of the subcut will be depend on final desired grade and the presence of organic soils. More borings would be useful in determining the extent of the organic soils. A typical pavement section could include up to 24 inches of select granular borrow, 8 inches of class 5 aggregate base, and 4 inches of bituminous pavement. The subgrade should be surface compacted, and a geogrid should be placed prior to the placement of any new fill.

- Even though the chemistry tests performed during the geotechnical exploration are below the Tier 1 SLVs and SRVs, it is likely that conditions may vary across the site due to the known historical use of the property. As a result, we recommend that native soil excavated as part of development, be field screened and characterized prior to re-use on site or for off-site disposal.

- Preparation of a site-specific excavation contingency plan should be considered, and may even be a site-specific MPCA requirement, for handling soil that is excavated during development. A contingency plan is recommended so that if contaminated soils is encountered, this soil can be handled cost-effectively and in accordance with state and federal requirements.

- The Environmental Protection Agency and the MPCA should be contacted prior to development to verify whether a contingency plan for excavation activities is required or whether there are site use or development restrictions applicable to the area proposed for development.

INTRODUCTION

You are proposing to construct a new building at Ugstad Road and Highway 53 in Hermantown, Minnesota. You have authorized American Engineering Testing, Inc., (AET) to conduct a subsurface exploration and limited site investigation, and to provide geotechnical engineering recommendations for your project. This report presents the information we obtained at the site and our engineering recommendations.

To protect you, AET, and the public, we authorize use of opinions and recommendations in this report only by you and your project team for this specific project. Contact us if other uses are intended. Even though this report is not intended to provide sufficient information to accurately determine quantities and locations of particular materials, we recommend that your potential contractors be advised of the report availability.

Scope of Services

Our scope of services for this work was presented in a written proposal dated October 14, 2002. A review of our agreed-upon scope of services is as follows:

- Arrange for existing utility locations for the site through the Gopher State One Call System.
- Drill six (6) standard penetration test (SPT) borings to depths of 25 feet in accordance with ASTM D1587 and D2487. The borings were sampled for both geotechnical purposes and environmental screening.
- Perform geotechnical laboratory tests to aid in classifying the soil and estimating soil properties.
- Field screen the soil sampled at each boring location and submit selected samples for chemical testing. Five soil samples were analyzed for DRO and two samples for polynuclear aromatic hydrocarbons (PAH), volatile organic compounds (VOC) and RCRA 8 metals.
- Prepare a formal engineering report which includes logs of the test borings, a sketch indicating boring locations, presentation of the soil and ground water conditions, the laboratory test results and our engineering opinions and recommendations regarding site preparation, foundation types, allowable soil bearing capacity, and special requirements with respect to any contaminated soils.

BACKGROUND

The area proposed for development includes a portion of the former Arrowhead Refinery Company Facility (the facility), which refined used oil from 1945 to 1977. The 28-acre facility generated a highly acidic, metal-laden sludge, which was disposed of in a two-acre waste lagoon located northwest of the area proposed for this development. Sludge disposal resulted in the contamination of the subsurface and surface water with oil-related compounds, heavy metals, cyanide, phenols, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). In 1984, the United States Environmental Protection Agency (EPA) conducted a remedial investigation and feasibility study and subsequently issued a Record of Decision (ROD) in 1986 for site cleanup.

The facility was removed and cleanup activities were directed by the EPA, which included the excavation, treatment and off-site disposal of approximately 11,750 tons of soil and sediment, and the backfilling of 48,050 tons of soil in the areas restored during 1995 and 1996 (Delta, 2002). A ground water treatment system was also installed and has been operating under the direction of the MPCA.

Residual lead at a concentration of less than 500 parts per million, are reported to remain in subsurface in some areas. As a result, the MPCA suggests that some areas of the former Arrowhead Facility may not be suitable for residential development or activities involving children with out further testing. The MPCA reports that the current contaminant levels in the ground water are generally below the maximum contaminant levels (MCLs) and that the treatment system may soon be shut down.

PROJECT INFORMATION

The proposed single story concrete building will be a 50,000 square foot structure with dimensions of 200' x 250' located in the northwest corner of the Ugstad Road and Highway 53 intersection. The proposed development also includes paved parking areas. For the purpose of this report, we assume that wall loads will be less than 5 kips/foot and maximum column loads will be less than 100 kips. We have also assumed that building floor elevation will be near 1420±.

The recommendations contained in this report are based on attaining a factor of safety of at least 3 with respect to localized shear or base failure of the foundations. We have also assumed allowable foundation settlements of 1" total and ½" differential are acceptable.

> The presented project information represents our understanding of the proposed construction. This information is an integral part of our engineering review. It is important that you contact us if there are changes from that described so that we can evaluate whether modifications to our recommendations are appropriate.

SITE CONDITIONS

Surface Observations

The site is currently vacant and relatively flat with little to no vegetation. Surface elevations at the boring locations were determined by our drill crew and ranged from 1418.8 to 1420.2 feet. These elevations are relative to the survey point on Lavaque By-Pass, a nail in the blacktop, which had an assigned elevation of +1425.16 feet. The approximate locations and elevations of the borings are indicated on the sketch in Appendix A.

Subsurface Soils

We have included our logs of the test borings in Appendix A of this report. We refer you to these logs for specific information concerning soil layer depths, soil/geology descriptions and density/consistency, based on the penetration resistance. It is important to note that the soil borings indicate only the subsurface conditions at the sampled locations and variations may occur between and beyond borings.

Based on our interpretation of the available boring information, it is our judgement that the generalized soil profile consists of 4 - 12½ feet of fill and/or swamp deposits overlying the native soils. The fill included silty sand with gravel and sand with silt and gravel. Most of the borings encountered a swamp deposited layer just below the fill layer ranging in thickness from 2 ½ to 11½ feet. The native soils consisted of clayey silt, silty sand, silty sand with gravel, sandy silt, and sand with silt, which extended to the boring termination depths of 25 feet. An exception was noted at boring 02-05 which met auger refusal at a depth of 11.7 feet. Auger refusal indicates an obstruction to drilling on objects such as cobbles, boulders, or bedrock. Diamond tip drilling would be required to determine the nature of the obstruction.

On site screening of subsurface soils yielded no organic vapors above 1.1 parts per million (ppm).

Groundwater

During our drilling operations, we probed the boreholes for the presence of free groundwater. The results of our observations are indicated at the bottom of the attached boring logs. A review of this data indicates that measurable groundwater was encountered in borings 02-01, 02-02, and 02-03 at depths of 7 to 9 feet below existing ground surface, and in borings 02-01 and 02-06 at depths of 20-21 feet below existing ground surface.

Fluctuations in the groundwater table can be expected both seasonally and annually and with changes in precipitation and infiltration. The attached Appendix sheet entitled "Exploration/ Classification" provides additional information on ground water level measuring.

LABORATORY TESTING

Engineering

Laboratory tests were performed on samples recovered during the soil boring program. The geotechnical testing program consisted of three sieve analysis tests and moisture content tests, which were used to aid in classifying the soils and to determine engineering parameters. The results of the laboratory testing are included in Appendix A.

Environmental

Five samples of the native soil encountered below the fill soils were submitted to En Chem for chemical analyses. The native soil was targeted for chemical analysis because the fill soil was imported and placed during the cleanup directed by the EPA and the field screening results did not indicate contamination was present in the fill. Each sample of the native soil was selected based on the relative appearance and/or presence of black material in the sample or, if no black material was present, the sample was collected from a depth at or below the water table interface.

Three soil samples were collected and analyzed for volatile organice compounds (VOCs). Two soil samples were collected and analyzed for RCRA 8 metals and polycyclic aromatic hydrocarbons (PAHs). Each of these five samples was also analyzed for diesel range organics (DRO). These analyses detected several metals and DRO at concentration above the method detection limit in two samples. PAH comounds were not detected in the samples analyzed.

Each analytical result was compared to the Tier 1 SRV (Non-Industrial) established in the MPCA Working Draft (1/99), with the exception of DRO. There is no standard for DRO, and concentrations above 200 milligrams per kilogram (mg/kg) in soils are generally considered reason for further investigation. The following tables summarize the analytes detected, and copy of the laboratory generated by En Chem is included in Appendix B.

TABLE I

Analytical Results - Soil

Boring/ (Depth)	02-03 (12-13½') (mg/kg)	02-04 (23.5-25') (mg/kg)	02-04 (4.5-6') (mg/kg)	02-05 (7-8.5') (mg/kg)	02-06 (7-8.5') (mg/kg)	Tier1SRV (1/99)
DRO	<3.3	<4.2	<4.1	16	220	na
Arsenic	-	-	2.9	4.1	-	10
Barium	-	-	76	67	-	1200
Cadmium	-	-	0.12	0.11	-	35
Chromium	-	-	35	26	-	71
Lead	-	-	5.3	4.9	-	400
Mercury	-	-	0.013	-	-	0.7

The results presented in the previous table indicate that all detected analytes are below the Tier 1 SRV for each respective compound.

ENGINEERING CONSIDERATIONS

Review of Soil Properties

Strength

The organic soils are judged to have a low strength and the fill soils are judged to have a moderate strength. The undisturbed, native soils at this site are considered to have a moderate to high strengths.

Compressibility

The organic soils are judged to be highly compressible. The fill soils and the native inorganic soils encountered at the site are judged to have a low compressibility based on the SPT values.

Frost Susceptibility

The silty sands, sandy silts, and silty clays encountered at the site are considered highly frost susceptible. The sands with silt have a low frost susceptibility.

Drainage

Drainage Properties - The sand with silt soils and silty sand soils encountered in our borings are judged to be moderately free draining. The clayey silt and sandy silt soils are judged to be relatively slow draining. Surface water may tend to "perch" over the these soils during wet periods.

RECOMMENDATIONS

Building Grading Procedures

Excavation

To prepare the building area for shallow spread footing and floor slab support, we recommend complete excavation of the existing organic soils. This excavation should result in the following excavation depths at the test boring locations:

Boring Number	Minimum Depth of Excavation	Approximate Elevation of Excavation
02-01	4	1415½
02-02	12½	1407½
02-03	8	1412½
02-04	6	1412½
02-05	9	1409½
02-06	10	1409

As conditions will likely change between the test locations, we recommend that an AET Geotechnical Engineer/Technician observe the final excavation and judge soil suitability prior to fill or footing placement.

It appears some of the excavation may extend below the ground water level. Where standing ground water is present, we recommend dewatering be performed to allow observation of the bottom, and to facilitate filling operations.

Where engineered fill is needed to establish foundation grade, the excavation bottom and subsequent fill system should maintain 1:1 lateral oversizing. That is, for each vertical foot of fill placed below the foundation, the excavation bottom should be extended laterally beyond the footing edges an equal distance.

Filling

We recommend fill placed below footing and floor slab areas be compacted in thin lifts to a minimum of 98% of the Standard Proctor density (ASTM:D698). The fill lift thicknesses should be thin enough such that the entire thickness of fill placed can be compacted to meet the minimum specified compaction level.

Many of the soils being excavated such as the black organic silts and peats will not be suitable for reuse as engineered fill. Also, some of the soils may be wet and not be practical to scarify and dry. It may be possible to salvage some of the more granular fill soils (silty sands to sands), although separation of more favorable materials should be monitored by a geotechnical technician on a full-time basis.

Imported fill should preferably consist of sands to silty sands with less than 20% by weight passing the #200 sieve (Granular Borrow). Cleaner materials may be needed in some portions of the fill sequence. When placing fill in excavations where the bottoms are wet or have sensitive soils, cleaner sands should be used to facilitate compaction of the sand, and reduce disturbance to the underlying soils. Another situation where cleaner sands may be needed will be exterior applications where frost properties are important (further discussed on page 17).

If engineered fill is placed on sloping ground (4:1 or steeper), we recommend the excavation bottom be benched or terraced into the slope (parallel to the ground contour) prior to fill placement.

Foundation Recommendations

After preparing the site, as recommended previously, it is our judgment that the structure can be supported on conventional spread or strip footings on either the undisturbed native soils or properly compacted engineered fill. These foundations can be designed for a maximum allowable soil bearing pressure of 3000 psf. Foundations bearing on soil should be provided with a minimum of 60 inches of cover for adequate protection from frost.

It is our judgment this design will include a factor of safety of greater than 3 against shear or base failure, and that total and differential building settlement should be less than 1 inch.

Floor Slab Support

Preparation of the building area, as previously recommended, will also prepare the site for floor slab support. All fill supporting the floor slabs should be compacted to a minimum of 95% of Standard Proctor density. This includes utility and foundation trench backfill.

Floor Slab Moisture/Vapor Protection

For recommendations pertaining to moisture and vapor protection of the floor slabs, we refer you to the attached standard sheet entitled "Floor Slab Moisture/Vapor Protection."

Building Backfilling

Our recommendations for backfilling the structure appears in the attached standard data sheet entitled "Freezing Weather Effects on Building Construction". This sheet presents information on preferred soil types and frost considerations.

Parking Lot

To achieve a no differential frost heave design, it would be necessary to subcut the frost-susceptible soils to a depth of 8 feet below final grade and replace these soils with clean granular, non-frost susceptible (NFS) sand. To achieve a no settlement design, it would be necessary to subcut all of the organic soils and replace with NFS sand. Based on the potential of mildly contaminated soils, this approach may not be economically feasible, and we assume you are willing to tolerate some movements due to frost heave and/or settlement.

We recommend providing a minimum inorganic section 36 inches thick including subbase, base and bituminous pavement. The depth of subcut would be dependant on your final desired grade and whether organic soils are present within 36 inches of final grade. It would be beneficial to advance more soil borings in proposed parking areas to further define the extent of organic soils.

Following the subcut (if any), the subgrade is surface compacted, and a non-woven geotextile fabric is placed. The fabric should have both separation and filtering properties (meeting the more stringent specification properties of the Type I, II, III, IV and V fabrics listed in MnDOT Specification 3733).

All fill should be placed in loose lifts of 8 to 10 inches, moisture conditioned if needed, and properly compacted. All fill should be compacted to 100% of Standard Proctor Density (ASTM:D698).

With this approach, the section placed above the geotextile fabric should consist of up to of 24 inches of Select Granular Borrow (Mn DOT 3149.2B2), 8 inches of Class 5 Aggregate Base (Mn DOT 3138), and 4 inches of bituminous pavement. The bituminous should be placed in two lifts, and should meet the requirements of MnDOT Specification 2340 or 2350.

Although this section does not totally eliminate frost heave or settlement, it will reduce movements and will significantly decrease the abruptness or differential nature of heaves, resulting in relatively good performance

at a more feasible cost. Once a parking lot grading plan has been developed, we recommend we be contacted for a review of the paved area corrections and design.

Utility Support

We recommend that utilities by supported either on the inorganic native soils or on engineered fill over the native inorganic soils. There may be significant soil corrections needed dependant on the locations of utilities. Additional borings may be warranted to identify the most economical utility routes.

CONSTRUCTION CONSIDERATIONS

Construction Difficulties

It appears the excavation may extend below the ground water level. Perched water sources can also appear, particularly during times of wetter weather. Where standing water collects within excavation bottom, we recommend positive dewatering be performed to allow fill or footing placement in a non-standing water condition.

The on-site soils can contain cobbles and boulders which can complicate excavation and filling.

Some of the on-site fill soils will likely be wet, and create unstable conditions. Wetter soils will also be difficult to reuse as fill, thereby requiring scarification and drying.

Excavation Sidesloping

If unretained, the excavation should maintain sideslopes in accordance with OSHA Regulations (Standards 29 CFR), Part 1926, Subpart P, "Excavations" (can be found on www.osha.gov). Even with the required OSHA sloping, water can potentially induce sideslope erosion or running which could require slope maintenance.

Environmental Concerns

Due to the past history of environmental concerns at the property, we recommend that the owner's environmental consultant be notified prior to and available during any excavation processes throughout construction. A Remedial Action Plan may be required if a cleanup becomes necessary at the site. Cleanup, if needed, would likely take place during site development and might include soil excavation and treatment.

Observation and Testing

The recommendations in this report are based on the subsurface conditions found at our test boring locations. Since the soil conditions can be expected to vary away from the soil boring locations, we recommend on-site observation by a geotechnical engineer/technician during construction to evaluate the effect of these potential changes. Soil density testing should also be performed on all new fill placed in order to document that project recommendations or specifications for compaction and moisture have been satisfied. Where fill material type is important, sieve analysis tests should be performed to document the actual fill meets the recommended gradation criteria.

EXPLORATION PROCEDURES

Boring Location/Elevation Data

Our subsurface exploration program included drilling a total of six (6) standard penetration test borings within the limits of the proposed developments. These borings were drilled at the site on October 22 and 23, 2002. The surface elevations at the test boring locations were determined by our drill crew and are relative to the survey point on Lavaque By-Pass, nail in blacktop, which had an assigned elevation of +1425.16 feet. The approximate locations of the borings and the benchmark chosen for our boring elevations are shown on the sketch in Appendix A.

Exploration/Classification Methods

We refer you to the last sheet in the Appendix for descriptions of our standard procedures for sampling methods, classification methods, water level measurements, and sample storage.

EXPLORATION PROGRAM LIMITATIONS

The data derived through this sampling and observation program have been used to develop our opinions about the subsurface conditions at your site. However, because no exploration program can reveal totally what is in the subsurface, conditions between borings and between samples and at other times may differ from conditions described in this report. The exploration we conducted identified subsurface conditions only at those points where we took samples or observed ground water conditions. Depending on the sampling methods and sampling frequency, every soil layer may not be observed, and some materials or layers which are present in the ground may not be noted on the boring logs.

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Thus, most contacts shown on the logs are approximate, with a possible upper and lower limits of contacts defined by the overlying and underlying samples.

Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

If conditions encountered during construction differ from those indicated by our borings, it may be necessary to alter our conclusions and recommendations, or to modify construction procedures, and the cost of construction may be affected.

The extent and detail of information about the subsurface condition is directly related to the scope of the exploration. It should be understood, therefore, that additional information can be obtained by means of additional exploration.

STANDARD OF CARE

Our services for your project have been conducted to those standards considered normal for services of this type at this time and location. Other than this, no warranty, either express or implied, is intended.

SIGNATURES

Report Prepared by:

Amy Smith, PE
Project Engineer

Report Reviewed by:

William K. Cody, PE
Principal Engineer
MN Reg. No. 16136

FLOOR SLAB MOISTURE/VAPOR PROTECTION

Floor slab design relative to moisture/vapor protection should consider the type and location of two elements, a granular layer and a vapor membrane (vapor retarder, water resistant barrier or vapor barrier). In the following sections, the pros and cons of the possible options regarding these elements will be presented, such that you and your specifier can make an engineering decision based on the benefits and costs of the choices.

GRANULAR LAYER

In American Concrete Institute (ACI) 302.1-96, a "base material" is recommended, rather than the conventional cleaner "sand cushion" material. The manual maintains that clean sand (common "cushion" sand) is difficult to compact and maintain until concrete placement is complete. ACI recommends a clean, fine graded material (with at least 10% to 30% of particles passing a #100 sieve) which is not contaminated with clay, silt or organic material. We refer you to ACI 302.1-96 for additional details regarding the requirements for the base material.

In cases where potential static water levels or significant perched water sources appear near or above the floor slab, an underfloor drainage system may be needed wherein a draintile system is placed within a thicker clean sand or gravel layer. Such a system should be properly engineered depending on subgrade soil types and rate/head of water inflow.

VAPOR MEMBRANE

The need for a vapor membrane depends on whether the floor slab will have a vapor sensitive covering, will have vapor sensitive items stored on the slab, or if the space above the slab will be a humidity controlled area. If the project does not have this vapor sensitivity or moisture control need, placement of a vapor membrane may not be necessary. Your decision will then relate to whether to use the ACI base material or a conventional sand cushion layer. However, if any of the above sensitivity issues apply, placement of a vapor membrane is recommended. Some floor covering systems (adhesives and flooring materials) require a vapor membrane to maintain a specified maximum slab moisture content as a condition of their warranty.

VAPOR MEMBRANE/GRANULAR LAYER PLACEMENT

A number of issues should be considered when deciding whether to place the vapor membrane above or below the granular layer. The benefits of placing the slab on a granular layer, with the vapor membrane placed **below** the granular layer, include **reduction** of the following:

- Slab curling during the curing and drying process.
- Time of bleeding, which allows for quicker finishing.
- Vapor membrane puncturing.
- Surface blistering or delamination caused by an extended bleeding period.
- Cracking caused by plastic or drying shrinkage.

The benefits of placing the vapor membrane **over** the granular layer include the following:

- The moisture emission rate is achieved faster.
- Eliminates a potential water reservoir within the granular layer above the membrane.
- Provides a "slip surface", thereby reducing slab restraint and the associated random cracking.

If a membrane is to be used in conjunction with a granular layer, the approach recommended depends on slab usage and the construction schedule. The vapor membrane should be placed above the granular layer when:

- Vapor sensitive floor covering systems are used or vapor sensitive items will be directly placed on the slab.
- The area will be humidity controlled, but the slab will be placed before the building is enclosed and sealed from rain.
- Required by a floor covering manufacturer's system warranty.

The vapor membrane should be placed below the granular layer when:

- Used in humidity controlled areas (without vapor sensitive coverings/stored items), with the roof membrane in place, and the building enclosed to the point where precipitation will not intrude into the slab area. Consideration should be given to slight sloping of the membrane to edges where draintile or other disposal methods can alleviate potential water sources, such as pipe or roof leaks, foundation wall damp proofing failure, fire sprinkler system activation, etc.

There may be cases where membrane placement may have a detrimental effect on the subgrade support system (e.g., expansive soils). In these cases, your decision will need to weigh the cost of subgrade options and the performance risks.

FREEZING WEATHER EFFECTS ON BUILDING CONSTRUCTION

GENERAL

Because water expands upon freezing and soils contain water, soils which are allowed to freeze will heave and lose density. Upon thawing, these soils will not regain their original strength and density. The extent of heave and density/ strength loss depends on the soil type and moisture condition. Heave is greater in soils with higher percentages of fines (silts/clays). High silt content soils are most susceptible, due to their high capillary rise potential which can create ice lenses. Fine grained soils generally heave about 1/4" to 3/8" for each foot of frost penetration. This can translate to 1" to 2" of total frost heave. This total amount can be significantly greater if ice lensing occurs.

DESIGN CONSIDERATIONS

Clayey and silty soils can be used as perimeter backfill, although the effect of their poor drainage and frost properties should be considered. Basement areas will have special drainage and lateral load requirements which are not discussed here. Frost heave may be critical in doorway areas. Stoops or sidewalks adjacent to doorways could be designed as structural slabs supported on frost footings with void spaces below. With this design, movements may then occur between the structural slab and the adjacent on-grade slabs. Non-frost susceptible sands (with less than 12% passing a #200 sieve) can be used below such areas. Depending on the function of surrounding areas, the sand layer may need a thickness transition away from the area where movement is critical. With sand placement over slower draining soils, subsurface drainage would be needed for the sand layer. High density extruded insulation could be used within the sand to reduce frost penetration, thereby reducing the sand thickness needed. We caution that insulation placed near the surface can increase the potential for ice glazing of the surface.

The possible effects of adfreezing should be considered if clayey or silty soils are used as backfill. Adfreezing occurs when backfill adheres to rough surfaced foundation walls and lifts the wall as it freezes and heaves. This occurrence is most common with masonry block walls, unheated or poorly heated building situations and clay backfill. The potential is also increased where backfill soils are poorly compacted and become saturated. The risk of adfreezing can be decreased by placing a low friction separating layer between the wall and backfill.

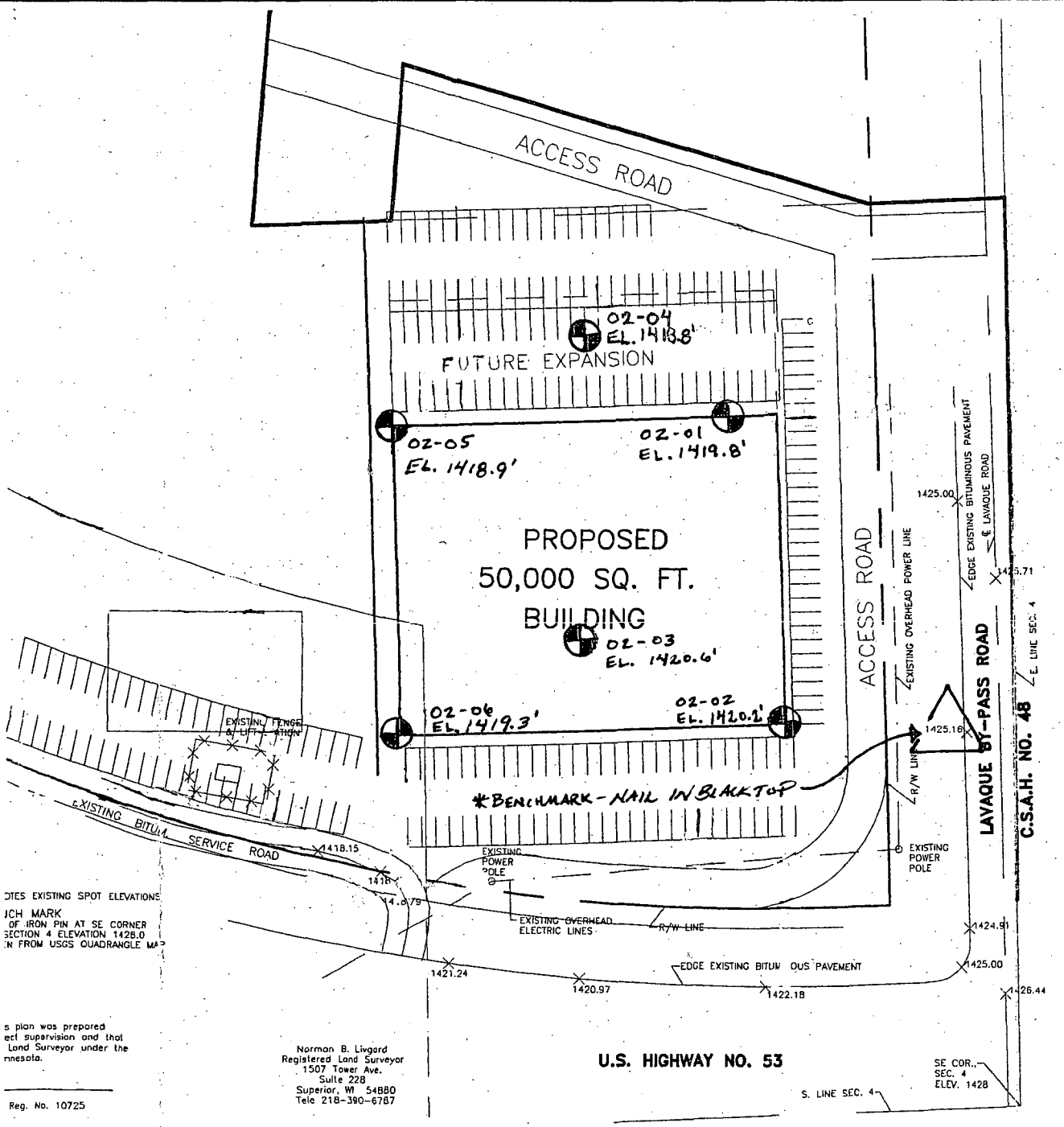
Adfreezing can occur on exterior piers (such as deck, fence or other similar pier footings), even if a smooth surface is provided. This is more likely in poor drainage situations where soils become saturated. Additional footing embedment and/or widened footings below the frost zones (which includes tensile reinforcement) can be used to resist uplift forces. Specific designs would require individual analysis.

CONSTRUCTION CONSIDERATIONS

Foundations, slabs and other improvements which may be affected by frost movements should be insulated from frost penetration during freezing weather. If filling takes place during freezing weather, all frozen soils, snow and ice should be stripped from areas to be filled prior to new fill placement. The new fill should not be allowed to freeze during transit, placement or compaction. This should be considered in the project scheduling, budgeting and quantity estimating. It is usually beneficial to perform cold weather earthwork operations in small areas where grade can be attained quickly rather than working larger areas where a greater amount of frost stripping may be needed. If slab subgrade areas freeze, we recommend the subgrade be thawed prior to floor slab placement. The frost action may also require reworking and recompaction of the thawed subgrade.

Appendix A

Boring Location Sketch
Logs of Test Borings
Results of Sieve Analysis Tests
Boring Log Notes
Classification of Soils for Engineering Purposes
General Terminology Notes
Geologic Terminology
Exploration/Classification Methods



EXPLANATION

02-01 = *Boring Location and Number*
EL. 1419.8' = *Boring Elevation*

△ Benchmark - *Survey point on Lavaque By-Pass, Nail in Blacktop. El. 1425.16'*

*Scale: 1"=100'

N

REFERENCE: Sketch derived from plans obtained from Bill Wilson (property owner).

AMERICAN ENGINEERING TESTING, INC.
DULUTH, MINNESOTA

FIGURE 1

BORING LOCATIONS

SCHNEIDERMAN'S BUILDING

UGSTAD ROAD AND HIGHWAY 53
HERMANTOWN, MINNESOTA

ALTERED BY: ZAE	CHECKED BY:
DATE: 11/19/02	AET JOB #: 07-01807

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **07-01807** LOG OF BORING NO. **02-01 (p. 1 of 1)**

PROJECT: **Proposed Schneiderman's Building, Highway 53 & Ugstad Road; Hermantown, MN**

DEPTH IN FEET	SURFACE ELEVATION: 1419.8 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	PID (ppm)
1	Fill, Silty Sand with Gravel, brown, moist	FILL		M	AS						
2	Peat, sapric, black, firm (PT)	SWAMP DEPOSIT	8	M	SS	12	32				
5	Silty Sand with Gravel, brown, moist, medium dense (SM)	TILL	12	M	SS	14					
8			25	M	SS	6					
10	Sand with Silt, fine to medium grained, brown, waterbearing, medium dense (SP-SM)	COARSE ALLUVIUM	14	WB	SS	10					
12	Sandy Silt with Gravel, brown, lenses of waterbearing sand, dense to very dense (ML)	TILL	36	WB	SS	12					
15			50/.4	WB	SS	8					
20			50/.4	WB	SS	0					
24			64	WB	SS	12					
25	End of Boring @ 25.0 feet Borehole backfilled with auger cuttings.										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
0-23½' 2.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
	10/22/02		11.0'	9.5'	11.0'	---	9.0'
	10/22/02	10:55 AM	25.0'	23.5'	25.0'	---	20.0'
BORING COMPLETED: 10/22/02	10/22/02	11:05 AM	25.0'	None	10.0'	---	9.0'
CC: LA CA: RJ Rig: 5							

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **07-01807** LOG OF BORING NO. **02-02 (p. 1 of 1)**

PROJECT: **Proposed Schneiderman's Building, Highway 53 & Ugstad Road; Hermantown, MN**

DEPTH IN FEET	SURFACE ELEVATION: 1420.2 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	PID (ppm)
1	Fill, Silty Sand with Gravel, brown, moist	FILL		M	AS						
2	Organic Silt, wood at 4.5 feet, black, moist, very soft to wet (OL)	SWAMP DEPOSIT									
3			2	M	SS	6					
4											
5			50/.4	M	SS	4	50				
6											
7											
8			3	M	SS	0					
9											
10			3	M	SS	12	120				
11											
12											
13	Silty Sand, fine grained, brown, wet to moist, medium dense (SM)		18	W	SS	12					
14											
15		TILL	17	M	SS	12	13				
16											
17											
18											
19	Sand with Silt, fine to medium grained, brown, waterbearing, dense (SP-SM)										
20		COARSE ALLUVIUM	40	WB	SS	3					
21											
22											
23	Sandy Silt with Gravel, brown, moist, dense (ML)	TILL									
24			33	M	SS	12					
25	End of Boring @ 25.0 feet Borehole backfilled with auger cuttings.										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-23½' 2.25" HSA	**10/22/02**	**1:15 PM**	**21.0'**	**19.5'**	**21.0'**	**---**	**17.0'**
	10/22/02	**1:35 PM**	**25.0'**	**23.5'**	**25.0'**	**---**	**17.0'**
BORING COMPLETED: **10/22/02**	**10/22/02**	**1:45 PM**	**25.0'**	**None**	**7.5'**	**---**	**7.0'**
CC: **LA** CA: **RJ** Rig: **5**							

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **07-01807** LOG OF BORING NO. **02-03 (p. 1 of 1)**

PROJECT: **Proposed Schneiderman's Building, Highway 53 & Ugstad Road; Hermantown, MN**

SURFACE ELEVATION: **1420.6**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	PID (ppm)
1	Fill, Silty Sand with Gravel, brown, moist			M	AS						-
3		FILL	15	M	SS	14					0.7
5			6	M	SS	12	48				1.0
6	Organic Silt, lenses of peat, moist, firm (OL)	SWAMP DEPOSIT									
8			7	M	SS	12	16				0.7
9	Silty Sand, a little gravel, brown, moist, medium dense (SM)	TILL									
10			23	M	SS	6					0.6
12	Sand with Silt, fine to medium grained, brown, waterbearing, medium dense (SP-SM)	COARSE ALLUVIUM	29	WB	SS	12					0.7
15	Sandy Silt, a little gravel, brown, wet, medium dense (ML)	TILL	27	W	SS	16					0.7
19	Sand with Silt, medium grained, brown, waterbearing, medium dense to dense (SP-SM)										
20			26	WB	SS	16					0.7
21		COARSE ALLUVIUM									
24			36	WB	SS	16					0.7
25	End of Boring @ 25.0 feet Borehole backfilled with auger cuttings.										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-23½' 2.25" HSA	**10/22/02**		**13.5'**	**12.0'**	**13.5**	**---**	**12.0'**
	10/22/02	**3:35 PM**	**25.0'**	**23.5'**	**23.5'**	**---**	**18.0'**
BORING COMPLETED: **10/23/02**	**10/22/02**	**3:45 PM**	**25.0'**	**None**	**7.5'**	**---**	**7.0'**
CC: **LA** CA: **RJ** Rig: **5**							

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **07-01807** LOG OF BORING NO. **02-04 (p. 1 of 1)**

PROJECT: **Proposed Schneiderman's Building, Highway 53 & Ugstad Road; Hermantown, MN**

DEPTH IN FEET	SURFACE ELEVATION: 1418.8 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	PID (ppm)
1	Fill, Sand with Silt and Gravel, brown, moist	FILL		M	AS		7				-
2											
3			21	M	SS	12					0.7
4	Clayey Silt, trace of organics, brown, moist, soft (CL-ML)	FINE ALLUVIUM									
5			4	M	SS	5	21				0.5
6											
7	Silty Sand with Gravel, apparent cobbles, brown, moist, medium dense to very dense (SM)										
8			24	M	SS	10					0.6
9											
10			42	M	SS	12					0.6
11											
12											
13			92/.9	M	SS	0					-
14		TILL									
15	Sandy Silt, a little gravel, brown, moist to wet, very dense to dense (ML)		89	M	SS	10					0.7
16											
17											
18											
19											
20			33	W	SS	16					0.5
21											
22	Sand with Silt, fine to medium grained, a little gravel, brown, waterbearing, medium dense (SP-SM)										
23											
24		COARSE ALLUVIUM	15	WB	SS	18					0.5
25	End of Boring @ 25.0 feet Borehole backfilled with auger cuttings.										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-23½' 2.25" HSA	**10/23/02**	**1:50 PM**	**25.0'**	**23.5'**	**25.0'**	**---**	**21.0'**
	10/23/02	**2:00 PM**	**25.0'**	**None**	**19.0'**	**---**	**None**
BORING COMPLETED: **10/23/02**							
CC: **LA** CA: **RJ** Rig: **5**							

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **07-01807** LOG OF BORING NO. **02-05 (p. 1 of 1)**

PROJECT: **Proposed Schneiderman's Building, Highway 53 & Ugstad Road; Hermantown, MN**

DEPTH IN FEET	SURFACE ELEVATION: 1418.9 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	PID (ppm)
1	Fill, Silty Sand with Gravel, brown, moist	FILL		M	AS						-
3			39	M	SS	12					0.5
5			44	M	SS	14	8				0.5
7	Silty Sand, trace of organics, brown, moist, medium dense (SM)		20	M	SS	14					1.1
9	Silty Sand with Gravel, apparent cobbles, brown, moist, medium dense (SM)	TILL	20	M	SS	12					-
11	Auger Refusal @ 11.7 feet Borehole backfilled with auger cuttings.										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-11.7'	2.25" HSA	10/23/02	11:35 AM	11.0'	11.7'	11.7'	---	None	
		10/23/02	11:45 PM	11.0'	None	10.0'	---	None	
BORING COMPLETED:	10/23/02								
CC: LA	CA: RJ Rig: 5								

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

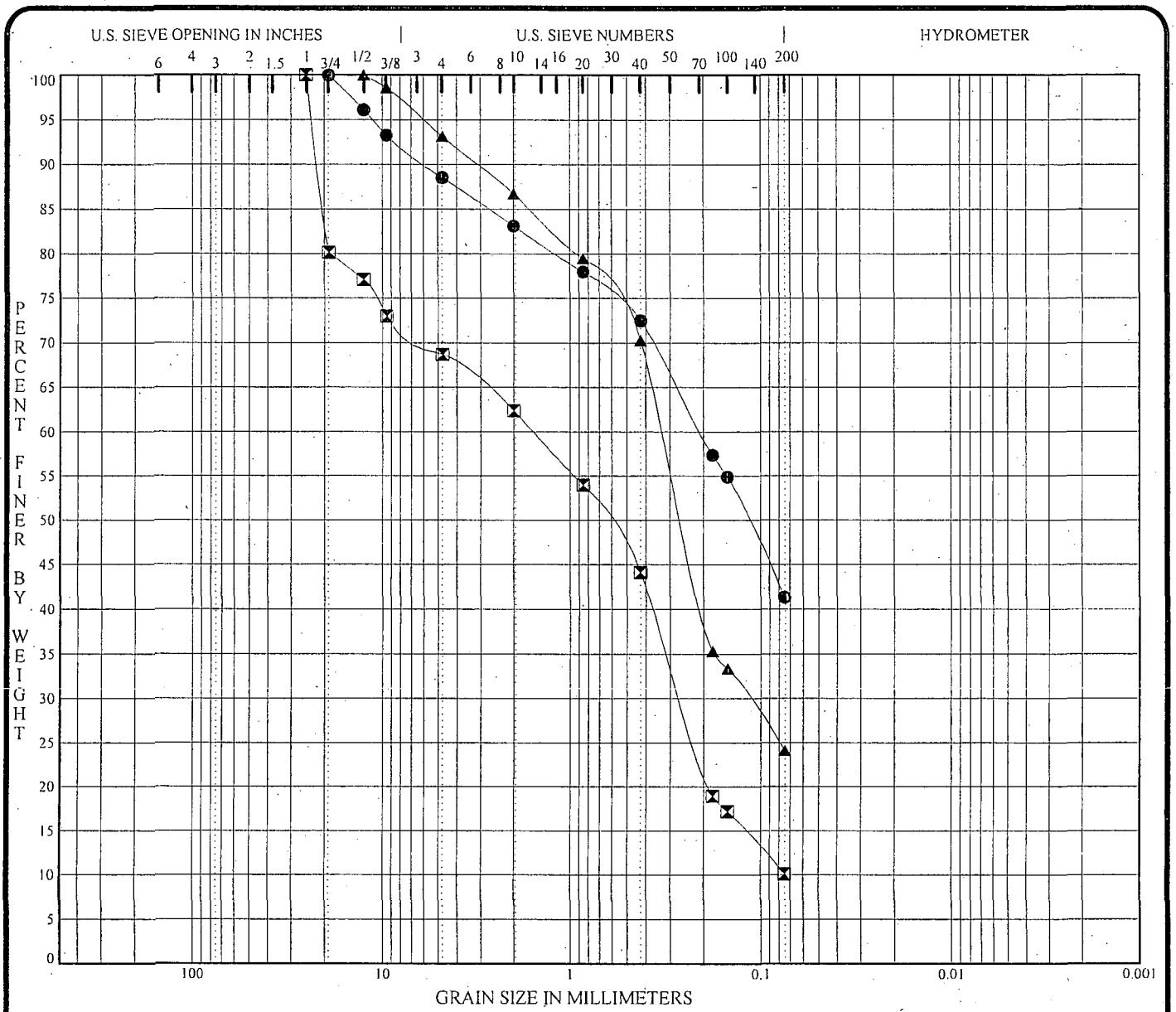
AET JOB NO: **07-01807** LOG OF BORING NO. **02-06 (p. 1 of 1)**

PROJECT: **Proposed Schneiderman's Building, Highway 53 & Ugstad Road; Hermantown, MN**

DEPTH IN FEET	SURFACE ELEVATION: 1419.3 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	PID (ppm)
1	Fill, Silty Sand with Gravel, brown, moist			M	AS						-
3		FILL	35	M	SS	16					0.6
5			8	M	SS	12					0.8
6	Peat, sapric, black, moist, firm (PT)										
8		SWAMP DEPOSIT	7	M	SS	5					0.7
9	Clayey Silt, trace of organics, dark brown, moist (ML-CL)	FINE ALLUVIUM									
10	Sitly Sand with Gravel, fine grained, brown, moist, medium dense (SM)		16	M	SS	16					0.6
13			22	M	SS	10					0.5
15			29	M	SS	12					0.6
17		TILL									
19	Sandy Silt, brown, lenses of waterbearing sand, dense to medium dense (ML)										
20			46	WB	SS	8					0.5
24			23	WB	SS	16					0.4
25	End of Boring @ 25.0 feet Borehole backfilled with auger cuttings.										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-23½' 2.25" HSA	**10/23/02**	**9:50 AM**	**25.0'**	**23.5'**	**25.0'**	**---**	**20.5'**
	10/23/02	**10:00 AM**	**25.0'**	**None**	**20.0'**	**---**	**None**
BORING COMPLETED: **10/23/02**							
CC: **LA** CA: **RJ** Rig: **5**							

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	02-02	14.5	Silty Sand (SM)	13					
⧓	02-04	0.0	Sand with Silt and Gravel (SP-SM)	7				0.59	21.2
▲	02-05	4.5	Silty Sand (SM)	8					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	02-02	14.5	19.00	0.21			11.5	47.2	41.4	
⧓	02-04	0.0	25.00	1.57	0.262		31.3	58.6	10.1	
▲	02-05	4.5	12.50	0.33	0.117		6.9	69.0	24.1	

PROJECT **Highway 53 & Ugstad Road; Hermantown, Minnesota**

JOB NO. **07-01807**

DATE **10/23/02**

AMERICAN ENGINEERING TESTING, INC.

GRADATION CURVES

BORING LOG NOTES

DRILLING AND SAMPLING SYMBOLS

Symbol	Definition
AC:	At completion of boring
B,H,N:	Size of flush-joint casing
BX:	BX double tube core barrel
CA:	Crew Assistant (initials)
CAS:	Pipe casing, number indicates nominal diameter in inches
CC:	Crew Chief (initials)
COT:	Clean-out tube
DC:	Drive casing; number indicates diameter in inches
DM:	Drilling mud or bentonite slurry
DR:	Driller (initials)
DS:	Disturbed sample from auger flights
FA:	Flight auger; number indicates outside diameter in inches
HA:	Hand auger; number indicates outside diameter
HSA:	Hollow stem auger; number indicates inside diameter in inches
LG:	Field logger (initials)
MC:	Column used to describe moisture condition of samples and for the ground water level symbols
N (BPF):	Standard penetration resistance (N-value) in blows per foot (see notes)
NQ:	NQ wireline core barrel
PQ:	PQ wireline core barrel
RD:	Rotary drilling with fluid and roller or drag bit
REC:	In split-spoon (see notes) and thin-walled tube sampling, the recovered length (in inches) of sample. In rock coring, the length of core recovered (expressed as percent of the total core run). Zero indicates no sample recovered.
REV:	Revert drilling fluid
SS:	Standard split-spoon sampler (steel; 1⅜" is inside diameter; 2" outside diameter); unless indicated otherwise
TW:	Thin-walled tube; number indicates inside diameter in inches
WASH:	Sample of material obtained by screening returning rotary drilling fluid or by which has collected inside the borehole after "falling" through drilling fluid
WH:	Sampler advanced by static weight of drill rod and 140-pound hammer
WR:	Sampler advanced by static weight of drill rod
94mm:	94 millimeter wireline core barrel
▼:	Water level directly measured in boring

TEST SYMBOLS

Symbol	Definition
▽:	Estimated water level based solely on sample appearance
CONS:	One-dimensional consolidation test
DEN:	Dry density, pcf
DST:	Direct shear test
E:	Pressuremeter Modulus, tsf
HYD:	Hydrometer analysis
LL:	Liquid Limit, %
LP:	Pressuremeter Limit Pressure, tsf
OC:	Organic Content, %
PERM:	Coefficient of permeability (K) test; F - Field; L - Laboratory
PL:	Plastic Limit, %
q_p:	Pocket Penetrometer strength, tsf (approximate)
q_c:	Static cone bearing pressure, tsf
q_u:	Unconfined compressive strength, psf
R:	Electrical Resistivity, ohm-cms
RQD:	Rock Quality Designator in percent (aggregate length of core pieces 4" or more in length as a percent of total core run)
SA:	Sieve analysis
TRX:	Triaxial compression test
VSR:	Vane shear strength, remoulded (field), psf
VSU:	Vane shear strength, undisturbed (field), psf
WC:	Water content, as percent of dry weight
%-200:	Percent of material finer than #200 sieve

STANDARD PENETRATION TEST NOTES

The standard penetration test consists of driving the sampler with a 140-pound hammer and counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), permitted in ASTM:D1586, the blows for each complete 6" increment and for each partial increment is on the boring log. For partial increments, the number of blows is shown to the nearest inch below the slash.

The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM:D1586 is encountered) whereas the length of sample recovered is for the entire sampler drive (which may even extend more than 18").

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES
ASTM Designation: D 2487
(Based on Unified Soil Classification System)

AMERICAN ENGINEERING TESTING, INC.

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay[K,L,M,N] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay[K,L,M,P] Organic silt[K,L,M,O]
Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥30% plus no. 200, predominantly sand, add "sandy" to to group name.

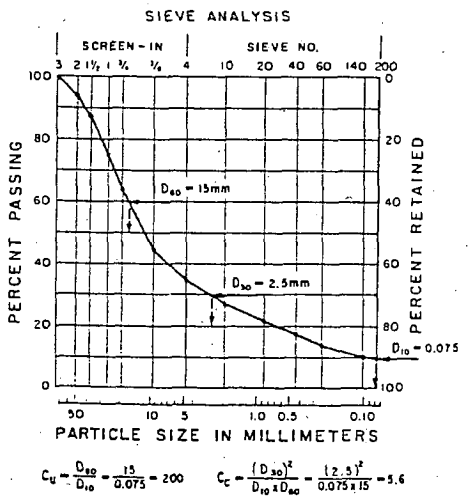
[M] If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.

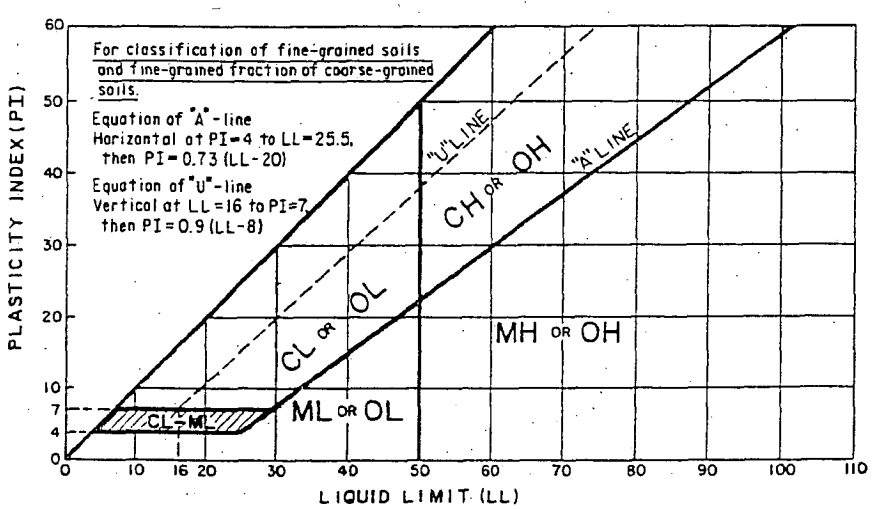
[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.





GENERAL TERMINOLOGY NOTES FOR SOIL IDENTIFICATION AND DESCRIPTION

GRAIN SIZE

Term	Particle Size
Boulders	Over 12"
Cobbles	3" to 12"
Gravel	#4 sieve to 3"
Sand	#200 to #4 sieve
Fines (silt & clay)	Pass #200 sieve

GRAVEL PERCENTAGES

Term	Percent
A Little Gravel	3%-15%
With Gravel	15%-30%
Gravelly	30%-50%

CONSISTENCY OF PLASTIC SOILS

Term	N-Value, BPF
Very Soft	less than 2
Soft	2-4
Firm (Medium)	5-8
Stiff	9-15
Very Stiff	16-30
Hard	Greater than 30

RELATIVE DENSITY OF NON-PLASTIC SOILS

Term	N-Value, BPF
Very Loose	0-4
Loose	5-10
Medium Dense	11-30
Dense	31-50
Very Dense	Greater than 50

MOISTURE/FROST CONDITION (MC Column)

D (Dry): Absence of moisture, dusty, dry to touch.

M (Moist): Damp, although free water not visible. Soil may still have a high water content (over "optimum").

W (Wet/ Waterbearing): Free water visible. Intended to describe non-plastic soils. Waterbearing usually relates to sands and sands with silt.

F (Frozen): Soil frozen.

LAYERING NOTES

Laminations: Layers less than ½" thick of differing material or color.

Lenses: Pockets or layers greater than ½" thick of differing material or color.

FIBER CONTENT OF PEAT

Term	Fiber Content (Visual Estimate)
Fibric:	Greater than 67%
Hemic:	33-67%
Sapric:	Less than 33%

ORGANIC DESCRIPTION

Non-peat soils are described as organic, if soil is judged to have sufficient organic content to influence the soil properties.

GEOLOGIC TERMINOLOGY

The geologic description indicates the apparent depositional origin or stratigraphic name. Geologic identification in interpretive. Judgment is sometimes limited due to small or disturbed samples.

General categories of geologic deposits, and descriptive information is as follows:

ALLUVIUM	**COARSE:**	Sandy (and gravelly). Stratified. Deposited from fast moving waters in streams and rivers. (Includes glacial outwash.)
	FINE:	Clayey and/or silty. Stratified. Deposited from slow moving waters in streams, rivers, lakes and ponds.
	MIXED:	Combination of Fine and Coarse Alluvium.
BEDROCK:	Wide range of characteristics: from hard, dense, consolidated rock; to soft, compressible, and unconsolidated soil-like material.	
FILL	**CONTROLLED:**	Compact, uniform material; inorganic; no debris.
	UNCONTROLLED:	Loose or variable density. Mixture of soil types. Often contains debris and organic material.
TILL:	Normally contains a wide range of grain sizes, from boulders through clay. Usually non-stratified. Deposited directly from glaciers.	
LOESS:	Silty. Non-stratified. Upper layer. Deposited from wind.	
SLOPE WASH:	Organic and/or inorganic material washed from slopes and redeposited.	
SWAMP DEPOSITS:	Peat, muck and marl, and organic soil. Formed through accumulation of organic material under water.	
TOPSOIL:	Contains both inorganic and organic material. Upper, black layer of soil. Formed by weathering of inorganic soil and accumulation of organic material.	
TUMBLEROCK OR COLLUVIUM:	Dominantly gravel, boulders and rock slabs. Deposited from gravity flow down hills or cliffs.	
WEATHERED BEDROCK:	Bedrock which has been substantially weathered through disintegration or decomposition. Texture and composition grades into bedrock.	
WEATHERED SOIL:	Texture, composition, and position is intermediate between topsoil and non-weathered soil.	

EXPLORATION/CLASSIFICATION METHODS

SAMPLING METHODS

Split-Spoon Samples (SS)

Standard penetration (split-spoon) samples were collected in general accordance with ASTM:D1586. This method consists of driving a 2" O.D. split barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30". The sampler is driven a total of 18" into the soil. After an initial set of 6", the number of hammer blows to drive the sampler the final 12" is known as the standard penetration resistance or N-value.

Disturbed Samples (DS)

Sample types described as "DS" on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

CLASSIFICATION METHODS

Soil classifications shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM:D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM:D2487 are possible. Otherwise, soil classifications shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

WATER LEVEL MEASUREMENTS

The ground water level measurements are shown at the bottom of the boring logs. The following information appears under "Water Level Measurements" on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.

Appendix B

Chemical Analysis
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- Preliminary Analytical Report -

Project Name SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-03 12-13.5
Lab Sample Number 827634-001
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/22/2002
Matrix Type : SOIL

Inorganic Results

Test	Result	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method
Solids, percent	92.0		%		10/25/2002	SM 2540G M	SM 2540G M

Organic Results

Preservation Date :

DIESEL RANGE ORGANICS - SOIL **Prep Method:** Wi MOD DRO **Prep Date:** 10/28/200 **Analyst:** KEG

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
DIESEL RANGE ORGANICS	< 3.3	3.3	mg/kg		10/28/2002	Wi MOD DRO
Blank spike	85	---	%Recov		10/28/2002	Wi MOD DRO
Blank spike duplicate	88	---	%Recov		10/28/2002	Wi MOD DRO
Blank	< 5.0	5.0	mg/kg		10/28/2002	Wi MOD DRO

All soil results are reported on a dry weight basis unless otherwise i

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- Preliminary Analytical Report -

Project Name SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-04 23.5-25
Lab Sample Number 827634-002
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Inorganic Results

Test	Result	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method
Solids, percent	85.6		%		10/25/2002	SM 2540G M	SM 2540G M

Organic Results

Preservation Date :

DIESEL RANGE ORGANICS - SOIL **Prep Method:** Wi MOD DRO **Prep Date:** 10/28/200 **Analyst:** KEG

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
DIESEL RANGE ORGANICS	< 4.2	4.2	mg/kg		10/28/2002	Wi MOD DRO
Blank spike	85	---	%Recov		10/28/2002	Wi MOD DRO
Blank spike duplicate	88	---	%Recov		10/28/2002	Wi MOD DRO
Blank	< 5.0	5.0	mg/kg		10/28/2002	Wi MOD DRO

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-04 4.5-6
Lab Sample Number 827634-003
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Inorganic Results

Test	Result	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method
Arsenic			mg/kg			SW846 3050	SW846 6020
Barium			mg/kg			SW846 3050	SW846 6020
Cadmium			mg/kg			SW846 3050	SW846 6020
Chromium			mg/kg			SW846 3050	SW846 6020
Lead			mg/kg			SW846 3050	SW846 6020
Mercury	0.013	0.012	mg/Kg		11/4/2002	SW846 7471	SW846 7471
Selenium			mg/kg			SW846 3050	SW846 6020
Silver			mg/kg			SW846 3050	SW846 6020
Solids, percent	84.0		%		10/25/2002	SM 2540G M	SM 2540G M

Organic Results

Preservation Date :

DIESEL RANGE ORGANICS - SOIL **Prep Method:** Wi MOD DRO **Prep Date:** 10/28/200 **Analyst:** KEG

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
DIESEL RANGE ORGANICS	< 4.1	4.1	mg/kg		10/28/2002	Wi MOD DRO
Blank spike	85	---	%Recov		10/28/2002	Wi MOD DRO
Blank spike duplicate	88	---	%Recov		10/28/2002	Wi MOD DRO
Blank	< 5.0	5.0	mg/kg		10/28/2002	Wi MOD DRO

Organic Results

Preservation Date :

MDH 466 VOLATILES - SOIL/METHANOL **Prep Method:** 5030B/5035 **Prep Date:** 10/29/200 **Analyst:** TLT

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
Acetone	< 300	300	ug/kg		10/29/2002	SW846 8260B
Allyl Chloride	< 30	30	ug/kg		10/29/2002	SW846 8260B
Benzene	< 30	30	ug/kg		10/29/2002	SW846 8260B
Bromochloromethane	< 30	30	ug/kg		10/29/2002	SW846 8260B
Bromodichloromethane	< 30	30	ug/kg		10/29/2002	SW846 8260B
Bromoform	< 30	30	ug/kg		10/29/2002	SW846 8260B

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-04 4.5-6
Lab Sample Number 827634-003
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Bromobenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B
Bromomethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
2-Butanone	< 300	300	ug/kg	10/29/2002	SW846 8260B
s-Butylbenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B
t-Butylbenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B
n-Butylbenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B
Carbon tetrachloride	< 30	30	ug/kg	10/29/2002	SW846 8260B
Chloroform	< 30	30	ug/kg	10/29/2002	SW846 8260B
Chlorobenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B
Chlorodibromomethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
Chloroethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
Chloromethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
2-Chlorotoluene	< 30	30	ug/kg	10/29/2002	SW846 8260B
4-Chlorotoluene	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,2-Dibromo-3-chloropropane	< 60	60	ug/kg	10/29/2002	SW846 8260B
1,2-Dibromoethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
Dibromomethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,3-Dichlorobenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,4-Dichlorobenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,2-Dichloroethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,2-Dichlorobenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,1-Dichloroethene	< 30	30	ug/kg	10/29/2002	SW846 8260B
cis-1,2-Dichloroethene	< 30	30	ug/kg	10/29/2002	SW846 8260B
Dichlorodifluoromethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
trans-1,2-Dichloroethene	< 30	30	ug/kg	10/29/2002	SW846 8260B
Dichlorofluoromethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,2-Dichloropropane	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,1-Dichloroethane	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,3-Dichloropropane	< 30	30	ug/kg	10/29/2002	SW846 8260B
2,2-Dichloropropane	< 30	30	ug/kg	10/29/2002	SW846 8260B
1,1-Dichloropropene	< 30	30	ug/kg	10/29/2002	SW846 8260B
cis-1,3-Dichloropropene	< 30	30	ug/kg	10/29/2002	SW846 8260B
trans-1,3-Dichloropropene	< 30	30	ug/kg	10/29/2002	SW846 8260B
Ethylbenzene	< 30	30	ug/kg	10/29/2002	SW846 8260B

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- Preliminary Analytical Report -

Project Name: SCHNEIDERMAN
Project Number: 07-01807
Client: AMERICAN ENG TESTING INC
Field ID: 02-04 4.5-6
Report Date: 11/15/2002
Lab Sample Number: 827634-003
Collection Date: 10/23/2002
MN LAB ID: 055-999-334
Matrix Type: SOIL

Diethyl ether	< 30	30	ug/kg		10/29/2002	SW846 8260B
Fluorotrichloromethane	< 30	30	ug/kg		10/29/2002	SW846 8260B
Hexachlorobutadiene	< 30	30	ug/kg		10/29/2002	SW846 8260B
Isopropylbenzene	< 30	30	ug/kg		10/29/2002	SW846 8260B
p-Isopropyltoluene	< 30	30	ug/kg		10/29/2002	SW846 8260B
Methylene chloride	< 30	30	ug/kg		10/29/2002	SW846 8260B
4-Methyl-2-pentanone	< 300	300	ug/kg		10/29/2002	SW846 8260B
Methyl-tert-butyl-ether	< 30	30	ug/kg		10/29/2002	SW846 8260B
Naphthalene	< 30	30	ug/kg		10/29/2002	SW846 8260B
n-Propylbenzene	< 30	30	ug/kg		10/29/2002	SW846 8260B
Styrene	< 30	30	ug/kg	&	10/29/2002	SW846 8260B
1,1,2,2-Tetrachloroethane	< 30	30	ug/kg		10/29/2002	SW846 8260B
1,1,1,2-Tetrachloroethane	< 30	30	ug/kg		10/29/2002	SW846 8260B
Tetrachloroethene	< 30	30	ug/kg		10/29/2002	SW846 8260B
Toluene	< 30	30	ug/kg		10/29/2002	SW846 8260B
1,2,3-Trichlorobenzene	< 30	30	ug/kg		10/29/2002	SW846 8260B
1,2,4-Trichlorobenzene	< 30	30	ug/kg		10/29/2002	SW846 8260B
1,1,1-Trichloroethane	< 30	30	ug/kg		10/29/2002	SW846 8260B
1,1,2-Trichloroethane	< 30	30	ug/kg		10/29/2002	SW846 8260B
1,1,2-Trichlorotrifluoroethane	< 30	30	ug/kg		10/29/2002	SW846 8260B
1,2,4-Trimethylbenzene	< 30	30	ug/kg		10/29/2002	SW846 8260B
Trichloroethene	< 30	30	ug/kg		10/29/2002	SW846 8260B
1,2,3-Trichloropropane	< 30	30	ug/kg		10/29/2002	SW846 8260B
Tetrahydrofuran	< 300	300	ug/kg		10/29/2002	SW846 8260B
1,3,5-Trimethylbenzene	< 30	30	ug/kg		10/29/2002	SW846 8260B
Vinyl chloride	< 30	30	ug/kg		10/29/2002	SW846 8260B
Xylenes, -m, -p	< 30	30	ug/kg		10/29/2002	SW846 8260B
Xylene, -o	< 30	30	ug/kg		10/29/2002	SW846 8260B
4-Bromofluorobenzene	101	---	%Recov		10/29/2002	SW846 8260B
Dibromofluoromethane	108	---	%Recov		10/29/2002	SW846 8260B
Toluene-d8	99	---	%Recov		10/29/2002	SW846 8260B

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- Preliminary Analytical Report -

Project Name SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-04 4.5-6
Lab Sample Number 827634-003
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Organic Results

Preservation Date :

PAH/PNA - SEMIVOLATILES **Prep Method:** SW846 3545 **Prep Date:** 10/27/200 **Analyst:** ARO

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
Acenaphthene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Acenaphthylene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Anthracene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Benzo(a)anthracene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Benzo(a)pyrene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Benzo(b)fluoranthene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Benzo(g,h,i)perylene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Benzo(k)fluoranthene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Chrysene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Dibenzo(a,h)anthracene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Fluoranthene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Fluorene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Indeno(1,2,3-cd)pyrene	< 30	30	ug/kg		10/30/2002	SW846 8270C
1-Methylnaphthalene	< 30	30	ug/kg		10/30/2002	SW846 8270C
2-Methylnaphthalene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Naphthalene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Phenanthrene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Pyrene	< 30	30	ug/kg		10/30/2002	SW846 8270C
Nitrobenzene-d5	61	---	%Recov		10/30/2002	SW846 8270C
2-Fluorobiphenyl	68	---	%Recov		10/30/2002	SW846 8270C
Terphenyl-d14	72	---	%Recov		10/30/2002	SW846 8270C

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- Preliminary Analytical Report -

Project Name :	SCHNEIDERMAN		
Project Number	07-01807	**Client :**	AMERICAN ENG TESTING INC
Field ID :	02-04 4.5-6	**Report Date :**	11/15/2002
Lab Sample Number	827634-003	**Collection Date :**	10/23/2002
MN LAB ID :	055-999-334	**Matrix Type :**	SOIL

Organic Results

Preservation Date :

PAH/PNA-BLANK **Prep Method:** SW846 3445 **Prep Date:** 10/27/200 **Analyst:** ARO

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
PAH-Blank	1089-27				10/29/2002	SW846 8270C

Organic Results

Preservation Date :

VOC-BLK **Prep Method:** **Prep Date:** **Analyst:**

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
VOC-BLK	1088-83					

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-05 7-8.5
Lab Sample Number 827634-004
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Inorganic Results

Test	Result	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method
Arsenic			mg/kg			SW846 3050	SW846 6020
Barium			mg/kg			SW846 3050	SW846 6020
Cadmium			mg/kg			SW846 3050	SW846 6020
Chromium			mg/kg			SW846 3050	SW846 6020
Lead			mg/kg			SW846 3050	SW846 6020
Mercury	< 0.011	0.011	mg/Kg		11/4/2002	SW846 7471	SW846 7471
Selenium			mg/kg			SW846 3050	SW846 6020
Silver			mg/kg			SW846 3050	SW846 6020
Solids, percent	88.2		%		10/25/2002	SM 2540G M	SM 2540G M

Organic Results

Preservation Date :

DIESEL RANGE ORGANICS - SOIL **Prep Method:** Wi MOD DRO **Prep Date:** 10/28/200 **Analyst:** KEG

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
DIESEL RANGE ORGANICS	16	3.9	mg/kg		10/28/2002	Wi MOD DRO
Blank spike	85	---	%Recov		10/28/2002	Wi MOD DRO
Blank spike duplicate	88	---	%Recov		10/28/2002	Wi MOD DRO
Blank	< 5.0	5.0	mg/kg		10/28/2002	Wi MOD DRO

Organic Results

Preservation Date :

MDH 466 VOLATILES - SOIL/METHANOL **Prep Method:** 5030B/5035 **Prep Date:** 10/29/200 **Analyst:** TLT

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
Acetone	< 280	280	ug/kg		10/29/2002	SW846 8260B
Allyl Chloride	< 28	28	ug/kg		10/29/2002	SW846 8260B
Benzene	< 28	28	ug/kg		10/29/2002	SW846 8260B
Bromochloromethane	< 28	28	ug/kg		10/29/2002	SW846 8260B
Bromodichloromethane	< 28	28	ug/kg		10/29/2002	SW846 8260B
Bromoform	< 28	28	ug/kg		10/29/2002	SW846 8260B

All soil results are reported on a dry weight basis unless otherwise i

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Fax: 920-469-8827

- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-05 7-8.5
Lab Sample Number 827634-004
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Bromobenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B
Bromomethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
2-Butanone	< 280	280	ug/kg	10/29/2002	SW846 8260B
s-Butylbenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B
t-Butylbenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B
n-Butylbenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B
Carbon tetrachloride	< 28	28	ug/kg	10/29/2002	SW846 8260B
Chloroform	< 28	28	ug/kg	10/29/2002	SW846 8260B
Chlorobenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B
Chlorodibromomethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
Chloroethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
Chloromethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
2-Chlorotoluene	< 28	28	ug/kg	10/29/2002	SW846 8260B
4-Chlorotoluene	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,2-Dibromo-3-chloropropane	< 57	57	ug/kg	10/29/2002	SW846 8260B
1,2-Dibromoethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
Dibromomethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,3-Dichlorobenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,4-Dichlorobenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,2-Dichloroethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,2-Dichlorobenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,1-Dichloroethene	< 28	28	ug/kg	10/29/2002	SW846 8260B
cis-1,2-Dichloroethene	< 28	28	ug/kg	10/29/2002	SW846 8260B
Dichlorodifluoromethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
trans-1,2-Dichloroethene	< 28	28	ug/kg	10/29/2002	SW846 8260B
Dichlorofluoromethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,2-Dichloropropane	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,1-Dichloroethane	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,3-Dichloropropane	< 28	28	ug/kg	10/29/2002	SW846 8260B
2,2-Dichloropropane	< 28	28	ug/kg	10/29/2002	SW846 8260B
1,1-Dichloropropene	< 28	28	ug/kg	10/29/2002	SW846 8260B
cis-1,3-Dichloropropene	< 28	28	ug/kg	10/29/2002	SW846 8260B
trans-1,3-Dichloropropene	< 28	28	ug/kg	10/29/2002	SW846 8260B
Ethylbenzene	< 28	28	ug/kg	10/29/2002	SW846 8260B

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- Preliminary Analytical Report -

Project Name SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-05 7-8.5
Lab Sample Number 827634-004
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Diethyl ether	< 28	28	ug/kg		10/29/2002	SW846 8260B
Fluorotrichloromethane	< 28	28	ug/kg		10/29/2002	SW846 8260B
Hexachlorobutadiene	< 28	28	ug/kg		10/29/2002	SW846 8260B
Isopropylbenzene	< 28	28	ug/kg		10/29/2002	SW846 8260B
p-Isopropyltoluene	< 28	28	ug/kg		10/29/2002	SW846 8260B
Methylene chloride	< 28	28	ug/kg		10/29/2002	SW846 8260B
4-Methyl-2-pentanone	< 280	280	ug/kg		10/29/2002	SW846 8260B
Methyl-tert-butyl-ether	< 28	28	ug/kg		10/29/2002	SW846 8260B
Naphthalene	< 28	28	ug/kg		10/29/2002	SW846 8260B
n-Propylbenzene	< 28	28	ug/kg		10/29/2002	SW846 8260B
Styrene	< 28	28	ug/kg	&	10/29/2002	SW846 8260B
1,1,2,2-Tetrachloroethane	< 28	28	ug/kg		10/29/2002	SW846 8260B
1,1,1,2-Tetrachloroethane	< 28	28	ug/kg		10/29/2002	SW846 8260B
Tetrachloroethene	< 28	28	ug/kg		10/29/2002	SW846 8260B
Toluene	< 28	28	ug/kg		10/29/2002	SW846 8260B
1,2,3-Trichlorobenzene	< 28	28	ug/kg		10/29/2002	SW846 8260B
1,2,4-Trichlorobenzene	< 28	28	ug/kg		10/29/2002	SW846 8260B
1,1,1-Trichloroethane	< 28	28	ug/kg		10/29/2002	SW846 8260B
1,1,2-Trichloroethane	< 28	28	ug/kg		10/29/2002	SW846 8260B
1,1,2-Trichlorotrifluoroethane	< 28	28	ug/kg		10/29/2002	SW846 8260B
1,2,4-Trimethylbenzene	< 28	28	ug/kg		10/29/2002	SW846 8260B
Trichloroethene	< 28	28	ug/kg		10/29/2002	SW846 8260B
1,2,3-Trichloropropane	< 28	28	ug/kg		10/29/2002	SW846 8260B
Tetrahydrofuran	< 280	280	ug/kg		10/29/2002	SW846 8260B
1,3,5-Trimethylbenzene	< 28	28	ug/kg		10/29/2002	SW846 8260B
Vinyl chloride	< 28	28	ug/kg		10/29/2002	SW846 8260B
Xylenes, -m, -p	< 28	28	ug/kg		10/29/2002	SW846 8260B
Xylene, -o	< 28	28	ug/kg		10/29/2002	SW846 8260B
4-Bromofluorobenzene	106	---	%Recov		10/29/2002	SW846 8260B
Dibromofluoromethane	109	---	%Recov		10/29/2002	SW846 8260B
Toluene-d8	100	---	%Recov		10/29/2002	SW846 8260B

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-05 7-8.5
Lab Sample Number 827634-004
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Organic Results

Preservation Date :

PAH/PNA - SEMIVOLATILES **Prep Method:** SW846 3545 **Prep Date:** 10/27/200 **Analyst:** ARO

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
Acenaphthene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Acenaphthylene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Anthracene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Benzo(a)anthracene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Benzo(a)pyrene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Benzo(b)fluoranthene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Benzo(g,h,i)perylene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Benzo(k)fluoranthene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Chrysene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Dibenzo(a,h)anthracene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Fluoranthene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Fluorene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Indeno(1,2,3-cd)pyrene	< 28	28	ug/kg		10/30/2002	SW846 8270C
1-Methylnaphthalene	< 28	28	ug/kg		10/30/2002	SW846 8270C
2-Methylnaphthalene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Naphthalene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Phenanthrene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Pyrene	< 28	28	ug/kg		10/30/2002	SW846 8270C
Nitrobenzene-d5	62	---	%Recov		10/30/2002	SW846 8270C
2-Fluorobiphenyl	69	---	%Recov		10/30/2002	SW846 8270C
Terphenyl-d14	71	---	%Recov		10/30/2002	SW846 8270C

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-05 7-8.5
Lab Sample Number 827634-004
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Organic Results

Preservation Date :

PAH/PNA-BLANK **Prep Method:** SW846 3445 **Prep Date:** 10/27/200 **Analyst:** ARO

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
PAH-Blank	1089-27				10/29/2002	SW846 8270C

Organic Results

Preservation Date :

VOC-BLK **Prep Method:** **Prep Date:** **Analyst:**

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
VOC-BLK	1088-83					

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : 02-06 7-8.5
Lab Sample Number 827634-005
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : SOIL

Inorganic Results

Test	Result	EQL	Units	Code	Analysis Date	Prep Method	Analysis Method
Solids, percent	46.2		%		10/25/2002	SM 2540G M	SM 2540G M

Organic Results

Preservation Date :

DIESEL RANGE ORGANICS - SOIL **Prep Method:** Wi MOD DRO **Prep Date:** 10/28/200 **Analyst:** KEG

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
DIESEL RANGE ORGANICS	220	8.6	mg/kg		10/28/2002	Wi MOD DRO
Blank spike	85	---	%Recov		10/28/2002	Wi MOD DRO
Blank spike duplicate	88	---	%Recov		10/28/2002	Wi MOD DRO
Blank	< 5.0	5.0	mg/kg		10/28/2002	Wi MOD DRO

All soil results are reported on a dry weight basis unless otherwise i

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : MEOH BLANK
Lab Sample Number 827634-006
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : METHANOL

Organic Results

Preservation Date :

MDH 466 VOLATILES - METHANOL **Prep Method:** SW846 5030B **Prep Date:** 10/28/200 **Analyst:** TLT

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
Acetone	< 250	250	ug/L		10/28/2002	SW846 8260B
Allyl Chloride	< 25	25	ug/L		10/28/2002	SW846 8260B
Benzene	< 25	25	ug/L		10/28/2002	SW846 8260B
Bromochloromethane	< 25	25	ug/L		10/28/2002	SW846 8260B
Bromodichloromethane	< 25	25	ug/L		10/28/2002	SW846 8260B
Bromoform	< 25	25	ug/L		10/28/2002	SW846 8260B
Bromobenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
Bromomethane	< 25	25	ug/L		10/28/2002	SW846 8260B
2-Butanone	< 250	250	ug/L		10/28/2002	SW846 8260B
s-Butylbenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
t-Butylbenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
n-Butylbenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
Carbon tetrachloride	< 25	25	ug/L		10/28/2002	SW846 8260B
Chloroform	< 25	25	ug/L		10/28/2002	SW846 8260B
Chlorobenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
Chlorodibromomethane	< 25	25	ug/L		10/28/2002	SW846 8260B
Chloroethane	< 25	25	ug/L		10/28/2002	SW846 8260B
Chloromethane	< 25	25	ug/L		10/28/2002	SW846 8260B
2-Chlorotoluene	< 25	25	ug/L		10/28/2002	SW846 8260B
4-Chlorotoluene	< 25	25	ug/L		10/28/2002	SW846 8260B
1,2-Dibromo-3-chloropropane	< 50	50	ug/L		10/28/2002	SW846 8260B
1,2-Dibromoethane	< 25	25	ug/L		10/28/2002	SW846 8260B
Dibromomethane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,3-Dichlorobenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
1,4-Dichlorobenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
1,2-Dichloroethane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,2-Dichlorobenzene	< 25	25	ug/L		10/28/2002	SW846 8260B

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : MEOH BLANK
Lab Sample Number 827634-006
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : METHANOL

1,1-Dichloroethene	< 25	25	ug/L		10/28/2002	SW846 8260B
cis-1,2-Dichloroethene	< 25	25	ug/L		10/28/2002	SW846 8260B
Dichlorodifluoromethane	< 25	25	ug/L		10/28/2002	SW846 8260B
trans-1,2-Dichloroethene	< 25	25	ug/L		10/28/2002	SW846 8260B
Dichlorofluoromethane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,2-Dichloropropane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,1-Dichloroethane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,3-Dichloropropane	< 25	25	ug/L		10/28/2002	SW846 8260B
2,2-Dichloropropane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,1-Dichloropropene	< 25	25	ug/L		10/28/2002	SW846 8260B
cis-1,3-Dichloropropene	< 25	25	ug/L		10/28/2002	SW846 8260B
trans-1,3-Dichloropropene	< 25	25	ug/L		10/28/2002	SW846 8260B
Ethylbenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
Diethyl ether	< 25	25	ug/L		10/28/2002	SW846 8260B
Fluorotrichloromethane	< 25	25	ug/L		10/28/2002	SW846 8260B
Hexachlorobutadiene	< 25	25	ug/L		10/28/2002	SW846 8260B
Isopropylbenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
p-Isopropyltoluene	< 25	25	ug/L		10/28/2002	SW846 8260B
Methylene chloride	44	25	ug/L		10/28/2002	SW846 8260B
4-Methyl-2-pentanone	< 250	250	ug/L		10/28/2002	SW846 8260B
Methyl-tert-butyl-ether	< 25	25	ug/L		10/28/2002	SW846 8260B
Naphthalene	< 25	25	ug/L		10/28/2002	SW846 8260B
n-Propylbenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
Styrene	< 25	25	ug/L	&	10/28/2002	SW846 8260B
1,1,2,2-Tetrachloroethane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,1,1,2-Tetrachloroethane	< 25	25	ug/L		10/28/2002	SW846 8260B
Tetrachloroethene	< 25	25	ug/L		10/28/2002	SW846 8260B
Toluene	< 25	25	ug/L		10/28/2002	SW846 8260B
1,2,3-Trichlorobenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
1,2,4-Trichlorobenzene	< 25	25	ug/L		10/28/2002	SW846 8260B
1,1,1-Trichloroethane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,1,2-Trichloroethane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,1,2-Trichlorotrifluoroethane	< 25	25	ug/L		10/28/2002	SW846 8260B
1,2,4-Trimethylbenzene	< 25	25	ug/L		10/28/2002	SW846 8260B

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- Preliminary Analytical Report -

Project Name : SCHNEIDERMAN
Project Number 07-01807
Field ID : MEOH BLANK
Lab Sample Number 827634-006
MN LAB ID : 055-999-334

Client : AMERICAN ENG TESTING INC
Report Date : 11/15/2002
Collection Date : 10/23/2002
Matrix Type : METHANOL

Trichloroethene	< 25	25	ug/L	10/28/2002	SW846 8260B
1,2,3-Trichloropropane	< 25	25	ug/L	10/28/2002	SW846 8260B
Tetrahydrofuran	< 250	250	ug/L	10/28/2002	SW846 8260B
1,3,5-Trimethylbenzene	< 25	25	ug/L	10/28/2002	SW846 8260B
Vinyl chloride	< 25	25	ug/L	10/28/2002	SW846 8260B
Xylenes, -m, -p	< 25	25	ug/L	10/28/2002	SW846 8260B
Xylene, -o	< 25	25	ug/L	10/28/2002	SW846 8260B
4-Bromofluorobenzene	104	---	%Recov	10/28/2002	SW846 8260B
Dibromofluoromethane	97	---	%Recov	10/28/2002	SW846 8260B
Toluene-d8	93	---	%Recov	10/28/2002	SW846 8260B

Organic Results

Preservation Date :

VOC-BLK **Prep Method:** **Prep Date:** **Analyst:**

Analyte	Result	EQL	Units	Code	Analysis Date	Analysis Method
VOC-BLK	1088-81					

(Please Print Legibly)

Company Name: American Engineering Testing (?)
Branch or Location: Duluth
Project Contact: Karl Roaster (?)
Telephone: 218-628-1518
Project Number: 07-01807
Project Name: Schneiderman (?)
Project State: MN
Sampled By (Print): Karl Roaster (?)

EN CHEM INC.

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☐ 525 Science Drive
Madison, WI 53711
608-232-3300
FAX: 608-233-0502

CHAIN OF CUSTODY

91328

*Preservation Codes
A=None B=HCL C=H2SO4 D=HN03 E=EnCore F=Methanol G=NaOH
H = Sodium Bisulfate Solution I = Sodium Thiosulfate J = Other

Page 1 of 1
P.O. #____ Quote #____
Mail Report To: Karl Roaster (?)
Company: AET
Address: P.O. Box 16008 (?)
Duluth MN 55816 (?)
Invoice To: same
Company:
Address:
Mail Invoice To: same

Data Package Options - (please circle if requested)

Sample Results Only (no QC)
EPA Level II (Subject to Surcharge)
EPA Level III (Subject to Surcharge)
EPA Level IV (Subject to Surcharge)

Regulatory Program: UST, RCRA, SDWA, NPDES, CERCLA

Matrix Codes: W=Water, S=Soil, A=Air, C=Charcoal, B=Biota, Sl=Sludge

ANALYSES REQUESTED

						DRO	VOC	PAH	RCRA (8) Metals	Dry Wt			TOTAL # OF BOTTLES SENT		
FILTERED? (YES/NO)						N	N	N	N	N					
PRESERVATION (CODE)*						A	F	A	A	A					
LABORATORY ID (Lab Use Only)	**FIELD ID**		**COLLECTION DATE**	**COLLECTION TIME**	**MATRIX**									**CLIENT COMMENTS**	**LAB COMMENTS (Lab Use Only)**
	02-03	12-13½	10-22-02	15:15	S	1				1					
	02-04	23½-25	10-23-02	13:45	S	1				1					
	02-04	4½-6	10-23-02	13:05	S	1	1	1	1					Metals Dry Wt included (?)	
	02-05	7-9½	10-22-02	11:05	S	1	1	1	1						
	02-06	7-9½	10-23-02	9:05	S	1				1					
	MeOH Blank		10-25-02	15:30									1		
	Temp Blank												1		

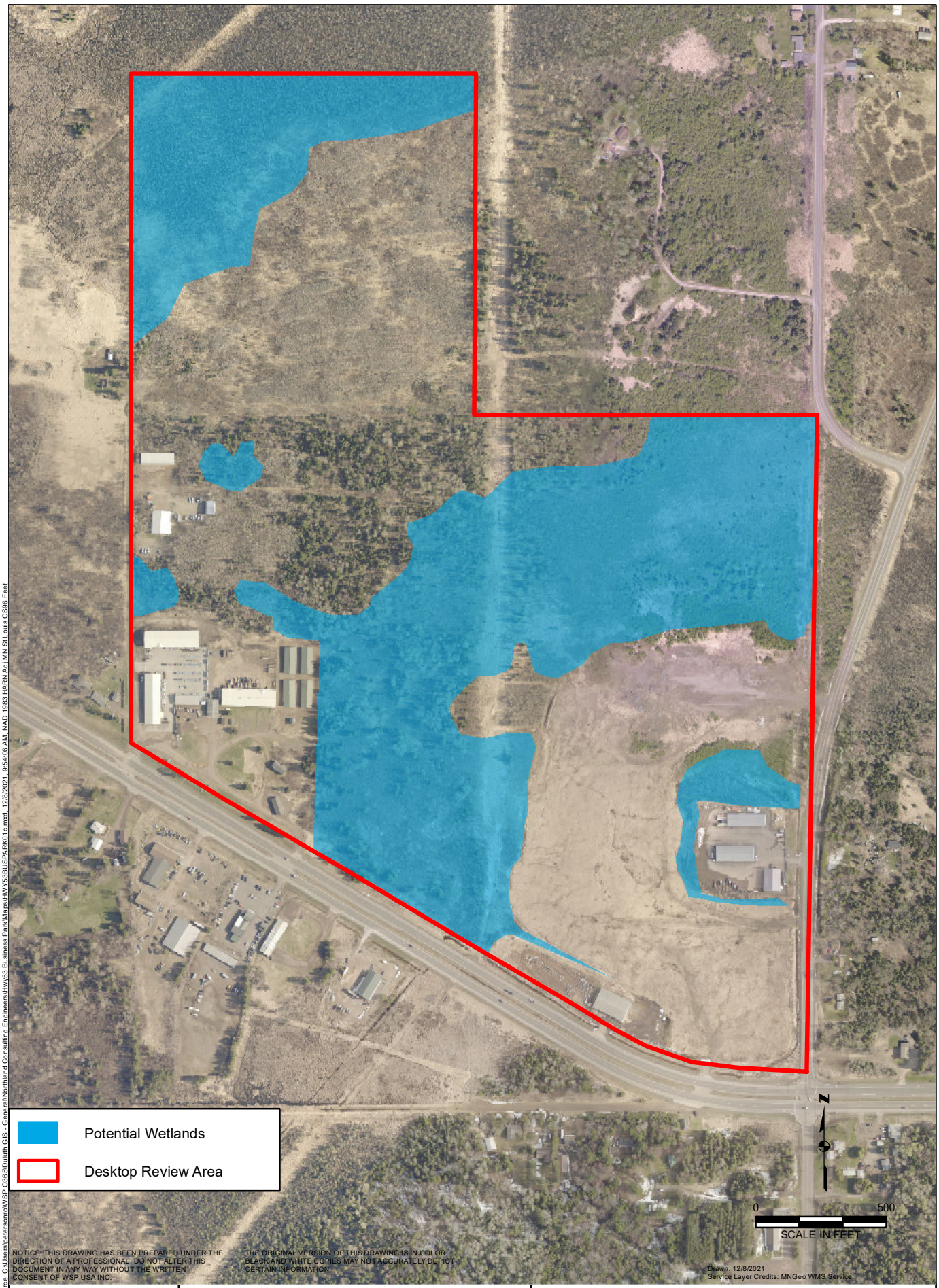
Rush Turnaround Time Requested (TAT) - Prelim
(Rush TAT subject to approval/surcharge)
Date Needed:
Transmit Prelim Rush Results by (circle):
Phone Fax E-Mail
Phone #:
Fax #:
E-Mail Address:

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:	
Karl Roaster (?)	10-23-02 16:25	[signature]	10-23-02 16:25	En Chem Project No.
				Sample Receipt Temp.
				Sample Receipt pH (Wet/Metals)
				Cooler Custody Seal Present / Not Present
				Intact / Not Intact

APPENDIX E

POTENTIAL SITE WETLANDS DIAGRAM



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WSP USA Inc.
4602 GRAND AVENUE
SUITE 300
Duluth, MN 55807
TEL: +1 218 336 8820

HWY 53 BUSINESS PARK
HERMANTOWN, MINNESOTA

PREPARED FOR

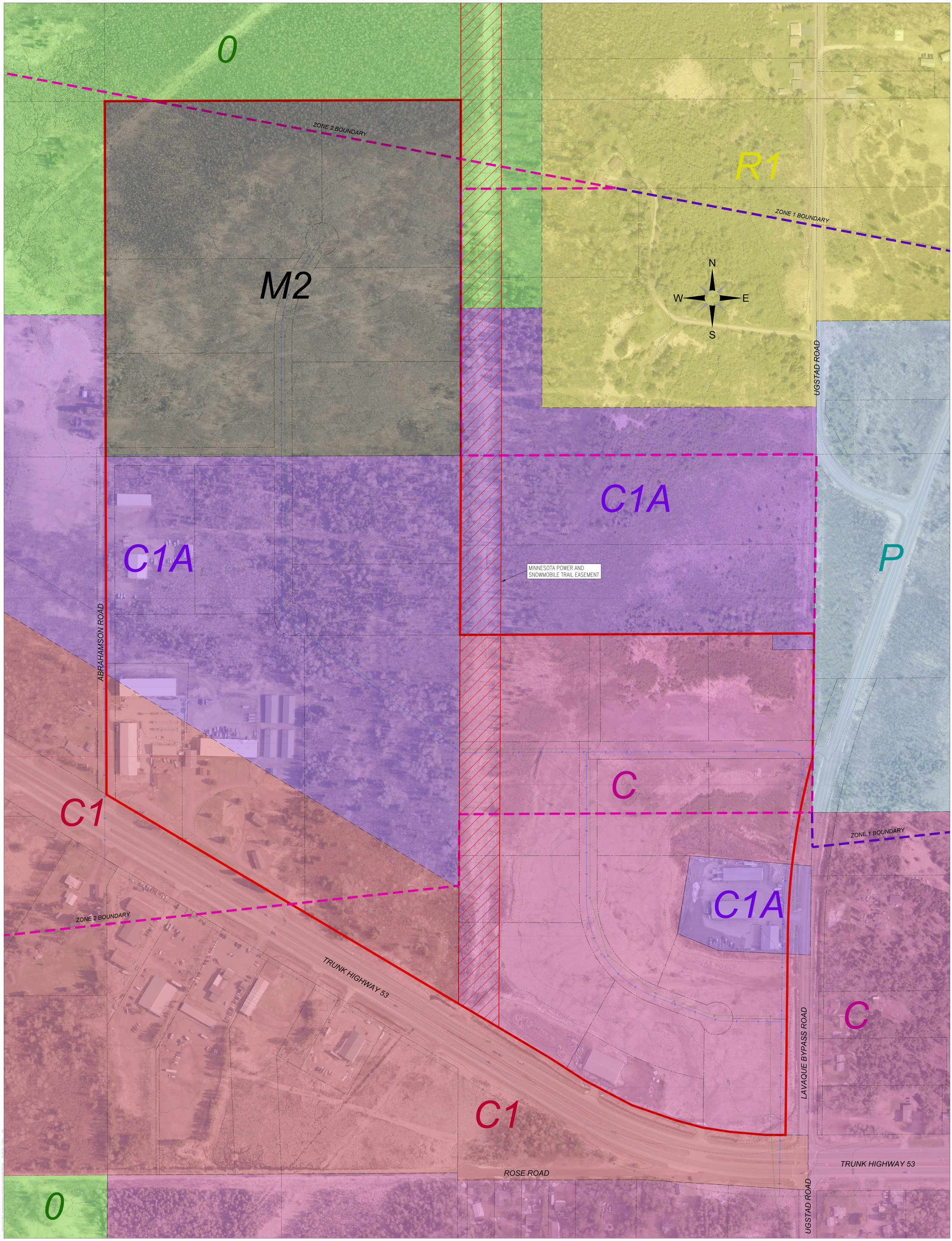
NORTHLAND CONSULTING ENGINEERS

FIGURE 02

DESKTOP WETLAND REVIEW AND
2019 AERIAL IMAGERY
OCTOBER, 2021

APPENDIX F

BUSINESS PARK ZONING MAP



City of Hermantown Minnesota

GOVERNMENT SERVICES BUILDING
5105 MAPLE GROVE ROAD
HERMANTOWN, MN 55811
PHONE: (218) 729-3600

HIGHWAY 53 BUSINESS PARK

DATE: NOVEMBER 3, 2021

LEGEND

- ZONED C (HIGH DENSITY COMMERCIAL)
- ZONED C1 (LOW DENSITY COMMERCIAL)
- ZONED C1A (OFFICE/LIGHT INDUSTRIAL/ADULT)
- ZONED M2 (HEAVY INDUSTRIAL)
- ZONED R1 (LOW DENSITY RESIDENTIAL)
- ZONED O (OPEN SPACE)
- ZONED P (PUBLIC)

0' 50' 100' 200'

Northland Consulting Engineers L.L.P.
Structural, Civil and Forensic Engineering Services
Voice: (218)727-5995
Fax: (218)727-7779
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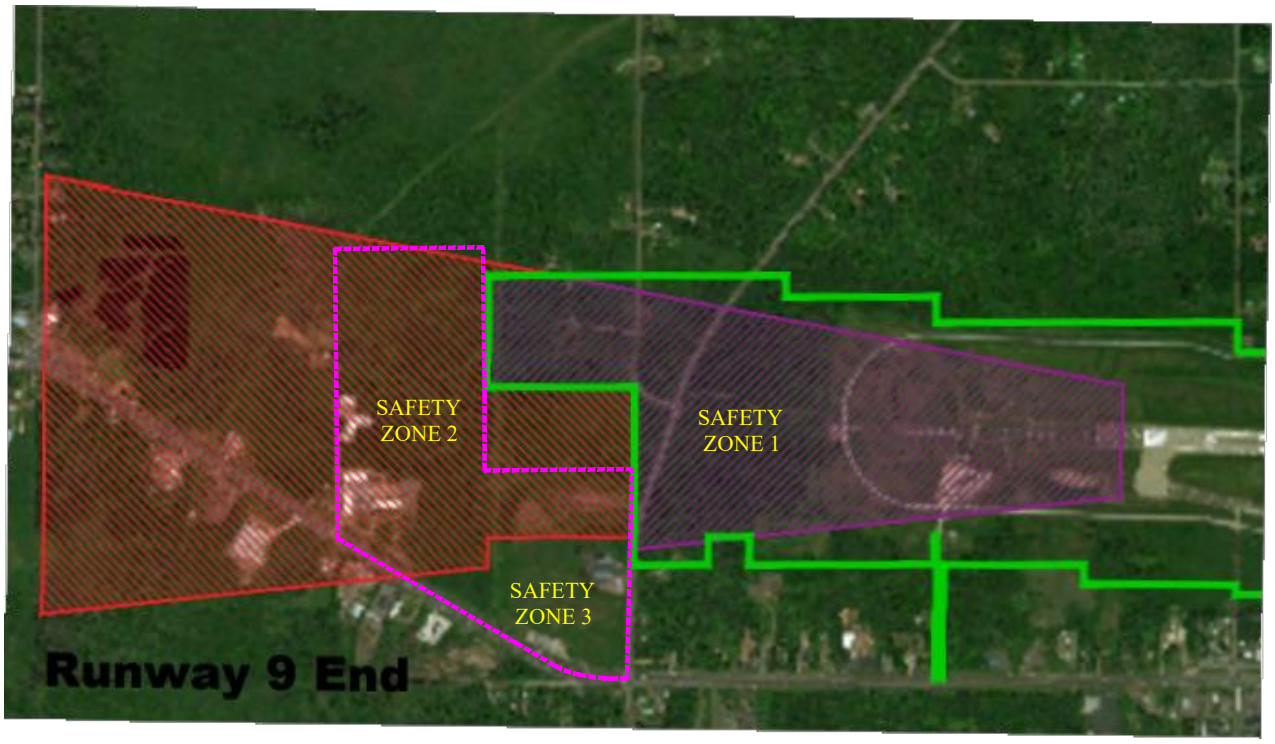
APPENDIX G

AIRPORT SAFETY ZONE MAP AND DEFINITIONS

AIRPORT SAFETY ZONE



LEGEND

BUSINESS PARK BOUNDARY

SAFETY ZONE 1

AREAS DESIGNATED AS SAFETY ZONE 1 SHALL CONTAIN NO BUILDINGS, TEMPORARY STRUCTURES EXPOSED TRANSMISSION LINES OR OTHER SIMILAR ABOVE-GROUND LAND USE STRUCTURAL HAZARDS.

SAFETY ZONE 2

GROUP A, E, 1-2 AND R-1 USES ARE PROHIBITED IN SAFETY ZONE 2. IN ADDITION, PROPERTIES MUST BE A MINIMUM OF 2.5 ACRES IN SIZE AND SHALL NOT CREATE, ATTRACT OR BRING TOGETHER A SITE POPULATION IN EXCESS OF 20 PERSONS PER ACRE DURING THE SAME TIME PERIOD; DENSITY AS CALCULATED PURSUANT TO THE 2020 MINNESOTA STATE BUILDING CODE.

SAFETY ZONE 3

SAFETY ZONE 3 ENCOMPASSES AN AREA 1 MILE FROM THE AIRPORT BOUNDARY AND 1.5 MILES FROM THE AIRPORT APPROACH ZONE. TOP FLOOR ELEVATION OF STRUCTURES IN SAFETY ZONE 3 ARE NOT TO EXCEED 1578 FEET IN ELEVATION IN RELATION TO THE GROUND ELEVATION OF THE RUNWAY (ELEVATION 1428).