Digital EGLE/USACE Joint Permit Application (JPA) for Inland Lakes and Streams, Great Lakes, Wetlands, Floodplains, Dams, Environmental Areas, High Risk Erosion Areas and Critical Dune Areas

version 1.26

(Submission #: HPB-72AQ-79WYR, version 1)

Details

Submission ID	HPB-72AQ-79WYR
Submission Reason	New
Status	In Process

Fees

Fee	$1,000.00
Payments/Adjustments	($1,000.00)
Balance Due	$0.00 (Paid)

Form Input

Instructions

To download a copy or print these instructions. Please click this link (recommended).

Contact Information

Applicant Information (Usually the property owner)

First Name Rob
Last Name *Wilson*

Organization Name
AMC-WSG LLC

Phone Type	Number	Extension
Business	8103276251	

Email
rwilson@midmichiganmaterials.com

Address
6966 FISHER RD
JEDDO, MI 48032

Is the Property Owner different from the Applicant?
No

Has the applicant hired an agent or cooperating agency (agency or firm assisting applicant) to complete the application process?
No

Are there additional property owners or other contacts you would like to add to the application?
No

Project Location

DEQ Site Reference Number (Pre-Populated)
-364992431144697778

Project Location
42.3418,-83.6836

4984 EARHART RD, ANN ARBOR, MI

Project Location Address
> 4984 EARHART RD
> ANN ARBOR, MI 48105

County
Washtenaw

Is there a Property Tax ID Number(s) for the project area?
Yes
Please enter the Tax ID Number(s) for the project location
I-09-01-200-002

Is there Subdivision/Plat and Lot Number(s)?
No

Is this project within Indian Lands?
No

Local Unit of Government (LUG)
Ann Arbor Charter Township

Directions to Project Site
Take Earhart Road north from city limits of Ann Arbor approx two miles. Driveway to Vella is on your right (east).

Background Information

Has the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and/or United States Army Corps of Engineers (USACE) conducted a pre-application meeting/inspection for this project?
No

Has the EGLE completed a Wetland Identification Program (WIP) assessment for this site?
No

Environmental Area Number (if known):
none

Has the United States Army Corps of Engineers (USACE) completed either an approved or preliminary jurisdictional determination for this site?
No

Were any regulated activities previously completed on this site under an EGLE and/or USACE permit?
No

Have any activities commenced on this project?
Yes
Describe the activities.
Historic sand and gravel mining since 1956.

Is this an after-the-fact application?
Yes

Are you aware of any unresolved violations of environmental law or litigation involving the property?
Yes
Please Explain
Notice of Violation VN-014898-Part 31, Part 91, Part 301, Part 303, and Part 327, being resolved

Is there a conservation easement or other easement, deed restriction, lease, or other encumbrance upon the property?
No

Are there any other federal, interstate, state, or local agency authorizations associated with this project?
Yes

List all other federal, interstate, state, or local agency authorizations.

Agency	Type of Approval	Number	Date Applied	Approved/Denied/Undetermined
Washtenaw County	Part 91	28-20	10/12/2020	Approved
Ann Arbor Twp	Conditional Use Permit	n/a	10/12/2020	Approved
Washtenaw County	PPP	n/a	2/15/2021	Undetermined
Ann Arbor Twp	Stormwater Maint. Agreement	n/a	10/12/2020	Approved
EGLE	NPDES Permit	MIG490349	10/7/2021	Approved
EGLE	Groundwater Discharger Permit	GW1540096	10/29/2020	Approved
EGLE	General Air Permit to Install	131-23	09/21/2023	Approved

Comments
The Washtenaw County PP Program has been on hold. According to their web site it will be into 2024.

Permit Application Category and Public Notice Information

Indicate the type of permit being applied for.
Individual Permit for all other projects

This type of permit application requires that you include contact information for the adjacent landowners to this project. If you are only entering in a small number of bordering parcel owners contact information, please select "Enter list of recipients". If there is a rather large number of affected property owners such as a project that significantly affects lake levels, please upload a spreadsheet of the property owners. Please include names and mailing addresses.
Upload a list.

Uploads/Attachments

MMM Vella-Pit.Adjacent Property List.pdf - 11/22/2023 08:08 AM
Comment
Attachments includes list of adjacent landowners' names, parcel numbers, and orientation from the project location.

Project Description

Project Use: (select all that apply - Private, Commercial, Public/Government/Tribal, Receiving Federal/State Transportation Funds, Non-profit, or Other)
Private
Commercial

Project Type (select all that apply):
Mining - Sand and Gravel

Project Summary (Purpose and Use): Provide a summary of all proposed activities including the intended use and reason for the proposed project.
Ponds created as a result of historic sand and gravel mining. Groundwater used to wash sand and gravel during materials processing. Site has been an active sand and gravel mine since the 1950s. Post mining/restoration activity includes creating a lake and future residential use.

Project Construction Sequence, Methods, and Equipment: Describe how the proposed project timing, methods, and equipment will minimize disturbance from the project construction, including but not limited to soil erosion and sedimentation control measures.
In 2020, Mid Michigan Materials (MMM) purchased the Vella Pit in Ann Arbor Township. MMM obtained necessary local permits (see list above) and various state-required permits. In 2022, MMM reinforced the berms for Pond 1. This resulted in Pond 1 expanding to over five acres when additional water was added. Pond 1 is also located within 500 feet of wetlands and a tributary of Fleming Creek on the north side of the MMM property. MMMs is mining sand and gravel from the active pit. Vella Pit has been mined since 1956: many years prior to MMM's purchase.

Pond 3 surface water acreage has grown since pumping ceased in October 2023. While Vella Pit has an EGLE NPDES permit to discharge mining wastewater to a tributary of Fleming Creek north of Pond 1, on October 10, 2023 Ann Arbor Township claimed the discharge was in violation of the Conditional Use Permit and required that pumping be discontinued immediately. As a result, Pond 3 has grown larger than five acres very quickly after pumping ceased. Removal of sand, gravel and associated overburden continues through mechanical means.

MMM intends to continue mine activities for up to another 20 years. No wetland or floodplain impacts are proposed.
Construction Details
Schedule: Construction Activities took place between 2021 and 2023 (present)

Sequencing: The sequencing below encompasses the overall approach to lake expansion:
– Construction Access and Excavation Planning: Mine roads are used to access Pond 1 and Pond 3. Typical mining sequence includes clearing vegetation and debris and reinforcing parking/working areas, as necessary, with crushed stone or gravel.
– Sediment Control Measures: Silt fencing is typically installed prior to clearing vegetation. MMM also uses stormwater berms to contain stormwater and reduce discharge of earthen materials off Site.
– Land Clearing and Grading: pit expansion has been ongoing since 2021. Dewatering commenced in mid-2022 to access additional sand and gravel material.
– Expansion of Erosion Control Measures: Erosion control measures are adjusted to accommodate the changing excavation extents, including the reinforcing of any berms or embankments. For example, significant improvements to erosion control were installed along the north berm of Pond 1, in September/October 2023 (approved by EGLE).

Mining Methods: excavation of sand and gravel through use of earthmoving machinery. SESC measures during excavation and stockpiling included the installation of erosion control fencing. Security improvements included installation of a high-wall chain link fence around the entire site. Additional SESC measures included planting grass and installation of double-mesh straw blankets along the north berm of Pond 1. Finally, additional stone was placed at the NPDES outfall location.

Equipment Used: Earthwork was completed with machinery including excavators, front-end loaders and off-road haul trucks.

Project Alternatives: Describe all options considered as alternatives to the proposed project, and describe how impacts to state and federal regulated waters will be avoided and minimized. This may include other locations, materials, etc.
Alternatives to expansion of Pond 3 were considered as part of the planning process for mine expansion. The first option considered was not expanding the lake, and in stead discharging dewatering volumes off-site through the NPDES outfall. This option was initially selected when the permit was received, but later discontinued at the request of Ann Arbor Township. Currently no dewatering is occurring, and there is no discharge through the NPDES outfall.

Project Compensation: Describe how the proposed impacts to state and federal regulated waters will be compensated, OR explain why compensatory mitigation should not be required for the proposed impacts. Include amount, location, and method of compensation (i.e., bank, on-site, preservation, etc.)
No major impacts are anticipated as a result of the lake expansion. The activities on Site are not expected to impact the wetlands nor 100 year floodplain. Existing water management systems are in place to ensure water retention and prevent discharges of excess water. No additional mitigation is anticipated.

Upload any additional information as needed to provide information applicable to your project regarding project purpose sequence, methods, alternatives, or compensation.
NONE PROVIDED
Comment
NONE PROVIDED

Resource and Activity Type

SELECT THE ACTIVITIES from the list below that are proposed in your project (check ALL that apply). If you don't see your project type listed, select "Other Project Type". These activities listed require additional information to be gathered later in the application.
Other Project Type

The Proposed Project will involve the following resources (check ALL that apply).
Inland Lake (open water greater than 5 acres in size)
Pond (open water less than 5 acres in size)

Pond Information

What is the surface area of the pond? (acres)
5

Identify all resources impacted by the proposed pond.
Pond located within 500 feet of a lake or stream

Major Project Fee Calculation Questions

Is filling of 10,000 cubic yards or more proposed (cumulatively) within wetlands, streams, lakes, or Great Lakes?
No

Is dredging of 10,000 cubic yards (cumulatively) or more proposed within streams, lakes, or Great Lakes? (wetlands not included)
No

Is new dredging or adjacent upland excavation in suspected contamination areas proposed by this application?
No

Is a subdivision, condominium, or new golf course proposed?
No

Inland Lake Project Information (1 of 1)

Lake Name
Unnamed pond (Pond 3)

Water elevation reference* (show elevation on plans with description):
Other: NAD `83. Surface water elevation varies seasonally and by plant needs.

Ordinary High Water Mark (OHWM) elevation (feet):
867

Date of observation (M/D/Y)
11/20/2023

Inland Lake average water depth at activity location in a normal year (feet):
15

What length (feet) does the project activity(ies) extend waterward of the OHWM?
20

How far from water (at the OHWM) onto the land will the project extend? (E.g. a boat well that is dug into the shoreline 20 feet extends 20 feet landward)
40

Describe any measures used to retain sediment:
Gate valve at outfall 001A in Pond 1 is closed. No discharge to surface waters.

Will a turbidity curtain be used during the proposed project?
No

Inland Lakes, Great Lakes and Stream Impacts (1 of 1)

The following impact description applies to: (select only one at a time, duplicate this entire section if there are impacts to multiple waterbody types):
Inland Lake

Acres of Inland lake/Great Lake affected by your project below the Ordinary High Water Mark:

Category	Acres
Permanent	60
Temporary	0
	Sum: 60

Select from the following list all Fill Activities (select all that apply to this waterbody impacted):
No fill

Activities Involving Dredging or Excavation: Select from the following list for Excavation/Dredge Activities (select all that apply to this waterbody impacted):
Pond Excavation/Creation
Lake Creation
General Dredging New (lakes, stream, Great Lakes below OHWM)

Projects involving Excavation/Dredging below the Ordinary High Water Mark:

Activity	Length (feet)	Width (feet)	Depth (feet)	Area (square feet)	Volume (cubic feet)	Volume (cubic yards)	Corrected value for complex impact Areas (square feet)
Mining	1743	1500	40	2614500	104580000	3873333	NONE PROVIDED
				Sum: 2614500	Sum: 104580000	Sum: 3873333	Sum: NaN

Has this area been previously dredged?
Yes
describe:
On-going sand and gravel mining

Date the area was previously Dredged:
06/01/1956

Permit Number under which previous dredging was authorized:
none

Previous Owner's Name
Washtenaw Sand and Gravel

Will the previously dredged area be enlarged?
Yes

Is long-term maintenance dredging proposed?
No

What is the method used to be dredged?
Mechanical

Has the dredge material been tested?
No

Bottom dredge elevation determined by?
Water level

Height difference between surface of water and bottom dredge elevation?
15

Date water elevation was used?
10/23/2023

Water source for lake/pond?
Groundwater

Spoils Disposal

Will the excavation/dredge spoils be disposed of on site or off site?
On site

Has the there been a hydrologic study performed on the site?
Yes

Provide a copy of the Hydrologic Study.
2023-1129_HAMI_MMM_VellaPit_Hydrogeolgical_Investigation_Report_F.pdf - 11/29/2023 03:45 PM
Comment
NONE PROVIDED

If your project includes STRUCTURES then select all of the proposed activities in the following list. If your activity is not shown, then select "None of the Above" and move to the next question. Only enter an impacted area in one of the impact tables (do not duplicate impact entries).:
None of the above

If your project includes Other Activities not listed in this section, then select from the proposed activities in the following list. If your activity has not been listed in this Section, then select "Other" and enter a description of your activity. Only enter an impacted area in one of the impact tables (do not duplicate impact entries). If you selected a Fill, Excavation/Dredging, or Structure activity above in this section, but do not have an activity listed as Other, then select None of the Above for this question.
None of the above

Does the proposed project include mitigation?
none

Upload of Proposed Site Plans

Required on all Site Plan uploads. Please identify that all of the following items are included on your plans that you upload with this application.

Site Plan Features	Existing and Proposed Plan Set
Scale, Compass North, and Property Lines	Yes
Fill and Excavation areas with associated amounts in cubic yards	Yes
Any rivers, lakes, or ponds and associated Ordinary High Water Mark (OHWM)	Yes
Exterior dimensions of Structures, Fill and Excavation areas associated with the proposed project	Yes
Dimensions to other Structures and Lot Lines associated with the project	Yes
Topographic Contour Lines from licensed surveyor or engineer when applicable	Yes

Upload Site Plans and Cross Section Drawings for your Proposed Project
0207666_VELLA_PIT_PERMIT_APP_11x17.pdf - 11/29/2023 01:34 PM
Comment
NONE PROVIDED

Additional Required and Supplementary Documents
NONE PROVIDED
Comment
NONE PROVIDED

Fees

Individual Permit Fee:
+$1000.00

Total Fee Amount:
$1000.00

Is the applicant or landowner a State of Michigan Agency?
No

Attachments

Date	Attachment Name	Context	User
11/29/2023 3:45 PM	2023-1129_HAMI_MMM_VellaPit_Hydrogeolgical_Investigation_Report_F.pdf	Attachment	Leslie Nelson
11/29/2023 1:34 PM	0207666_VELLA_PIT_PERMIT_APP_11x17.pdf	Attachment	Leslie Nelson
11/22/2023 8:08 AM	MMM Vella-Pit.Adjacent Property List.pdf	Attachment	Brett Schwen

Status History

	User	Processing Status
8/24/2021 11:20:24 AM	Leslie Nelson	Draft
11/29/2023 3:47:32 PM	Leslie Nelson	Submitting
11/29/2023 3:47:50 PM	Leslie Nelson	Submitted
11/29/2023 3:47:52 PM	Leslie Nelson	In Process

ATTACHMENT A
Hydrogeology Investigation Report

HALEY ALDRICH

www.haleyaldrich.com

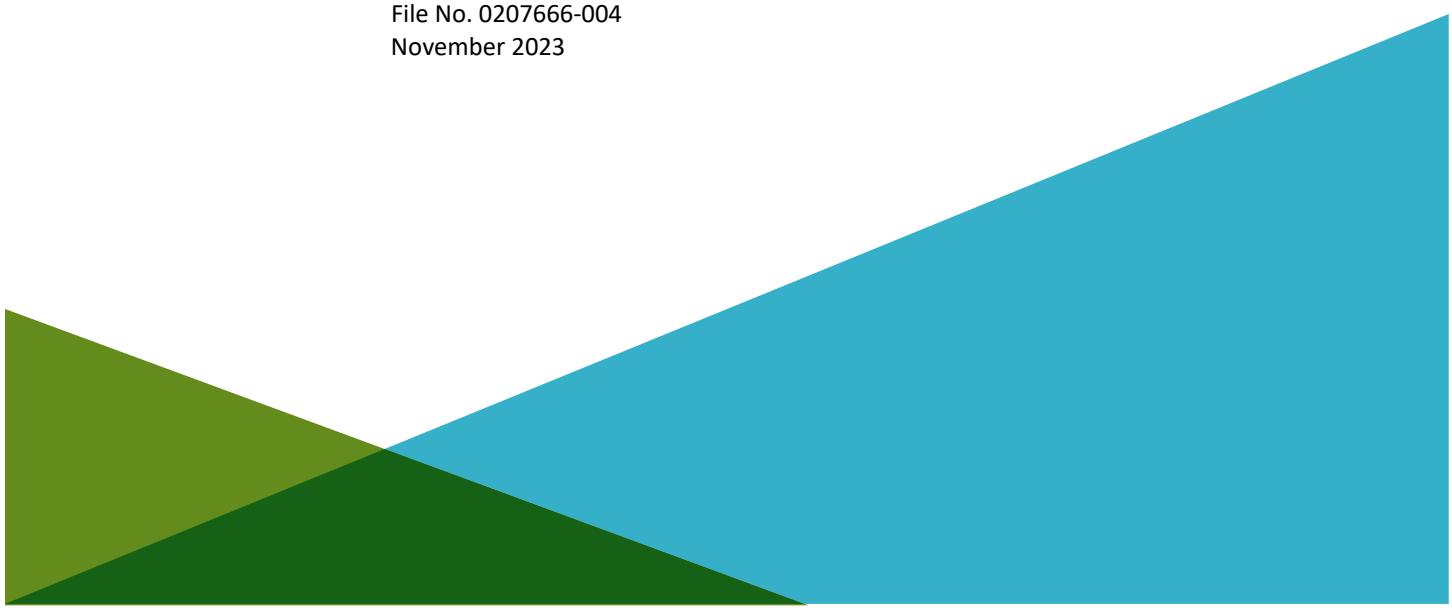
REPORT ON

VELLA PIT HYDROGEOLOGICAL INVESTIGATION
4984 EARHART ROAD
ANN ARBOR TOWNSHIP, MICHIGAN

by
Haley & Aldrich of Michigan, Inc.
Ann Arbor, Michigan

for
Mid Michigan Materials
Jeddo, Michigan

File No. 0207666-004
November 2023



HALEY & ALDRICH OF MICHIGAN, INC.
455 E. Eisenhower Parkway
Suite 210
Ann Arbor, MI 48108
734.887.8400

29 November 2023
File No. 0207666-004

Mid Michigan Materials
6966 Fisher Road
Jeddo, Michigan 49032

Attention: Mr. Robert Wilson

Subject: Vella Pit Hydrogeological Investigation
4984 Earhart Road
Ann Arbor Township, Michigan

Dear Mr. Wilson:

Haley & Aldrich of Michigan, Inc. has prepared this Hydrogeological Investigation Report on behalf of Mid Michigan Materials, for the Vella Pit Sand and Gravel Mine location at 4984 Earhart Road, Ann Arbor Township, Michigan (Site). This report summarizes the results and findings of the Hydrogeological Investigation at the Site.

Sincerely yours,
HALEY & ALDRICH OF MICHIGAN, INC.

Nicholas W. Schaffer
Senior Environmental Scientist

Sylvan Long
Senior Project Manager, Hydrogeologist

Leslie M. Nelson, P.E.
Senior Environmental Engineer

Enclosures

HALEY & ALDRICH OF MICHIGAN, INC.
455 E. EISENHOWER PARKWAY
SUITE 210
ANN ARBOR, MI 48108
734.887.8400

SIGNATURE PAGE FOR

REPORT ON

VELLA PIT HYDROGEOLOGICAL INVESTIGATION
4984 EARHART ROAD
ANN ARBOR TOWNSHIP, MICHIGAN

PREPARED FOR

MID MICHIGAN MATERIALS
JEDDO, MICHIGAN

PREPARED BY:

Nicholas Schaffer
Senior Environmental Scientist
Haley & Aldrich of Michigan, Inc.

REVIEWED AND APPROVED BY:

Sylvan Long
Senior Project Manager, Hydrogeologist
Haley & Aldrich of Michigan, Inc.

Leslie M. Nelson, P.E.
Senior Environmental Engineer
Haley & Aldrich of Michigan, Inc.

Table of Contents

Page

List of Tables ii
List of Figures ii
List of Appendices ii

1. Introduction and Site Background 1

1.1 SITE LOCATION 1
1.2 SITE DESCRIPTION 1
1.3 HISTORICAL/ONGOING/PROPOSED ACTIVITIES 1
1.4 CLIMATE 1
1.5 SURFACE WATER HYDROLOGY 2
1.5.1 Wetlands & Streams 2
1.5.2 Lakes 2
1.5.3 Site Ponds 2
1.5.4 Stormwater 2
1.6 REGIONAL GEOLOGIC SETTING 2
1.7 SITE GEOLOGY 3
1.7.1 Overburden 3
1.7.2 Bedrock 3
1.8 GROUNDWATER 3

2. Field Investigations 4

2.1 TEST BORINGS AND MONITORING WELLS 4
2.2 STAFF GAUGES 4
2.3 SURVEYING 4
2.4 WATER LEVEL DATA COLLECTION AND PROCESSING 4

3. Data Analysis 6

3.1 GEOLOGIC CROSS SECTIONS 6
3.2 WATER ELEVATIONS 6
3.3 COMPARISON WITH GROUNDWATER MODEL RESULTS 8

4. Summary and Conclusions 9

References 10

List of Tables

Table No.	Title
I	Summary of Monitoring Wells
II	Summary of Staff Gauges
III	Groundwater and Surface Water Elevation Measurements

List of Figures

Figure No.	Title
1	Site Locus
2	Regional Setting
3	Detailed Site Map
4	Monitoring Well and Surface Water Gauge Locations
5A	Geologic Cross Section Locations
5B	Geologic Cross Section A-A’
5C	Geologic Cross Section B-B’
5D	Geologic Cross Section C-C’
6A	Groundwater Potentiometric Surface Map – 3 November 2023
6B	Groundwater Potentiometric Surface Map – 20 November 2023

List of Appendices

Appendix	Title
A	Boring Logs and Well Installation Reports
B	Monitoring Well and Staff Gauge Pressure Transducer Data
C	2 October 2023 Aerial Survey
D	Preliminary Groundwater Potentiometric Surface Contour Maps

1. Introduction and Site Background

Haley & Aldrich of Michigan, Inc. (Haley & Aldrich) conducted a hydrogeological investigation at the Mid Michigan Materials Vella Pit sand and gravel mine located at 4984 Earhart Road, Ann Arbor Township, Washtenaw County, Michigan (Site). The purpose of this Report is to present available data that characterizes the Site geology, hydrology, and hydrogeology.

1.1 SITE LOCATION

The Site is an active sand and gravel mine located in the northern one-half of Section 1, Township 2 South, Range 6 East in Washtenaw County, Michigan as shown in Figure 1. The Site is bounded to the north by Joy Road and residential properties, to the south and east by residential properties, and to the west by Earhart Road and residential properties. Land use adjacent to the Site is primarily forest, agricultural, and low-density residential. Some sections of the Site parcel are forested or used for agricultural purposes.

1.2 SITE DESCRIPTION

The Site is situated on a topographic high which stands approximately 100 feet higher than much of the surrounding area, as shown in Figure 1. The Site parcel encompasses approximately 142 acres of land; however, the current extent of the mining operates in approximately 75 acres. Wetlands exist in the lower-lying forested areas of the Site along the north and northeastern portions of the parcel, outside of the extent of mining. There is also an unnamed creek and lake which are tributaries of Fleming Creek located to the south of the Site (Figure 2).

1.3 HISTORICAL/ONGOING/PROPOSED ACTIVITIES

Sand and gravel have been mined at the Site since operations began in 1956. Current activities at the Site include mining and production of washed sand and stone. Dewatering of the mining pit has been done to facilitate mechanical surface mining, including previously lowering the water table in the mine by approximately 29 feet. The reserve material is mechanically mined (by excavator or front-end loader) and hauled to the wash plant. The wash plant washes and sizes the material into usable finished product. Finished product is stockpiled on-site and is hauled via truck by the consumer. Water from the wash plant flows via gravity to one of the on-site settling ponds (Pond 4) and is recirculated for use at the wash plant (Figure 3).

The mine pit dewatering pump (in Pond 3) was shut off on 10 October 2023, prior to the completion of monitoring well installation and collection of the groundwater measurements included in this Report. Groundwater conditions observed and reported herein therefore represent transient conditions as the aquifer responds to shutting off the dewatering pump.

1.4 CLIMATE

Washtenaw County has a well-defined seasonal climate and is influenced by the Great Lakes. Frequent weather changes come from the passing of weather fronts and associated low and high centers of air pressure across the region. Winds are typically from the southwest, but during the winter months are dominantly from the northwest. The mean average temperature normal is 48.8 degrees Fahrenheit (°F); the mean low temperature normal is 16.2°F in January and the mean high temperature normal is 83.7°F

in July. The total annual precipitation normal for the county is approximately 38 inches (National Oceanic and Atmospheric Administration, 2023).

1.5 SURFACE WATER HYDROLOGY

1.5.1 Wetlands & Streams

In the north and northeast portions of the Site, a belt of forest/shrub wetlands drains to Massey Lake via an unnamed tributary of Fleming Creek running from the northwest to the southeast as shown in Figure 2. Massey Lake drains south into another belt of forest/shrub wetlands, which subsequently drain into Fleming Creek.

1.5.2 Lakes

There are a number of small lakes and ponds in the vicinity of Vella Pit. Some of these are natural, while others are artificial or artificially supplemented by groundwater pumped from residential wells. Massey Lake, the largest in the area, is situated on privately owned property to the east of the Site and receives water from the abovementioned unnamed creek. This lake drains to Fleming Creek as shown in Figure 2.

1.5.3 Site Ponds

There are four ponds created by mining (Ponds 1 through 4) at the Site as shown in Figure 3. Pond 1 is the northernmost pond and is the location of the Site's National Pollution Discharge Elimination System permitted outfall[1]. Pond 2 is south of Pond 1 and north of Pond 3, collecting pumped groundwater from Pond 3 during dewatering activity and supplying the wash plant with water. Pond 3 comprises a large portion of the mining pit area south of Pond 2 and was previously dewatered to facilitate mining operations. Pond 4 is east of Pond 3 and acts as the initial settling basin for fines originating from the wash plant, before water returns to Pond 3.

1.5.4 Stormwater

Stormwater at the Site is designed to remain within the mining area. Historically, some of the stormwater berms were not vegetated, resulting in some material leaving the mine area during large rainfall events. However, those berms were hydroseeded and covered with erosion control blankets in September and October 2023 to correct this issue.

1.6 REGIONAL GEOLOGIC SETTING

The topography of Washtenaw County is typical of an area that has been glaciated. The northwest portion of the county is relatively hilly and contains numerous lakes and wetlands that are interconnected or flow through wide swampy valleys. In the southeast, the elevation of the land surface decreases as the soils shift from glacial moraine deposits to lakebed deposits. Between these two topographically different areas, local steepening of the land surface marks the shoreline of former glacial lakes. In the northeast part of the county, subsurface glacial tills and end moraine deposits of clay, sand, and gravel can reach up to 250 feet thick. Throughout most of the county, glacial deposits are underlain by the Coldwater Shale, except in the western part where they are underlain by the Marshall Sandstone, and in the southeastern part, where they are underlain by Paleozoic limestone (Fleck, 1980).

[1] While this outfall is permitted, there is currently no discharge from the outfall.

1.7 SITE GEOLOGY

1.7.1 Overburden

Vella Pit is situated in an area of Washtenaw County dominated by fine to medium textured glacial tills and end moraines (Farrand and Bell, 1982). The main sand and gravel body mined at Vella Pit is a localized lens of coarse glacial outwash surrounded above and below by clay-rich strata. The overlying fine-grained strata is likely clay till based on its heterolithic characteristics, while the underlying fine-grained strata is likely either a till or lacustrine deposit. For purposes of this study, both fine grained units are referred to as tills. Soils classified during soil boring activities were found to be consistent with this description and are described in more detail in Section 3.1. A review of publicly available driller's logs from nearby domestic water wells and two water supply wells on the Site indicates that a deeper (>200 feet depth) gravel unit is present beneath the lower till unit described above. The thickness of this gravel unit was not identified based on review of the domestic water well logs.

1.7.2 Bedrock

Bedrock was not encountered in borings advanced at the Site. A small number of domestic water wells in the area have been installed as open-hole completions in a sandstone or an unspecified but presumably productive consolidated formation encountered between approximately 240 and 270 feet below ground surface (bgs). This is most probably a sandy member of the Coldwater Shale, which has been previously noted as a sporadic, minor drinking water resource in Eastern Washtenaw County (Fleck, 1980). The State of Michigan Department of Environment, Great Lakes, and Energy (EGLE) Water Well Viewer (https://www.mcgi.state.mi.us/waterwellviewer/) also notes one private geothermal well on Joy Road initially advanced into a sandstone at 296 to 460 feet bgs; this was reported to be dry and the bedrock portion of the well was plugged with neat cement. Based on depth and geographic location, this was likely the Berea Sandstone which is not considered a drinking water resource in this part of Michigan.

1.8 GROUNDWATER

Review of nearby domestic water well logs indicates that the upper sand and gravel unit described in Section 2.7.1 is used as a drinking water source by several nearby properties (the "Upper Aquifer"). Soil borings at the Site encountered this unit at thicknesses ranging from 81 feet in the southwest of the Site to 3 feet in the northeast. Other nearby residential and community water supply wells withdraw water from the deeper (>200 feet depth) gravel unit (the "Lower Aquifer"). The thickness of the Lower Aquifer is unknown as most wells producing from the deep aquifer do not fully penetrate that unit. The Upper Aquifer dips gently towards the south, while the Lower Aquifer appears nearly horizontal. The Upper Aquifer is likely under confined conditions where fully saturated and overlain by clay till, although the static water level in some driller's logs indicates that it may not be fully saturated in all locations. Primary recharge of the Upper Aquifer likely occurs where the main body of the coarse-grained sediments are at or near the ground surface in low lying areas, such as the Site and portions of the wetlands to the north and east of the Site. Removal of the clay overburden at the Site likely created or expanded the Upper Aquifer recharge area at the Site. The Lower Aquifer is confined, and the primary recharge area has not yet been identified. No evidence reviewed to date suggests the two aquifers are in hydraulic communication. The lateral extent of both aquifers has not yet been fully delineated, although review of nearby publicly available drillers logs suggests a stratigraphic pinch-out of the Upper Aquifer south of Warren Road and that the Lower Aquifer may not extend east past Dixboro Road.

2. Field Investigations

2.1 TEST BORINGS AND MONITORING WELLS

To collect additional data regarding geology and hydrogeology at the Site, five soil borings were installed from 2 to 11 October 2023, in the locations shown on Figure 4. The soil borings were advanced using sonic drilling methods and continuously sampled to the top of the intermediate clay unit separating the Upper and Lower Aquifers. Soil from the borings was logged and classified, including material descriptions and the presence of saturated or wet zones on the boring log (Appendix A), by an on-site Haley & Aldrich geologist. Upon reaching the target clay unit, the borings were converted to permanent 2-inch polyvinyl chloride PVC monitoring wells with gravel-packed screens set immediately above the clay unit, sealed in the annular space with bentonite clay and grout to the surface. The monitoring wells were constructed with 5-foot screens, except MW-5 which was constructed with a 10-foot screen to accommodate anticipated lower yield based on field observations during drilling. These observations indicated that the Upper Aquifer was thinner and contained finer grained material at this location compared with the others (see boring logs in Appendix A). Surface completion consisted of a concrete pad and stick-up protective casing. Monitoring wells were developed until the water was visibly clear after grouting. Total boring depth, well depth, and well construction information is summarized in Table I.

2.2 STAFF GAUGES

To collect water level data in on-site ponds, the wetlands in the northern portion of the Site, and the nearby unnamed stream on the Site; seven staff gauges with attached PVC stilling wells were installed as shown on Figure 4. Staff gauges consisting of a vertical scale measured in tenths of a foot were attached to a metal stake and driven into pond sediment or into the ground to visually measure water level at the five locations, with the exception of Pond 3. Pond 3 has three separate gauges to accommodate a larger range of water level elevations resulting from shut off of the dewatering pump in this pond. Additionally, a PVC pipe with drilled openings was attached to each stake to act as a stilling well for water level data collection via pressure transducer, with the exception of Pond 3, where a guidewire was installed to facilitate access and placement of a transducer in the pond from a higher elevation. Installation of the pressure transducers is described in detail in Section 3.4. Staff gauge construction information is summarized in Table IB.

2.3 SURVEYING

A licensed surveyor surveyed monitoring well locations, ground surface elevations, and top of riser elevations at each monitoring well. Surveyors also measured locations and top of gauge elevations at each staff gauge. The surveyed elevations are included in Table I and Table II.

2.4 WATER LEVEL DATA COLLECTION AND PROCESSING

Haley & Aldrich personnel measured depth to water in each monitoring well manually from a known reference point on the top of the PVC casing using an electric water level meter. Water levels at staff gauges were measured by observing the height of water on the staff gauge ruler. Groundwater potentiometric surface elevations were calculated by subtracting the depth to water in each monitoring from the elevation of the surveyed reference point on the monitoring well's PVC casing. Surface water

elevations were calculated by comparing the height of water on the staff gauge ruler to a surveyed reference point on the staff gauge ruler.

To obtain a more continuous record of water levels, Haley & Aldrich personnel installed In-Situ LevelTroll 400 unvented pressure transducers in the monitoring wells and staff gauge stilling wells. The transducers were calibrated to manual water level measurements and programmed to collect water column depth readings at 15-minute intervals. To correct for the influence of barometric pressure on the unvented pressure transducers, barometric pressure readings were collected by a pressure transducer exposed to the atmosphere at the Site, and these pressure readings were subtracted from the transducer water level pressure readings during data processing. Transducer data were plotted and checked against manual measurements to confirm quality and accuracy of the data.

3. Data Analysis

3.1 GEOLOGIC CROSS SECTIONS

Cross sections were created from geology classifications made during soil boring activities and are provided as Figures 5A, 5B, 5C, and 5D. Interpolation of geologic units between soil borings indicate that the Upper Aquifer is generally overlain by a substantial clay unit, and exists in varying thicknesses across the Site, with varying percentages of fine-grained material. Geology encountered in soil borings at the Site was generally consistent with the description of overburden characteristics in this area as described in Sections 1.7.1 and 1.8. The Upper Aquifer was encountered in soil borings as unconsolidated sands and gravels: generally fine to coarse sands with low silt fractions and lenses of sand with higher gravel fractions. The Upper Aquifer was encountered at thicknesses ranging from 81 feet in the southwest of the Site (MW-2) to 3 feet in the northeast (MW-5). A clay unit was encountered below the Upper Aquifer, as expected based on geologic information available for the area (Section 2.7.1). Borings were terminated upon contacting the lower clay unit; therefore, the clay unit thickness was not evaluated during this investigation.

3.2 WATER ELEVATIONS

Groundwater potentiometric surface and surface water elevation measurements collected from manual readings are shown in Table III. Plots of pressure transducer readings at the monitoring wells and staff gauges are included as Appendix B.

Groundwater potentiometric surface elevations in monitoring wells MW-1, MW-2, MW-3, and MW-4 increased between deployment of pressure transducers on 13 October 2023 and the most recent measurements on 20 November 2023. From 17 October to 3 November 2023, groundwater potentiometric surface elevations in MW-1, MW-3, and MW-4 increased by 1.33 to 1.58 feet. The groundwater potentiometric surface elevation in MW-2 increased by 0.67 feet over the same period. From 3 to 20 November 2023, groundwater potentiometric surface elevations in MW-1, MW-3, and MW-4 increased by 0.93 to 1.17 feet. The groundwater potentiometric surface elevation in MW-2 increased by 0.36 feet over the same period. The increasing potentiometric surface elevations observed in these monitoring wells after shutdown of dewatering in Pond 3 suggests a hydraulic influence from the rising surface water elevation in Pond 3, which is discussed in more detail below.

The groundwater potentiometric surface elevation in MW-5 remained relatively stable over the same period, decreasing by 0.03 feet from 17 October to 3 November 2023 and increasing by 0.16 feet from 3 to 20 November 2023. This relatively stable elevation suggests a limited influence from rising surface water elevation in Pond 3.

Prior to the dewatering pump shut off on 10 October 2023, the surface water elevation of Pond 3 was approximately 858 feet above mean sea level (amsl), as indicated by the 2 October 2023 aerial survey included as Appendix C. By 3 November 2023, the Pond 3 water elevation had risen by approximately 7.6 feet from this prior elevation. By 20 November 2023, the Pond 3 water elevation had risen another 1.44 feet to 867.01 feet amsl, for a total increase of approximately 9 feet since 2 October 2023. The plot of surface water elevation in Pond 3 from 27 October to 20 November 2023 (Appendix B) shows a general rise in elevation over this period, with short-term fluctuations that appear to be associated with removal of sand and gravel material from below the water surface at the edge of Pond 3. A short-term

drop of approximately 1 foot occurred on 13 November 2023, which appears to be associated with temporary operation of the pump to supply the Site wash plant. The transducer data indicates that the Pond 3 water elevation recovered to above its elevation before the temporary drop by the evening of 13 November 2023.

Surface water elevations in Pond 1 and Pond 2 decreased by approximately 1.7 and 1.3 feet, respectively, between deployment of pressure transducers on 13 October 2023 and transducer measurements from 20 November 2023. The observed decrease in surface water elevation in these ponds is consistent with shutdown of the pump in Pond 3, which supplied water to Pond 2 that then flowed to Pond 1. As of 3 November 2023, surface water elevations in these ponds were approximately 33 feet higher than the groundwater potentiometric surface in the same location, indicating that the ponds are therefore not fed by groundwater. Field observations by Haley & Aldrich personnel indicate that clay has accumulated at the bottom of these ponds, likely limiting their permeability. However, the observed decrease in surface water elevations suggests that some infiltration from surface water to groundwater is occurring in these ponds.

Surface water elevations at the wetland and stream staff gauges exhibited short-term increases correlated with precipitation events (see plots in Appendix B). The wetland staff gauge location is typically dry except after precipitation events.

Groundwater potentiometric surface contour maps were generated from monitoring well measurements collected on 3 and 20 November 2023 (Figures 6A and 6B)[2]. The surface water elevation of Pond 3 was also used in contouring because this pond has a direct hydraulic connection with the surrounding saturated portion of the Upper Aquifer.

The 3 November 2023 potentiometric contours generally indicate that groundwater flows from northwest to southeast in the northern portion of the Site, and towards Pond 3 in the southern portion of the Site. The surface water elevation in Pond 3 on this date was approximately 0.7 and 0.4 feet lower than the groundwater potentiometric surface elevations in MW-3 to the south and MW-4 to the southeast, respectively.

The 20 November 2023 potentiometric contours also indicate groundwater flow from northwest to southeast in the northern portion of the Site. The surface water elevation in Pond 3 on this date was approximately 0.4 and 0.2 feet lower than the groundwater potentiometric surface elevations in MW-3 to the south and MW-4 to the southeast, respectively. While this surface water elevation is still lower than the groundwater potentiometric surface in the surrounding monitoring wells, indicating flow towards Pond 3, the smaller difference in elevations relative to those measured on 3 November 2023 indicates that Pond 3 is moving closer to equilibrium with the surrounding aquifer.

[2] A preliminary groundwater potentiometric surface map for the Site, generated from data collected on 17 October 2023 and submitted to EGLE on 27 October 2023, is included in Appendix D. These preliminary contours were created from water level information gathered prior to the installation of new Pond 3 staff gauges, after the initial Pond 3 staff gauge was fully submerged as a result of the shutdown of the dewatering pump. Because the surface water elevation of Pond 3 was not available and Pond 3 is a key data point for contouring in the southern portion of the Site, these preliminary contours represent a partial dataset and are not compared directly with the contours from subsequent rounds of measurement.

3.3 COMPARISON WITH GROUNDWATER MODEL RESULTS

A preliminary evaluation of hydrological and hydrogeological conditions at the Site, submitted to EGLE on 12 October 2023, included the results of preliminary groundwater modeling of the Site and surrounding area. The submittal included a preliminary potentiometric surface map based on modeled potentiometric surface elevations at the Site and an approximation of the potentiometric surface in the surrounding area based on recent static water level measurements collected from residential wells in July through August 2023. This preliminary potentiometric surface map, which is included in Appendix D, represented conditions prior to shutdown of dewatering in Pond 3.

This preliminary potentiometric surface map generally indicates groundwater flow from the northwest to southeast in the northern portion of the Site, and groundwater flow towards Pond 3 in the southern portion of the Site. These flow directions are consistent with those observed based on the potentiometric surface measurements from 3 and 20 November 2023; however, the preliminary potentiometric surface map indicates a larger difference (more than 3 feet) between the surface water elevation of Pond 3 and the modeled groundwater potentiometric surface elevation at the southern edge of the Site, near the current locations of MW-3 and MW-4. This is consistent with active dewatering conditions, where the elevation of Pond 3 was held lower by pumping and there would have been a greater hydraulic gradient towards Pond 3 within the surrounding portions of the Upper Aquifer. The groundwater potentiometric surface observed at MW-3 and MW-4 on 20 November 2023 was approximately 5 feet higher than the modeled potentiometric surface in this location, which is consistent with the general increase in groundwater and surface water elevations observed in this area since shutdown of dewatering.

4. Summary and Conclusions

Haley & Aldrich conducted a hydrogeological investigation at the Site to evaluate current groundwater and surface water conditions. The investigation included installation of five monitoring wells in the Upper Aquifer, staff gauges in three Site ponds, a staff gauge in Site wetlands, and a staff gauge in an unnamed Site stream. Manual measurements of depth to water in the monitoring wells and surface water height on staff gauges were collected and compared with surveyed reference points at these features to calculate groundwater potentiometric surface elevations and surface water elevations. Pressure transducers were installed in the monitoring wells and at staff gauge locations to provide a more continuous record of changes in groundwater potentiometric surface elevations and surface water elevations.

The dewatering pump at Pond 3 was shut down on 10 October 2023, during installation of the monitoring wells, and the investigation therefore represents conditions occurring shortly after this shutdown. The observed conditions include a rising surface water elevation in Pond 3 and corresponding increases in the groundwater potentiometric surface elevations at the four monitoring wells closest to Pond 3. The groundwater potentiometric surface at the northernmost monitoring well (MW-5) remained relatively stable, suggesting a limited hydraulic influence of Pond 3 at this location. Surface water elevations generally decreased at Ponds 1 and 2, consistent with shut down of the Pond 3 pump that formerly fed these ponds and infiltration of surface water in these ponds to groundwater.

Groundwater potentiometric surface contours indicate groundwater flow in the northern portion of the Site is generally from northwest to southeast, consistent with regional data previously evaluated during preliminary modeling. The contours indicate groundwater flow in the southern portion of the Site is towards Pond 3; however, the hydraulic gradient between these monitoring wells and Pond 3 was observed to decrease over time, indicating that Pond 3 is moving towards equilibrium with the surrounding Upper Aquifer.

Assuming current operating conditions continue at the Site, the surface water elevation of Pond 3 is expected to continue to rise, as are the groundwater potentiometric surface elevations in the four monitoring wells surrounding Pond 3, based on the increasing water elevation trends observed at these locations during the study period to date. Pond 3 is expected to reach equilibrium with the surrounding Upper Aquifer materials, with decreasing groundwater flow towards Pond 3 and potentially a reversal in hydraulic gradient with flow from Pond 3 into the Upper Aquifer as Pond 3 captures precipitation and surface water runoff. The Site is anticipated to continue to be a primary recharge area to the Upper Aquifer where the Upper Aquifer materials are exposed at the ground surface.

References

1. Environment, Great Lakes and Energy, Online Water Well Viewer: www.mcgi.state.mi.us/waterwellviewer/ State of Michigan. Accessed April-November 2023

2. United States Geological Survey, 2017. 1/3 arc-second Digital Elevation Models (DEMs) – USGS National Map 3DEP Downloadable Data Collection: U.S. Geological Survey

3. National Oceanic and Atmospheric Administration, NOWData: https://www.weather.gov/wrh/climate?wfo=dtx/ US Department of Commerce. Accessed August-November 2023

4. Quaternary Geology of Southern Michigan - W.R. Farrand, compiler, and D.L. Bell geologic cartographer, Department of Geological Sciences, The University of Michigan, Ann Arbor, 1982, 1:500,000-scale. https://mnfi.anr.msu.edu/resources/quaternary-geology

5. Fleck, W. B., 1980. *Geology and hydrology for environmental planning in Washtenaw County, Michigan*. Michigan Water Science Center.

TABLES

TABLE I
SUMMARY OF MONITORING WELLS
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN

Monitoring Well	Date Installed (mm/dd/yy)	X-coordinate	Y-coordinate	Ground Surface Elevation (ft amsl)	Reference (TOC) Elevation (ft amsl)	Borehole Total Depth (ft bgs)	Screen Length (ft)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Borehole Diameter (in)	Well Diameter (in)	Depth to Upper Aquifer Top (ft bgs)	Depth to Upper Aquifer Bottom (ft bgs)	Elevation of Upper Aquifer Top (ft amsl)	Elevation of Upper Aquifer Bottom (ft amsl)
MW-1	10/9/23	13309320.230062	307581.760042	946.4	949.67	120	5	105	110	6	2	40	110	906.4	836.4
MW-2	10/4/23	13308700.540028	306707.945844	965.34	868.6	138	5	125	130	6	2	48	129	917.34	836.34
MW-3	10/11/23	13309782.179925	306644.873136	947.6	864.7	110	5	85	90	6	2	27	97	920.6	850.6
MW-4	10/5/23	13310605.500129	306581.479890	929.8	864.5	95	5	85	90	6	2	24	85	905.8	844.8
MW-5	10/10/23	13309959.349847	308438.296058	902.68	869.0	70	10	35	45	6	2	36	39	866.68	863.68

ft amsl: feet above mean sea level
TOC: top of casing (PVC riser)
ft bgs: feet below ground surface

TABLE II
SUMMARY OF STAFF GAUGES
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN

Gauge ID	Date Installed (mm/dd/yy)	X-coordinate	Y-coordinate	Reference Elevation (ft amsl)	Top of Ruler (calculated) (ft amsl)	Bottom of ruler (calculated) (ft amsl)	Ruler Length (ft)	Description of Feature
POND-1	10/04/23	13309696.99	308363.512	903.05	903.05	899.05	4	Staff gauge affixed to green stake. Anchored to existing fixed catwalk.
POND-2	10/04/23	13309938.19	307825.367	904.65	904.65	900.65	4	Staff gauge affixed to green stake. Near pump catwalk.
POND-3-FAR	10/27/23	13310095.64	307267.37	868.97	876.97	864.97	12	Farthest from shore and lowest elevation Pond 3 staff gauge.
POND-3-MID	10/27/23	13310138.03	307221.06	875.62	883.62	871.62	12	Intermediate Pond 3 staff gauge.
POND-3-CLOSE	10/27/23	13310156.28	307230.05	881.8	889.8	877.8	12	Closest to shore and highest elevation Pond 3 staff gauge.
WETLANDS GAUGE	10/04/23	13309648.29	308475.006	881.89	881.89	879.93	1.96	Located in a wetland north of POND-1. Gauge is affixed to Fence running E-W on property.
STREAM GAUGE	10/04/23	13310071.49	308658.934	876.89	876.89	874.86	2.03	Located mid-channel of a natural stream, upstream of small debris/rocks that act as downstream control.

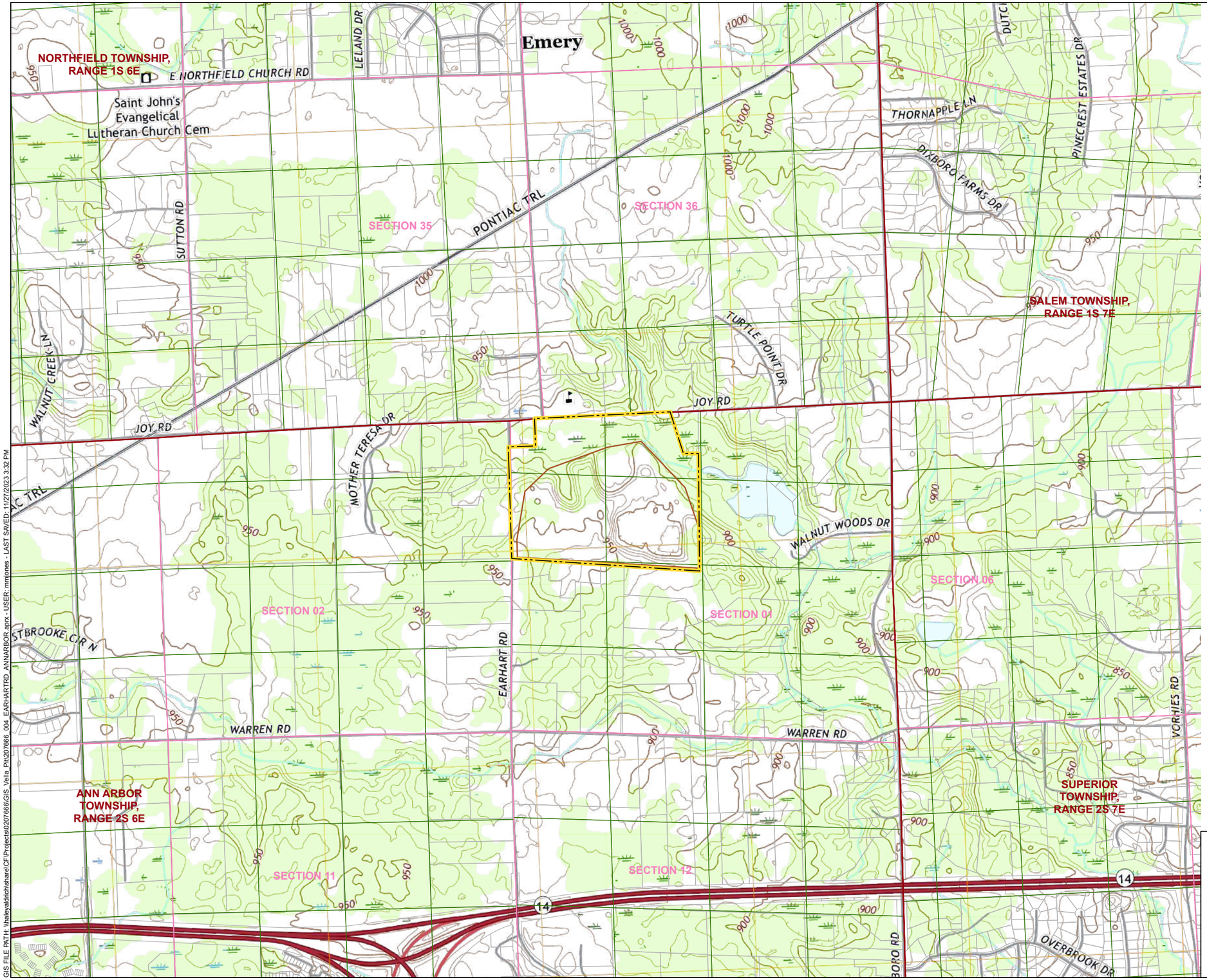
ft amsl: feet above mean sea level
Note: A staff gauge was installed in Pond 3 on 10/04/2023, and was submerged following pump shutoff on 10/10/2023

TABLE III
GROUNDWATER AND SURFACE WATER ELEVATION MEASUREMENTS
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN

Location Identifier	Date of Measurement	Reference Elevation (ft amsl)	Depth to Water/Gauge Height[1] (ft)	Water Elevation (ft amsl)
MW-1	10/17/2023	949.67	83.88	865.79
MW-2	10/17/2023	968.31	99.68	868.63
MW-3	10/17/2023	950.67	85.98	864.69
MW-4	10/17/2023	933.23	68.78	864.45
MW-5	10/17/2023	905.78	36.83	868.95
Pond-1	10/17/2023	899.05	0.89	899.94
Pond-2	10/17/2023	900.65	0.96	901.61
Stream Gauge	10/17/2023	874.86	0.65	875.51
Wetlands Gauge	10/17/2023	879.93	0.70	880.63
MW-1	11/3/2023	949.67	82.55	867.12
MW-2	11/3/2023	968.31	99.01	869.30
MW-3	11/3/2023	950.67	84.40	866.27
MW-4	11/3/2023	933.23	67.22	866.01
MW-5	11/3/2023	905.78	36.86	868.92
Pond-1	11/3/2023	899.05	0.09	899.14
Pond-2	11/3/2023	900.65	0.30	900.95
Pond-3	11/3/2023	864.97	0.60	865.57
Stream Gauge	11/3/2023	874.86	0.68	875.54
Wetlands Gauge	11/3/2023	879.93	Below Gauge, Dry	Dry
MW-1	11/20/2023	949.67	81.62	868.05
MW-2	11/20/2023	968.31	98.65	869.66
MW-3	11/20/2023	950.67	83.30	867.37
MW-4	11/20/2023	933.23	66.05	867.18
MW-5	11/20/2023	905.78	36.70	869.08
Pond-1	11/20/2023	899.05	Below Gauge, Pond not dry	<899.05
Pond-2	11/20/2023	900.65	Below Gauge, Pond not dry	<900.65
Pond-3	11/20/2023	864.97	2.04	867.01
Stream Gauge	11/20/2023	874.86	0.68	875.54
Wetlands Gauge	11/20/2023	879.93	Below Gauge, Dry	Dry

Notes and Abbreviations:
1. Gauge height shown as water level height above reference point
ft amsl: feet above mean sea level

FIGURES



LEGEND

- SITE BOUNDARY
- PROPOSED LIMIT OF EXCAVATION
- TOWNSHIP BOUNDARY
- PUBLIC LAND SURVEY SYSTEM (PLSS) SECTION
- PUBLIC LAND SURVEY SYSTEM (PLSS) INTERSECTED
- PARCEL BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: WASHTENAW COUNTY, MICHIGAN
3. TOWNSHIP, SECTION, AND INTERSECTED DATA SOURCE: BUREAU OF LAND MANAGEMENT (BLM) PUBLIC LAND SURVEY SYSTEM (PLSS)
4. WORLD TOPOGRAPHIC MAP SOURCE: USGS, 2019

N

0 1,500 3,000
SCALE IN FEET

HALEY ALDRICH

MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

SITE LOCUS

NOVEMBER 2023

FIGURE 1

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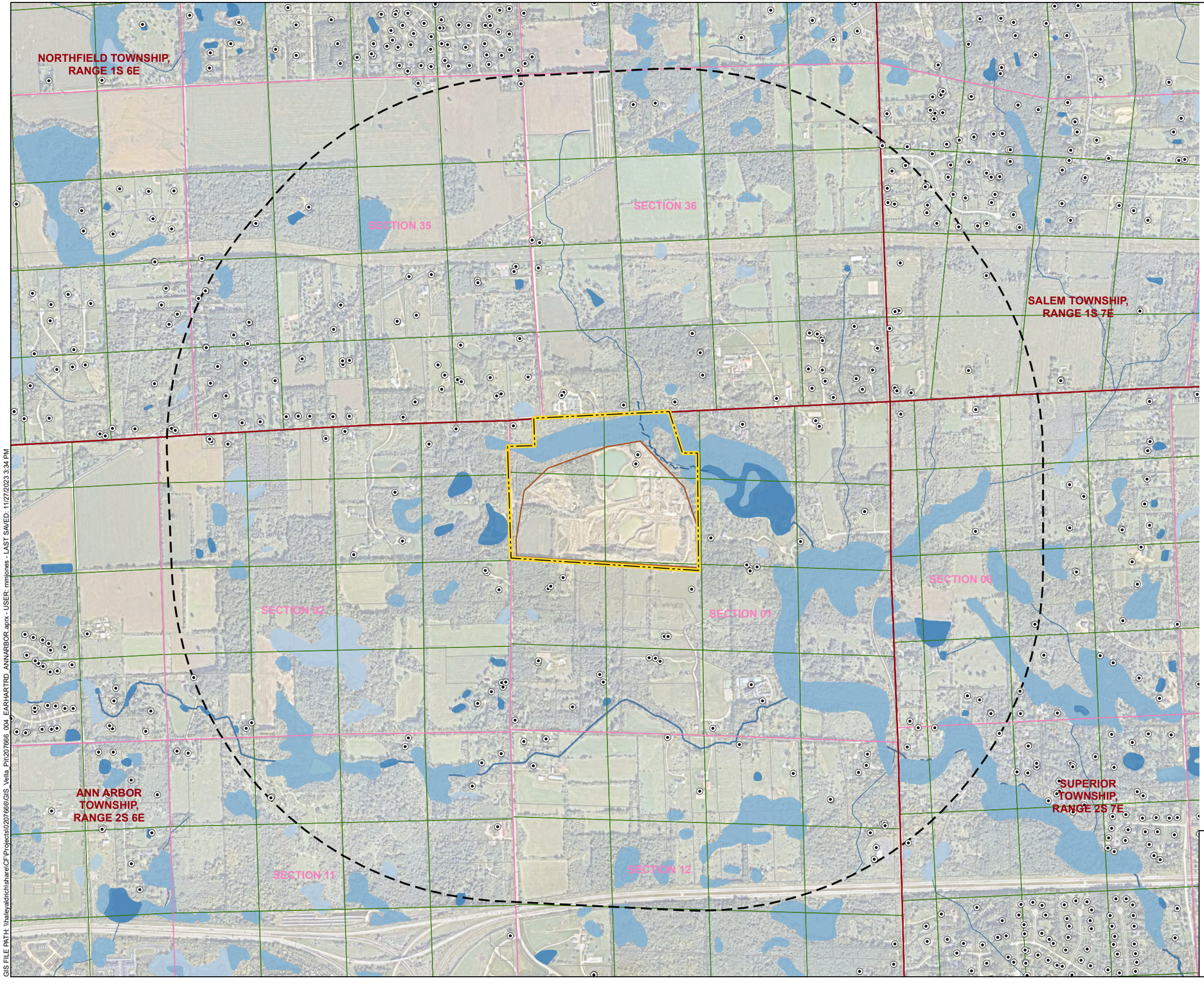

LEGEND

- RESIDENTIAL WELL
- PROPOSED LIMIT OF EXCAVATION
- 1 MILE RADIUS SURROUNDING SITE
- PUBLIC LAND SURVEY SYSTEM (PLSS) SECTION
- PUBLIC LAND SURVEY SYSTEM (PLSS) INTERSECTED
- TOWNSHIP BOUNDARY
- SITE BOUNDARY
- PARCEL BOUNDARY

MICHIGAN WETLAND TYPE

- FRESHWATER EMERGENT WETLAND
- FRESHWATER FORESTED/SHRUB WETLAND
- FRESHWATER POND
- RIVERINE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. WETLANDS DATA SOUCE: NATIONAL WETLANDS INVENTORY
3. PARCEL DATA SOURCE: WASHTENAW COUNTY, MICHIGAN
4. RESIDENTIAL WELLS DATA SOURCE: STATE OF MICHIGAN GIS
5. TOWNSHIP, SECTION, AND INTERSECTED DATA SOURCE: BUREAU OF LAND MANAGEMENT (BLM) PUBLIC LAND SURVEY SYSTEM (PLSS)
6. AERIAL IMAGERY SOURCE: NEARMAP, 2 OCTOBER 2023

N

0 1,500 3,000
SCALE IN FEET

HALEY ALDRICH

MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

REGIONAL SETTING

NOVEMBER 2023

FIGURE 2

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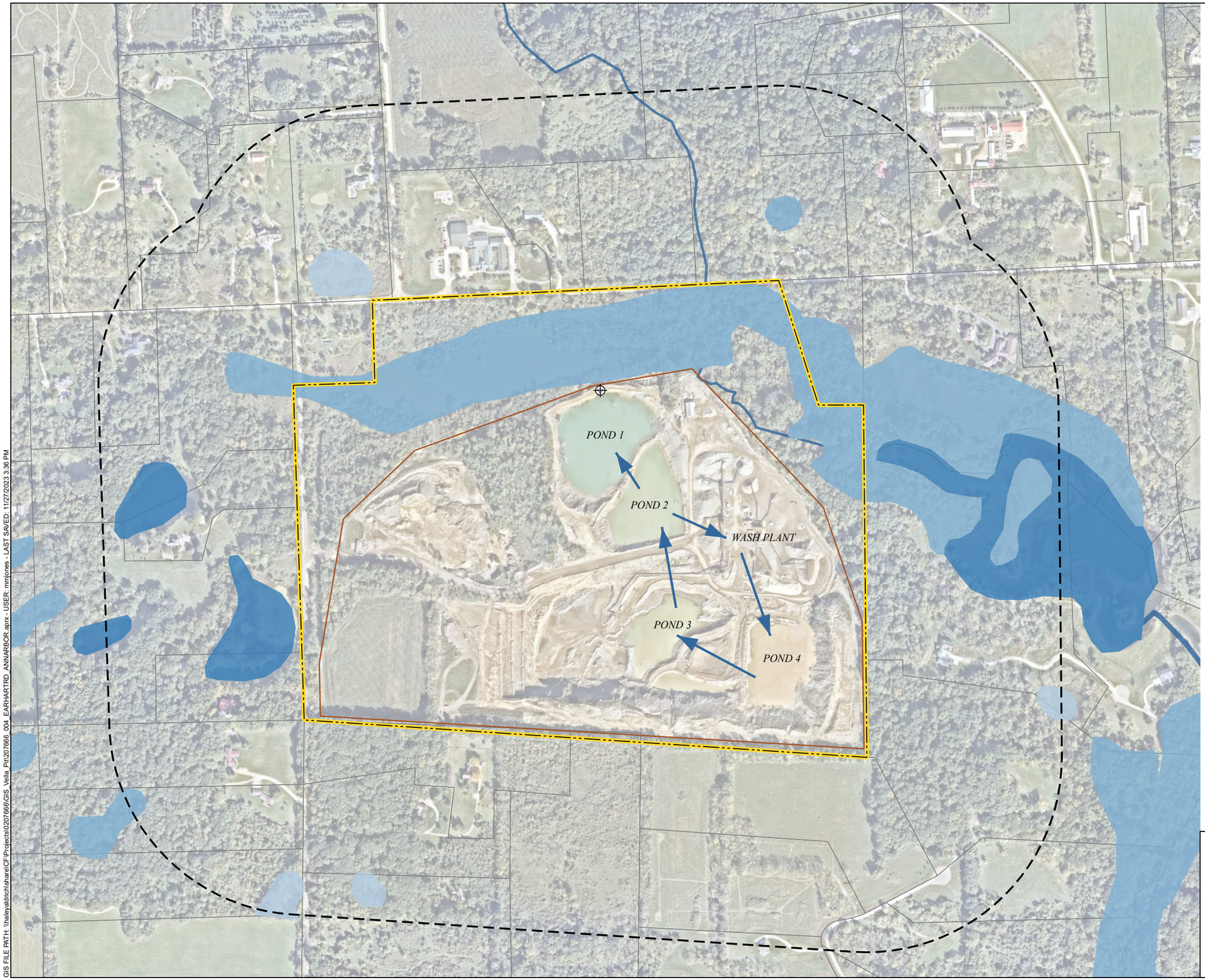

LEGEND

- NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITTED OUTFALL (NO CURRENT DISCHARGE)
- FLOW ARROW
- 1,000 FEET RADIUS SURROUNDING SITE
- PROPOSED LIMIT OF EXCAVATION
- SITE BOUNDARY
- PARCEL BOUNDARY

MICHIGAN WETLAND TYPE

- FRESHWATER EMERGENT WETLAND
- FRESHWATER FORESTED/SHRUB WETLAND
- FRESHWATER POND
- RIVERINE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. WETLANDS DATA SOUCE: NATIONAL WETLANDS INVENTORY
3. PARCEL DATA SOURCE: WASHTENAW COUNTY, MICHIGAN
4. AERIAL IMAGERY SOURCE: NEARMAP, 2 OCTOBER 2023

N

0 500 1,000
SCALE IN FEET

HALEY ALDRICH

MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

DETAILED SITE MAP

NOVEMBER 2023

FIGURE 3

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LEGEND

- MONITORING WELL
- POND GAUGE
- STREAM GAUGE
- WETLAND GAUGE
- CREEK

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: NEARMAP, 2 OCTOBER 2023

N

0 250 500
SCALE IN FEET

HALEY ALDRICH

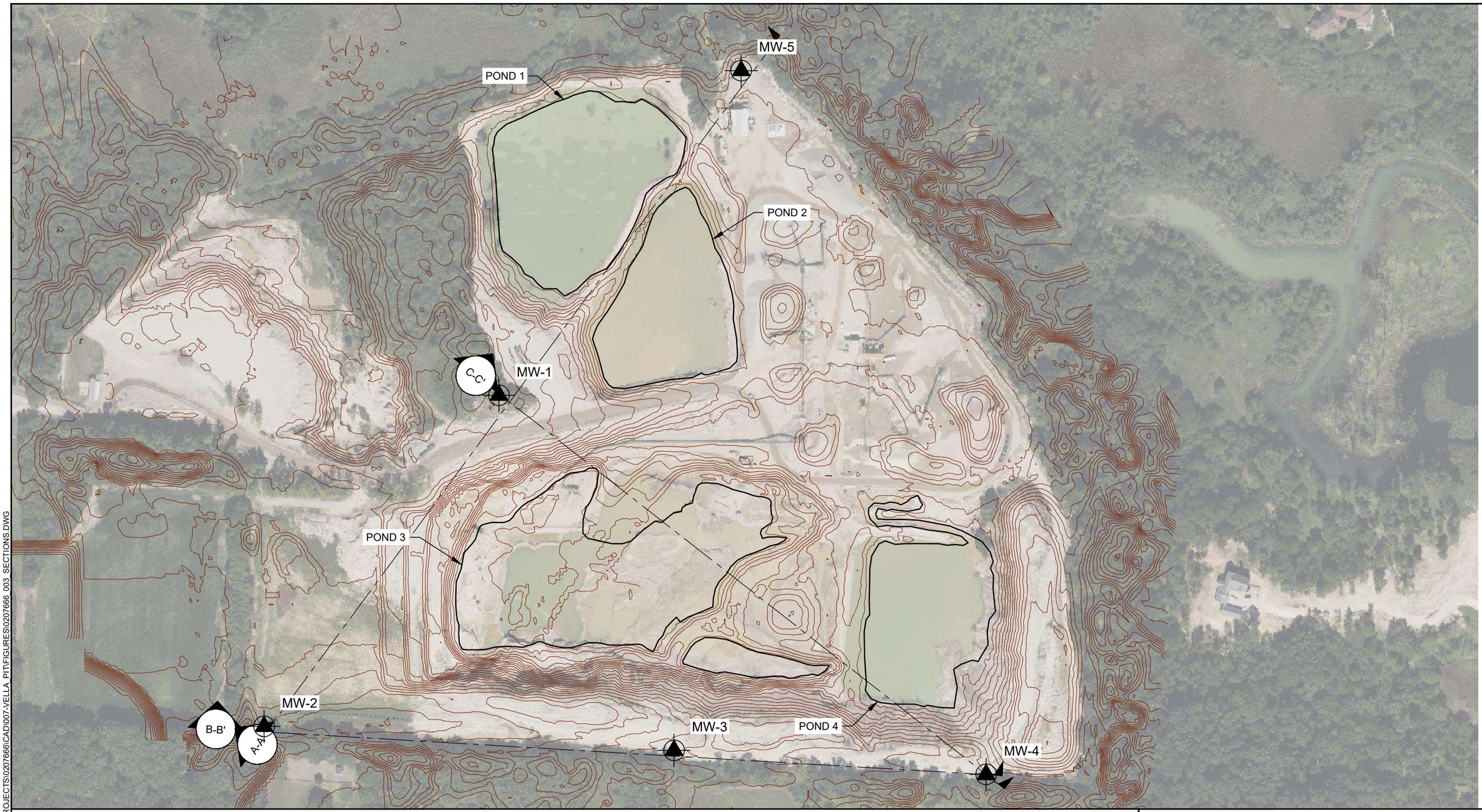
MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

MONITORING WELL AND SURFACE WATER GAUGE LOCATIONS

NOVEMBER 2023

FIGURE 4

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0207666\GIS_Vella Pit\207666_004_EARHARTRD_ANNARBOR.aprx - USER: mmjones - LAST SAVED: 11/27/2023 3:39 PM



LEGEND

MW-# DESIGNATION AND APPROXIMATE LOCATION OF MONITORING WELL INSTALLED BY CASCADE DRILLING AND OBSERVED BY HALEY & ALDRICH, INC. FROM 2 OCTOBER 2023 TO 11 OCTOBER 2023.

NOTES

1. BASE MAP TAKEN FROM ELECTRONIC CAD FILE TITLED "TOPOGRAPHIC SURVEY", DATED 20 OCTOBER 2023, PROVIDED BY PEA GROUP. SURVEY CONDUCTED ON 02 OCTOBER 2023.
2. ELEVATIONS ARE IN FEET AND REFERENCE THE NORTH AMERICAN DATUM OF 1988 (NAVD88). THE HORIZONTAL CONTROL REFERENCES THE NORTH AMERICAN DATUM OF 1983, MICHIGAN SOUTH STATE PLANE.

N

0 250 500

SCALE IN FEET

HALEY ALDRICH

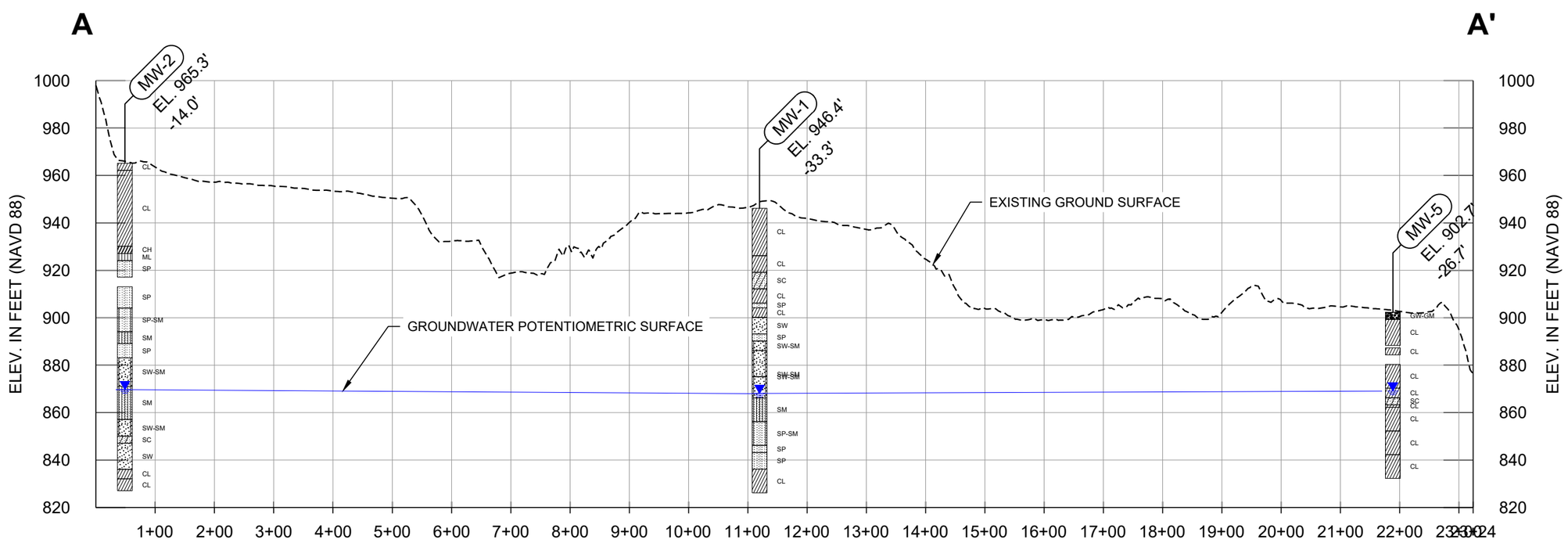
MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

CROSS-SECTION LOCATION PLAN

SCALE: AS SHOWN
NOVEMBER 2023

FIGURE 5A

OSLIVNYAK Printed: 11/27/2023 1:59 PM Sheet: ELP
\\HALEYALDRICH.COM\SHARE\CF\PROJECTS\02076661\CAD\007-VELLA PIT\FIGURES\02076661 003 SECTIONS.DWG



PROFILE LEGEND

- EXISTING GROUND SURFACE
- CLAY
- SAND AND GRAVEL
- GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION MEASURED 20 NOVEMBER 2023
- MW-5 — LOCATION ID
- EL. 0.0' — APPROXIMATE GROUND SURFACE (NAVD88)
- 0.0' — OFFSET FROM ALIGNMENT (-) INDICATES LEFT OF ALIGNMENT (SEE NOTE 4)

- SP — POORLY-GRADED SAND
- SP-SM — POORLY-GRADED SAND WITH SILT AND GRAVEL
- SM — SILTY SAND OR SILTY SAND WITH GRAVEL
- SW — WELL GRADED SAND
- SW-SM — WELL GRADED SAND WITH SILT
- SC — CLAYEY SAND OR CLAYEY SAND WITH GRAVEL
- CL — LEAN CLAY OR SANDY CLAY
- ML — SILT OR SANDY SILT
- GW-GM — WELL GRADED GRAVEL WITH SILT
- GM — SILTY GRAVEL
- GC — CLAYEY GRAVEL

NOTES

1. BASE MAP TAKEN FROM ELECTRONIC CAD FILE TITLED “TOPOGRAPHIC SURVEY", DATED 20 OCTOBER 2023, PROVIDED BY PEA GROUP. SURVEY CONDUCTED ON 02 OCTOBER 2023.
2. ELEVATIONS ARE IN FEET AND REFERENCE THE NORTH AMERICAN DATUM OF 1988 (NAVD88). THE HORIZONTAL CONTROL REFERENCES THE NORTH AMERICAN DATUM OF 1983, MICHIGAN SOUTH STATE PLANE.
3. OFFSET DISTANCES INDICATED ARE MEASURED FROM THE PLAN LOCATION OF THE PROFILE LINE, PERPENDICULAR TO THE LINE
4. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON THE INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ARE BASED UPON INTERPOLATION BETWEEN ADJACENT EXPLORATIONS.

HORIZ. 0 200 400
VERT. 0 50 100
SCALE IN FEET

HALEY ALDRICH

MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

GEOLOGIC CROSS SECTION A-A'

SCALE: AS SHOWN
NOVEMBER 2023

FIGURE 5B

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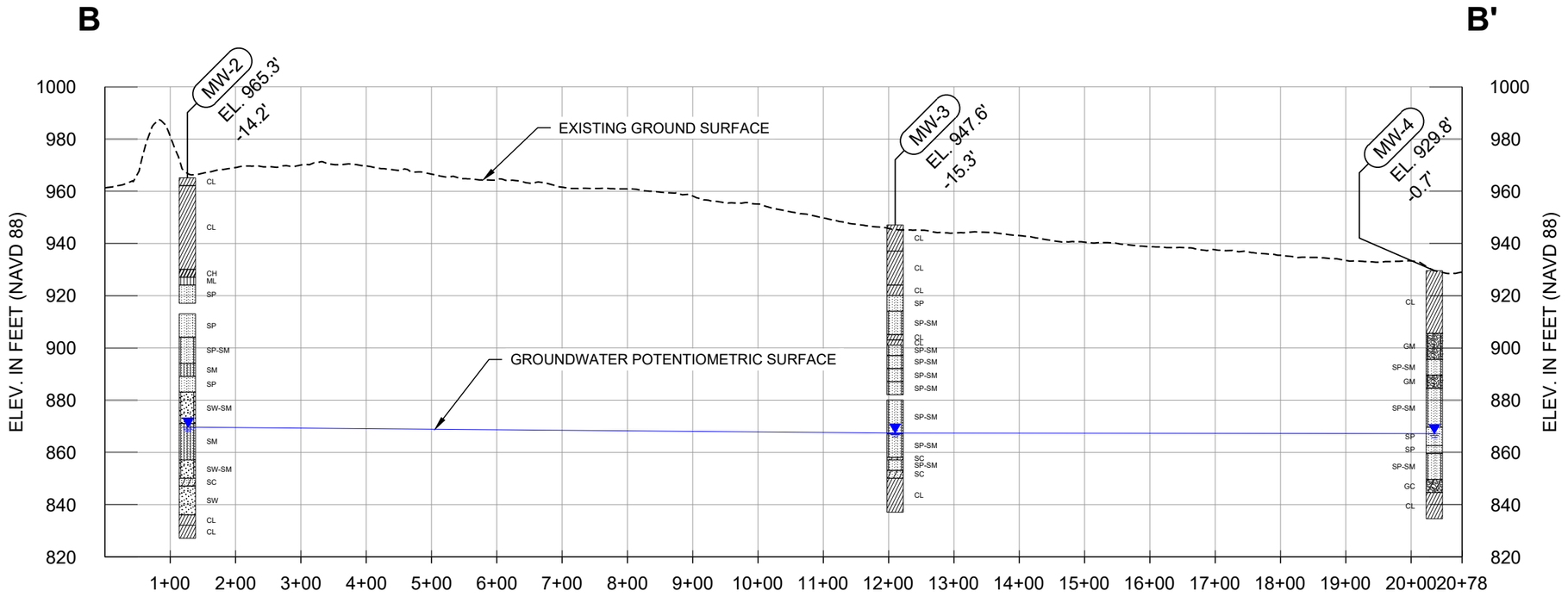
\\HALEYALDRICH.COM\SHARE\CF\PROJECTS\0207686\CAD\007-VELLA PIT\FIGURES\0207686_003_SECTIONS.DWG



SECTION B-B
SCALE: AS SHOWN

PROFILE LEGEND

- EXISTING GROUND SURFACE
- CLAY
- SAND AND GRAVEL
- GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION MEASURED 20 NOVEMBER 2023
- MW-5 / EL. 0.0' / 0.0' — LOCATION ID; APPROXIMATE GROUND SURFACE (NAVD88); OFFSET FROM ALIGNMENT (-) INDICATES LEFT OF ALIGNMENT (SEE NOTE 4)

- SP — POORLY-GRADED SAND
- SP-SM — POORLY-GRADED SAND WITH SILT AND GRAVEL
- SM — SILTY SAND OR SILTY SAND WITH GRAVEL
- SW — WELL GRADED SAND
- SW-SM — WELL GRADED SAND WITH SILT
- SC — CLAYEY SAND OR CLAYEY SAND WITH GRAVEL
- CL — LEAN CLAY OR SANDY CLAY
- ML — SILT OR SANDY SILT
- GW-GM — WELL GRADED GRAVEL WITH SILT
- GM — SILTY GRAVEL
- GC — CLAYEY GRAVEL

NOTES

1. BASE MAP TAKEN FROM ELECTRONIC CAD FILE TITLED “TOPOGRAPHIC SURVEY", DATED 20 OCTOBER 2023, PROVIDED BY PEA GROUP. SURVEY CONDUCTED ON 02 OCTOBER 2023.
2. ELEVATIONS ARE IN FEET AND REFERENCE THE NORTH AMERICAN DATUM OF 1988 (NAVD88). THE HORIZONTAL CONTROL REFERENCES THE NORTH AMERICAN DATUM OF 1983, MICHIGAN SOUTH STATE PLANE.
3. OFFSET DISTANCES INDICATED ARE MEASURED FROM THE PLAN LOCATION OF THE PROFILE LINE, PERPENDICULAR TO THE LINE
4. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON THE INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ARE BASED UPON INTERPOLATION BETWEEN ADJACENT EXPLORATIONS.

HORIZ. 0 200 400
VERT. 0 50 100
SCALE IN FEET

HALEY ALDRICH

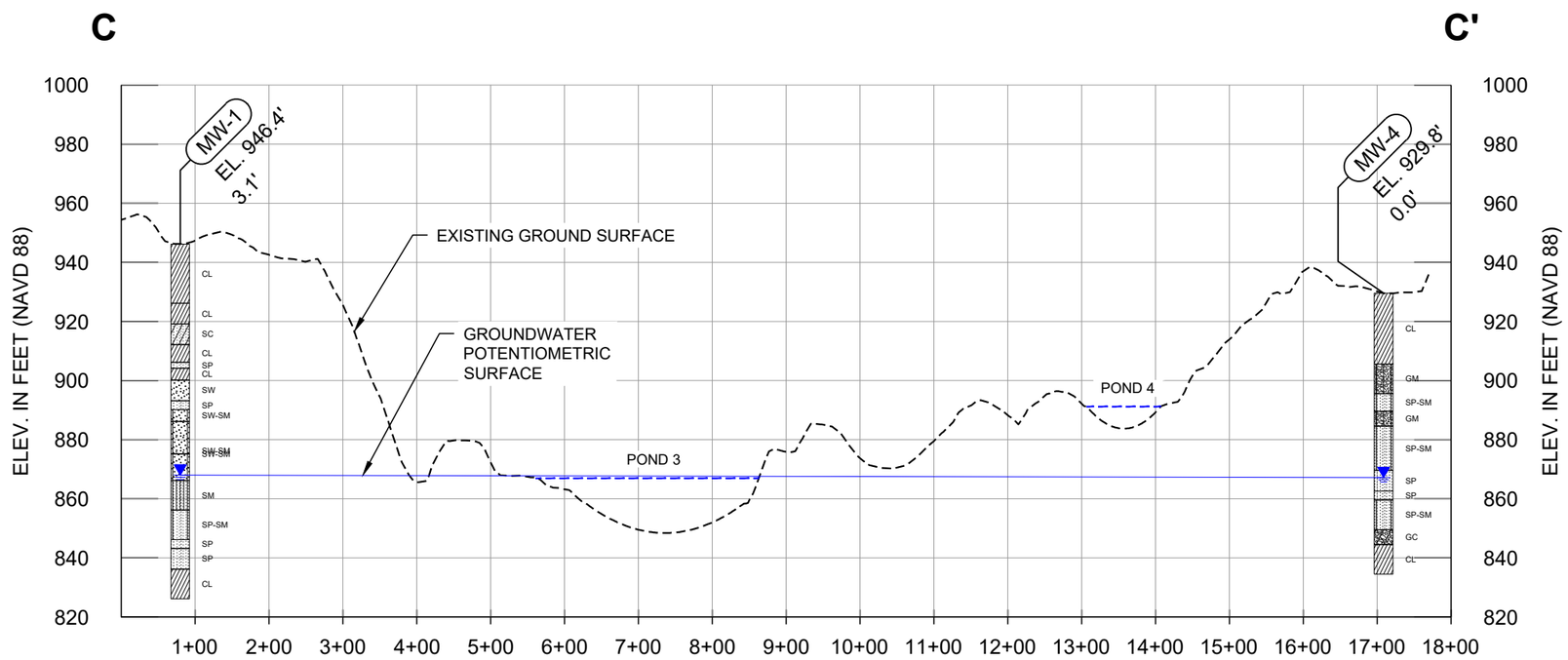
MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

GEOLOGIC CROSS SECTION B-B'

SCALE: AS SHOWN
NOVEMBER 2023

FIGURE 5C

Saved by: OSLIVNYAK Printed: 11/27/2023 1:58 PM Sheet: BB
\\HALEYALDRICH.COM\SHARE\CF\PROJECTS\0207686\CAD\007-VELLA PIT\FIGURES\0207686_003_SECTIONS.DWG



SECTION C-C
SCALE: AS SHOWN

PROFILE LEGEND

- EXISTING GROUND SURFACE
- CLAY
- SAND AND GRAVEL
- GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION MEASURED 20 NOVEMBER 2023
- MW-5 — LOCATION ID
- EL. 0.0' — APPROXIMATE GROUND SURFACE (NAVD88)
- 0.0' — OFFSET FROM ALIGNMENT (-) INDICATES LEFT OF ALIGNMENT (SEE NOTE 4)

- SP — POORLY-GRADED SAND
- SP-SM — POORLY-GRADED SAND WITH SILT AND GRAVEL
- SM — SILTY SAND OR SILTY SAND WITH GRAVEL
- SW — WELL GRADED SAND
- SW-SM — WELL GRADED SAND WITH SILT
- SC — CLAYEY SAND OR CLAYEY SAND WITH GRAVEL
- CL — LEAN CLAY OR SANDY CLAY
- ML — SILT OR SANDY SILT
- GW-GM — WELL GRADED GRAVEL WITH SILT
- GM — SILTY GRAVEL
- GC — CLAYEY GRAVEL

NOTES

1. BASE MAP TAKEN FROM ELECTRONIC CAD FILE TITLED “TOPOGRAPHIC SURVEY", DATED 20 OCTOBER 2023, PROVIDED BY PEA GROUP. SURVEY CONDUCTED ON 02 OCTOBER 2023.
2. ELEVATIONS ARE IN FEET AND REFERENCE THE NORTH AMERICAN DATUM OF 1988 (NAVD88). THE HORIZONTAL CONTROL REFERENCES THE NORTH AMERICAN DATUM OF 1983, MICHIGAN SOUTH STATE PLANE.
3. OFFSET DISTANCES INDICATED ARE MEASURED FROM THE PLAN LOCATION OF THE PROFILE LINE, PERPENDICULAR TO THE LINE
4. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON THE INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ARE BASED UPON INTERPOLATION BETWEEN ADJACENT EXPLORATIONS.

HORIZ. 0 200 400
VERT. 0 50 100
SCALE IN FEET

HALEY ALDRICH

MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

GEOLOGIC CROSS SECTION C-C'

SCALE: AS SHOWN
NOVEMBER 2023

FIGURE 5D

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\\HALEYALDRICH.COM\SHARE\CF\PROJECTS\0207686\CAD\007-VELLA PIT\FIGURES\0207686_003_SECTIONS.DWG

LEGEND

- MONITORING WELL
- POND GAUGE
- STREAM GAUGE
- WETLAND GAUGE
- 868.95 GROUNDWATER POTENTIOMETRIC SURFACE MEASUREMENT
- 868.95 SURFACE WATER ELEVATION MEASUREMENT
- GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION CONTOUR IN FEET
- INFERRED GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION CONTOUR IN FEET
- CREEK
- SITE BOUNDARY
- POND 3 LIMITS

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. POTENTIOMETRIC SURFACE MEASUREMENTS TAKEN 3 NOVEMBER 2023.
3. POND 3 DEWATERING CEASED ON 10 OCTOBER 2023
4. SURFACE WATER ELEVATIONS MEASUREMENTS NOT USED IN CONTOURING, EXCEPT FOR POND 3.
5. AERIAL IMAGERY SOURCE: NEARMAP, 2 OCTOBER 2023

N

0 250 500
SCALE IN FEET

HALEY ALDRICH

MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

GROUNDWATER POTENTIOMETRIC SURFACE MAP - 3 NOVEMBER 2023

NOVEMBER 2023

FIGURE 6A

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0207666\GIS_Vella_Pit\207666_004_EARHARTRD_ANNARBOR.aprx - USER: mmjones - LAST SAVED: 11/27/2023 3:43 PM

JOY ROAD

STREAM GAUGE
875.54

WETLAND GAUGE
DRY

MW-5
869.08

POND GAUGE 1
898.38
(EST.)

869

869

POND 1

POND 2

868

POND GAUGE 2
900.48
(EST.)

MW-1
868.05

POND 3 FAR
867.01

POND 3 CLOSE
N/A

POND 3 MID
N/A

POND 3

POND 4

MW-2
869.66

MW-3
867.37

MW-4
867.18

LEGEND

- MONITORING WELL
- POND GAUGE
- STREAM GAUGE
- WETLAND GAUGE
- 868.05 — GROUNDWATER POTENTIOMETRIC SURFACE MEASUREMENT
- 875.54 — SURFACE WATER ELEVATION MEASUREMENT
- GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION CONTOUR IN FEET
- INFERRED GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION CONTOUR IN FEET
- CREEK
- SITE BOUNDARY
- POND 3 LIMITS

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. POTENTIOMETRIC SURFACE MEASUREMENTS TAKEN 20 NOVEMBER 2023.

3. POND 3 DEWATERING CEASED ON 10 OCTOBER 2023

4. POND 1 AND POND 2 POTENTIOMETRIC SURFACE ELEVATIONS ESTIMATED FROM TRANSDUCER DATA

5. SURFACE WATER ELEVATION MEASUREMENTS NOT USED IN CONTOURING, EXCEPT FOR POND 3.

6. AERIAL IMAGERY SOURCE: NEARMAP, 2 OCTOBER 2023

N

0 250 500
SCALE IN FEET

HALEY ALDRICH

MID-MICHIGAN MATERIALS, INC. - VELLA PIT
4984 EARHART RD
ANN ARBOR TOWNSHIP, MICHIGAN

GROUNDWATER POTENTIOMETRIC SURFACE MAP - 20 NOVEMBER 2023

NOVEMBER 2023

FIGURE 6B

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0207666\GIS_Vella_Pit\207666_004_EARHARTRD_ANNARBOR.aprx - USER: mmjones - LAST SAVED: 11/27/2023 3:56 PM

APPENDIX A
Boring Logs and Well Installation Reports

TEST BORING REPORT

Boring No. MW-1

Project	MMM Vella Pit, Ann Arbor, MI
Client	Mid Michigan Materials
Contractor	Cascade Drilling

File No. 0207666-006
Sheet No. 1 of 4
Start October 06, 2023
Finish October 09, 2023
Driller Nolan Wilson
H&A Rep. N. Schaffer
Elevation 946.4
Datum NAVD 1988
Location See Plan
N 307581.760042
E 13309320.230062

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	Sonic	O	--	Rig Make & Model: Sonic
Inside Diameter (in.)	6	5.25	--	Bit Type:
Hammer Weight (lb)	--	Sonic	-	Drill Mud:
Hammer Fall (in.)	--	--	-	Casing: Driven
				Hoist/Hammer:
				PID Make & Model: NA

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
0		S1 75	0.0 10.0		CL		Stiff, brown, **LEAN CLAY** with gravel, MPS 0.15 inch, no structure, no odor, dry.		10			5	85
						938.4 8.0	Similar as above.						
10		S2 120	10.0 20.0										
						931.4 15.0	Similar as above.						
20		S3 120	20.0 30.0		CL	926.4 20.0	Stiff, brown, **LEAN CLAY**, MPS 0.5 inch, no odor, no structure, dry.		5			5	90
25													

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 120
Rock Cored (ft)
Samples
Boring No. MW-1

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
25						919.4							
					SC	27.0	Stiff, brown, **CLAYEY SAND**, MPS 0.5 inch, no odor, no structure, dry.		5			80	15
30		S4 120	30.0 40.0			914.4 32.0	Similar as above.						
					CL	912.4 34.0	Stiff, brown, sandy **LEAN CLAY**, MPS 0.25 inch, no odor, no structure, dry.					30	70
35						908.4 38.0	Similar as above. Gray-brown at 38 feet.						
40		S5 120	40.0 50.0		SP	906.4 40.0	Loose, brown, **POORLY GRADED SAND** with clay, MPS 0.25 inch, no odor, no structure, dry.				10	80	10
					CL	904.4 42.0	Stiff, brown, sandy **LEAN CLAY**, MPS 0.25 inch, no odor, no structure, moist.					30	70
45					SW	900.4 46.0	Loose, brown-gray, **WELL GRADED SAND** with silt and gravel, no odor, no structure, moist.	10	10	20	30	20	10
50		S6 120	50.0 60.0			896.4 50.0	Similar as above.						
					SP	893.4 53.0	Loose, brown, **POORLY GRADED SAND** with silt, MPS 0.2 inch, no odor, no structure, moist.				20	70	10
55					SW-SM	890.4 56.0	Loose, gray-brown, **WELL GRADED SAND** with silt, MPS 0.5 inch, no odor, no structure, moist.			20	30	40	10
60		S7 120	60.0 70.0		SW-SM	886.4 60.0	Loose, gray, **WELL GRADED SAND** with silt, no structure, no odor, moist.		5	15	30	40	10

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-1
File No. 0207666-006
Sheet No. 3 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
65													
70		S8 102	70.0 80.0		SW-SM	875.4 71.0	Similar as above, now gray-brown.			20	30	40	10
75													
80		S9 112	80.0 90.0		SM	866.4 80.0	Loose, gray, **SILTY SAND**, no structure, no odor, moist.			20	30	30	20
85													
90		S10 110	90.0 100.0		SP-SM	856.4 90.0	Loose, gray, **POORLY GRADED SAND** with silt, no structure, no odor, moist.			5	50	35	10
95													

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-1

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-1
File No. 0207666-006
Sheet No. 4 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
100						846.4							
		S11 69	100.0 110.0		SP	100.0	Loose, gray, **POORLY GRADED SAND** with gravel, no structure, no odor, moist.		20	20	30	25	5
					SP		Similar as above	5	30	45	15	5	
105													
110		S12 120	110.0 120.0		CL	836.4 110.0	Very stiff, gray, **LEAN CLAY**, homogenous, no odor, moist.					10	90
115													
120						826.4 120.0	**END OF BORING**						

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-1

TEST BORING REPORT

Boring No. MW-2

Project	MMM Vella Pit, Ann Arbor, MI
Client	Mid Michigan Materials
Contractor	Cascade Drilling

File No. 0207666-006
Sheet No. 1 of 5
Start October 02, 2023
Finish October 04, 2023
Driller Trevor Ramun
H&A Rep. N. Schaffer
Elevation 965.3
Datum NAVD 1988
Location See Plan
N 306707.945844
E 13308700.540028

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	Sonic	O	--	Rig Make & Model: Sonic
Inside Diameter (in.)	6	5.25	--	Bit Type:
Hammer Weight (lb)	--	Sonic	-	Drill Mud:
Hammer Fall (in.)	--	--	-	Casing: Driven
				Hoist/Hammer:
				PID Make & Model: NA

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
0		S1 96	0.0 8.0		CL		Medium stiff, brown, **SANDY CLAY**, MPS 1.0 inch, no structure, no odor, wet-moist, trace fine gravel.				10	20	70
					CL	962.3 3.0	Hard, brown, **CLAY** with sand, MPS 0.5 inch, no structure, no odor, moist.				5	5	90
5													
		S2 120	8.0 18.0										
10						955.3 10.0	Similar as above, brown-gray.						
15													
						949.3 16.0	Similar as above, now very stiff.						
		S3 120	18.0 28.0										
20													

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 138
Rock Cored (ft)
Samples

Boring No. MW-2

Field Tests:
Dilatancy: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
20						943.3							
						22.0	Similar as above, gray, MPS 0.25 inch, fat.						
25													
		S4 120	28.0 38.0										
30						934.3							
						31.0	Similar as above, wet.						
						932.3							
						33.0	Similar as above, trace fine gravel.						
35						930.3							
					CH	35.0	Medium stiff, gray, **FAT CLAY** with gravel, MPS 0.25 inch, no structure, no odor, moist.		10		5	5	80
						927.3							
		S5 60	38.0 43.0		ML	38.0	Medium stiff, brown, **SILT** with sand, no structure, no odor, moist.				5	5	90
40													
					ML		Similar as above					10	90
		S6 60	43.0 48.0										
45						917.3							
		S7 60	48.0 58.0		SP	48.0	Soft, brown, **POORLY GRADED SAND**, no oversized particulate, no structure, no odor, moist.			5	90	5	

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
50													
55													
		S8 68	58.0 68.0										
60					SP-SM	904.3 61.0	Loose, brown, **POORLY GRADED SAND** with silt, MPS 0.5 inch, no structure, no odor, moist.			5	80	5	10
65													
		S9 39	68.0 73.0										
70					SM	894.3 71.0	Loose, brown, **SILTY SAND**, MPS 0.25 inch, no structure, no odor, moist.			5	70	5	20
		S10 60	73.0 78.0										
75					SP	889.3 76.0	Loose, gray, **POORLY GRADED SAND**, medium grained, MPS 0.25 inch, no structure, no odor, moist.			5	90		5
		S11 60	78.0 83.0										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
80						883.3							
					SW-SM	82.0	Loose, brown-gray, **WELL GRADED SAND** with silt and gravel, MPS 1.0 inch, no structure, no odor, moist.		15	10	55	10	10
		S12 60	83.0 88.0										
85						878.3 87.0	Similar as above, less gravel.			10	65	15	10
		S13 60	88.0 98.0										
90						873.3 92.0	Similar as above.						
					SM	871.3 94.0	Loose, light-gray, **SILTY SAND**, MPS 0.2 inch, no structure, no odor, moist-wet.			10	70		20
95													
		S14 120	98.0 108.0										
100													
						862.3 103.0	Similar as above.						
105													
		S15 118	108.0 118.0		SW-SM	857.3 108.0	Loose, gray, **WELL GRADED SAND** with silt, MPS 0.2 inch, no structure, no odor, moist-wet.			20	60	10	10

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-2
File No. 0207666-006
Sheet No. 5 of 5

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
110													
115					SC	850.3 115.0	Medium dense, gray, **CLAYEY SAND**, MPS 1.0 inch, no structure, no odor, moist.			10	60	10	20
		S16 108	118.0 128.0		SW	847.3 118.0	Medium dense, gray, **WELL-GRADED SAND** coarsening downward, MPS 0.2 inch, no structure, no odor, moist.				80	15	5
120													
125						839.3 126.0	Similar as above, more coarse.			15	65	15	5
		S17 120	128.0 138.0		CL	836.3 129.0	Very stiff, gray, **LEAN CLAY** with sand, MPS 0.1 inch, no structure, no odor, moist.			5	15	95	80
130													
					CL	832.3 133.0	Very stiff, gray, **LEAN CLAY**, MPS 0.05 inch, no structure, no odor, moist.				5		95
135													
						827.3 138.0	**END OF BORING**						

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-2

TEST BORING REPORT

Boring No. MW-3

Project	MMM Vella Pit, Ann Arbor, MI
Client	Mid Michigan Materials
Contractor	Cascade Drilling

File No. 0207666-006
Sheet No. 1 of 4
Start October 11, 2023
Finish October 11, 2023
Driller Nolan Wilson
H&A Rep. N. Schaffer
Elevation 947.6
Datum NAVD 1988
Location See Plan
N 306644.873136
E 13309782.179925

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	Sonic	O	--	Rig Make & Model: Sonic
Inside Diameter (in.)	6	5.25	--	Bit Type:
Hammer Weight (lb)	--	Sonic	-	Drill Mud:
Hammer Fall (in.)	--	--	-	Casing: Driven
				Hoist/Hammer:
				PID Make & Model: NA

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
0		S1 86	0.0 10.0		CL		Very stiff, red-gray, **LEAN CLAY** with sand, MPS 0.1 inch, no structure, no odor, dry-moist.					15	85
10		S2 98	10.0 20.0		CL	937.6 10.0	Stiff, brown, **LEAN CLAY** with sand, MPS 0.1 inch, no structure, no odor, moist.					20	80
20		S3 120	20.0 30.0				Similar as above.						
25					CL	924.6 23.0	Stiff, gray, **LEAN CLAY**, MPS 0.3 inch, no structure, no odor, moist.					5	95

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 110
Rock Cored (ft)
Samples

Boring No. MW-3

Field Tests:
Dilatancy: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
25						920.6							
					SP	27.0	Loose, brown, **POORLY GRADED SAND**, MPS 0.3 inch, no structure, no odor, moist.				55	40	5
30		S4 120	30.0 40.0			915.6 32.0	Similar as above.						
					SP-SM	914.6 33.0	Loose, tan, **POORLY GRADED SAND** with silt, MPS 0.2 inch, no structure, no odor, moist.				20	70	10
35													
40		S5 120	40.0 50.0										
					CL	905.6 42.0	Stiff, brown, **LEAN CLAY**, MPS 0.5 inch, no structure, no odor, moist.				5	5	90
					CL	903.6 44.0	Gravel lense, medium stiff, brown, **SANDY LEAN CLAY**, MPS 0.5 inch, no structure.						
45					SP-SM	901.6 46.0	Loose, brown, **POORLY GRADED SAND** with silt and gravel, MPS 0.5 inch, no structure, no odor, moist.		5	10	50	25	10
50		S6 120	50.0 60.0		SP-SM	897.6 50.0	Loose, brown, **POORLY GRADED SAND** with silt, MPS 0.3 inch, no structure, no odor, moist.				60	30	10
55					SP-SM	892.6 55.0	Loose, brown, **POORLY GRADED SAND** with silt and gravel, no structure, no odor, moist.	5	25		40	20	10
60		S7 120	60.0 70.0		SP-SM	887.6 60.0	Loose, brown, **POORLY GRADED SAND** with silt and gravel, MPS 3.0 inch.	5	10		40	35	10

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-3
File No. 0207666-006
Sheet No. 3 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
65							Similar as above, gray.						
					SP-SM	880.6 67.0	Loose, gray, **POORLY GRADED SAND** with silt, MPS 0.5 inch, no structure, no odor, dry.		5		25	60	10
70		S8 120	70.0 80.0			876.6 71.0	Similar as above.						
75						869.6 78.0	Similar as above.						
80		S9 120	80.0 90.0		SP-SM	867.6 80.0	Loose, gray, **POORLY GRADED SAND** with silt and gravel, MPS 4.0 inch, no structure, no odor, dry.	10	15		40	25	10
85													
					SC	858.6 89.0	Loose, gray, **CLAYEY SAND** with gravel, MPS 3.0 inch, no odor, no structure, moist.	10	15	20	25	10	20
90		S10 120	90.0 100.0		SP-SM	857.6 90.0	Loose, gray, **POORLY GRADED SAND** with silt, MPS 0.5 inch, no odor, no structure, moist.		5	5	45	35	10
					SC	853.6 94.0	Loose, gray, **CLAYEY SAND** with gravel, MPS 5.0 inch, no odor, no structure, moist.	10	20	15	20	15	20
95					CL	850.6 97.0	Stiff, gray, **LEAN CLAY** with sand, MPS 0.5 inch, no structure, no odor, moist.					15	85

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-3

TEST BORING REPORT

Boring No. MW-3
File No. 0207666-006
Sheet No. 4 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
100		S11 120	100.0 110.0				Similar as above.						
105													
110						837.6 110.0	**END OF BORING**						

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-3

TEST BORING REPORT

Boring No. MW-4

Project	MMM Vella Pit, Ann Arbor, MI
Client	Mid Michigan Materials
Contractor	Cascade Drilling

File No. 0207666-006
Sheet No. 1 of 4
Start October 05, 2023
Finish October 05, 2023
Driller Nolan Wilson
H&A Rep. N. Schaffer
Elevation 929.8
Datum NAVD 1988
Location See Plan
N 306581.47989
E 13310605.500129

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	Sonic	O	--	Rig Make & Model: Sonic
Inside Diameter (in.)	6	5.25	--	Bit Type:
Hammer Weight (lb)	--	Sonic	-	Drill Mud:
Hammer Fall (in.)	--	--	-	Casing: Driven
				Hoist/Hammer:
				PID Make & Model: NA

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
0		S1 120	0.0 10.0		CL		Stiff, gray-brown, **LEAN CLAY** with gravel, MPS 0.5 inch, no structure, no odor, moist.		15		5		80
10		S2 120	10.0 20.0			915.8 14.0	Similar as above.						
20													

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
- O - Open End Rod
- T - Thin Wall Tube
- U - Undisturbed Sample
- S - Split Spoon Sample

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary
- Overburden (ft) 95
- Rock Cored (ft)
- Samples

Boring No. MW-4

Field Tests:

Dilatancy: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-4
File No. 0207666-006
Sheet No. 2 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
20		S3 120	20.0 30.0			907.8 22.0	Similar as above.						
					GM	905.8 24.0	Loose, brown, **WELL GRADED GRAVEL** with silt and sand, MPS 4.0 inch, no structure, no odor, dry.	50	20			20	10
25													
30		S4 120	30.0 40.0			897.8 32.0	Similar as above.						
					SP-SM	895.8 34.0	Loose, brown, **POORLY GRADED SAND** with silt, MPS 0.2 inch, no structure, no odor, moist.				10	80	10
35													
40		S5 42	40.0 45.0		GM	889.8 40.0	Loose, brown, **WELL GRADED GRAVEL** with silt and sand, MPS 3.0 inch, no structure, no odor, moist.	40	30			20	10
45		S6 60	45.0 50.0		SP-SM	884.8 45.0	Loose, brown, **POORLY GRADED SAND** with silt and gravel, MPS 2.0 inch, no structure, no odor, dry.	15	15		10	50	10

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-4

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-4
File No. 0207666-006
Sheet No. 3 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
50		S7 120	50.0 60.0				Similar as above.						
55													
60		S8 120	60.0 70.0		SP	869.8 60.0	Loose, gray, **POORLY GRADED SAND** MPS 0.2 inch, no structure, no odor, dry.	5	5		60	25	5
65													
						862.8 67.0	Similar as above, moist-wet.						
70		S9 105	70.0 80.0		SP-SM	859.8 70.0	Loose, brown-gray, **POORLY GRADED SAND** with silt and gravel, MPS 4.0 inch, no structure, no odor, moist.	10	15		65		10
75													

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-4

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-4
File No. 0207666-006
Sheet No. 4 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
80						849.8							
		S10 60	80.0 85.0		GC	80.0	Loose, gray, **CLAYEY GRAVEL**, MPS 4.0 inch, no odor, no structure, moist-wet.	50	30				20
85		S11 120	85.0 95.0		CL	844.8 85.0	Stiff, gray, **LEAN CLAY** with sand, MPS 0.1 inch, no odor, no structure, moist.			10	10		80
90													
95						834.8 95.0	**END OF BORING**						

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-4

TEST BORING REPORT

Boring No. MW-5

Project	MMM Vella Pit, Ann Arbor, MI
Client	Mid Michigan Materials
Contractor	Cascade Drilling

File No. 0207666-006
Sheet No. 1 of 3
Start October 10, 2023
Finish October 10, 2023
Driller Nolan Wilson
H&A Rep. N. Schaffer
Elevation 902.7
Datum NAVD 1988
Location See Plan
N 308438.296058312
E 13309959.349847

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	Sonic	O	--	Rig Make & Model: Sonic
Inside Diameter (in.)	6	5.25	--	Bit Type:
Hammer Weight (lb)	--	Sonic	-	Drill Mud:
Hammer Fall (in.)	--	--	-	Casing: Driven
				Hoist/Hammer:
				PID Make & Model: NA

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
0		S1 48	0.0 10.0		GW-GM		Medium stiffness, dark brown, **WELL GRADED GRAVEL** with silt and sand, MPS 3.0 inch, no structure, no odor, moist.	30	30	20	10		10
					CL	899.7 3.0	Soft, gray-brown, **LEAN CLAY** with gravel, MPS 0.5 inch, no structure, no odor, moist.	5	10		10		75
5													
10		S2 70	10.0 20.0			891.7 11.0	Similar as above.						
						888.7 14.0	Lense of filler material, **CONCRETE AND METAL**.						
15					CL	887.7 15.0	Soft, red-brown, **SANDY LEAN CLAY**, MPS 0.25 inch, no structure, no odor, moist-wet.		10	10	10	10	60
						884.7 18.0	Similar as above, light brown color.						
20													

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 70
Rock Cored (ft)
Samples

Boring No. MW-5

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-5
File No. 0207666-006
Sheet No. 2 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
20		S3 120	20.0 30.0				Similar as above.						
					CL		Stiff, gray-brown, **LEAN CLAY** with sand, MPS 0.4 inch, no structure, no odor, moist.		5			10	85
25													
30		S4 104	30.0 40.0			872.7 30.0	Similar as above.						
					CL	870.7 32.0	Very soft, gray-brown, **SANDY LEAN CLAY**, MPS 0.2 inch, no structure, no odor, moist-wet.			10	10	10	70
35					SC	866.7 36.0	Loose, gray-brown, **CLAYEY SAND**, MPS 0.2 inch, no structure, no odor, wet.			20	35	20	25
					CL	863.7 39.0	Very stiff, gray, **LEAN CLAY**, MPS 0.2 inch, no structure, no odor, wet.					10	90
40		S5 108	40.0 50.0		CL	862.7 40.0	Medium stiff, gray, **SANDY LEAN CLAY**, MPS 0.1 inch, no structure, no odor, wet.			10	15	10	65
45													

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-5

HALEY ALDRICH

TEST BORING REPORT

Boring No. MW-5
File No. 0207666-006
Sheet No. 3 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	PID Readings (ppm)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines
50		S6 120	50.0 60.0		CL	852.7 50.0	Medium stiff, gray, **LEAN CLAY**, MPS 0.1 inch, no structure, no odor, moist-wet.					10	90
55													
60		S7 120	60.0 70.0		CL		Similar as above					10	90
65													
70						832.7 70.0	**END OF BORING**						

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. MW-5

OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

Well No. MW-1

Boring No.

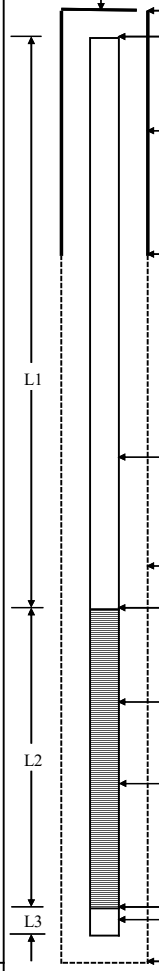
PROJECT	MMM VELLA PIT HYDROGEOLOGICAL EVALUATION	**H&A FILE NO.**	207666
LOCATION	ANN ARBOR CHARTER TOWNSHIP, MI	**PROJECT MGR.**	LESLIE NELSON
CLIENT	MID MICHIGAN MATERIALS	**FIELD REP.**	RAJ GAUTAM
CONTRACTOR	CASCADE DRILLING LP	**DATE INSTALLED**	10/9/2023
DRILLER	NOLAN WILSON	**WATER LEVEL**	

Ground El. 946.4 ft
El. Datum NAVD 1988

Location

☑ **Guard Pipe**
☐ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
See log	See right



Type of protective cover/lock (circle one): Pent.bolt 9/16" hex. 1/2" hex. 7/10" hex.
Padlock key no: ---

Height/Depth of top of guard pipe/roadway box above/below ground surface: ~3.5 ft

Height/Depth of top of riser pipe above/below ground surface: 3.27 ft

Type of protective casing: METAL STICK UP
Length: ~5.0 ft
Inside Diameter: 4.0 in

Depth of bottom of guard pipe/roadway box: ~1.5 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Grout	0.0	103.0
Bentonite Seal	103.0	2.0

Type of riser pipe: PVC
Inside diameter of riser pipe: 2.0 in
Type of backfill around riser: BENTONITE GROUT

Diameter of borehole: 6.0 in

Depth to top of well screen: 105.0 ft

Type of screen: SCHEDULE 40, 10 SLOT
Screen gauge or size of openings: 0.1 in
Diameter of screen: 2.0 in
Type of backfill around screen: WELL GRAVEL

Depth of bottom of well screen: 110.0 ft

Backfilled Borehole (Collapsed/Bentonite Chip): 10.0 ft

Depth of bottom of borehole: 120.0 ft

(Bottom of Exploration)

(Numbers refer to depth from ground surface in feet)

(Not to Scale)

108.27 ft	+	5 ft	+	0 ft	=	113.27 ft
Riser Pay Length (L1)		Length of screen (L2)		Length of silt trap (L3)		Pay length

COMMENTS:

OBSERVATION WELL INSTALLATION REPORT

Well No. MW-2

Boring No.

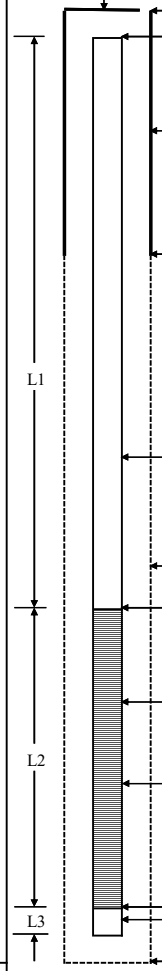
PROJECT	MMM VELLA PIT HYDROGEOLOGICAL EVALUATION	**H&A FILE NO.**	207666
LOCATION	ANN ARBOR CHARTER TOWNSHIP, MI	**PROJECT MGR.**	LESLIE NELSON
CLIENT	MID MICHIGAN MATERIALS	**FIELD REP.**	RAJ GAUTAM / NICK SCHAFFER
CONTRACTOR	CASCADE DRILLING LP	**DATE INSTALLED**	10/4/2023
DRILLER	TREVOR RAMUN	**WATER LEVEL**	

Ground El. 965.34 ft
El. Datum NAV 1988

Location

☑ **Guard Pipe**
☐ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
See log	See right



Type of protective cover/lock (circle one): Pent.bolt 9/16" hex. 1/2" hex. 7/10" hex.
Padlock key no._____

Height/Depth of top of guard pipe/roadway box above/below ground surface	~3.5	ft
Height/Depth of top of riser pipe above/below ground surface	2.97	ft
Type of protective casing:	METAL STICK UP	
Length	5.0	ft
Inside Diameter	4.000	in
Depth of bottom of guard pipe/roadway box	~1.5	ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Grout	0.0	123.0
Bentonite Seal	123.0	2.0

Type of riser pipe:	PVC	
Inside diameter of riser pipe	2.0	in
Type of backfill around riser	BENTONITE GROUT	
Diameter of borehole	6.0	in
Depth to top of well screen	125.0	ft
Type of screen	SCHEDULE 40, 10 SLOT	
Screen gauge or size of openings	0.1	in
Diameter of screen	2.0	in
Type of backfill around screen	WELL GRAVEL	
Depth of bottom of well screen	130.0	ft
Backfilled Borehole (Collapsed/Bentonite Chip)	-	ft
Depth of bottom of borehole	138.0	ft

(Bottom of Exploration)

(Numbers refer to depth from ground surface in feet)

(Not to Scale)

Riser Pay Length (L1)		Length of screen (L2)		Length of silt trap (L3)		Pay length
127.97 ft	+	5 ft	+	0 ft	=	132.97 ft

COMMENTS:

OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

Well No. MW-3

Boring No.

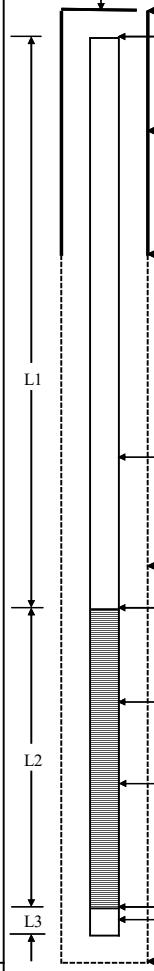
PROJECT	MMM VELLA PIT HYDROGEOLOGICAL EVALUATION	**H&A FILE NO.**	207666
LOCATION	ANN ARBOR CHARTER TOWNSHIP, MI	**PROJECT MGR.**	LESLIE NELSON
CLIENT	MID MICHIGAN MATERIALS	**FIELD REP.**	RAJ GAUTAM
CONTRACTOR	CASCADE DRILLING LP	**DATE INSTALLED**	10/11/2023
DRILLER	NOLAN WILSON	**WATER LEVEL**	

Ground El. 947.6 ft
El. Datum NAVD 1988

Location

☑ **Guard Pipe**
☐ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
See log	See right



Type of protective cover/lock (circle one): Pent.bolt 9/16" hex. 1/2" hex. 7/10" hex.
Padlock key no: ---

Height/Depth of top of guard pipe/roadway box above/below ground surface: ~3.5 ft

Height/Depth of top of riser pipe above/below ground surface: 3.07 ft

Type of protective casing: 4" Diameter Metal Stick Up
Length: 5.0 ft
Inside Diameter: 4.0 in

Depth of bottom of guard pipe/roadway box: ~1.5 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Grout	0.0	83.0
Bentonite Seal	83.0	2.0

Type of riser pipe: PVC
Inside diameter of riser pipe: 2.0 in
Type of backfill around riser: BENTONITE GROUT

Diameter of borehole: 6.0 in

Depth to top of well screen: 85.0 ft

Type of screen: SCHEDULE 40, 10 SLOT
Screen gauge or size of openings: 0.1 in
Diameter of screen: 2.0 in
Type of backfill around screen: WELL GRAVEL

Depth of bottom of well screen: 90.0 ft

Backfilled Borehole (Collapsed/Bentonite Chip): 20.0 ft

Depth of bottom of borehole: 110.0 ft

(Bottom of Exploration)

(Numbers refer to depth from ground surface in feet)

(Not to Scale)

88.07 ft	+	5 ft	+	0 ft	=	93.07 ft
Riser Pay Length (L1)		Length of screen (L2)		Length of silt trap (L3)		Pay length

COMMENTS:

OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

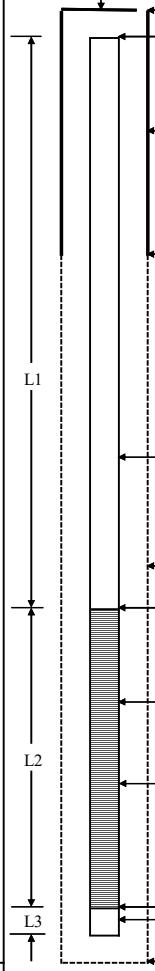
Well No. MW-4

Boring No.

PROJECT	MMM VELLA PIT HYDROGEOLOGICAL EVALUATION	**H&A FILE NO.**	207666
LOCATION	ANN ARBOR CHARTER TOWNSHIP, MI	**PROJECT MGR.**	LESLIE NELSON
CLIENT	MID MICHIGAN MATERIALS	**FIELD REP.**	RAJ GAUTAM / NICK SCHAFFER
CONTRACTOR	CASCADE DRILLING LP	**DATE INSTALLED**	10/5/2023
DRILLER	NOLAN WILSON	**WATER LEVEL**	

Ground El.	**929.8** ft	**Location**	☑ **Guard Pipe**
El. Datum	**NAV 1988**		☐ **Roadway Box**

SOIL/ROCK CONDITIONS	**BOREHOLE BACKFILL**
See log	See right



Type of protective cover/lock (circle one): Pent.bolt 9/16" hex. 1/2" hex. 7/10" hex.
Padlock key no._____

Height/Depth of top of guard pipe/roadway box above/below ground surface	~3.5	ft
Height/Depth of top of riser pipe above/below ground surface	~3.43	ft
Type of protective casing:	METAL STICK UP	
Length	5.0	ft
Inside Diameter	4.000	in
Depth of bottom of guard pipe/roadway box	~1.5	ft

Type of Seals	**Top of Seal (ft)**	**Thickness (ft)**
Grout	0.0	83.0
Bentonite Seal	83.0	2.0

Type of riser pipe:	PVC	
Inside diameter of riser pipe	2.0	in
Type of backfill around riser	BENTONITE GROUT	
Diameter of borehole	6.0	in
Depth to top of well screen	85.0	ft
Type of screen	SCHEDULE 40, 10 SLOT	
Screen gauge or size of openings	0.1	in
Diameter of screen	2.0	in
Type of backfill around screen	WELL GRAVEL	
Depth of bottom of well screen	90.0	ft
Backfilled Borehole (Collapsed/Bentonite Chip)	-	ft
Depth of bottom of borehole	95.0	ft

(Bottom of Exploration)

(Numbers refer to depth from ground surface in feet)

(Not to Scale)

88.43 ft	+	5 ft	+	0 ft	=	93.43 ft
Riser Pay Length (L1)		Length of screen (L2)		Length of silt trap (L3)		Pay length

COMMENTS:

OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

Well No. MW-5

Boring No.

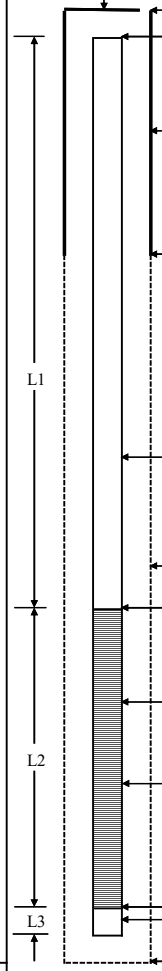
PROJECT	MMM VELLA PIT HYDROGEOLOGICAL EVALUATION	**H&A FILE NO.**	207666
LOCATION	ANN ARBOR CHARTER TOWNSHIP, MI	**PROJECT MGR.**	LESLIE NELSON
CLIENT	MID MICHIGAN MATERIALS	**FIELD REP.**	RAJ GAUTAM
CONTRACTOR	CASCADE DRILLING LP	**DATE INSTALLED**	10/10/2023
DRILLER	NOLAN WILSON	**WATER LEVEL**	

Ground El. 902.8 ft
El. Datum NAV 1988

Location

☑ **Guard Pipe**
☐ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
See log	See right



Type of protective cover/lock (circle one): Pent.bolt 9/16" hex. 1/2" hex. 7/10" hex.
Padlock key no: ---

Height/Depth of top of guard pipe/roadway box above/below ground surface	~3.5	ft
Height/Depth of top of riser pipe above/below ground surface	~3.1	ft
Type of protective casing:	METAL STICK UP	
Length	5.0	ft
Inside Diameter	4.000	in
Depth of bottom of guard pipe/roadway box	~1.5	ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Grout	0.0	33.0
Bentonite Seal	33.0	2.0

Type of riser pipe:	PVC	
Inside diameter of riser pipe	2.0	in
Type of backfill around riser	BENTONITE GROUT	
Diameter of borehole	6.0	in
Depth to top of well screen	35.0	ft
Type of screen	SCHEDULE 40, 10 SLOT	
Screen gauge or size of openings	0.1	in
Diameter of screen	2.0	in
Type of backfill around screen	WELL GRAVEL	
Depth of bottom of well screen	45.0	ft
Backfilled Borehole (Collapsed/Bentonite Chip)	-	ft
Depth of bottom of borehole	70.0	ft

(Bottom of Exploration)

(Numbers refer to depth from ground surface in feet)

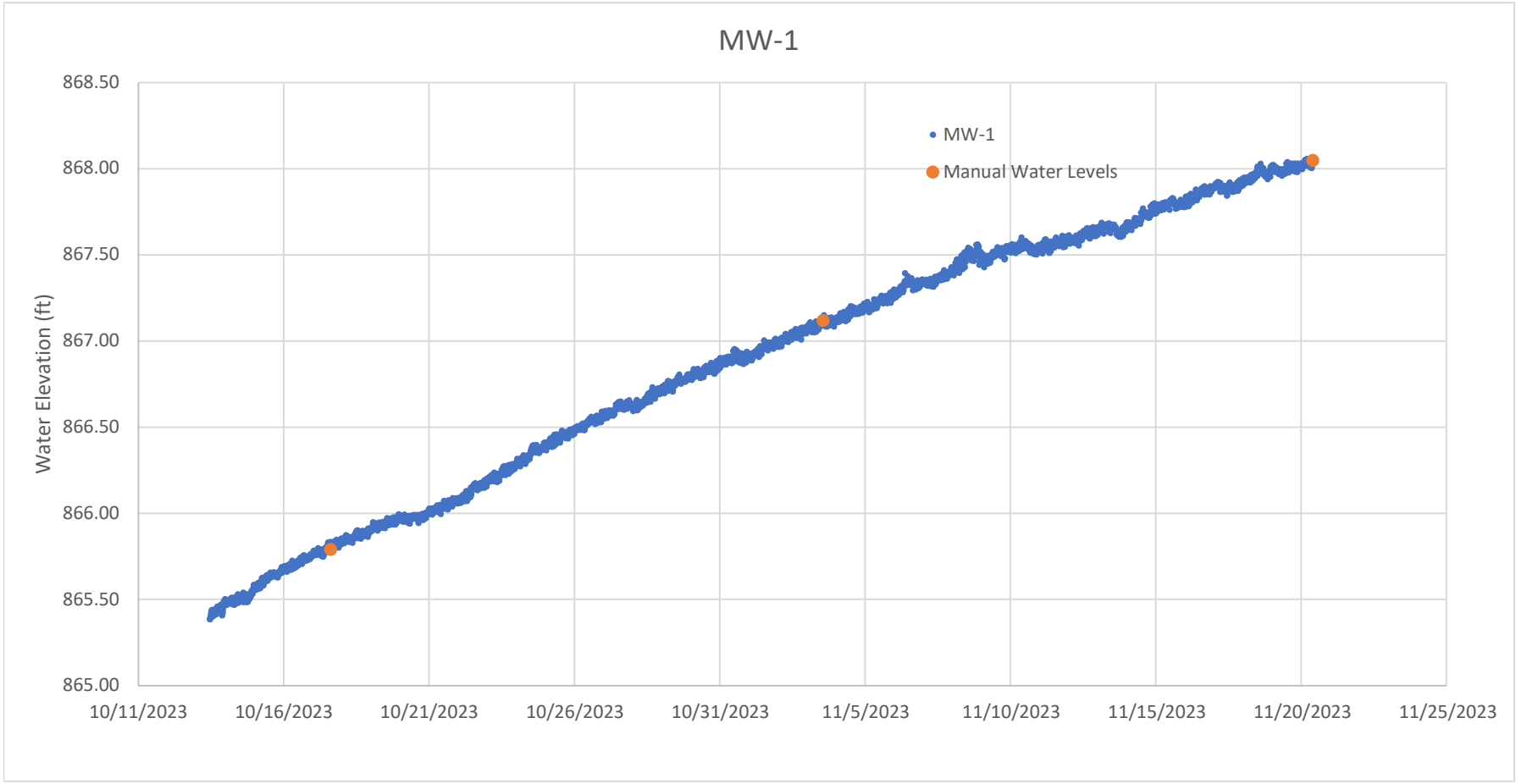
(Not to Scale)

Riser Pay Length (L1)		Length of screen (L2)		Length of silt trap (L3)		Pay length
38.1 ft	+	10 ft	+	0 ft	=	48.1 ft

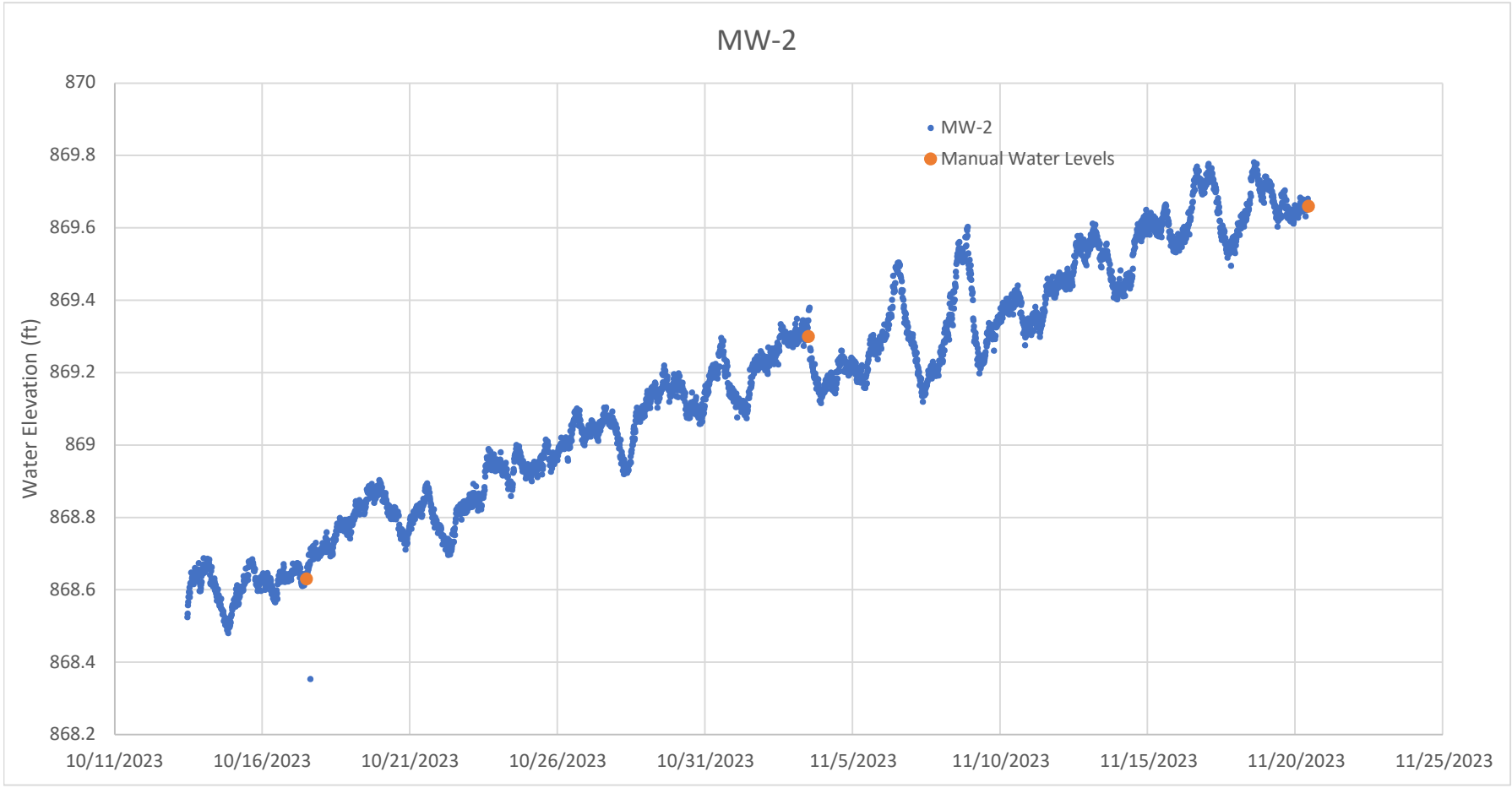
COMMENTS:

APPENDIX B
Monitoring Well and Staff Gauge Pressure Transducer Data

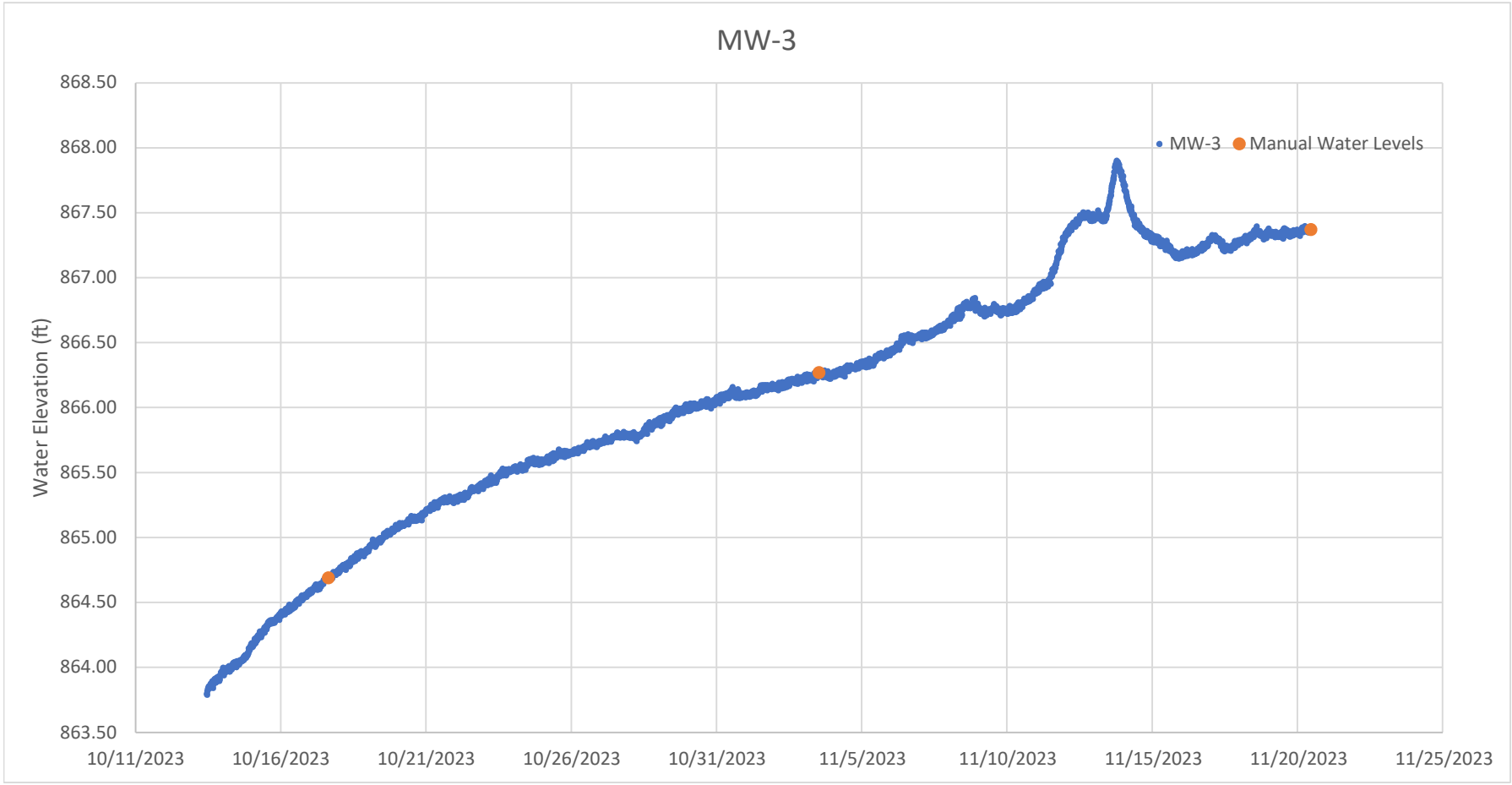
TRANSDUCER DATA PLOT - MW-1
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



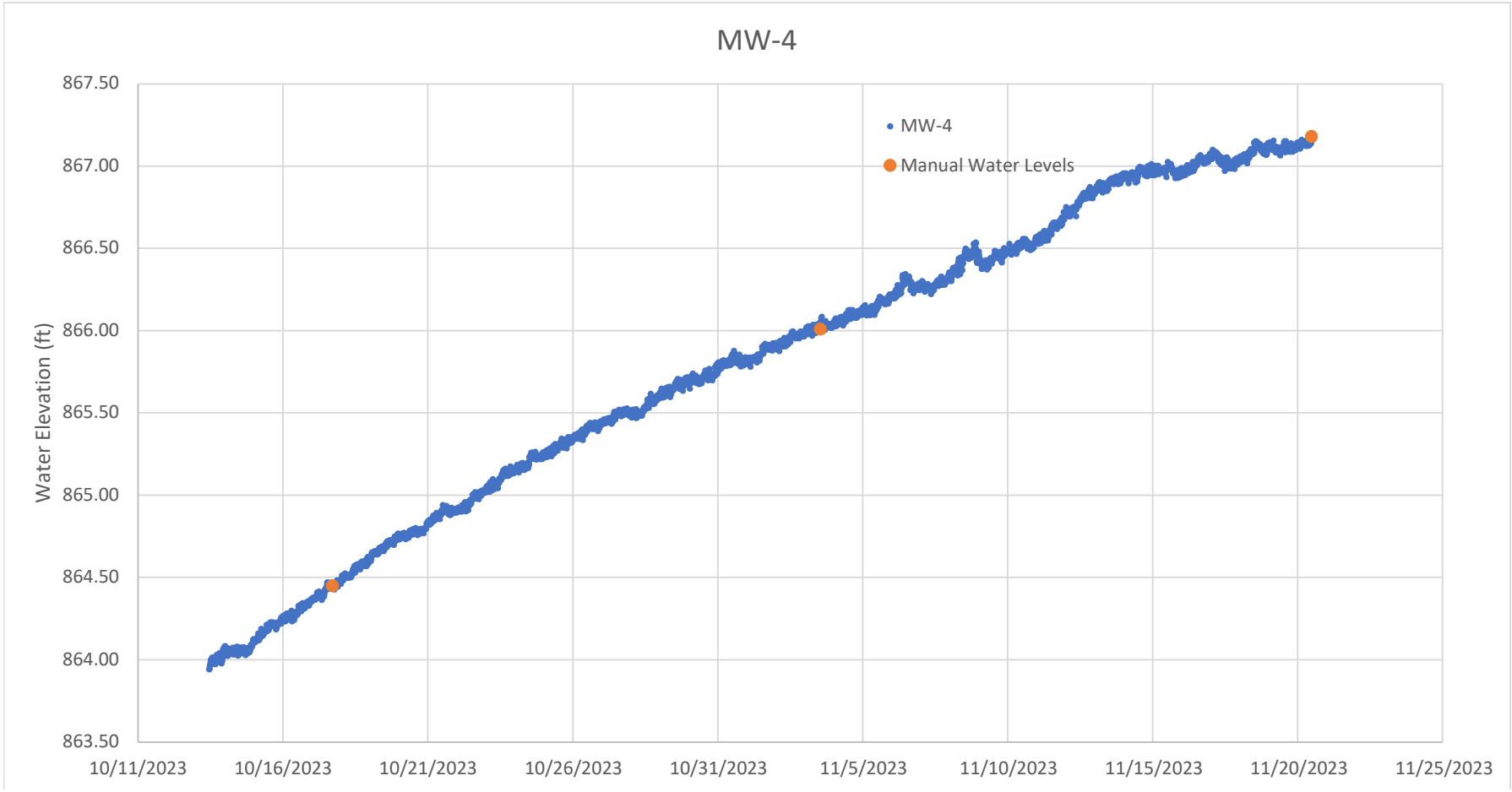
TRANSDUCER DATA PLOT - MW-2
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



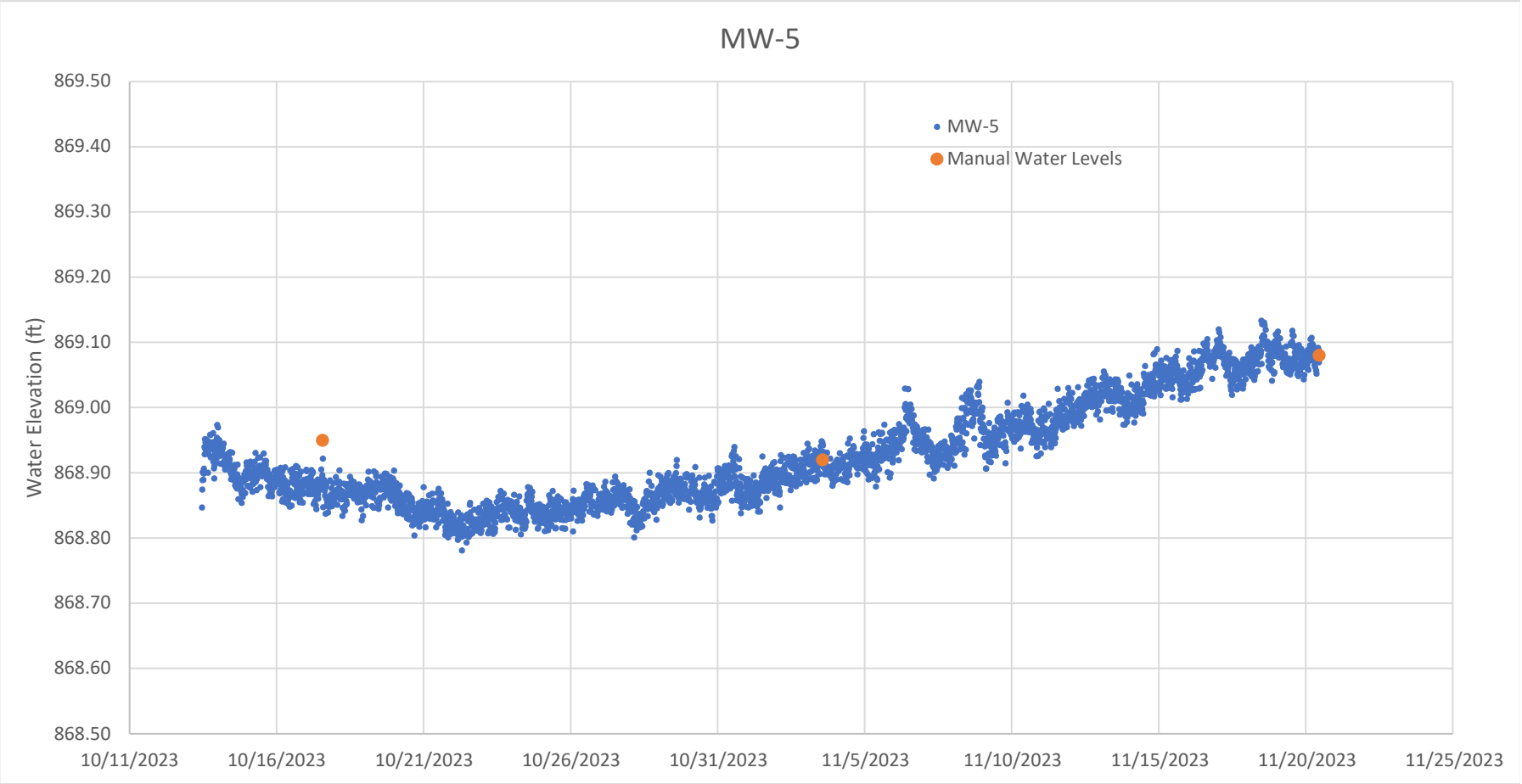
TRANSDUCER DATA PLOT - MW-3
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



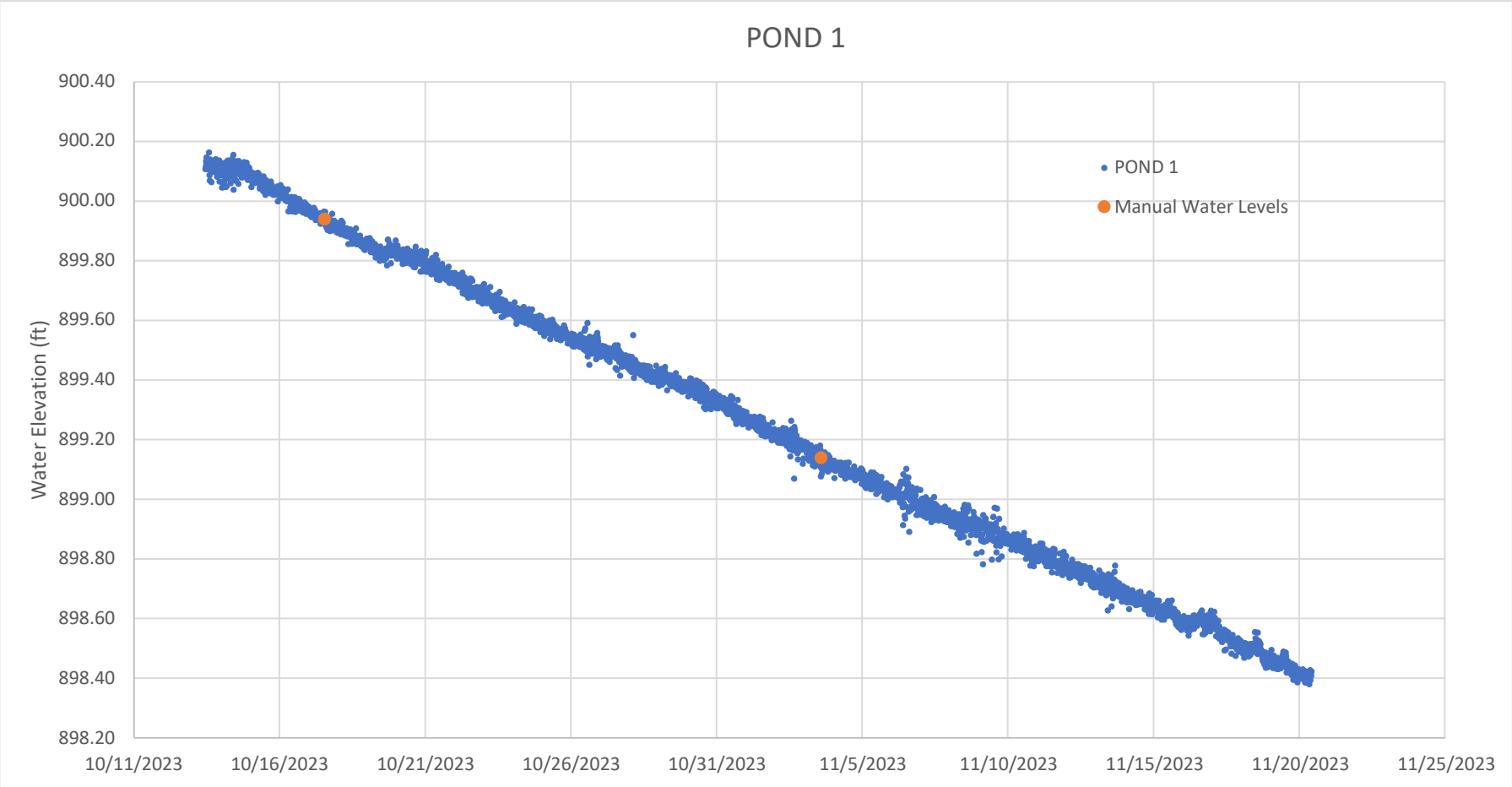
TRANSDUCER DATA PLOT - MW-4
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



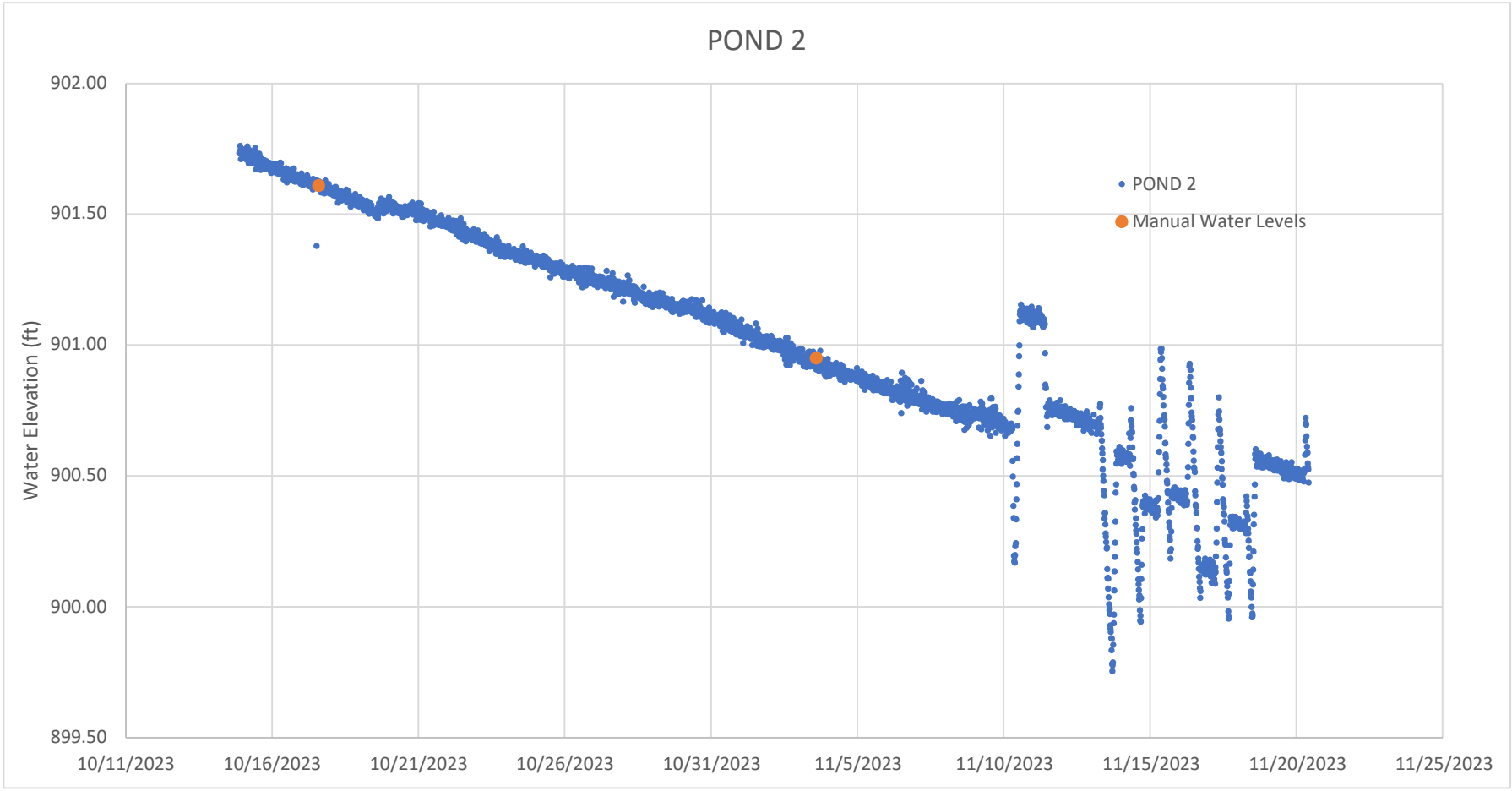
TRANSDUCER DATA PLOT - MW-5
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



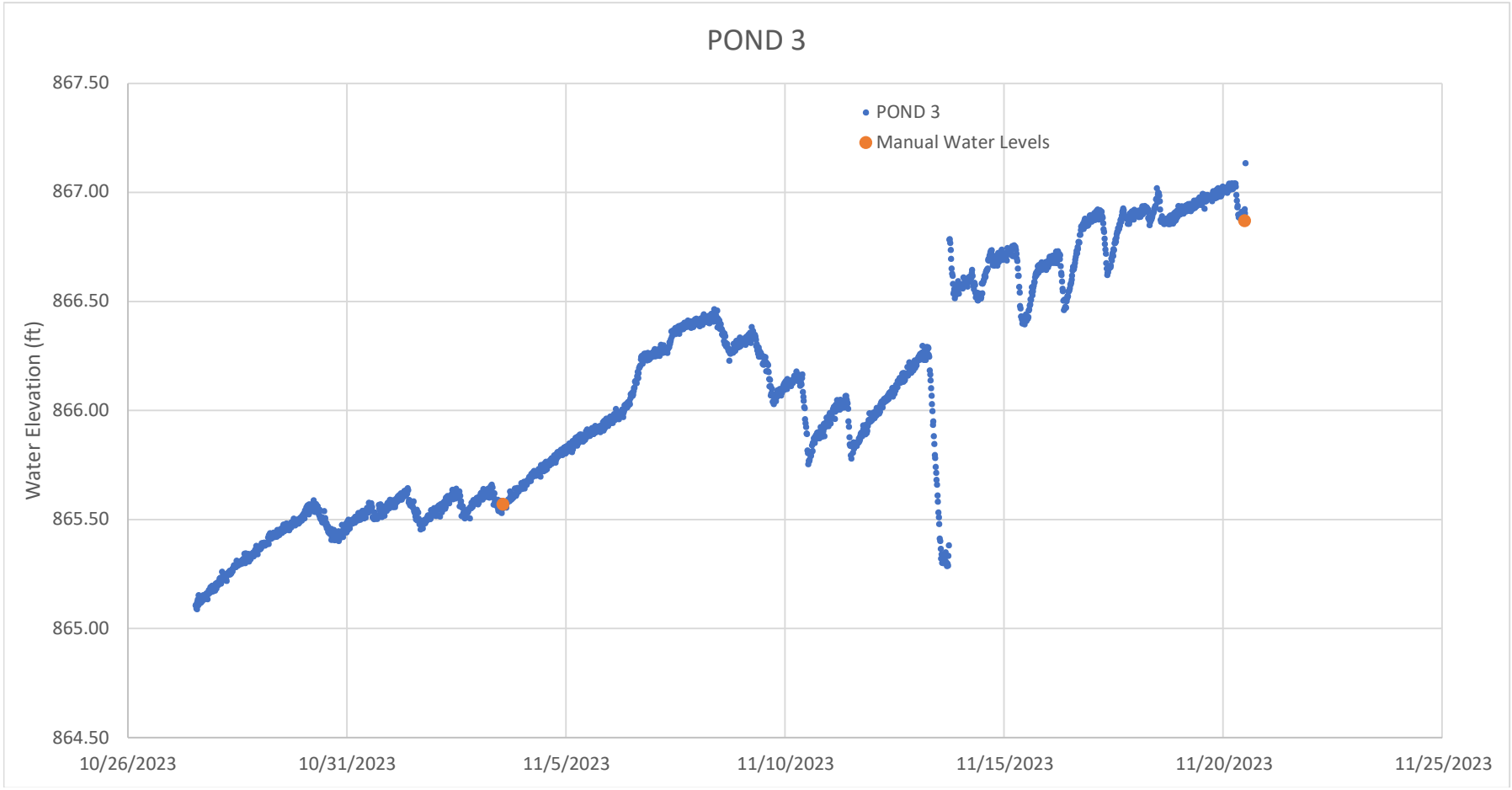
TRANSDUCER DATA PLOT - POND 1
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



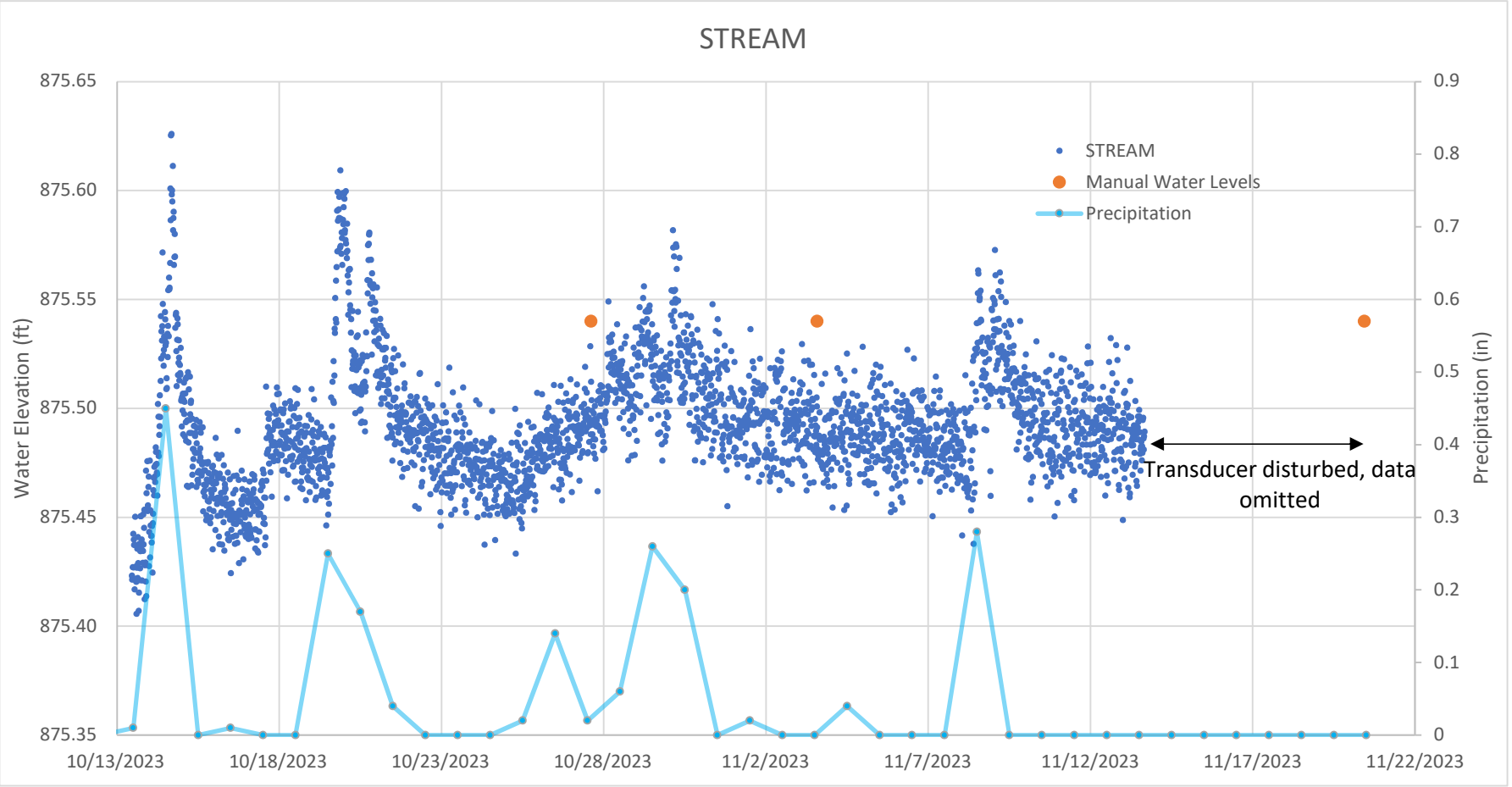
TRANSDUCER DATA PLOT - POND 2
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



TRANSDUCER DATA PLOT - POND 3
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN

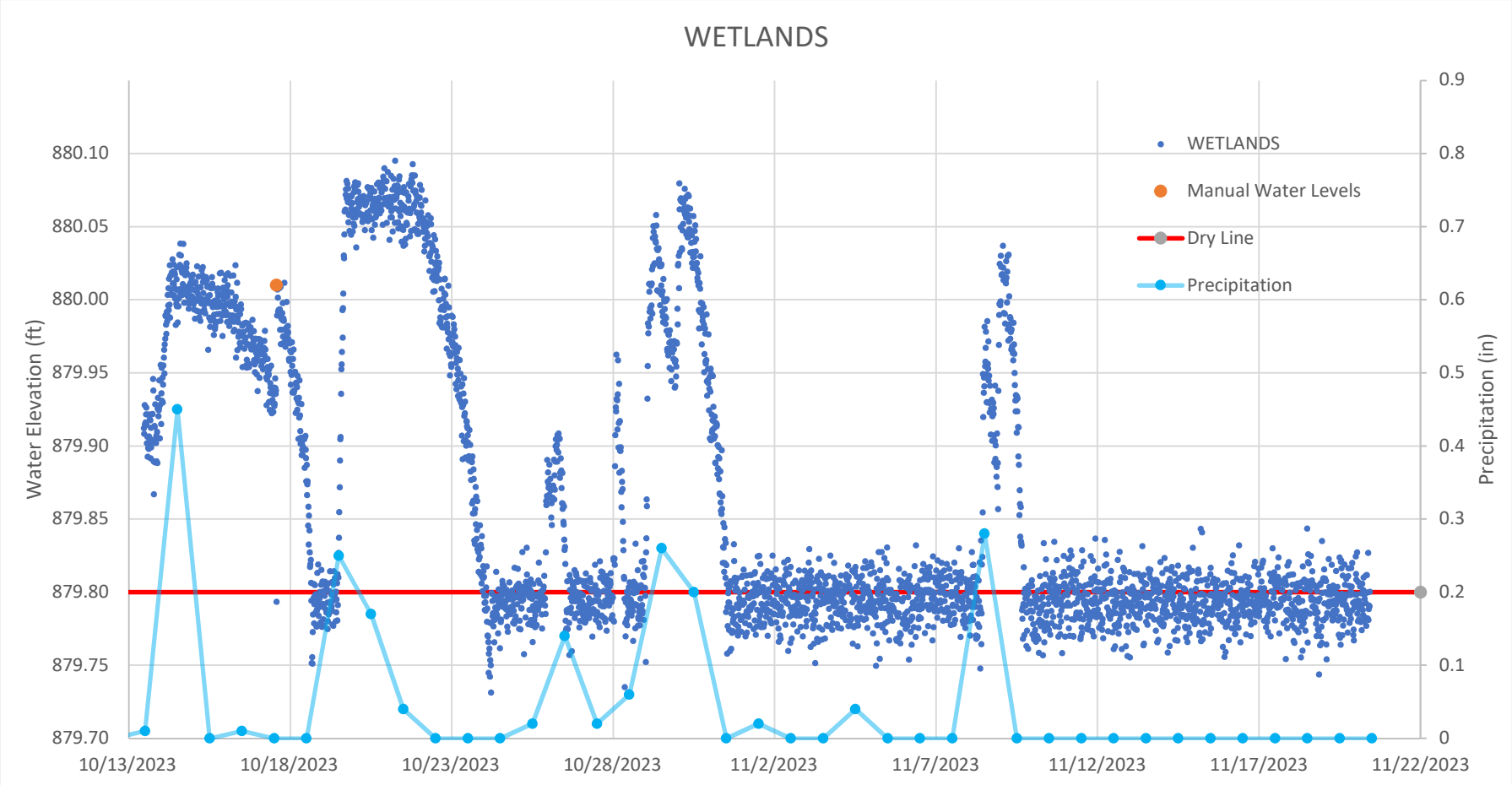


TRANSDUCER DATA PLOT - STREAM
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



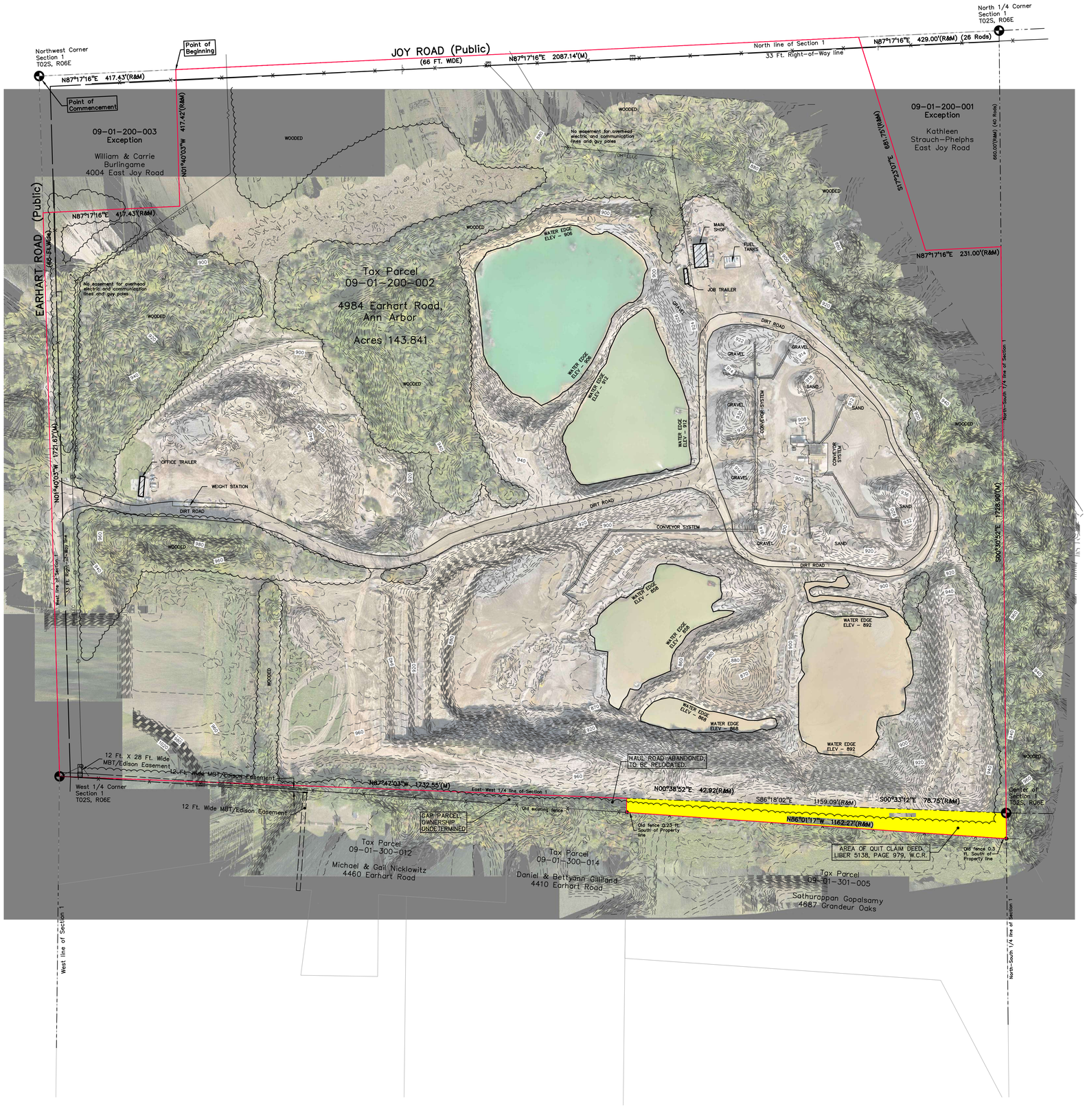
Precipitation data source: National Oceanic and Atmospheric Administration (NOAA), NOWData: https://www.weather.gov/wrh/climate?wfo=dtx/

TRANSDUCER DATA PLOT - WETLANDS
MID MICHIGAN MATERIALS - VELLA PIT
ANN ARBOR TOWNSHIP, MICHIGAN



Precipitation data source: National Oceanic and Atmospheric Administration (NOAA), NOWData: https://www.weather.gov/wrh/climate?wfo=dtx/

APPENDIX C
2 October 2023 Aerial Survey



LEGEND:

- EX. OH, ELEC, POLE & GUY WIRE
- EX. U.G. CABLE TV & PEDESTAL
- EX. U.G. COMMUNICATION LINE, PEDESTAL & MANHOLE
- EX. U.G. ELEC,MANHOLE, METER & HANDHOLE
- EX. GAS LINE
- EX. GAS VALVE & GAS LINE MARKER
- EX. TRANSFORMER & IRRIGATION VALVE
- EX. WATER MAIN
- EX. HYDRANT, GATE VALVE & POST INDICATOR VALVE
- EX. WATER VALVE BOX & SHUTOFF
- EX. SANITARY SEWER
- EX. SANITARY CLEANOUT & MANHOLE
- EX. COMBINED SEWER MANHOLE
- EX. STORM SEWER
- EX. CLEANOUT & MANHOLE
- EX. SQUARE, ROUND, & BEEHIVE CATCH BASIN
- EX. YARD DRAIN & ROOF DRAIN
- EX. UNIDENTIFIED STRUCTURE
- EX. MAILBOX, SIGN & LIGHTPOLE
- EX. FENCE
- EX. GUARD RAIL
- EX. SPOT ELEVATION
- EX. CONTOUR
- EX. WETLAND

- IRON FOUND / SET
- NAIL FOUND / NAIL & CAP SET
- BRASS PLUG SET
- MONUMENT FOUND / SET
- SECTION CORNER FOUND
- R M C RECORDED / MEASURED / CALCULATED

LEGAL DESCRIPTION:

(per First American Title Insurance Company, Commitment No. C000122143, Commitment Date: June 04, 2020, Revision No. 3, Dated June 15, 2020)

Tax Id Number(s): I-09-01-200-002
Land situated in the Township of Ann Arbor, in the County of Washtenaw, in the State of Michigan

The Northwest fractional 1/4 of Section 1, except beginning in the North line of section at a point which is 26 rods West of North 1/4 corner of Section 1; thence East 26 rods to North 1/4 corner of Section 1; thence South 40 rods in the North and South 1/4 line; thence West 14 rods; thence Northwesterly to the point of beginning. ALSO EXCEPT North 417.42 feet of West 417.42 feet of Northwest 1/4 of Section 1. Also commencing at South 1/4 corner of Section 1; thence North 86 degrees 49 minutes 07 seconds West 1214.13 feet; thence North 02 degrees 07 minutes 34 seconds East 2597.57 feet to point of beginning; thence continue North 02 degrees 07 minutes 34 seconds East 42.92 feet; thence South 86 degrees 18 minutes 02 seconds East 1159.09 feet; thence South 00 degrees 55 minutes 22 seconds West 78.75 feet; thence North 84 degrees 32 minutes 15 seconds West 1162.27 feet to the point of beginning. Being part of the West 1/2 of Section 1, Town 2 South, Range 6 East.

More particularly described as:

Part of the Northwest 1/4 of Section 1, Township 02 South, Range 06 East of Ann Arbor Township, Washtenaw County, Michigan.

Commencing at the Northwest corner of Section 1, Township 02 South, Range 06 East, Thence along the north line of said Section 1, N87°17'16"E, 417.43 feet to the Point-of-Beginning: Thence continuing along said north line of Section 1, N87°17'16"E, 2087.14 feet; thence along the west line of Tax Parcel 09-01-200-001, S17°23'07"E, 681.75 feet; thence along the south line of said Tax Parcel 09-01-200-001, N87°17'16"E, 231.00 feet to the north-south 1/4 line of said Section 1 as monumented; thence along said north-south line as monumented, S00°30'52"E, 1728.90 feet to the Center of said Section 1 as referenced in Quit Claim deed recorded in Liber 5130, Page 979, Washtenaw Register of Deed; thence along said north-south line of said Section 1 as monumented, S00°33'12"E 78.75 feet; thence N86°01'17"W, 1162.27 feet; thence N00°38'52"E, 42.92 feet to the east-west 1/4 line as monumented; thence along said east-west 1/4 line as monumented, N87°47'03"W, 1732.55 feet to the west 1/4 corner of said Section 1, thence along the west line of said Section 1, N01°40'03"W, 1721.67 feet; thence along the south line of Tax Parcel 09-01-200-003, N87°17'16"E, 417.43 feet; thence along the east line of said Tax Parcel 09-01-200-003, N01°40'03"W, 417.42 feet to the north line of said Section 1 and the Point-of-Beginning.

Flood Zone Rating and Statement:

Said described property is located within an area having a Zone Designation "X" (Area of Minimal Flooding), on Flood Insurance Community Panel 26161C0258E, Effective Date – March 03, 2012. Per FEMA Interactive Map.

PEA GROUP
t: 844.813.2949
www.peagroup.com

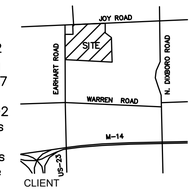
NORTH

0 75 150 300
SCALE: 1" = 150'

811 Know what's below. Call before you dig.

CAUTION!!
THE LOCATIONS AND ELEVATIONS OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THIS DRAWING ARE ONLY APPROXIMATE LOCATIONS AND ELEVATIONS AND ARE NOT GUARANTEED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT UTILITY LOCATIONS AND ELEVATIONS PRIOR TO THE START OF CONSTRUCTION.

LOCATION MAP – NOT TO SCALE



MID MICHIGAN MATERIALS
6966 FISHER ROAD
JEDDO, MICHIGAN 48032

PROJECT TITLE
ASC-WSG
4984 EARHART ROAD
ANN ARBOR, MICHIGAN 48105

REVISIONS
- -

ORIGINAL ISSUE DATE:
OCTOBER 09, 2023

DRAWING TITLE
TOPOGRAPHIC SURVEY

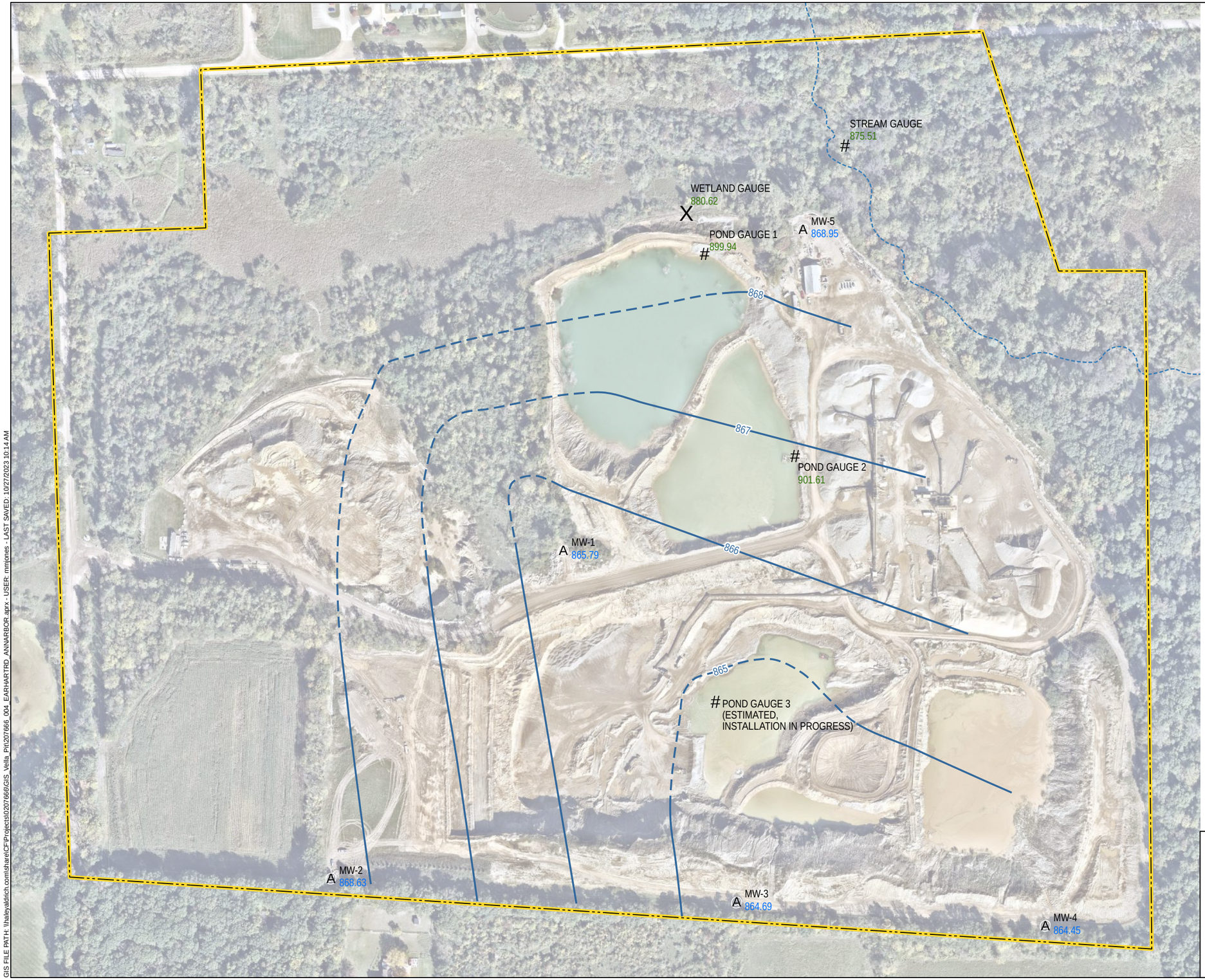
PEA JOB NO.	2022-1308
P.M.	DLC
DN.	JSH
DES.	XXX

DRAWING NUMBER:
1 OF 1

NOT FOR CONSTRUCTION

C:\Users\Jhosley\Desktop\[XP08A0E-22-1308.dwg PLOT DATE: 10/10/2023 BY: Jared Hosley

APPENDIX D
Preliminary Groundwater Potentiometric Surface Contour Maps



LEGEND

- A — MONITORING WELL
- # — POND GAUGE
- # — STREAM GAUGE
- X — WETLAND GAUGE
- 868.95 — GROUNDWATER POTENTIOMETRIC SURFACE MEASUREMENT
- 868.95 — SURFACE WATER ELEVATION MEASUREMENT, NOT USED IN CONTOURING
- CREEK
- GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION CONTOUR IN FEET
- INFERRED GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION CONTOUR IN FEET
- SITE BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. POTENTIOMETRIC SURFACE MEASUREMENTS TAKEN 17 OCTOBER 2023
3. POND 3 DEWATERING CEASED ON 10 OCTOBER 2023
4. AERIAL IMAGERY SOURCE: NEARMAP, 2 OCTOBER 2023

N

0 260 520
SCALE IN FEET

HALEY ALDRICH

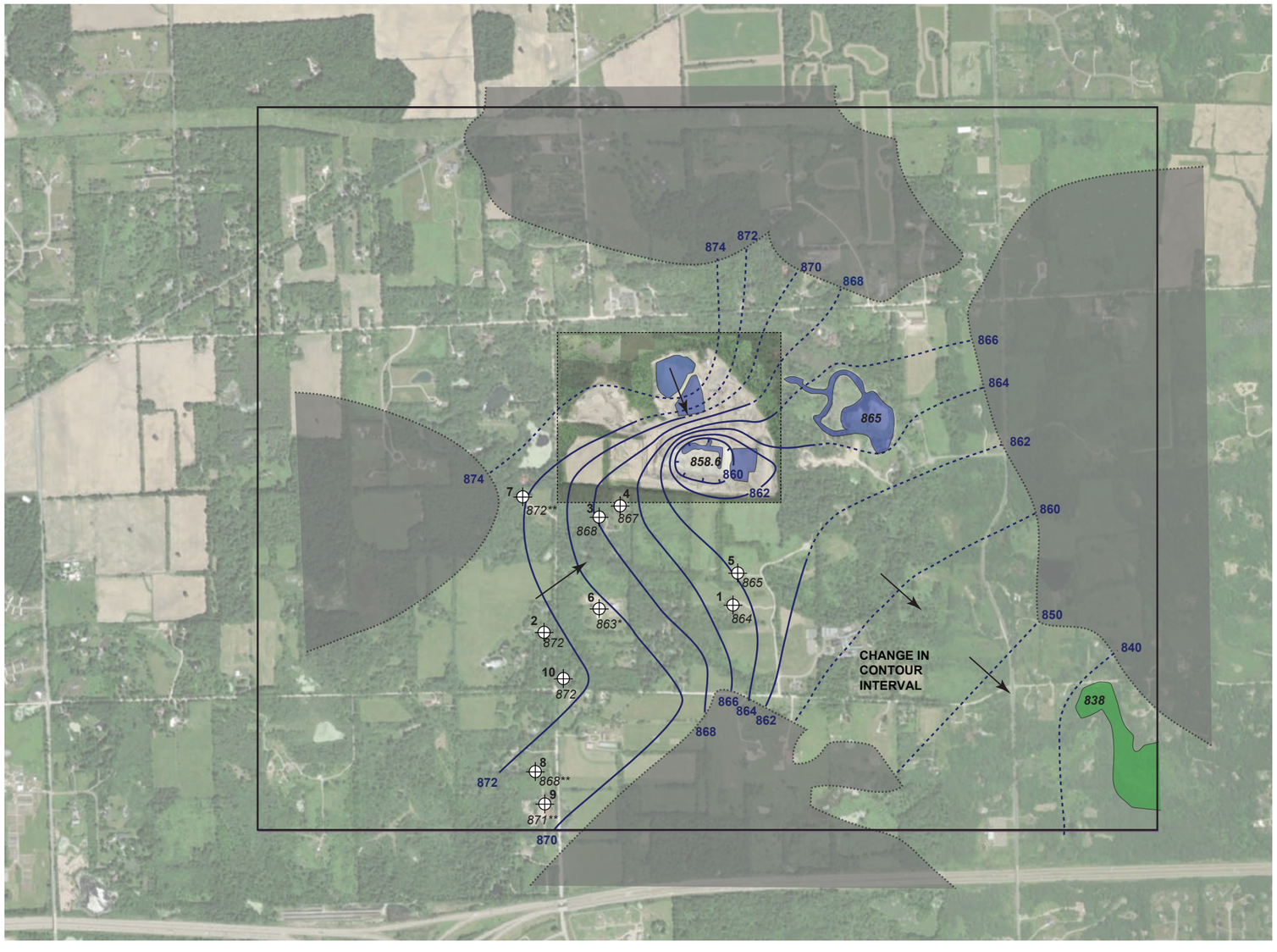
MID MICHIGAN MATERIALS VELLA PIT
4984 EARHART RD
ANN ARBOR, MICHIGAN

GROUNDWATER POTENTIOMETRIC SURFACE MAP

OCTOBER 2023

PRELIMINARY FIGURE 1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0207666\GIS_Vella_Pit\207666_004_EARHARTRD_ANNARBOR.aprx - USER: mmjones - LAST SAVED: 10/27/2023 10:14 AM



LEGEND

7 / 865 DOMESTIC WELL: SUBSCRIPT = ESTIMATED GROUNDWATER ELEVATION
SUPERSCRIPT = WELL ID: SEE DESCRIPTION IN TEXT
* = NOT USED IN CONTOURING
** = NOT SURVEYED; UNCERTAIN REFERENCE ELEVATION

866 POTENTIOMETRIC CONTOUR: WATER LEVEL IN UPPER AQUIFER ESTIMATED FOR JULY - AUGUST, 2023. DASHED WHERE INFERRED

GROUNDWATER FLOW DIRECTION

INITIAL (CIRCA AUGUST 2023) NUMERICAL MODEL DOMAIN

AERIAL IMAGERY FOR VELLA PIT, 2023 (INSET)

SURFACE WATER BODY; NUMBER INDICATES ESTIMATED WATER SURFACE ELEVATION

WETLANDS; NUMBER INDICATES ESTIMATED TOPOGRAPHIC ELEVATION

UPPER AQUIFER NOT PRESENT IN INITIAL NUMERICAL MODEL: SUBJECT TO REVISION AFTER MODEL EXPANSION AND REFINEMENT

NOTES

1. https://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer ACCESSED 05 OCTOBER 2023
2. AERIAL IMAGE FOR VELLA PIT IS OVERLAYED ON AERIAL IMAGE BASEMAP: SHOWS CURRENT CONFIGURATION OF PIT LAKES

N

0 2,500 5,000

SCALE IN FEET

HALEY ALDRICH

MID MICHIGAN MATERIALS - VELLA PIT
4984 EARHART ROAD, ANN ARBOR, MI 48105

POTENTIOMETRIC SURFACE JULY-AUGUST 2023

OCTOBER 2023

FIGURE A5

Explanation for Wells on Potentiometric Surface Map

Note: Domestic water wells are not designed to be used as observation wells and many details of the well construction (type of pump, how the riser pipe is attached to the pitless adapter, etc.) add uncertainty in addition to the lack of surveyed elevations when converting reported static water depths to groundwater head in the aquifer. We estimate that this uncertainty is on the order of ±2 feet.

1. Well ID: 81000035111. Installed on 10 August 2023. Drillers Log reports static water level at 55 feet below ground surface (BGS). Well location surveyed by Global Positioning System (GPS): geographic coordinates given, but no surveyed elevation. Elevation estimated as 919 feet during visit to property for well health check: corresponds to an estimated groundwater elevation of 864 feet above sea level (ASL).

2. Well ID: 81000035077. Installed on 3 August 2023. Drillers Log reports static water level at 69 feet BGS. Well location surveyed by GPS: geographic coordinates given, but no surveyed elevation. Elevation estimated as 941 feet during visit to property for well health check: corresponds to an estimated groundwater elevation of 872 feet ASL.

3. Well ID: 81000019759. Installed on 14 September 2012. Cribley Drilling Co. (Cribley) measured static water level at 100.1 feet BGS in a well health check on 31 July 2023. Well location surveyed by GPS: geographic coordinates given, but no surveyed elevation. Elevation estimated as 968 feet during visit to property for well heath check: corresponds to an estimated groundwater elevation of 868 feet ASL.

4. Well ID: 81000004744. Installed 8 September 1983. Drillers Log reports a wellhead elevation of 970 feet with map interpolated geographic coordinates. The estimate from the United States Geological Survey (USGS) digital elevation model is 974 feet ASL. The well pump was lowered on 19 July 2023. The homeowner reports that Cribley measured a depth to water of 107.4 feet at the time of this repair. Using the 974 feet ASL elevation, this corresponds to an estimated groundwater elevation of 867 feet ASL.

5. Well ID: 81000035072. Installed on 21 June 2023. Drillers Log reports static water level at 45 feet BGS. Well location surveyed by GPS: geographic coordinates given, but no surveyed elevation. Elevation estimated as 910 feet ASL based on USGS digital elevation model. This corresponds to an estimated groundwater elevation of 865 feet ASL. Note that because this groundwater elevation estimate is at least a month earlier than the other wells in this map and water levels in the upper aquifer are known to have fallen during this time, contours have not been adjusted to force a fit to this well.

6. Well ID: 81000035073. Installed on 7 June 2023. Drillers Log reports static water level at 75 feet BGS. Well location surveyed by GPS: geographic coordinates given, but no surveyed elevation. Elevation estimated as 938 feet ASL based on USGS digital elevation model, which would correspond to an estimated groundwater elevation of 863 feet ASL, a non-sequitur compared with nearby wells. However, this well was a direct replacement for a well installed into the lower aquifer in May. Both logs list a static water level of 75 feet, which is an unlikely coincidence given observations in nearby wells in the upper and lower aquifers. We believe that this may have resulted from the driller re-using their well log template. Based on this data quality concern, this well was omitted from the potentiometric surface contouring.

7. Well ID: 81000004750. Installed on 2 June 1987. Drillers Log reports an elevation of 950 feet ASL with map interpolated geographic coordinates. The estimate from the USGS digital elevation model is 951 feet ASL. On 12 July 2023, Cribley measured the static water level in this well at 78.9 feet BGS as part of a well health check performed on behalf of the property owner. These results were shared in a 31 July 2023 e-mail from a representative of the property owner. Using the latter estimate of elevation, this corresponds to an estimated groundwater elevation of 872 feet ASL. Given the age of the well and lack of surveyed coordinates, an estimated reference elevation is unavailable, and this result is treated with greater uncertainty in drawing potentiometric contours.

8. Well ID: 81000004825. Installed on 6 July 1983. Drillers Log reports an elevation of 905 feet ASL with map interpolated geographic coordinates. The estimate from the USGS digital elevation model is 905.7 feet ASL. On 12 July 2023, Cribley measured the static water level in this well at 37.7 feet BGS as part of a well health check performed on behalf of the property owner. These results were shared in a 31 July 2023 e-mail from a representative of the property owner. Using the latter estimate of elevation, this corresponds to an estimated groundwater elevation of 868 feet ASL. Given the age of the well and lack of surveyed coordinates, an estimated reference elevation is unavailable, and this result is treated with greater uncertainty in drawing potentiometric contours.

9. Well ID: 81000004829. Installed on 2 July 1987. Drillers Log reports an elevation of 929 feet ASL with map interpolated geographic coordinates. The estimate from the USGS digital elevation model is 914.77 feet ASL. On 12 July 2023, Cribley measured the static water level in this well at 44 feet BGS as part of a well health check performed on behalf of the property owner. These results were shared in a 31 July 2023 e-mail from a representative of the property owner. Using the latter estimate of elevation, this corresponds to an estimated groundwater elevation of 871 feet ASL. Given the age of the well and lack of surveyed coordinates, a precise reference elevation is unavailable, and this result is treated with greater uncertainty in drawing potentiometric contours.

10. Well ID: 81000035168. Installed on 16 August 2023. Drillers Log reports static water level at 52 feet BGS. Well location surveyed by GPS: geographic coordinates given, but no surveyed elevation. Elevation estimated as 924 feet ASL based on USGS digital elevation model, which corresponds to an estimated groundwater elevation of 872 feet ASL.

Other constraints used in potentiometric surface: the general shape of potentiometric contours was taken from the groundwater model and refined using the 10 wells described above. The minimum groundwater elevation at Vella Pit is constrained to 858.6, the set operating level of dewatering in the lowest excavation. Based on topographic maps and Google Earth, Massey Lake has a surface elevation of approximately 865 feet ASL. A wetland related to Flemming Creek in the southeast corner of the groundwater model area corresponds to a topographic depression of 838 – 830 feet ASL constraining groundwater elevations to no higher than this elevation in the upper aquifer. The assumed influence of the northern settling ponds at Vella Pit is represented in the deflection of contours: determining a relationship between the elevation of water in these ponds and water levels in the aquifer is part of the current investigation.

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No: i-09-01-301-002	**Permit No:** well2023-0337	**County:** Washtenaw		**Township:** Ann Arbor
		Town/Range: 02S 06E	**Section:** 1	**Well Status:** Active	**WSSN:**	**Source ID/Well No:**

Well ID: 81000035111

Elevation:

Latitude: 42.33531

Longitude: -83.67578

Method of Collection: GPS Std Positioning Svc SA Off

Distance and Direction from Road Intersection:
EAST OF EARHART RD. AND NORTH OF WARREN RD.

Well Owner: DALE AND MARGAUX MORI TUTTLE

Well Address:
4275 GRANDEUR OAKS LANE
ANN ARBOR, MI 48105

Owner Address:
4275 GRANDEUR OAKS LANE
ANN ARBOR, MI 48105

Drilling Method: Rotary
Well Depth: 97.00 ft. **Well Use:** Household
Well Type: Replacement **Date Completed:** 8/10/2023

Casing Type: PVC plastic **Height:** 1.00 ft. above grade
Casing Joint: Solvent welded/glued
Casing Fitting: None

Diameter: 5.68 in. to 67.00 ft. depth SDR: 21.00
0.00 in. to 0.00 ft. depth SDR: 0.00

Borehole: 9.00 in. to 97.00 ft. depth

Pump Installed: Yes **Pump Installation Only:** No
Pump Installation Date: 8/21/2023 **HP:** 1.00
Manufacturer: Grundfos **Pump Type:** Submersible
Model Number: 22SQE10-190 **Pump Capacity:** 20 GPM
Drop Pipe Length: 75.00 ft. **Pump Voltage:** 230
Drop Pipe Diameter: 1.25 in. **Drilling Record ID:**
Draw Down Seal Used: No

Pressure Tank Installed: Yes
Pressure Tank Type: Diaphragm/bladder
Manufacturer: Well-Rite-Flexcon
Model Number: FT-8 **Tank Capacity:** 2.0 Gallons
Pressure Relief Valve Installed: Yes

Static Water Level: 55.00 ft. Below Grade
Well Yield Test: **Yield Test Method:** Air
Pumping level 65.00 ft. after 1.00 hrs. at 25 GPM

Formation Description	Thickness	Depth to Bottom
Brown Sand	10.00	10.00
Clay Sandy	13.00	23.00
Sand & Gravel	74.00	97.00

Screen Installed: Yes **Filter Packed:** Yes
Screen Diameter: 5.00 in. **Blank:**
Screen Material Type: PVC-slotted
Screen Installation Type: Attached

Slot	Length	Set Between
20.00	20.00 ft.	77.00 ft. and 97.00 ft.

Fittings: Coupling

Well Grouted: Yes **Grouting Method:** Grout pipe outside casing

Grouting Material	Bags	Additives	Depth
Bentonite slurry	9.00	None	0.00 ft. to 72.00 ft.

Geology Remarks:

Wellhead Completion: Pitless adapter, 12 inches above grade

Nearest Source of Possible Contamination:

Type	Distance	Direction
Septic tank	275 ft.	Southeast

Abandoned Well Plugged: No
Reason Not Plugged: Other

Drilling Machine Operator Name: Travis Ostrowski
Employment: Employee
Pump Installer: Justin Banks, Dominic Hoffman

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-2014
Business Name: Cribley Drilling Company
Business Address: 8300 Dexter-Chelsea Rd, Dexter, MI, 48130

Water Well Contractor's Certification

This well and/or pump installation was performed under my registration.

Signature of Registered Contractor **Date**

General Remarks: USED 1,000# SAND PACK. RE-USED OWNER'S SUBMERSIBLE PUMP AND PRESSURE TANK FROM OLD WELL. OLD WELL NOT YET ABANDONED - OWNER WANTS TO KEEP IT IN RESERVE FOR NOW.

Other Remarks: Not Plugged Reason:SEE GENERAL REMARKS.

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No: I-09-02-400-011	**Permit No:** WELL2023-0327	**County:** Washtenaw		**Township:** Ann Arbor

Well ID: 81000035077

Elevation:

Latitude: 42.33431

Longitude: -83.68396

Method of Collection: GPS Std Positioning Svc SA Off

Town/Range:	Section:	Well Status:	WSSN:	Source ID/Well No:
02S 06E	2	Active		

Distance and Direction from Road Intersection:
70 FT OFF OF EARHART RD, AND 500 FT N OF WARREN

Well Owner: KAY YOURIST & SUSAN MINARD

Well Address:	Owner Address:
4125 EARHART RD ANN ARBOR, MI 48105	4125 EARHART RD ANN ARBOR, MI 48105

Drilling Method: Rotary
Well Depth: 95.00 ft. **Well Use:** Household
Well Type: Replacement **Date Completed:** 8/3/2023

Casing Type: PVC plastic **Height:** 1.00 ft. above grade
Casing Joint: Solvent welded/glued
Casing Fitting: None

Diameter: 5.00 in. to 85.00 ft. depth SDR: 21.00

Borehole: 8.75 in. to 97.00 ft. depth

Pump Installed: Yes **Pump Installation Only:** No
Pump Installation Date: 8/4/2023 **HP:** 0.75
Manufacturer: F.E. Myers **Pump Type:** Submersible
Model Number: 2NFL 7212 **Pump Capacity:** 12 GPM
Drop Pipe Length: 80.00 ft. **Pump Voltage:** 230
Drop Pipe Diameter: 1.00 in. **Drilling Record ID:**
Draw Down Seal Used: No

Pressure Tank Installed: No
Pressure Relief Valve Installed: Yes

Static Water Level: 69.00 ft. Below Grade
Well Yield Test: **Yield Test Method:** Air
Pumping level 95.00 ft. after 4.00 hrs. at 14 GPM

Formation Description	Thickness	Depth to Bottom
Brown Sand	22.00	22.00
Gray Clay	15.00	37.00
Rust Sand & Gravel	41.00	78.00
Gray Sand Water Bearing	17.00	95.00
Gray Clay	2.00	97.00

Screen Installed: Yes **Filter Packed:** Yes
Screen Diameter: 5.00 in. **Blank:** 0.00 ft.
Screen Material Type: PVC-slotted
Screen Installation Type: Attached

Slot	Length	Set Between
15.00	10.00 ft.	85.00 ft. and 95.00 ft.

Fittings: Coupling

Well Grouted: Yes **Grouting Method:** Grout pipe outside casing

Grouting Material	Bags	Additives	Depth
Bentonite slurry	6.00	None	0.00 ft. to 84.00 ft.

Wellhead Completion: 12 inches above grade

Nearest Source of Possible Contamination:

Type	Distance	Direction
Septic tank	100 ft.	Southwest

Abandoned Well Plugged: No
Reason Not Plugged: Other

Geology Remarks:

Drilling Machine Operator Name: John Stepp
Employment: Employee
Pump Installer: Ed Wheeler

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-2591
Business Name: Ann Arbor Well Drilling Inc
Business Address: PO Box 163, Dexter, MI, 48130

Water Well Contractor's Certification

This well and/or pump installation was performed under my registration.

Signature of Registered Contractor **Date**

General Remarks:

Other Remarks: Not Plugged Reason:Left well for when the gravel pit stops running.

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No:	Permit No: 2012 00525	County: Washtenaw	Township: Ann Arbor

Well ID: 81000019759

Elevation:
Latitude: 42.33835
Longitude: -83.68136
Method of Collection: GPS Std Positioning Svc SA Off

Town/Range:	Section:	Well Status:	WSSN:	Source ID/Well No:
02S 06E	1	Active		

Distance and Direction from Road Intersection:
4410 Earhart

Well Owner: Betty Gilliland

Well Address:	Owner Address:
4410 Earhart Rd Ann Arbor, MI 48105	4410 Earhart Rd Ann Arbor, MI 48105

Drilling Method: Rotary
Well Depth: 120.00 ft. **Well Use:** Household
Well Type: Replacement **Date Completed:** 9/14/2012

Casing Type: PVC plastic **Height:** 1.00 ft. above grade
Casing Joint: Solvent welded/glued
Casing Fitting: None

Diameter: 5.68 in. to 105.00 ft. depth SDR: 21.00
0.00 in. to 105.00 ft. depth SDR: 0.00

Borehole: 9.00 in. to 115.00 ft. depth

Pump Installed: Yes **Pump Installation Only:** No
Pump Installation Date: 8/30/2012 **HP:** 0.75
Manufacturer: Franklin Electric **Pump Type:** Submersible
Model Number: 10FV07P4 **Pump Capacity:** 10 GPM
Drop Pipe Length: 105.00 ft. **Pump Voltage:** 230
Drop Pipe Diameter: 1.00 in. **Drilling Record ID:**
Draw Down Seal Used: No

Pressure Tank Installed: Yes
Pressure Tank Type: Diaphragm/bladder
Manufacturer: Well-Rite-Flexcon
Model Number: WR 200 **Tank Capacity:** 62.0 Gallons
Pressure Relief Valve Installed: Yes

Static Water Level: 85.00 ft. Below Grade
Well Yield Test: **Yield Test Method:** Air
Pumping level 85.00 ft. after 2.00 hrs. at 12 GPM

Formation Description	Thickness	Depth to Bottom
Yellow Clay	22.00	22.00
Gray Clay	23.00	45.00
Sand	70.00	115.00
Gray Clay	5.00	120.00

Screen Installed: Yes **Filter Packed:** No
Screen Diameter: 5.00 in. **Blank:**
Screen Material Type: PVC-slotted
Screen Installation Type: Telescoped

Slot	Length	Set Between
12.00	10.00 ft.	105.00 ft. and 115.00 ft.

Fittings: Neoprene packer

Well Grouted: Yes **Grouting Method:** Grout pipe outside casing

Grouting Material	Bags	Additives	Depth
Bentonite slurry	9.00	None	0.00 ft. to 105.00 ft.

Wellhead Completion: Pitless adapter

Nearest Source of Possible Contamination:

Type	Distance	Direction
Septic tank	150 ft.	Southwest

Abandoned Well Plugged: Yes

Latitude: 42.33835 **Longitude:** -83.68136
Casing Diameter: 5 in. **Casing Removed:** No
Plugging Material: Bentonite slurry
No. of Bags: 3.00 **Well Depth:** 92 ft.

Geology Remarks:

Drilling Machine Operator Name: Kurt Wing
Employment: Employee
Pump Installer: Tod Stevens

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-2014
Business Name: Cribley Drilling Company
Business Address: 8300 Dexter-Chelsea Rd, Dexter, MI, 48130

Water Well Contractor's Certification

This well/pump was constructed under my supervision and I hereby certify that the work complies with Part 127 Act 368 PA 1978 and the well code.

Signature of Registered Contractor **Date**

General Remarks: 5 TAILPIPE 900# SAND PACK ABANDON OLD WELL 5 X 92 WITH 3-50# BAGS BENTONITE SLURRY, PUMP EQUIPMENT REMOVED, CASING CUT OFF BELOW GRADE

Other Remarks:

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No: 810901300012	**Permit No:**	**County:** Washtenaw		**Township:** Ann Arbor
		Town/Range: 02S 06E	**Section:** 1	**Well Status:** Active	**WSSN:**	**Source ID/Well No:**

Well ID: 81000004744

Elevation: 970 ft.
Latitude: 42.3387093214
Longitude: -83.6806529686
Method of Collection: Interpolation-Map

Distance and Direction from Road Intersection:
2350' N OF WARREN RD., 800' E OF EARHART RD.

Well Owner: DIMCHOFF, DON

Well Address:	**Owner Address:**
4460 EARHART RD. ANN ARBOR, MI 48105	4460 EARHART RD. ANN ARBOR, MI 48105

Drilling Method: Rotary
Well Depth: 124.00 ft. **Well Use:** Household
Well Type: Replacement **Date Completed:** 9/8/1983

Casing Type: Unknown **Height:** 2.00 ft. above grade
Casing Joint: Unknown
Casing Fitting: None

Diameter: 5.00 in. to 124.00 ft. depth

Borehole:

Pump Installed: No
Pressure Tank Installed: No
Pressure Relief Valve Installed: No

Static Water Level: 85.00 ft.
Well Yield Test: **Yield Test Method:** Unknown
Pumping level 85.00 ft. after 2.00 hrs. at 12 GPM

Unrestricted Flow Rate:

Formation Description	Thickness	Depth to Bottom
Yellow Clay	12.00	12.00
Gray Clay	55.00	67.00
Sand	57.00	124.00

Screen Installed: Yes **Filter Packed:** Unknown
Screen Diameter: 4.00 in. **Blank:** 1.00 ft. Above
Screen Material Type: Stainless steel-wire wrapped
Screen Installation Type: Unknown

Slot	Length	Set Between
16.00	4.00 ft.	120.00 ft. and 124.00 ft.

Fittings: Unknown

Geology Remarks:

Wellhead Completion: Unknown

Nearest Source of Possible Contamination:

Type	Distance	Direction
Unknown		

Drilling Machine Operator Name:
Employment: Unknown

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-1586
Business Name:
Business Address:

Abandoned Well Plugged: Unknown

Casing Removed:

Water Well Contractor's Certification

This well was drilled under my supervision and this report is true to the best of my knowledge and belief.

Signature of Registered Contractor **Date**

General Remarks: STILL IN SAND-BUT BOTTOMED OUT ON BOULDER. AA 8-83 S/W SCREEN MATERIAL AND CONTRACTOR TYPE MB 04/07/2022

Other Remarks:

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No: I-09-01-301-003	**Permit No:** WELL2023-0255	**County:** Washtenaw		**Township:** Ann Arbor

Well ID: 81000035072

Elevation:

Latitude: 42.336195

Longitude: -83.674699

Method of Collection: GPS Std Positioning Svc SA Off

Town/Range:	Section:	Well Status:	WSSN:	Source ID/Well No:
02S 06E	1	Active		

Distance and Direction from Road Intersection:
LOT #3 - NORTH OF WARREN RD. AND EAST OF EARHART RD.

Well Owner: DAVID S. GONZALEZ & EMIKO MORI

Well Address:	Owner Address:
4429 GRANDEUR OAKS ANN ARBOR, MI 48105	4429 GRANDEUR OAKS ANN ARBOR, MI 48105

Drilling Method: Rotary
Well Depth: 105.00 ft. **Well Use:** Household
Well Type: Replacement **Date Completed:** 6/21/2023

Casing Type: PVC plastic **Height:** 1.00 ft. above grade
Casing Joint: Solvent welded/glued
Casing Fitting: None

Diameter: 5.68 in. to 75.00 ft. depth SDR: 21.00
0.00 in. to 0.00 ft. depth SDR: 0.00

Borehole: 9.00 in. to 105.00 ft. depth

Pump Installed: Yes **Pump Installation Only:** No
Pump Installation Date: 6/22/2023 **HP:** 1.50
Manufacturer: Franklin Electric **Pump Type:** Submersible
Model Number: 20FV15P4 **Pump Capacity:** 18 GPM
Drop Pipe Length: 75.00 ft. **Pump Voltage:** 230
Drop Pipe Diameter: 1.25 in. **Drilling Record ID:**
Draw Down Seal Used: No

Pressure Tank Installed: Yes
Pressure Tank Type: Diaphragm/bladder
Manufacturer: Well-Rite-Flexcon
Model Number: WR 260 **Tank Capacity:** 85.0 Gallons
Pressure Relief Valve Installed: Yes

Static Water Level: 45.00 ft. Below Grade
Well Yield Test: **Yield Test Method:** Test pump
Pumping level 105.00 ft. after 2.00 hrs. at 50 GPM

Formation Description	Thickness	Depth to Bottom
Brown Clay	15.00	15.00
Gravel	33.00	48.00
Boulders	2.00	50.00
Gravel	41.00	91.00
Clay	14.00	105.00

Screen Installed: Yes **Filter Packed:** Yes
Screen Diameter: 5.00 in. **Blank:** 20.00 ft. Below
Screen Material Type: PVC-slotted
Screen Installation Type: Attached

Slot	Length	Set Between
20.00	10.00 ft.	75.00 ft. and 85.00 ft.

Fittings: None

Well Grouted: Yes **Grouting Method:** Grout pipe outside casing

Grouting Material	Bags	Additives	Depth
Bentonite slurry	8.00	None	0.00 ft. to 70.00 ft.

Geology Remarks:

Wellhead Completion: Pitless adapter, 12 inches above grade

Nearest Source of Possible Contamination:

Type	Distance	Direction
Septic tank	70 ft.	West

Drilling Machine Operator Name: Jerry Whaley
Employment: Employee
Pump Installer: Justin Banks, Dominic Hoffman

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-2014
Business Name: Cribley Drilling Company
Business Address: 8300 Dexter-Chelsea Rd, Dexter, MI, 48130

Abandoned Well Plugged: Yes
Drilling Record ID: 81000022524

Latitude: 42.336233 **Longitude:** -83.674712
Casing Diameter: 5 in. **Casing Removed:** No
Plugging Material: Bentonite slurry
No. of Bags: 4.00 **Well Depth:** 56 ft.

Water Well Contractor's Certification

This well and/or pump installation was performed under my registration.

Signature of Registered Contractor **Date**

General Remarks: USED 1,200# SAND PACK, 2 CENTRALIZERS AND A 20 FT. TAIL PIPE. RE-USED OWNERS PUMP AND PRESSURE TANK.

Other Remarks:

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No: I-09-01-300-021	**Permit No:** WELL2023-0215	**County:** Washtenaw		**Township:** Ann Arbor

Well ID: 81000035073

Elevation:

Latitude: 42.335199

Longitude: -83.682093

Method of Collection: GPS Std Positioning Svc SA Off

Town/Range:	Section:	Well Status:	WSSN:	Source ID/Well No:
02S 06E	1	Active		

Distance and Direction from Road Intersection:
NORTH OF WARREN RD. AND SOUTH OF JOY RD.

Well Owner: JARED & DEANE RUNDELL

Well Address:	Owner Address:
4210 EARHART RD. ANN ARBOR, MI 48105	4210 EARHART RD. ANN ARBOR, MI 48105

Drilling Method: Rotary
Well Depth: 104.00 ft. **Well Use:** Household
Well Type: Replacement **Date Completed:** 6/7/2023

Casing Type: PVC plastic **Height:** 1.00 ft. above grade
Casing Joint: Solvent welded/glued
Casing Fitting: None

Diameter: 5.68 in. to 96.00 ft. depth SDR: 21.00
0.00 in. to 0.00 ft. depth SDR: 0.00

Borehole: 9.00 in. to 104.00 ft. depth

Pump Installed: Yes **Pump Installation Only:** No
Pump Installation Date: 7/26/2023 **HP:** 1.50
Manufacturer: Franklin Electric **Pump Type:** Submersible
Model Number: 20FV15P4 **Pump Capacity:** 18 GPM
Drop Pipe Length: 98.00 ft. **Pump Voltage:** 230
Drop Pipe Diameter: 1.25 in. **Drilling Record ID:**
Draw Down Seal Used: No

Pressure Tank Installed: No
Pressure Relief Valve Installed: Yes

Static Water Level: 75.00 ft. Below Grade
Well Yield Test: **Yield Test Method:** Air
Pumping level 95.00 ft. after 1.00 hrs. at 20 GPM

Formation Description	Thickness	Depth to Bottom
Yellow Clay	15.00	15.00
Gray Clay	35.00	50.00
Sand	23.00	73.00
Gray Clay	23.00	96.00
Gray Sand	8.00	104.00

Screen Installed: Yes **Filter Packed:** Yes
Screen Diameter: 5.00 in. **Blank:**
Screen Material Type: PVC-slotted
Screen Installation Type: Attached

Slot	Length	Set Between
12.00	8.00 ft.	96.00 ft. and 104.00 ft.

Fittings: None

Well Grouted: Yes **Grouting Method:** Grout pipe outside casing

Grouting Material	Bags	Additives	Depth
Bentonite slurry	9.00	None	0.00 ft. to 91.00 ft.

Geology Remarks:

Wellhead Completion: Pitless adapter, 12 inches above grade

Nearest Source of Possible Contamination:

Type	Distance	Direction
Septic tank	225 ft.	Northeast

Drilling Machine Operator Name: Travis Ostrowski
Employment: Employee
Pump Installer: Justin Banks, DomInic Hoffman

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-2014
Business Name: Cribley Drilling Company
Business Address: 8300 Dexter-Chelsea Rd, Dexter, MI, 48130

Abandoned Well Plugged: Yes
Drilling Record ID: 81000020559

Latitude: 42.335176 **Longitude:** -83.682099
Casing Diameter: 5 in. **Casing Removed:** No
Plugging Material: Bentonite slurry
No. of Bags: 6.00 **Well Depth:** 89 ft.

Water Well Contractor's Certification

This well and/or pump installation was performed under my registration.

Signature of Registered Contractor **Date**

General Remarks: USED 700# SAND PACK AND 2 CENTRALIZERS. RE-USED OWNERS PRESSURE TANK - 62 GALLON SIZE. PUMPING EQUIPMENT REMOVED FROM ABANDONED WELL.

Other Remarks:

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No:	Permit No:	County: Washtenaw	Township: Ann Arbor

Well ID: 81000004750

Elevation: 950 ft.
Latitude: 42.3389516441
Longitude: -83.6849880263
Method of Collection: Interpolation-Map

Town/Range:	Section:	Well Status:	WSSN:	Source ID/Well No:
02S 06E	2	Active		

Distance and Direction from Road Intersection:
2450' N OF WARREN RD., 300' W OF EARHART RD.

Well Owner: MILLER, RICHARD

Well Address:
4485 EARHART RD.
ANN ARBOR, MI 48105

Owner Address:
WESTLAND, MI

Drilling Method: Cable Tool
Well Depth: 113.00 ft. **Well Use:** Household
Well Type: Replacement **Date Completed:** 6/2/1978

Casing Type: Unknown **Height:** 0.00 ft. below grade
Casing Joint: Threaded & coupled
Casing Fitting: Drive shoe

Diameter: 4.00 in. to 109.00 ft. depth

Borehole:

Pump Installed: Yes **Pump Installation Only:** No
Pump Installation Date: **HP:**
Manufacturer: Red Jacket **Pump Type:** Submersible
Model Number: **Pump Capacity:** 0 GPM
Drop Pipe Length: 84.00 ft. **Pump Voltage:**
Drop Pipe Diameter: **Drilling Record ID:**
Draw Down Seal Used: No

Pressure Tank Installed: No
Pressure Relief Valve Installed: No

Static Water Level: 66.00 ft.
Well Yield Test: **Yield Test Method:** Unknown
Pumping level 66.00 ft. after 2.00 hrs. at 12 GPM

Unrestricted Flow Rate:

Formation Description	Thickness	Depth to Bottom
Clay	20.00	20.00
Sand & Gravel	65.00	85.00
Clay	2.00	87.00
Sand	26.00	113.00

Screen Installed: Yes **Filter Packed:** No
Screen Diameter: 3.75 in. **Blank:** 0.00 ft. Above
Screen Material Type: Stainless steel-wire wrapped
Screen Installation Type: Unknown

Slot	Length	Set Between
30.00	4.00 ft.	109.00 ft. and 113.00 ft.

Fittings: Neoprene packer

Geology Remarks:

Wellhead Completion: Pitless adapter

Nearest Source of Possible Contamination:

Type	Distance	Direction
Septic tank	100 ft.	East

Abandoned Well Plugged: No
Reason Not Plugged: Unknown

Drilling Machine Operator Name:
Employment: Unknown

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-0524
Business Name:
Business Address:

Water Well Contractor's Certification

This well was drilled under my supervision and this report is true to the best of my knowledge and belief.

Signature of Registered Contractor **Date**

General Remarks: BOTTOMED ON CLAY. AA1-78. SCREEN MATERIAL, CONTRACTOR TYPE, SOURCE 04/11/2022 MB

Other Remarks:

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No: 810911100001	**Permit No:**	**County:** Washtenaw		**Township:** Ann Arbor
		Town/Range: 02S 06E	**Section:** 11	**Well Status:** Active	**WSSN:**	**Source ID/Well No:**

Well ID: 81000004825

Elevation: 905 ft.
Latitude: 42.329927
Longitude: -83.685919
Method of Collection: Interpolation-Map

Distance and Direction from Road Intersection:
400' S OF WARREN RD., 300' W OF EARHART RD.

Well Owner: KORZON, MARK

Well Address:	**Owner Address:**
3867 EARHART RD. ANN ARBOR, MI 48105	3867 EARHART RD. ANN ARBOR, MI 48105

Drilling Method: Cable Tool
Well Depth: 63.00 ft. **Well Use:** Household
Well Type: Replacement **Date Completed:** 7/6/1983

Casing Type: Unknown **Height:** 1.00 ft. above grade
Casing Joint: Threaded & coupled
Casing Fitting: Drive shoe

Diameter: 4.00 in. to 59.00 ft. depth
3.00 in. to 63.00 ft. depth

Borehole:

Pump Installed: Yes **Pump Installation Only:** No
Pump Installation Date: **HP:** 0.50
Manufacturer: A.Y. McDonald **Pump Type:** Submersible
Model Number: **Pump Capacity:** 10 GPM
Drop Pipe Length: 40.00 ft. **Pump Voltage:** 230
Drop Pipe Diameter: **Drilling Record ID:**
Draw Down Seal Used: No

Pressure Tank Installed: No
Pressure Relief Valve Installed: No

Static Water Level: 20.00 ft. Below Grade
Well Yield Test: **Yield Test Method:** Unknown
Pumping level 30.00 ft. after 1.00 hrs. at 15 GPM

Formation Description	Thickness	Depth to Bottom
Yellow Sand	10.00	10.00
Yellow Clay	20.00	30.00
Gray Sand	5.00	35.00
Gray Clay	5.00	40.00
Gray Sand Fine	10.00	50.00
Gray Sand Medium	13.00	63.00

Screen Installed: Yes **Filter Packed:** No
Screen Diameter: 3.00 in. **Blank:** 0.00 ft. Above
Screen Material Type: PVC-slotted
Screen Installation Type: Unknown

Slot	Length	Set Between
12.00	5.00 ft.	59.00 ft. and 63.00 ft.

Fittings: Neoprene packer

Well Grouted: No

Geology Remarks:

Wellhead Completion: Other, 12 inches above grade

Drilling Machine Operator Name:
Employment: Unknown

Nearest Source of Possible Contamination:

Type	Distance	Direction
Septic tank	100 ft.	East

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-1692
Business Name:
Business Address:

Abandoned Well Plugged: No
Reason Not Plugged: Unknown

Water Well Contractor's Certification

This well was drilled under my supervision and this report is true to the best of my knowledge and belief.

Signature of Registered Contractor **Date**

General Remarks: WELL STATUS, SCREEN MATERIAL, HP, VOLTS, GPM, CONT. TYPE, SOURCE, 04/25/2022 MB

Other Remarks: Wellhead Completion:12 inch Above Grade

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Import ID:

Tax No:	Permit No:	County: Washtenaw	Township: Ann Arbor

Town/Range:	Section:	Well Status:	WSSN:	Source ID/Well No:
02S 06E	11	Active		

Well ID: 81000004829

Elevation: 929 ft.
Latitude: 42.328223
Longitude: -83.684493
Method of Collection: Interpolation-Map

Distance and Direction from Road Intersection:
2200' S OF WARREN RD., 750' W EARHART RD.

Well Owner: DOMINO'S FARMS HOLDING

Well Address:	Owner Address:
3767 EARHART RD. ANN ARBOR, MI 48105	P.O. BOX 974 ANN ARBOR, MI 48106

Drilling Method: Rotary
Well Depth: 96.00 ft. **Well Use:** Unknown
Well Type: Replacement **Date Completed:** 7/2/1987

Casing Type: PVC plastic **Height:** 0.00 ft. below grade
Casing Joint: Welded
Casing Fitting: None

Diameter: 5.00 in. to 84.00 ft. depth

Borehole:

Pump Installed: Yes **Pump Installation Only:** No
Pump Installation Date: **HP:** 5.00
Manufacturer: Aermotor **Pump Type:** Submersible
Model Number: 4ST-70-500 **Pump Capacity:** 64 GPM
Drop Pipe Length: 67.00 ft. **Pump Voltage:** 230
Drop Pipe Diameter: **Drilling Record ID:**
Draw Down Seal Used: No

Pressure Tank Installed: No
Pressure Relief Valve Installed: No

Static Water Level: 48.00 ft. Below Grade
Well Yield Test: **Yield Test Method:** Unknown
Pumping level 70.00 ft. after 2.00 hrs. at 80 GPM

Formation Description	Thickness	Depth to Bottom
Yellow Clay	16.00	16.00
Blue Clay Hard	51.00	67.00
Sand & Gravel Fine	29.00	96.00

Screen Installed: Yes **Filter Packed:** No
Screen Diameter: 4.00 in. **Blank:** 0.00 ft. Above
Screen Material Type: Stainless steel-wire wrapped
Screen Installation Type: Unknown

Slot	Length	Set Between
10.00	12.00 ft.	84.00 ft. and 96.00 ft.

Fittings: Neoprene packer

Well Grouted: Yes **Grouting Method:** Unknown

Grouting Material	Bags	Additives	Depth
Bentonite slurry	0.00	None	

Wellhead Completion: Pitless adapter

Nearest Source of Possible Contamination:

Type	Distance	Direction
None		

Abandoned Well Plugged: No
Reason Not Plugged: Unknown

Geology Remarks:

Drilling Machine Operator Name:
Employment: Unknown

Contractor Type: Water Well Drilling Contractor **Reg No:** 81-1760
Business Name:
Business Address:

Water Well Contractor's Certification

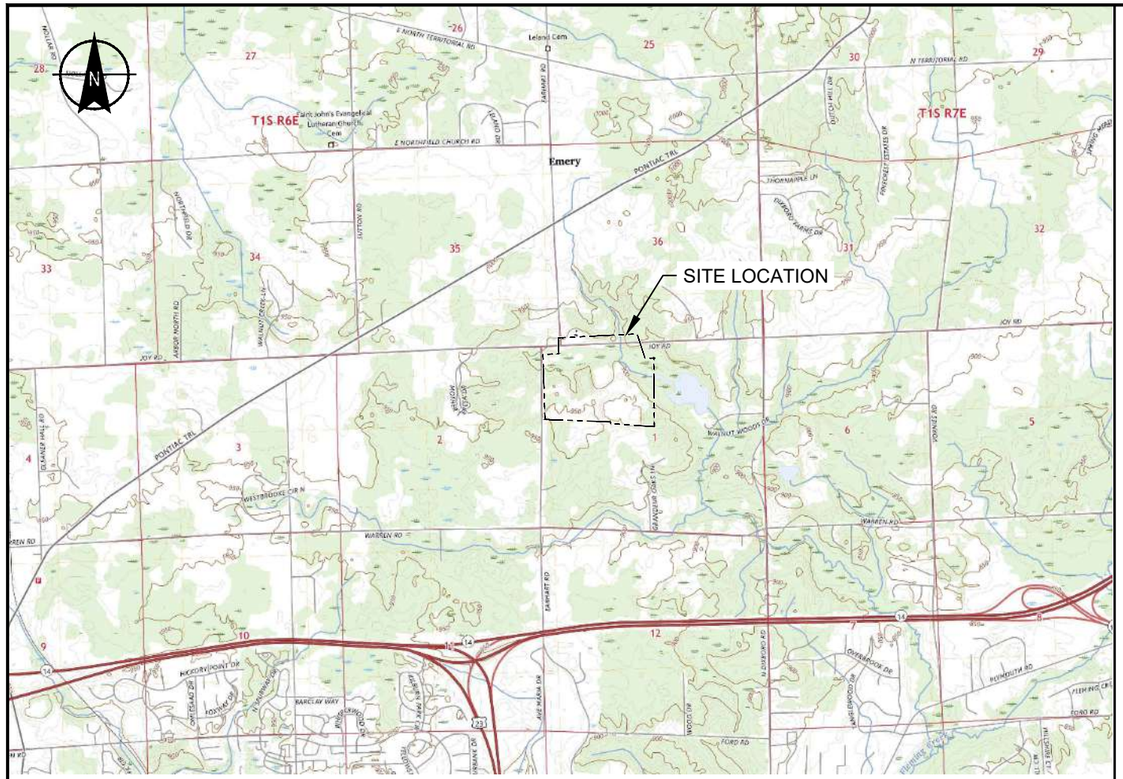
This well was drilled under my supervision and this report is true to the best of my knowledge and belief.

Signature of Registered Contractor **Date**

General Remarks: SCREEN MATERIAL, STATUS, CONT. TYPE, MODEL #, HP, VOLTS, GPM, LONGITUDE/LATITUDE 04/25/2022 MB

Other Remarks:

ATTACHMENT B
Site Plans and Drawings



SITE LOCUS
TOPO SOURCE: USGS TOPOGRAPHIC MAP, ANN ARBOR EAST, MICHIGAN QUADRANGLE (2023).

0 2000 4000
SCALE IN FEET

SITE AERIAL
MAP SOURCE: NEARMAP, 2023

0 500 1000
SCALE IN FEET

VELLA PIT PART 301
APPLICATION FOR PERMIT

SITE ADDRESS:
4984 EARHART RD.
ANN ARBOR, MICHIGAN
TOWNSHIP 02 SOUTH, RANGE 06 EAST

DRAWING INDEX		
SHEET NO.	SHEET TITLE	DESCRIPTION
1	G-100	TITLE SHEET AND DRAWING INDEX
2	C-100	EXISTING CONDITIONS
3	C-101	CROSS SECTIONS
4	C-102	WETLAND LOCATION PLAN
5	C-103	WELL LOCATION PLAN
6	C-104	CONCEPTUAL RECLAIMATION PLAN

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Tel: 734.887.8400
www.haleyaldrich.com

PREPARED FOR:

AMC-WSG LLC
6966 FISHER ROAD
JEDDO, MI

FOR PERMITTING PURPOSES ONLY

Project No.:	0207666_003
Scale:	AS SHOWN
Date:	23 OCTOBER 2023
Drawn By:	JD
Designed By:	JD
Checked By:	OS
Approved By:	LN
Stamp:	

Rev.	Description	By	Date

VELLA PIT PART 301
APPLICATION FOR PERMIT

4984 EARHART RD.
ANN ARBOR, MICHIGAN

TITLE SHEET AND DRAWING INDEX

G-100

Sheet: 1 of 6

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Sheet: G-100

LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- TOPOGRAPHIC CONTOURS 5-FT INTERVAL
- 1 / C-101 — CROSS SECTION

NOTES

1. LOCATIONS OF BUILDINGS AND STRUCTURES ARE APPROXIMATE.
2. TOPOGRAPHIC CONTOUR SOURCE: SURVEY PERFORMED BY PEA GROUP, 20 OCTOBER 2023. HORIZONTAL DATUM IS NAD83 MICHIGAN STATE PLANES, SOUTH ZONE, INTERNATIONAL FOOT.
3. AERIAL IMAGERY SOURCE: NEARMAP, 2 OCTOBER 2023.
4. SLOPES AND BATHYMETRIC CONDITIONS OF PONDS 1 AND 2 ARE NOT EXPECTED TO CHANGE.
5. SLOPE AND BATHYMETRIC CONDITIONS OF PONDS 3 AND 4 ARE EXPECTED TO CHANGE DUE TO CURRENT MINING ACTIVITIES.

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VELLA PIT PART 301
APPLICATION FOR PERMIT

4984 EARHART RD.
ANN ARBOR, MICHIGAN

EXISTING CONDITIONS

C-100

Sheet: 2 of 6

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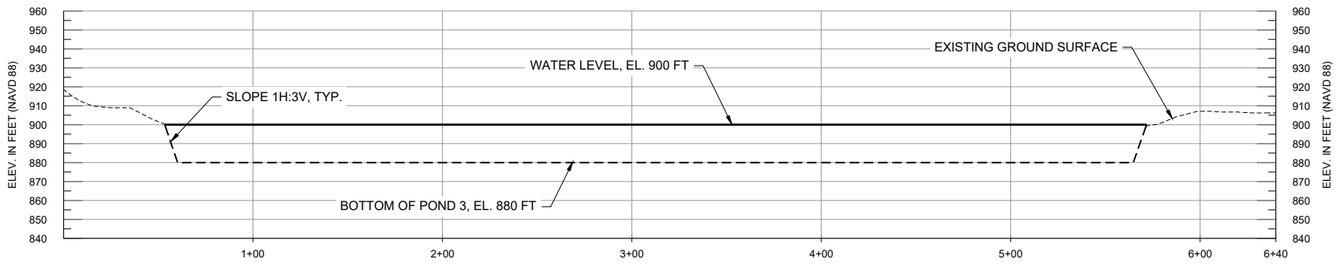
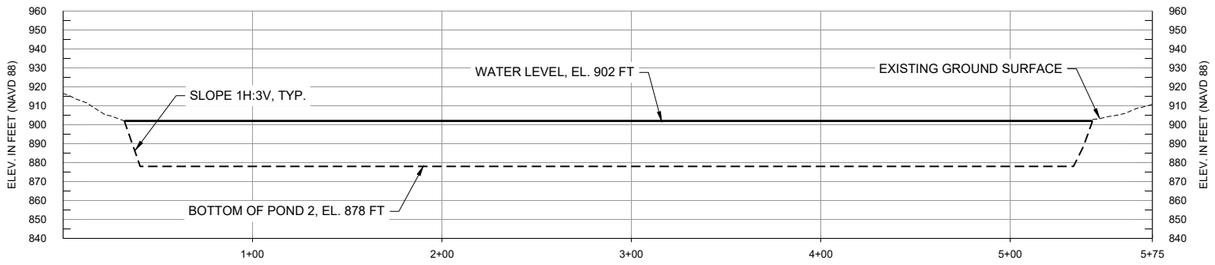


1 C-100 **CROSS SECTION - POND 1**
SCALE: AS SHOWN



2 C-100 **CROSS SECTION - POND 2**
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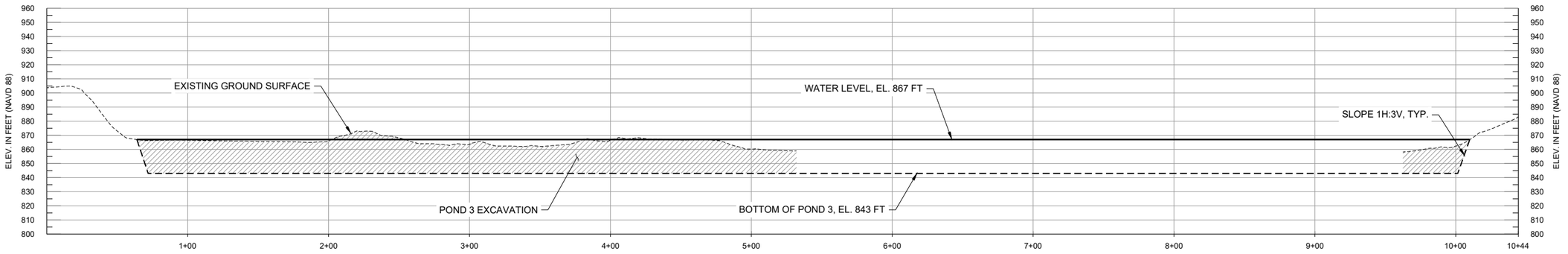

3 C-100 **CROSS SECTION - POND 3**
SCALE: AS SHOWN

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VERT. 0 50 100 150 200
SCALE IN FEET

NOTES

1. TOPOGRAPHIC CONTOUR SOURCE: SURVEY PERFORMED BY PEA GROUP, 20 OCTOBER 2023. HORIZONTAL DATUM IS NAD83 MICHIGAN STATE PLANES, SOUTH ZONE, INTERNATIONAL FOOT.
2. SLOPES AND BATHYMETRIC CONDITIONS OF PONDS 1 AND 2 ARE NOT EXPECTED TO CHANGE. SLOPE AND BATHYMETRIC CONDITIONS OF PONDS 3 AND 4 ARE EXPECTED TO CHANGE DUE TO CURRENT MINING ACTIVITIES.
3. POND 3 EXCAVATION VOLUME IS 158,406 CU YD.

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JEDDO, MI

FOR PERMITTING PURPOSES ONLY

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VELLA PIT PART 301
APPLICATION FOR PERMIT

4984 EARHART RD.
ANN ARBOR, MICHIGAN

CROSS SECTIONS

C-101

Sheet: 3 of 6

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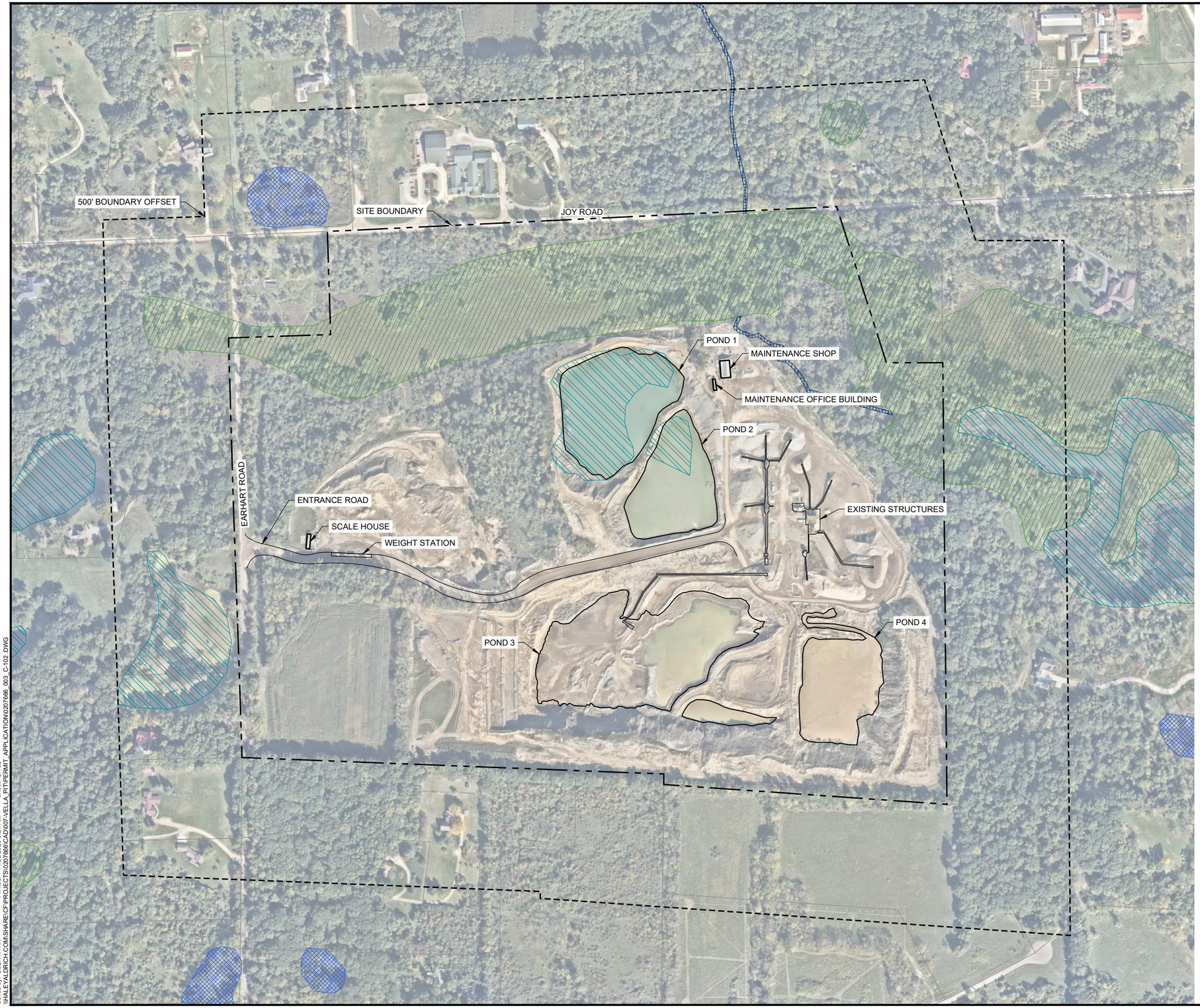

LEGEND

- SITE BOUNDARY
- 500-FT BOUNDARY OFFSET
- PARCEL BOUNDARY
- FRESHWATER FORESTED/SHRUB WETLAND (USGS)
- FRESHWATER EMERGENT WETLAND (USGS)
- FRESHWATER POND (USGS)
- RIVERINE (USGS)

NOTES

1. LOCATIONS OF BUILDINGS AND STRUCTURES ARE APPROXIMATE.
2. WETLANDS DATA SOURCE: U.S. FISH AND WILDLIFE NATIONAL WETLANDS INVENTORY, 2023.
4. AERIAL IMAGERY SOURCE: NEARMAP, 2 OCTOBER 2023.
5. SLOPES AND BATHYMETRIC CONDITIONS OF PONDS 1 AND 2 ARE NOT EXPECTED TO CHANGE.
6. SLOPE AND BATHYMETRIC CONDITIONS OF PONDS 3 AND 4 ARE EXPECTED TO CHANGE DUE TO CURRENT MINING ACTIVITIES.

N

0 200 400 600 800
SCALE IN FEET

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VELLA PIT PART 301
APPLICATION FOR PERMIT

4984 EARHART RD.
ANN ARBOR, MICHIGAN

WETLAND LOCATION PLAN

C-102

Sheet: 4 of 6

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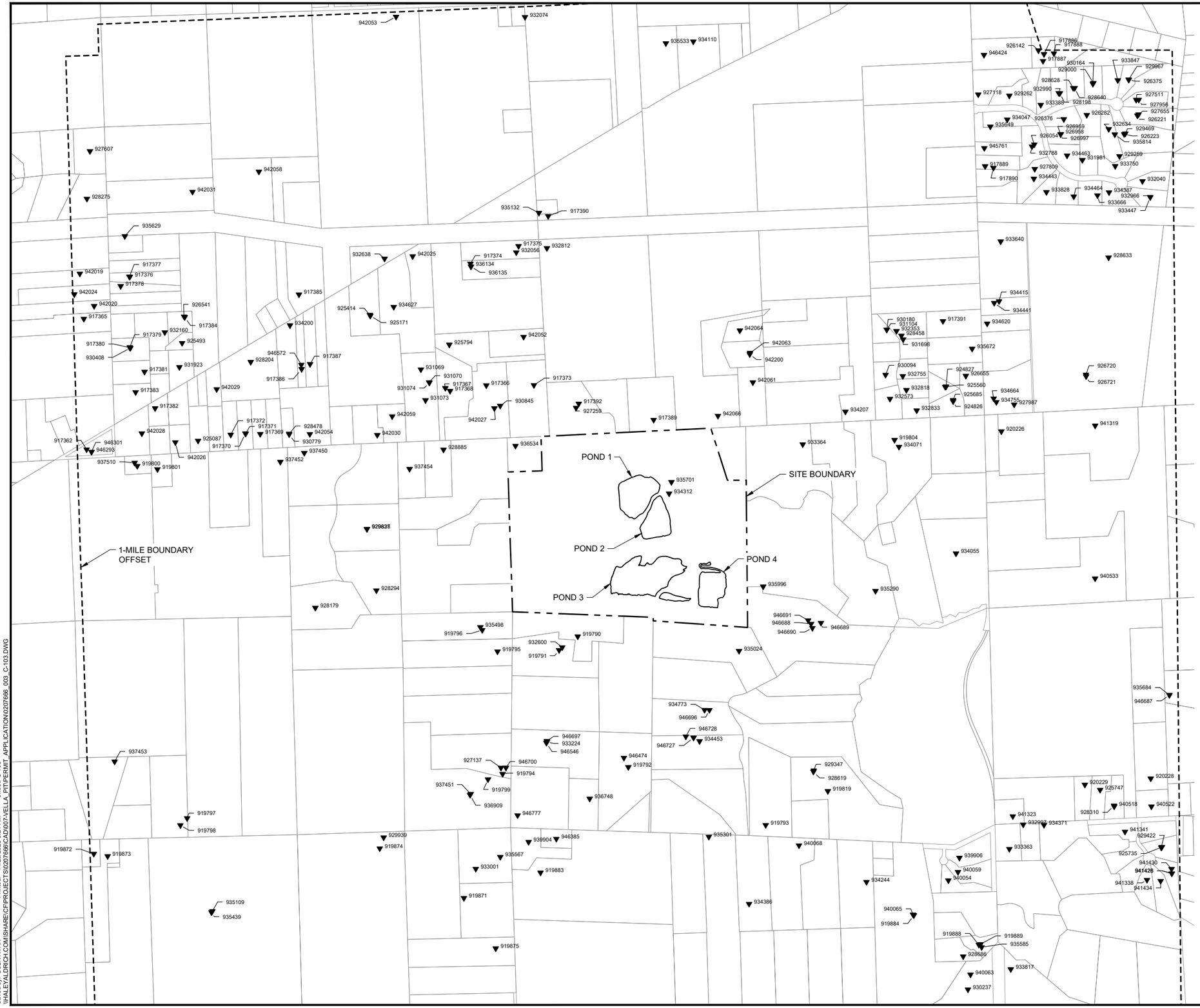

LEGEND

- SITE BOUNDARY
- 1-MILE BOUNDARY OFFSET
- PARCEL BOUNDARY
- 933847 WELL LOCATION AND DESIGNATION

NOTES

1. LOCATIONS OF BUILDINGS AND STRUCTURES ARE APPROXIMATE.
2. WETLANDS DATA SOURCE: U.S. FISH AND WILDLIFE NATIONAL WETLANDS INVENTORY, 2023
3. SLOPES AND BATHOMETRIC CONDITIONS OF PONDS 1 AND 2 ARE NOT EXPECTED TO CHANGE. SLOPE AND BATHOMETRIC CONDITIONS OF PONDS 3 AND 4 ARE EXPECTED TO CHANGE DUE TO CURRENT MINING ACTIVITIES.

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VELLA PIT PART 301
APPLICATION FOR PERMIT

4984 EARHART RD.
ANN ARBOR, MICHIGAN

WELL LOCATION PLAN

C-103

Sheet: 5 of 6

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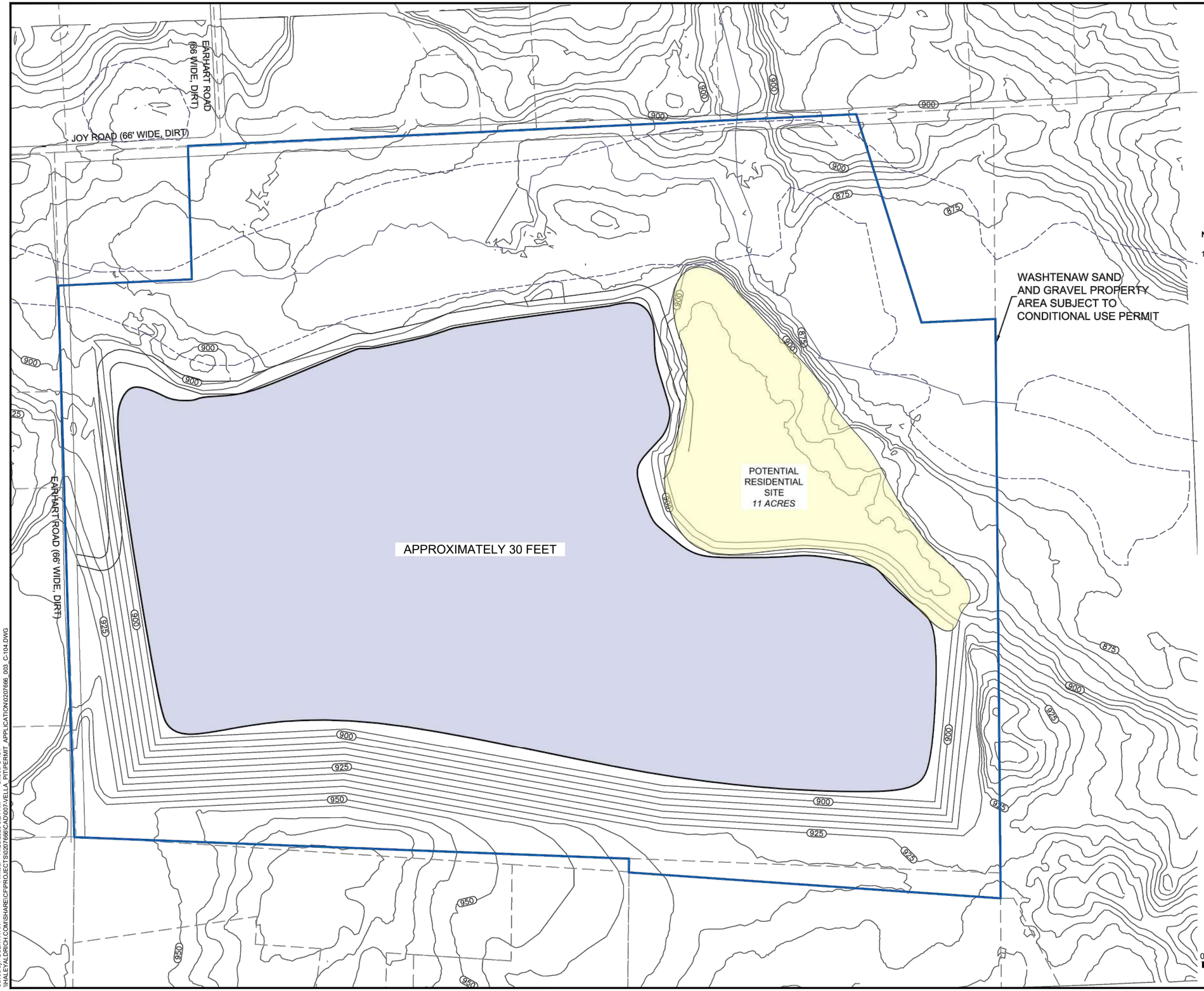

LEGEND:

- TOPOGRAPHIC MAJOR CONTOUR INTERVAL (25 FOOT)
- TOPOGRAPHIC MINOR CONTOUR INTERVAL (5 FOOT)
- PROPERTY BOUNDARY
- WETLANDS
- WATERWAY
- POTENTIAL RESIDENTIAL SITE(S) *APPROXIMATELY 10 ACRES*
- RECLAMATION AREA (WATER BODY)
- POTENTIAL RESIDENTIAL SITE *(11 ACRES)*

NOTES

1. THIS PLAN IS BASED ON A FIGURE THAT WAS PREPARED BY PEA INC. AND REVISED BY GZA GEOENVIRONMENTAL, INC. IN OCTOBER 2020.

0 150 300 450 600
SCALE IN FEET

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JEDDO, MI

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Approved By:	LN
Stamp:	

Rev.	Description	By	Date

VELLA PIT PART 301
APPLICATION FOR PERMIT

4984 EARHART RD.
ANN ARBOR, MICHIGAN

CONCEPTUAL RECLAIMATION PLAN

C-104

Sheet: 6 of 6

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ATTACHMENT C
Adjacent Property List

Adjacent Property List
MMM Vella Pit
4984 Earhart Road

Location Relative to Site	Address	Tax ID	Owner(s)
North Adjacent			
	4004 E Joy Road	I-09-01-200-003	Burlingame, Willam H & Cassie
	E Joy Road	I-09-01-200-001	Strauch-Phelps, Kethleen
North Adjacent (North of Joy Road)			
	5085 Earhart Road	B-02-35-400-026	Hufnagel, Alan M & Michele E
	4101 E Joy Road	B-02-36-300-004	Spiritus Sanctus Academy
	4225 E Joy Road	B-02-36-300-005	Spiritus Sanctus Academy
	4257 E Joy Road	B-02-36-300-020	Spiritus Sanctus Academy
	4451 E Joy Road	B-02-36-301-009	DF Land Development, LLC
East Adjacent			
	4650 Joy Road	I-09-01-100-007	Beagle, Joseph L & Mary P Trustees
	4715 Ridge Creek Lane	I-09-01-101-004	Darish, John-Joan
	4700 Grandeur Oaks	I-09-01-301-009	Watts, Steven-Bishcin, Sandra
South Adjacent			
	4687 Grandeur Oaks	I-09-01-301-005	Gopalsamy, Sthurappan
	Earhart Road	I-09-01-300-014	Gilliland, Daniel P & Bettyann
	4460 Earhart Road	I-09-01-300-012	Nicklowitz, Michael & Gail
West Adjacent (West of Earhart Road)			
	4525 Earhart Road	I-09-02-100-016	Hotz, Scott & Jill
	Earhart Road	I-09-02-100-015	Weimer Family Trust Agreement
	4989 Earhart Road	I-09-02-100-018	Bunch, Richard J & Amy S
	Earhart Road	I-09-02-100-017	Burlingame, William - Carrie Revocable Trust