

# Final Abstract

Final Report Approved on August 7, 2024

## M.L. 2021 Project Abstract

For the Period Ending June 30, 2024

**Project Title:** St. James Pit Water-Level Control Study

**Project Manager:** Lucas Heikkila

**Affiliation:** City of Aurora

**Mailing Address:** 16 West 2nd Aveunue North PO Box 160

**City/State/Zip:** Aurora, MN 55705

**Phone:** (218) 290-5993

**E-mail:** lucash@ci.aurora.mn.us

**Website:** <http://www.aurora-mn.com/>

**Funding Source:**

**Fiscal Year:**

**Legal Citation:** M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 04h

**Appropriation Amount:** \$259,000

**Amount Spent:** \$259,000

**Amount Remaining:** -

### Sound bite of Project Outcomes and Results

Through groundwater study and modeling, our project provided vital information necessary to help understand and mitigate the effects of anticipated water level rise of the St. James Pit on water quality and quantity, as well as on aquatic ecosystems and human infrastructure in the vicinity of the pit.

### Overall Project Outcome and Results

The goal of this study was to determine how the cessation of pumping water from the St. James Pit will impact water quality and quantity in the pit and related impacts to groundwater flow, pit stability, and human infrastructure. To determine water quality and quantity impacts, we installed wells to collect groundwater elevation data that aided in the modeling of future water levels. Additionally, we assessed the risk to pit stability and human infrastructure by constructing models using sensor and monitoring data.

Preliminary findings from the modeling shows that, after the City of Aurora stops pumping water from the St. James Pit, water levels are likely to stabilize at 13 feet below the rim of the pit within 20-25 years. Pit stabilization modeling used two points for data collection: one at its weakest point and one near infrastructure. Results show moderate risk of

stabilization failure but not imminent failure. Future modeling will be done after pumping cessation to more accurately investigate these projected numbers.

This project will provide the City of Aurora and surrounding communities with important information about the impacts of stopping pumping in the St. James Pit. We can better understand how the water quality is expected to change, which may influence human and aquatic health, as well as how contaminants might flow out of the pit into the surrounding ground and surface waters. Lastly, understanding the hydrological changes to the pit will allow civic and community leaders to prepare for threats to the stability of the pit itself, and other human infrastructure (like basements in homes).

### **Project Results Use and Dissemination**

The final report documenting the results of the modeling and analysis were submitted to the DNR. Additionally, these study results will be shared with the East Range Joint Powers Board, the Department of Iron Range Resources, and other stakeholders. This information will be useful not just for residents in the community but also future businesses as well. With the creation of Auroras Industrial Park in 2024 prospective companies are inquiring about the water model and if their business would be viable using pit water as well.



## Environment and Natural Resources Trust Fund

M.L. 2021 Approved Final Report

### General Information

**Date:** November 8, 2024

**ID Number:** 2021-376

**Staff Lead:** Noah Fribley

**Project Title:** St. James Pit Water-Level Control Study

**Project Budget:** \$259,000

### Project Manager Information

**Name:** Lucas Heikkila

**Organization:** City of Aurora

**Office Telephone:** (218) 290-5993

**Email:** lucash@ci.aurora.mn.us

**Web Address:** <http://www.aurora-mn.com/>

### Project Reporting

**Final Report Approved:** August 7, 2024

**Reporting Status:** Project Completed

**Date of Last Action:** August 7, 2024

**Project Completion:** May 31, 2024

### Legal Information

**Legal Citation:** M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 04h

**Appropriation Language:** \$259,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with the city of Aurora to install sampling wells and conduct a study to determine appropriate mitigation of the abandoned St. James pit mine to protect surface and drinking water and prevent harm to homes and residents.

**Appropriation End Date:** June 30, 2024

## Narrative

**Project Summary:** The St. James Pit Rising Water Levels Study, Mitigation, and Diversion Plan

**Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.**

The St. James Pit is an old, abandoned Iron Ore Mine within the City of Aurora. It is not subject to new mining mitigation rules due to its operation many years ago before rules were in place. The City receives its drinking water from this mine and has a pumping station near it. The City, along with neighboring communities, have decided to switch to another source of water, and therefore Aurora will stop pumping water from the St. James Pit. The water level will rise-- estimated to rise 33 feet. The consequences may be water discharge via a surface outlet that needs to be developed, the St. James pit walls will destabilize, aquifer water levels will rise promoting basement flooding, and unintended surface water discharges will occur. The proposal seeks to develop a plan to address these problems using scientific data and analysis.

**What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.**

It is proposed that 14 well installations be developed that will allow the collection of groundwater elevation data, which will be used to determine groundwater flow directions, hydraulic gradients, aquifer parameters, and other data to be used in modeling. The modeling will determine the potential outflow rates at different water elevations to aid in engineering and design of the potential outlet. The data collected from the wells, pit water levels data, and precipitation data would go into the modeling effort. An important component of the project will be the Pit Wall Stability study to assess the mechanisms and safety factors associated with the ability of natural and human altered earthen materials to address pit wall stability throughout the potential range of pit water levels. The Wet Basement Study is to determine the potential for wet basements in the City to occur depending on the water elevations in the pit. This will be done by using the well information to determine current water levels in the surgical sediments and collecting information from homeowners . These studies will determine the outflow management plan in the future.

**What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?**

These efforts will protect, preserve, conserve and enhance the water quality of the St. James Pit, the aquifer, and the discharge into the local river as well as fish populations who enjoy these waters. It is targeted especially to these waters and the pit that was substantially impaired. This effort will provide strategies that include citizens and the community in these scientific efforts. It is specifically designed to mitigate the impacts resulting from artificial hydrological modifications and its effects on the drinking water of the community. The outflow work will prevent and reduce the levels of potential contaminants in surface waters.

## Project Location

**What is the best scale for describing where your work will take place?**

Region(s): NE

**What is the best scale to describe the area impacted by your work?**

Region(s): NE

**When will the work impact occur?**

During the Project and In the Future

## Activities and Milestones

### Activity 1: Pit Wall Stability and Wet Basement Studies

**Activity Budget:** \$45,800

**Activity Description:**

The pit wall stability study will access the mechanisms and safety factors associated with the ability of natural and human altered earthen materials (glacial drift and assorted fill associated with past mining operations) to address pit wall stability throughout the potential range of pit water levels. Identify the possible mechanisms of uncontrolled outflow from each of the target locations. Determine the factors of safety for a range of water elevations at a number of locations identified for modeling that pose the greatest threat to public safety. The wet basement study will determine the potential for wet basements to occur depending on water elevations in the pit. By using the well information to determine current water levels in the surficial sediments and collecting information from homeowners basement elevations.

**Activity Milestones:**

Description	Approximate Completion Date
Pit Wall Stability & Wet Basement Study 25% complete.	November 30, 2021
Pit Wall Stability & Wet Basement Study 50% complete.	March 31, 2022
Pit Wall Stability & Wet Basement Study 75% complete.	July 31, 2022
Wet Basement Study Completed	December 31, 2022
Pit Wall Stability Study Completed	December 31, 2022

### Activity 2: Well Installation And Monitoring

**Activity Budget:** \$213,200

**Activity Description:**

This activity consists of installing 4 bedrock wells and 10 surficial wells to collect groundwater elevation data in the City of Aurora. The data will be used to determine groundwater flow directions, hydraulic gradients and aquifer parameters used in modeling and needed studies. The purpose of the modeling is to determine the potential outflow rates at different water elevations to aid the engineering design of the potential outlet. The data collected from all of the wells, pit water levels data, precipitation data, etc. would be integrated into the modeling effort.

**Activity Milestones:**

Description	Approximate Completion Date
Well Installation & Water Modeling 25% complete.	November 30, 2021
Well Installation & Water Modeling 50% complete.	March 31, 2022
Well Installation & Water Modeling 75% complete.	July 31, 2022
Water Modeling Completed	December 31, 2022
Well Installation Completed	December 31, 2022

## Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Doug Gregor	East Range Joint Powers Board	Coordinates the joint efforts of the surrounding communities to identify and implement an alternative community water supply and support the studies.	No
Hydrological Services Firm	Northeast Technical Services (NTS)	Responsible for the completion of the well installation, modeling, pit wall stabilization study and wet basement study	Yes
Chris Ismil	Department of Iron Range Resources and Rehabilitation	Project co-funder	No
Michael Liljegren	Division of Lands and Minerals, Minnesota Department of Natural Resources	Michael Liljegren, the Supervisor of Mine Permitting and Coordination Section, will coordinate the project with the City Clerk and supervise the modeling, well installation, Pit Wall stability Study, and Wet Basement Study.	No

## Dissemination

**Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.**

All study results will be shared with the East Range Joint Powers Board, Department of Iron Range Resources, Minnesota Department of Natural Resources and other stakeholders.

The City has regular project meetings. Documentation of these meetings are developed in the form of meeting minutes that are presented and approved by the City Council. All council meetings are public and reports discussed are available to the general public.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgement Guidelines.

## Long-Term Implementation and Funding

**Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?**

The results will determine the outflow discharge and the need for pit wall stabilization to prevent harm to the community and adjacent waters and aquifer. The City and the DNR will report the findings to the Minnesota Legislature and seek funding from the State and other sources including Section 569 program of the Army Corps of Engineers for the implementation of the long-term plan to control the water levels. Project results will also be reported to our collaborating partners and the community.

## Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
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County Geologic Atlases - Part B, Mapping Aquifer Hydrology	M.L. 2019, First Special Session, Chp. 4, Art. 2, Sec. 2, Subd. 03o	\$2,400,000
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## Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount	\$ Amount Spent	\$ Amount Remaining
<b>Personnel</b>										
							Sub Total	-	-	-
<b>Contracts and Services</b>										
Northeast Technical Services	Professional or Technical Service Contract	This firm will install the wells, conduct the modeling/ monitoring and will complete the pit wall stabilization and wet basement studies				4		\$259,000	\$259,000	-
							Sub Total	\$259,000	\$259,000	-
<b>Equipment, Tools, and Supplies</b>										
							Sub Total	-	-	-
<b>Capital Expenditures</b>										
							Sub Total	-	-	-
<b>Acquisitions and Stewardship</b>										
							Sub Total	-	-	-
<b>Travel In Minnesota</b>										
							Sub Total	-	-	-
<b>Travel Outside Minnesota</b>										
							Sub Total	-	-	-
<b>Printing and Publication</b>										



							<b>Sub Total</b>	-	-	-
<b>Other Expenses</b>										
							<b>Sub Total</b>	-	-	-
							<b>Grand Total</b>	<b>\$259,000</b>	<b>\$259,000</b>	-

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	\$ Amount	\$ Amount Spent	\$ Amount Remaining
<b>State</b>						
			<b>State Sub Total</b>	-	-	-
<b>Non-State</b>						
Cash	Grant from the Department of Iron Range Resources and Rehabilitation	For the same purposes in the LCCMR application	Pending	\$305,000	-	\$305,000
			<b>Non State Sub Total</b>	<b>\$305,000</b>	-	<b>\$305,000</b>
			<b>Funds Total</b>	<b>\$305,000</b>	-	<b>\$305,000</b>

## Attachments

### Required Attachments

#### *Visual Component*

File: [a08b83e4-f2a.pdf](#)

#### *Alternate Text for Visual Component*

Map of project area....

#### *Board Resolution or Letter*

Title	File
City Resolution	<a href="#">3eaa9bc4-0a3.pdf</a>

### Supplemental Attachments

#### *Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other*

Title	File
Background Check Doc	<a href="#">0a45d171-372.pdf</a>
NTS Water Level/Pit Wall study	<a href="#">6a0f703c-d55.pdf</a>
NTS February 2023 Update	<a href="#">3b5594c4-971.pdf</a>
NTS June 1st Update Report	<a href="#">baae417c-0bf.docx</a>
Final Report	<a href="#">dc67811e-7c4.pdf</a>

## Difference between Proposal and Work Plan

### *Describe changes from Proposal to Work Plan Stage*

We have made the change to the title. Thank you!

## Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

**Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?**

N/A

**Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?**

N/A

**Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?**

No

**Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?**

N/A

**Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?**

N/A

**Does your project include original, hypothesis-driven research?**

Yes

**Does the organization have a fiscal agent for this project?**

No

## Work Plan Amendments

Amendment ID	Request Type	Changes made on the following pages	Explanation & justification for Amendment Request (word limit 75)	Date Submitted	Approved	Date of LCCMR Action
1	Amendment Request	<ul style="list-style-type: none"> <li>• Project Collaborators - Project Manager Info</li> <li>• Project Collaborators - Project Partner Info</li> <li>• Budget - Professional / Technical Contracts</li> <li>• Attachments</li> </ul>	NTS was updated as our consultant. The full funds have not been expended for the water level study yet. NTS was hired to complete the study and create a report helpful to plan for constructions.	February 22, 2023	Yes	March 6, 2023
2	Project Manager	Previous Manager: Stefanie Dickinson (cityclerk@ci.aurora.mn.us) New Manager: Lucas Heikkila (lucash@ci.aurora.mn.us)	Stefanie is no longer employed with the city. I have replaced her as of 1.30.23	February 14, 2023	Yes	February 14, 2023
3	Completion Date	Previous Completion Date: 12/31/2023 New Completion Date: 05/31/2024	To reflect analysis and reporting done after field monitoring.	June 28, 2024	Yes	June 28, 2024
4	Completion Date	Previous Completion Date: 05/31/2024 New Completion Date: 07/31/2025	LCCMR administrative workaround to approve submitted updates, due to online system functionality	July 26, 2024	Yes	July 26, 2024
5	Completion Date	Previous Completion Date: 07/31/2025 New Completion Date: 05/31/2024	LCCMR administrative workaround due to online system functionality.	July 26, 2024	Yes	July 26, 2024

# Status Update Reporting

## Final Status Update July 15, 2024

**Date Submitted:** August 6, 2024

**Date Approved:** August 6, 2024

### Overall Update

This is the final update for the project. Since our last update we have met with the MN DNR Hydrology Department and had a presentation meeting to show the results from the modeling. We provided them with the software model which they can now use in the future and gave them information on bank stabilization risks and ratings. There is a final written report which is attached to this website for public viewing which goes into detail as to what wells and cross sections were used in the project.

### Activity 1

All of the work is completed for activity 1. Our model is complete and showing water stabilization at 13 feet below the pit rim. Slope stability at our two selected points is also showing a low to moderate risk of failure at these levels. We have had a peer review conducted of the model which also concurred with these results. A final sit down meeting with the MN DNR hydrology department going over all results and handing off the model to them has been completed as well. It should be noted that our "final" report is noted as a draft as we will continue to collect data and update it as it becomes available. As well as when Aurora discontinues pumping in summer of 2026.

*(This activity marked as complete as of this status update)*

### Activity 2

All of the work is completed for activity 2. All of the wells have been drilled and data has been collected and assimilated into a report which is attached to this webpage. Currently it is anticipated that the pit will gradually fill over a 20 to 25 year period once pumping and dewatering operations stop in 2026. This report is in draft status as it is ongoing as the MN Hydrology department continues its own work now that the model has been passed on to their staff.

*(This activity marked as complete as of this status update)*

### Dissemination

The results have been given to the DNR to use for publication and updates as they start their project.

# Additional Status Update Reporting

## Additional Status Update July 15, 2024

**Date Submitted:** July 3, 2024

**Date Approved:** July 26, 2024

### **Overall Update**

This is the final update for the project. Since our last update we have met with the MN DNR Hydrology Department and had a presentation meeting to show the results from the modeling. We provided them with the software model which they can now use in the future and gave them information on bank stabilization risks and ratings. There is a final written report which is attached to this website for public viewing which goes into detail as to what wells and cross sections were used in the project.

### **Activity 1**

All of the work is completed for activity 1. Our model is complete and showing water stabilization at 13 feet below the pit rim. Slope stability at our two selected points is also showing a low to moderate risk of failure at these levels. We have had a peer review conducted of the model which also concurred with these results. A final sit down meeting with the MN DNR hydrology department going over all results and handing off the model to them has been completed as well. It should be noted that our "final" report is noted as a draft as we will continue to collect data and update it as it becomes available. As well as when Aurora discontinues pumping in summer of 2026.

*(This activity marked as complete as of this status update)*

### **Activity 2**

All of the work is completed for activity 2. All of the wells have been drilled and data has been collected and assimilated into a report which is attached to this webpage. Currently it is anticipated that the pit will gradually fill over a 20 to 25 year period once pumping and dewatering operations stop in 2026. This report is in draft status as it is ongoing as the MN Hydrology department continues its own work now that the model has been passed on to their staff.

*(This activity marked as complete as of this status update)*

### **Dissemination**

The results have been given to the DNR to use for publication and updates as they start their project.



# Additional Status Update Reporting

## Additional Status Update February 14, 2024

**Date Submitted:** July 3, 2024

**Date Approved:** July 26, 2024

**Overall Update**

not applicable

**Activity 1**

not applicable

**Activity 2**

not applicable

**Dissemination**

not applicable

# Status Update Reporting

## Status Update December 1, 2023

**Date Submitted:** July 3, 2024

**Date Approved:** July 26, 2024

### Overall Update

The approved work plan for the project includes milestones and associated completion dates for the two specific project activities, which are:

1. Activity 1: Pit Wall Stability and Wet Basement Study
2. Activity 2: Well Installation and Monitoring.

Table 1 below outlines the schedule and milestones associated with the project. The 4th milestone of '100% completion' for both activities was reached on December 31, 2022 with project completion designated for December 31, 2023 and report submittal by February 14, 2024.

NTS (hired contractor) plans to meet the project completion date and report submittal date as outlined in the project scope.

### Activity 1

At this point in the project all of the field work is completed. All of the site survey has been done and wells have been drilled. Over the past year we have used electronic monitoring devices and field visits to collect data points which will now be used to put into a model. There has been historical research performed to try and help identify most susceptible slope failure locations based on anticipated soils and pit wall grade, as well as associated risk to human life and infrastructure. We are now using the information gathered to create a 2-D limit equilibrium model to be made in Geoslope software. Initial findings are that slopes at the two selected locations appear to be stable under current parameters. Groundwater levels appear to equalize at 13 feet below the pit rim. Over the upcoming months we will work on a peer review of the model as well as continue to update and shift parameters to stabilize test results.

### Activity 2

At this point in the project all of the field work is completed. All of the site survey has been done and wells have been drilled. We have submitted soil samples for laboratory analysis to estimate hydraulic parameters. In addition, we have conducted historical research of City of Aurora records, LTV mine records, and public record archives to better understand pit bathymetry, historical pump records, existing monitoring wells that may be useful, and historical exploration boring records completed in the area. At this point we have created a baseline MODFLOW model of surface overburden soils and estimated bedrock surfaces to begin filling in aquifer parameters as data is gathered. We will now define lithography surface for overburden materials based on completed borings and historical research as well as define bedrock units/contacts based on historical researched exploration borings completed in the area and Minnesota Geologic Society

### Dissemination

Currently we have not done any media reporting as we are waiting for the modeling to be verified by the DNR and are waiting for the project to be 100% completed. We do not want to rush results out before we have this task finalized.

# Status Update Reporting

## Status Update June 1, 2023

**Date Submitted:** May 30, 2023

**Date Approved:** June 2, 2023

### Overall Update

The majority of the field and laboratory work is completed. The groundwater model is currently being calibrated utilizing the water levels collected over the past year in the installed wells and nearby water bodies. Once calibrated, the groundwater input to the St James Pit and estimated future elevations can be derived, substantially completing Activity 2. The estimated future water levels will inform the final analysis of Activity 1 to estimate slope stability of the pit. Additionally, once final pit water levels are estimated, the final assessment of public and private infrastructure will be assessed against the estimated groundwater elevation to determine if there is a risk of groundwater impacting basements or other infrastructure.

### Activity 1

The activity 1 stands at approximately 80% complete and awaits the output from Activity 2. Soil parameters have been estimated by drilling 2 boreholes, one to the north and one to the south of the St James Pit, at locations estimated to have the steepest pit wall slope. Collected soil samples were submitted to the laboratory to measure soil strength parameters. Soil lithology and strength parameters have been determined. The final component is to estimate long term groundwater levels. The estimated long term groundwater levels will also inform the wet basement study to determine if private or public infrastructure will be impacted. Once this analysis is complete, a report summarizing the findings will be completed. Estimated reporting date in August 30, 2023.

### Activity 2

Activity 2 stands at approximately 75% complete with all initial field and laboratory work completed. Groundwater elevations have been monitored in the installed wells since May 2022. This data combined with the water level data collected in the St James Pit and surrounding water bodies is being used to calibrate a Modflow model. Once the model is sufficiently calibrated, a groundwater flux and future water levels can be estimated. This will inform the slope stability model, be used to assess the wet basement study and inform if a surface outflow is likely and what flow is estimated. The groundwater model is expected to be calibrated and functional by the end of June 2023 at which point final reporting for the project will begin. It is possible that additional field work will be completed, specifically, installing additional wells if additional data seems needed while conducting the modelling effort. These additional wells would be installed in July 2023 if deemed necessary.

### Dissemination

The primary consultant NTS has worked with the Minnesota DNR and the City of Aurora throughout the project, providing updates regarding progress, budget, and timeline throughout the project. A final report will be completed summarizing the findings of the study for both Activities 1 and 2 and will be submitted to all parties. Additionally, a presentation is expected to be prepared for sharing with the stakeholders and any other interested persons regarding the historical research completed, study details and findings.

# Status Update Reporting

## Status Update December 1, 2022

**Date Submitted:** February 22, 2023

**Date Approved:** March 6, 2023

### Overall Update

These efforts will protect, preserve, conserve and enhance the water quality of the St. James Pit, the aquifer, and the discharge into the local river as well as fish populations who enjoy these waters. It is targeted especially to these waters and the pit that was substantially impaired. This effort will provide strategies that include citizens and the community in these scientific efforts. It is specifically designed to mitigate the impacts resulting from artificial hydrological modifications and its effects on the drinking water of the community. The outflow work will prevent and reduce the levels of potential contaminants in surface waters.

### Activity 1

- Solicit services for engineering firm to complete Project Activities. (COMPLETE)
- Conduct project kick-off meeting (COMPLETE)
- Create work plan that includes completing borings to acquire geotechnical parameters, surveying the existing pit wall, and creating a 2D model to assess Pit wall stability (WORK PLAN AND BORINGS ARE COMPLETE, MODEL IS INITIALLY COMPLETE, SURVEY WILL BE DONE IN SPRING)
- Solicit sub-contractor services for drilling activity (COMPLETE)
- Conduct historical research to better understand of pre-mining (early 1900s) conditions and water levels (COMPLETE)
- Drill 2 borings to bedrock at the proposed locations. Collect continuous soil samples and geotechnical parameters. (COMPLETE)
- Complete geotechnical lab analyses and determine appropriate soil parameters for stability analysis. (COMPLETE)
- As of 2/22/23 Activity sits at roughly at 75% complete and is on pace to be 100% by September 30th 2023.

### Activity 2

- Solicit services for engineering firm to complete Project Activities. (DONE)
- Create work plan that includes overburden and bedrock well installations (DONE FOR THIS PROJECT, MODEL WILL CREATE DATA POINTS TO TARGET AND DRILL FOR FUTURE TESTING)
- Set meeting to discuss/revise work plan with MNDNR (DONE)
- Solicit sub-contractor services to complete bedrock drilling and well installation. (COMPLETE)
- Conduct Historical research of LTV documentation and public record to better understand pit bathymetry, historic pump records, existing monitoring wells that may be useful, etc. (COMPLETE)
- Create baseline MODFLOW model of surface and estimated bedrock surfaces to begin filling in aquifer parameters as data is gathered. (COMPLETE)
- Install 1 bedrock well and 3 surface wells. Done
- Conduct laboratory testing of collected soil samples from drilling. (COMPLETE)
- Purchase and Install pressure transducers in installed wells and relevant waterbodies to monitor water levels. (COMPLETE)
- Create initial steady-state run of MODFLOW model with all gathered data incorporated including soil stratigraphy, bedrock geologic units, hydraulic conductivity measurements, water level data, observation well data, historical

topography, mining, and exploration well data included. (IN PROGRESS, EXPECTED COMPLETION DATE APRIL 30TH, PROJECT FULLY COMPLETE BY SEPTEMBER 23)

**Dissemination**

All study results to date have been shared with the East Range Joint Powers Board, Department of Iron Range Resources, Minnesota Department of Natural Resources and other stakeholders. (DONE)

The City has regular project meetings. Documentation of these meetings are developed in the form of meeting minutes that are presented and approved by the City Council. All council meetings are public and reports discussed are available to the general public. (ONGOING)

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the ENRTF Acknowledgement Guidelines. (ONGOING)

- As of 2/15/23 there are no plans to disseminate info yet as projects are at 75% complete. This will be done at a later date.

# Status Update Reporting

## Status Update June 1, 2022

**Date Submitted:** February 22, 2023

**Date Approved:** March 6, 2023

### Overall Update

The City of Aurora has solicited the services of the engineering firm Northeast Technical Services, Inc. (NTS) located in Virginia, MN to complete the project activities.

### Activity 1

NTS was solicited for engineering services. A project kick off meeting was conducted and a work plan was created that includes borings surveying and creating a 2D model to assess Pit wall Stability. A subcontractor was secured by NTS to do the drilling activity. Historical research was completed to better understand pre-mining conditions and water levels. 2 borings were drilled to bedrock at the proposed locations, soil samples were collected. Activity 1 is about 50% complete.

### Activity 2

NTS created a work plan that includes overburden and bedrock well installations. A meeting was set to discuss revise the work plan with the MNDNR. NTS solicited a subcontractor to complete bedrock drilling and well installation. Historical research was completed of LTV documentation and public record to better understand pit bathymetry, historic pump records and existing monitoring wells that may be useful. A baseline model was created for surface and estimated bedrock surfaces to begin filling in aquifer parameters as data is gathered. 1 bedrock and 3 surface wells were installed. Laboratory testing of collected soil samples from drilling was completed. Activity 2 is about 50% complete.

### Dissemination

To date the city staff has met with NTS for project meetings for project kick off and 2 update meetings. The city staff and NTS also had a joint meeting with MNDNR staff to review the project and work collaboratively to address the work plan and progress.

The Aurora City Council has been given updates on the progress as well and to date no action has been necessary from them regarding the work.