GELMAN SCIENCES INC.
WESTERN AREA GSI WORK PLAN

SCIO TOWNSHIP
WASHTENAW COUNTY, MI

PREPARED FOR
GELMAN SCIENCES INC.

FOR SUBMITTAL TO THE

MICHIGAN DEPARTMENT OF ENVIRONMENT,
GREAT LAKES AND ENERGY (EGLE)

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

August 30, 2021
Project No. 806500

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1.0 INTRODUCTION/BACKGROUND

This Groundwater-Surface Water Interface ("GSI") work plan for the Gelman Sciences Inc. ("Gelman") Site is being provided to the Michigan Department of Environment, Great Lakes and Energy ("EGLE") to satisfy the requirements of the proposed Fourth Amended and Restated Consent Judgment ("4th Amended CJ") incorporated by reference by the Washtenaw County Circuit Court's June 1, 2021 "Order to Conduct Response Activities to Implement and Comply with Revised Cleanup Criteria" (the "Response Activity Order").

The 4th Amended CJ defines the Western Area Groundwater-Surface Water Interface objective as follows: "Defendant shall prevent 1,4-dioxane from venting into surface waters in the Western Area at concentrations above the Generic GSI Cleanup Criterion, except in compliance with Part 201, including MCL 324.20120e ("Groundwater-Surface Water Interface Objective" for the Western Area)." (Section V.B.2.a.).

The 4th Amended CJ outlines the requirements for a GSI Investigation Work Plan (this document) in Section V.B.2.b. These requirements are that within 90 days of entry of the 4th Amended CJ, Gelman shall submit to EGLE for its review and approval a work plan for investigation of the groundwater-surface water interface in the Western Area and a schedule for implementing the work plan. Gelman's work plan shall include:

1. An evaluation of the Western Area and identification of any areas where the GSI pathway is relevant, i.e., any areas where 1,4-dioxane in groundwater is reasonably expected to vent to surface water in concentrations that exceed the Generic GSI Criterion based on evaluation of the factors listed in MCL 324.20120e(3); and

2. A description of the Response Activities Gelman will take to determine whether 1,4-dioxane in groundwater is venting to surface water in any such areas in concentrations that exceed the Generic GSI Criterion.

According to the EGLE document "Groundwater-Surface Water Interface Pathway Compliance Options," April 2018, key elements in determining pathway relevancy include the following:

1. There must be a hydraulic connection between the contaminated groundwater and surface water to have a groundwater/surface water interface. This includes an intermittent stream or water body that has flow until the groundwater table drops below the stream bottom. Intermittent streams are protected for acute and chronic risks. An ephemeral stream or water body only has flow during periods of surface runoff (rain or snowmelt). By definition an ephemeral stream would not have a groundwater surface water interface.

2. The hydraulic connection must transport contaminated groundwater to the surface water; a "losing" surface water body would have a hydraulic connection with groundwater but would not transport contaminated groundwater to the surface water body.

3. The designation of groundwater "not in an aquifer" does not eliminate the need to evaluate the GSI pathway. Groundwater "not in an aquifer" may be hydraulically connected to a surface water body and may vent or be reasonably expected to vent in concentrations that exceed generic GSI risk-based screening levels (RBSLs)/criteria (See Appendix A).

4. The applicable generic GSI RBSLs/criteria for all appropriate hazardous substances released or otherwise affected (reactions, breakdown byproducts, etc.) and appropriate WQS for physical characteristics are or could be exceeded in representative samples at GSI monitoring points.

5. Contaminated groundwater is discharging into a separate storm sewer that discharges to a surface water body.

If the pathway for venting groundwater is determined to be not relevant, further evaluation is not necessary.

2.0 AREAS WHERE THERE IS A GSI POTENTIAL (WESTERN AREA)

Many investigations of the surface waters of the Western Area (the portion of the Gelman site that is west of Wagner Road) have been completed by Gelman and others. The report "Gelman Summary Report of Groundwater and Surface Water Interactions within the Honey Creek Area" (March 2019) describes/summarizes much of this work. Based on the findings presented in this report, along with our analysis of other historical information, we have determined that there are three general areas where 1,4-dioxane associated with the Gelman Site has the potential to interface with surface water at concentrations approaching or exceeding the 280 ug/L EGLE Part 201 1,4-Dioxane Generic Groundwater-Surface Water Interface Criterion. These areas are:

1. Area A – The north/south portion of the unnamed tributary (referred to as the Honey Creek Tributary or HCT for purposes of this document) from the Gelman NPDES Outfall-001 to the northwest corner of the Gelman "Marshy Area";

2. Area B – The Gelman Marshy Area, including the east/west portion of the HCT along the northern boundary of the Marshy Area; and

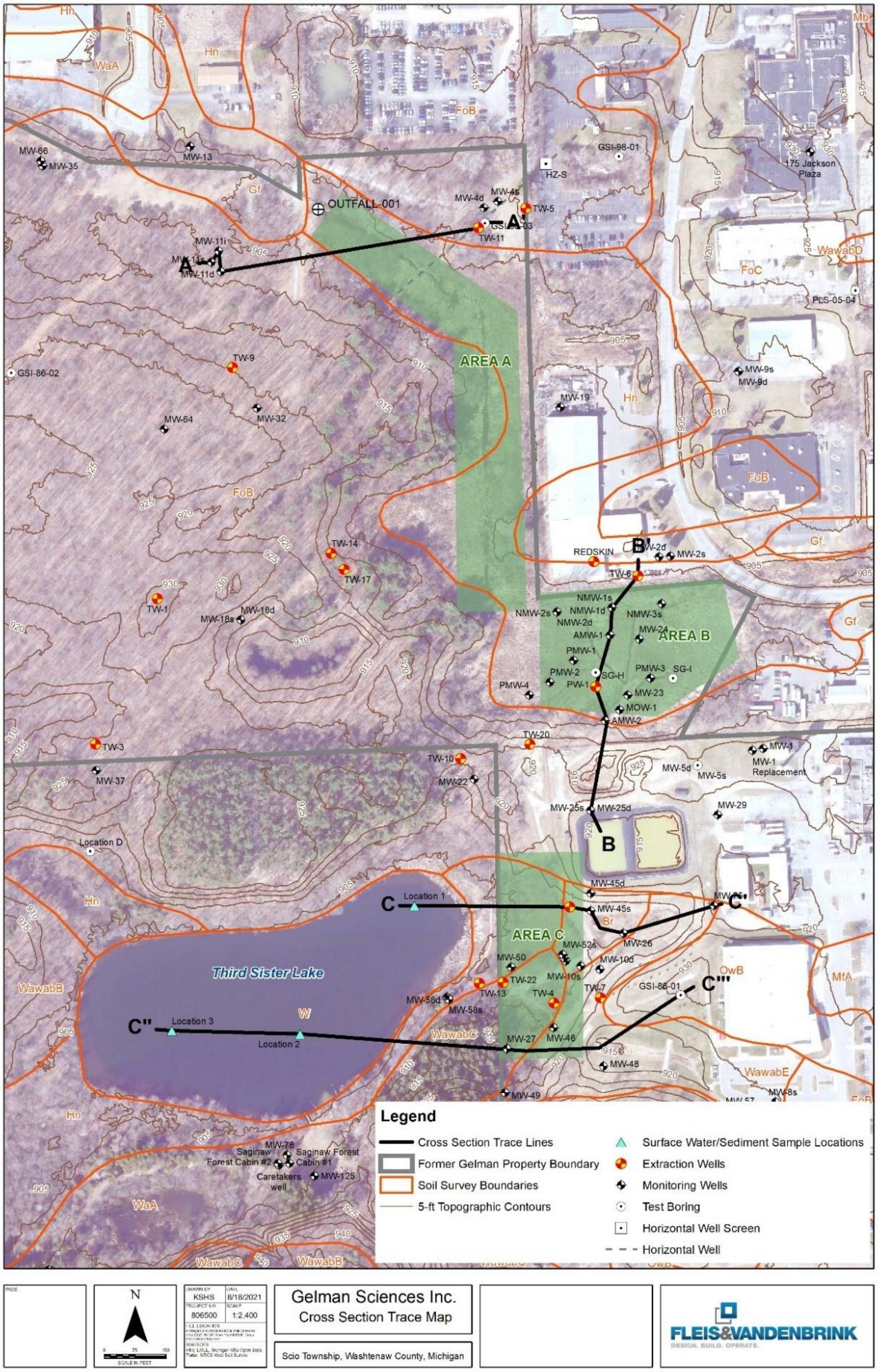
3. Area C – The wetland area on the east side of Third Sister Lake.

Storm drains in the Gelman site area (where there would be a potential for a completed GSI pathway) drain to Area C, as such, will be addressed by this work plan.

Figure 1 depicts the general locations of Areas A, B and C along with cross-sections used to present conceptual models for these areas.

The following report sections further describe these areas relative to their potential to have a completed GSI pathway, discuss the conceptual models for these areas, and present our proposed work plan, where appropriate.

Figure 1 – Areas A, B, and C Showing Lines of Cross-Section



2.1 Area A

Area A is generally the north-south and northwest-southeast portions of the HCT up to the Gelman NPDES Outfall-001. This area is shown on Figure 1.

2.1.1 Summary of Conceptual Model

A cross-section depicting our conceptual model for Area A is provided as Attachment 1. The conceptual site model for Area A provides that there is a potential (albeit low) for groundwater containing concentrations of 1,4-dioxane over the GSI criterion to discharge into the HCT along Area A.

2.1.2 Discussion/Support

Area A is primarily a wetland along the HCT. This area is very difficult to access and not accessible using conventional drilling equipment without constructing engineered drill platforms. Shallow water-bearing zones in this area do not appear to discharge to the HCT, based on a comparison of groundwater and surface water elevation data. An example of a monitoring well completed in the shallow water-bearing zone/aquifer is MW-11s. Hydraulic heads at MW-11s are lower than those in the HCT (see table below), indicating that groundwater does not discharge to surface water in this area. In addition, shallow groundwater elevations are higher than those in deeper groundwater zones, indicating that hydraulic gradients are conducive to downward vertical groundwater migration, not upward migration and discharge to surface water (see table below). The shallowest water-bearing zones in this reach overlie more substantial aquifers that are primarily associated with the transport of 1,4-dioxane.

Water Level Data from the MW-11 Cluster

	Screen Interval (feet below ground)	Groundwater Elevation (feet amsl)
MW-11s	14-16	898.33
MW-11i	39-41	885.99
MW-11d	87-90	878.74

amsl – above mean sea level (NAVD88 datum)
- Water level data collected 9/20/17.
- HCT Elevation in this area approximately = approximately 902.5 ft amsl

Because of this downward hydraulic potential, the lateral movement of groundwater is competing with a downward flow potential. This strong downward flow potential minimizes the lateral flow of groundwater in the shallow water-bearing zones toward the HCT in Area A.

Some minor venting of groundwater into the HCT in Area A remains possible. 1,4-Dioxane concentrations in wells in portions of this area indicate 1,4-dioxane concentrations may exceed 280 ug/L.

2.1.3 Pathway Analysis

Our assessment of site data suggests that the likelihood for groundwater to be interacting with the HCT in Area A at all is low, and the possibility that groundwater with 1,4-dioxane concentrations approaching 280 ug/L is even lower. That said, the potential for such interaction cannot be ruled out given the absence of data along the HCT in this area. As such, investigations into the GSI pathway are recommended.

2.1.4 Proposed Work Plan

Access to Area A is very difficult and significant effort (clearing and stabilization) would be necessary to position even a small drilling rig in this area. As such, Gelman is proposing that a hand-driven pore water sampler be used to profile groundwater out of the base of the tributary in this area. Pore water samples would be collected at transects along Area A, with three samples collected at each transect (east side, center, and west side of the HCT). The proposed locations of the transects are shown on Figure 2 below:

Figure 2 – Area A Pore Water Sampling Transects

Pore water sampling will be conducted in accordance with procedures outlined in F&V SOP F25 (Attachment 2). It is recommended that this work be completed in the winter months under frozen or partially frozen conditions when access is likely to be substantially better. This will be a one-time sampling event. If porewater concentrations are below 280 ug/L, no further evaluations of this area will be conducted.

2.2 AREA B

Area B consists of a wetland on the north side of the property owned by Gelman and is commonly referred to at the site as the “Marshy Area.” The northern border of the Marshy Area is the HCT. This general area is shown on Figure 1.

2.2.1 SUMMARY OF CONCEPTUAL MODEL

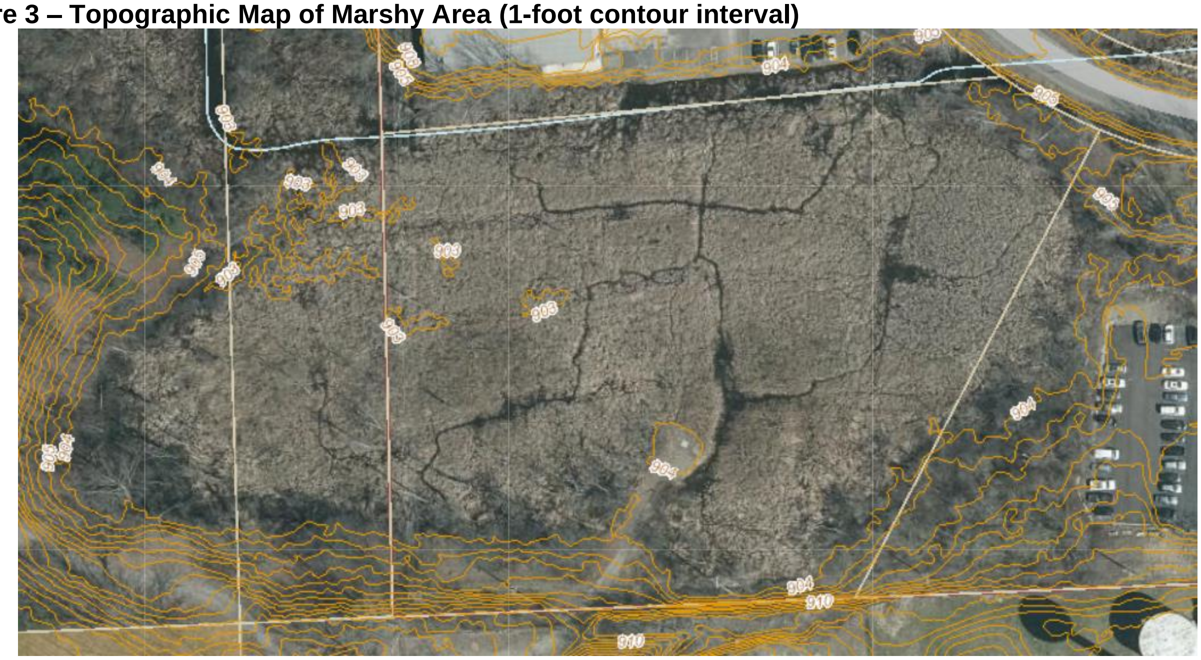
A cross-section showing our conceptual model for Area B is provided as Attachment 3. The conceptual site model for the Marshy Area provides that surface water associated with the HCT is no longer entirely contained in the former HCT channel due to vegetation buildup on the channel that causes water to fan out into a larger surface area of the Marshy Area. The HCT channel is no longer the potential interface with groundwater, rather the potential interface has become a large portion of the Marshy Area. This surface water either discharges as surface water along the indistinct HCT corridor or develops a hydraulic mound that recharges the underlying groundwater. In neither case would groundwater be venting to the surface water.

2.2.2 DISCUSSION/SUPPORT

Numerous investigations have been conducted and multiple monitoring wells and borings have been installed to monitor groundwater conditions in the Marshy Area.

The Marshy Area topography is very flat, ranging in elevation from approximately 902 to 904 feet amsl. A topographic map of the Marshy Area (1-foot contour interval) is provided below as Figure 3.

Figure 3 – Topographic Map of Marshy Area (1-foot contour interval)



Source: Washtenaw County GIS, 2018 Aerial Photograph

In recent years, vegetation buildup along the HCT in the Marshy area (mostly phragmites) has restricted the flow in the HCT, causing surface water to back up into the low-lying Marshy Area. As a result, much of the Marshy

Area is consistently inundated with water. There is no longer a clear division between water in the HCT and the Marshy Area as there was in the past. The filling in of the HCT is shown below on aerial photos taken in 1997 (top) and 2020 (bottom).

1997

2020

Source: Washtenaw County GIS

Water entering the Marshy Area comes from precipitation that falls into the Marshy Area and its sub-watershed, as well as discharge from First and Second Sister Lakes, which flows into the HCT and toward/into the Marshy Area. USGS measurements in 2003 estimated the base flows coming out of the First and Second Sister Lakes to be 0.11 to 0.79 ft^3/s (50-354 gpm).

Surface water elevations in the Marshy Area are not routinely measured. Based on the topographic surface elevations and limited measurements, the surface water is expected to range in elevation between 902 and 904 feet amsl.

The subsurface in the Marshy Area consists of peat underlain by marl and other fine- to coarse-grained deposits. The peat and other fine-grained deposits contain residual 1,4-dioxane in groundwater associated with a historical release to the Marshy Area that has back-diffused into the materials. Groundwater extraction and the slow downward flux of groundwater have reduced 1,4-dioxane concentrations in the Marshy Area over time.

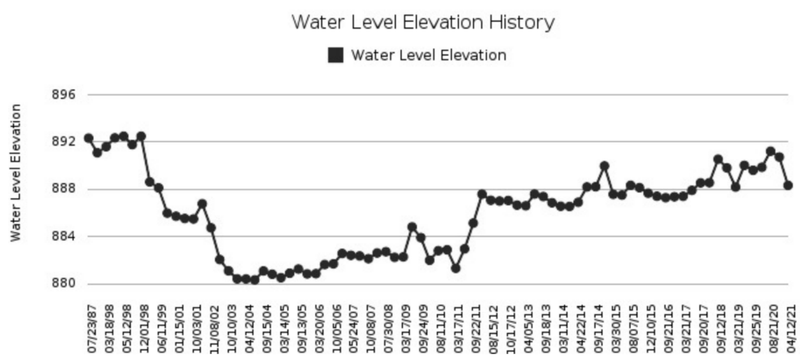
Materials underlying the peat, marl and shallow sand/gravel have a head that is lower, resulting in a downward vertical gradient that is approximately 0.7 to 0.8 ft/ft downward. A hydrograph of MW-24, located within the Marshy Area at a depth of approximately 23-25 feet below ground level, is provided below. Water level data from this and other wells demonstrate the lower head, which results in a downward potential from the shallower deposits into the deeper deposits.

Water Level Elevation Graph

Printed: 08/22/2021

Well Name: MW-24

Aquifer:	C3	Date Installed:	07/22/1987	Boring Depth:	26.00 Feet bgl	Screen 1:	25.00 to 23.00 Feet
Map Location:	N-16	Well Driller:	Keck	Ground Elevation:	902.85 Feet	Screen Length:	2.00
X Coordinate:	13275929.00	Well Type:	Monitoring Wells	TOC Elevation:	904.37 Feet	Screen 2:	NA to NA Feet
Y Coordinate:	284151.00	Sampling Interval:	Annual	TOC to screen bottom:	27.00 Feet		
Comments:							



Historically, 1,4-dioxane levels in groundwater sampled from the Marshy Area have been as high as 202,000 ug/L. Gelman has been operating an extraction well (PW-1) in the Marshy Area since 1994. Operation of this extraction well along with natural processes (downward flux of groundwater) have substantially reduced 1,4-dioxane levels in Marshy Area groundwater. 1,4-Dioxane concentrations in the Marshy Area are summarized on maps prepared by Gelman on a semiannual basis.

PW-1 currently operates at a flow rate of approximately 1 to 4 gpm. The approximate mass reduced by PW-1 to date is 1,073 pounds (May 1997 through June 2021). It is important to note that water migrating downward from the Marshy Area into underlying aquifers is subject to capture by multiple Gelman extraction wells in addition to PW-1.

The approximate range in 1,4-dioxane concentrations in groundwater samples from the peat is between 100 and 6,800 ug/L. 1,4-Dioxane concentrations in groundwater sampled from the marl are in the range of 1,200 to 2,700 ug/L. Below the marl, interbedded sands and fine-textured deposits are encountered. 1,4-Dioxane concentrations in the monitoring wells screened within these deposits range from approximately 60 to 1,000 ug/L. Given the nature of these deposits (complex, low permeability/high porosity), 1,4-dioxane concentrations are expected to be variable with zones of higher and lower 1,4-dioxane concentrations anticipated.

The flux of groundwater from the Marshy Area to the HCT is little to none due to the low permeability of the peat and consistently downward vertical hydraulic gradients measured in this area between the peat/marl and the underlying aquifers. USGS flow measurements collected during a low-flow period in 2003 suggested that during very dry periods, groundwater can discharge to surface water in the Marshy Area at a rate of approximately 30 gpm. However, the conditions observed in 2003 no longer exist today. The distinct channel of the HCT is no longer evident, and flooded conditions prevail over most of the Marshy Area, effectively eliminating the potential for groundwater to be discharging into surface water. Rather, surface water flooding of the Marshy Area creates a hydraulic mound that drives water into the subsurface.

A drone photo taken in July 2021 (below) shows an undefined HCT channel and flood inundation in the Marshy Area (Figure 4). This flooding typically extends as far south as PW-1, which is mounded up due to the flooding.

Figure 4 – Drone Photo of Marshy Area

Drone photo taken 7/20/21

1,4-Dioxane surface water concentrations in the HCT near the Marshy area have ranged from 293 ug/L (2/25/87) to <1 ug/L (9/25/18). Since their peak in the late 1980s, the 1,4-dioxane concentrations in the HCT in the Marshy area have decreased substantially. The most recent sample collected by EGLE in October 2020 had a 1,4-dioxane concentration of 1.5 ug/L. The low concentration of 1,4-dioxane in the HCT in Area A is another line of evidence that groundwater with 1,4-dioxane is not venting to the HCT and that GSI is not a relevant pathway in this area.

2.2.3 Pathway Analysis

EGLE guidance states, "The hydraulic connection must transport contaminated groundwater to the surface water; a 'losing' surface water body would have a hydraulic connection with groundwater but would not transport contaminated groundwater to the surface water body." At least as long as surface water is present in the Marshy Area outside a channelized area, there is no completed GSI pathway, and there is no clear GSI interface. As such, no further investigations are planned to investigate the GSI pathway in the Marshy Area. If site conditions change in the future, Gelman will discuss with EGLE if additional GSI evaluations would be appropriate.

2.3 AREA C

2.3.1 SUMMARY OF CONCEPTUAL MODEL

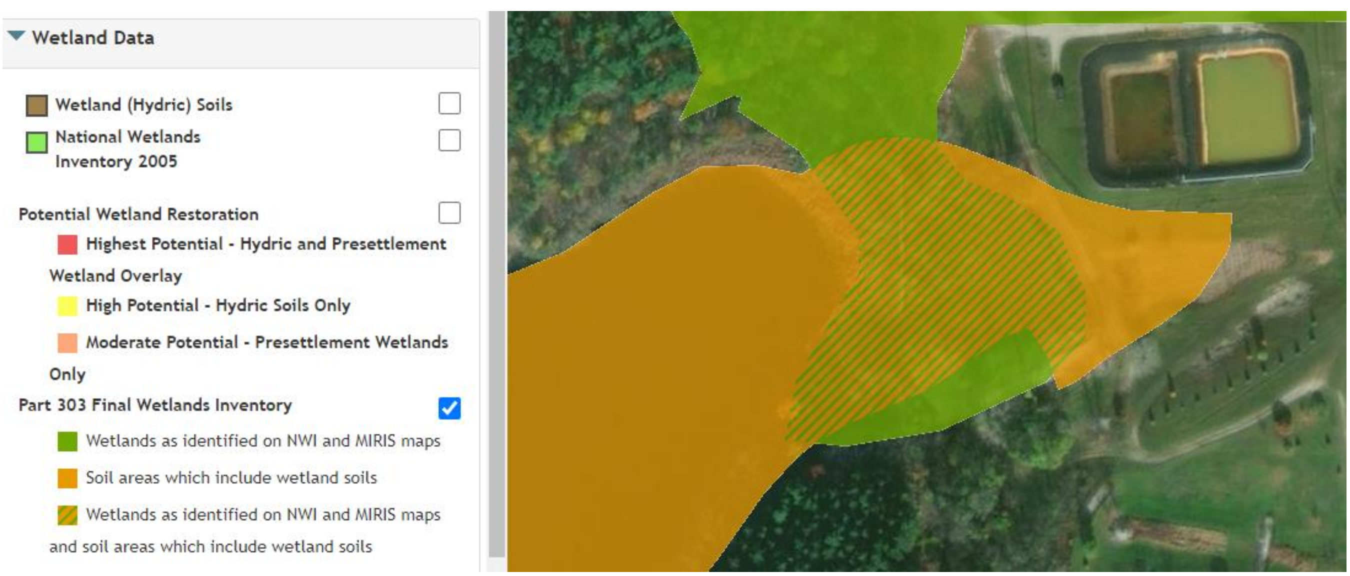
A cross-section depicting our conceptual model for Area C is provided as Attachment 4. The conceptual site model for Area C provides that there is a potential for shallow/perched groundwater possibly containing 1,4-dioxane over the GSI Generic Criterion to migrate along the two former/current drainage channels toward Third Sister Lake and vent into either the wetland area on the east side of Third Sister Lake or into Third Sister Lake. It should be noted that deeper groundwater in this area with elevated 1,4-dioxane concentrations that are being actively remediated is at a significantly lower head than Third Sister Lake and not discharging into Third Sister Lake or the wetland on the east side of the lake.

2.3.2 DISCUSSION/SUPPORT

Area C consists of the eastern portion of Third Sister Lake along with the adjacent wetland area east of the lake. Area C receives drainage from a large portion of the developed portion of the former Gelman campus. There are two distinct east-west conveyances that contribute water to Area C.

The wetland along the eastern border of Third Sister Lake is characterized as Forested Wetland and Hydric Soils. There is typically not standing water in this wetland, suggesting a potential GSI compliance point in this area is near the eastern edge of Third Sister Lake. Figure 5 shows the approximate extent of wetland areas in the eastern area of Third Sister Lake (Source: EGLE Wetland Viewer).

Figure 5 – Area C Wetlands



1,4-Dioxane was historically detected in both water samples and sediment samples collected from Third Sister Lake. More recent samples by Apex, a consultant to U of M, have not identified 1,4-dioxane in either the water or sediment collected from Third Sister Lake (2018 Annual Report for Water and Sediment Sampling Conducted at Saginaw Forest in Ann Arbor, Michigan, Apex Companies, LLC, November 13, 2019). Samples by EGLE have identified 1,4-dioxane low concentrations in Third Sister Lake. The most recent sample was collected October 7, 2021 and had a concentration of 3.2 ug/L. The early detections of 1,4-dioxane in the lake water and sediment samples were likely attributed to surface water runoff associated with Gelman's former spray irrigation.

The hydraulic head of Third Sister Lake is at an elevation of approximately 904 ft amsl (Washtenaw County GIS). The primary 1,4-dioxane plume in this area is deeper and associated with groundwater at an elevation of 890 ft amsl. As such, this groundwater and 1,4-dioxane are not discharging into either the wetland or Third Sister Lake.

Any interaction between groundwater and the wetland/lake would be through very shallow, perched, water-bearing zones, which have not been investigated.

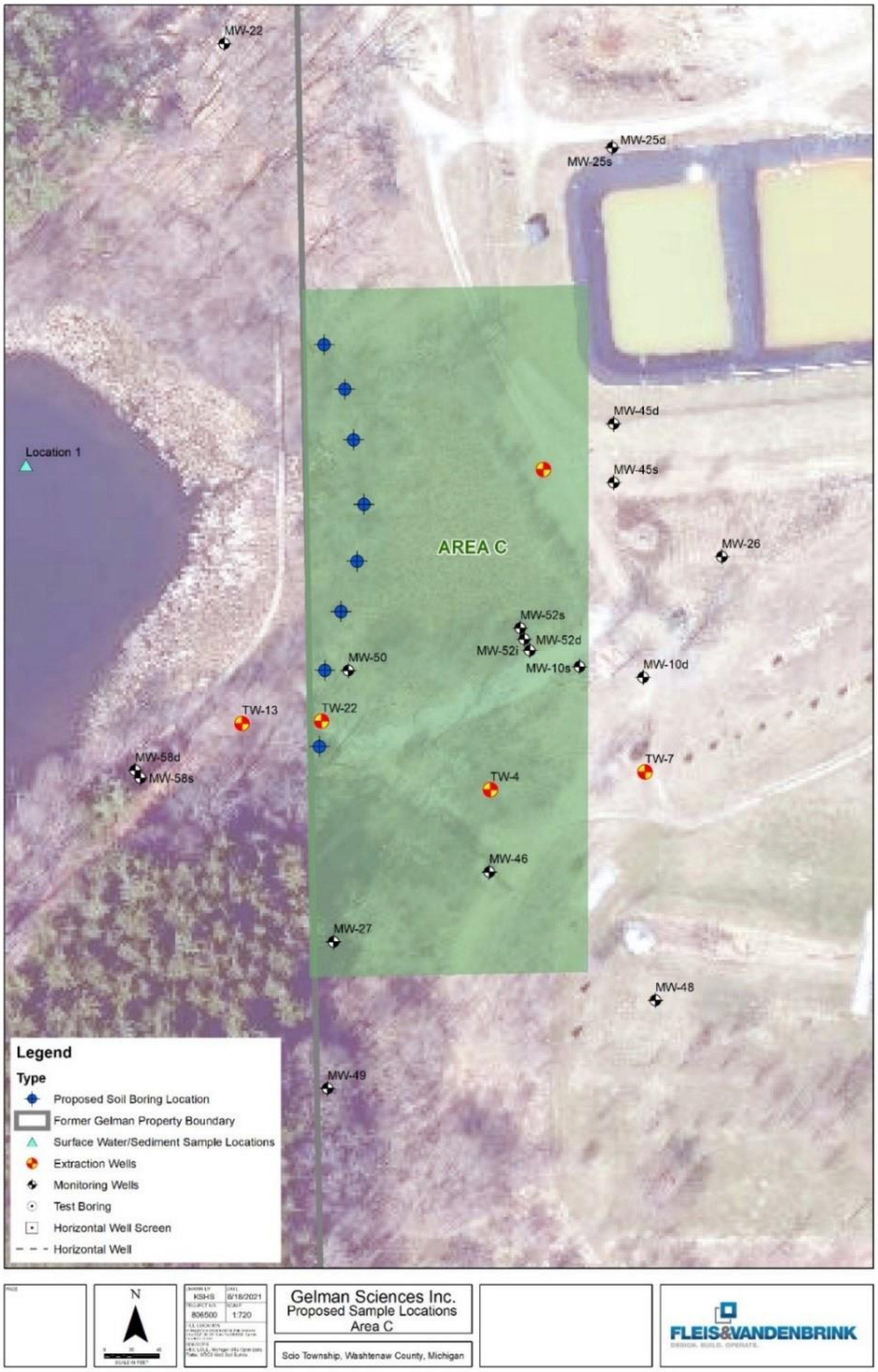
2.3.3 Pathway Analysis

The potential for a shallow (i.e., 0-10 foot) interaction between groundwater and Third Sister Lake cannot be ruled out by our conceptual model and existing data. As such, we propose the collection of additional data in Area C.

2.3.4 Proposed Work Plan

Gelman proposes to drill a series of shallow borings to determine 1,4-dioxane concentrations in shallow/perched groundwater that may be interfacing with Third Sister Lake. The proposed locations for borings/wells are shown on Figure 6.

Figure 6 – Area C Proposed Boring Locations



Vertical aquifer profiling using the WaterlooAPS characterization method will be performed to provide information on hydrostratigraphy and allow groundwater sampling at multiple discrete depths. Hydrologic information provided by the WaterlooAPS profiling method includes an approximate measure of hydraulic conductivity (the "index of hydraulic conductivity") that is estimated from the measured flow rate and pressure of water injected as the probe is advanced. This parameter is calculated in real time, which enables selection of sampling intervals in relatively permeable zones. Each aquifer profiling location will be characterized to a minimum depth of 20 feet. Groundwater samples will be collected and submitted to Gelman for 1,4-dioxane analysis. Unsaturated soils are not expected to be encountered in the investigated area. As such, no soil samples will be collected for 1,4-dioxane analysis.

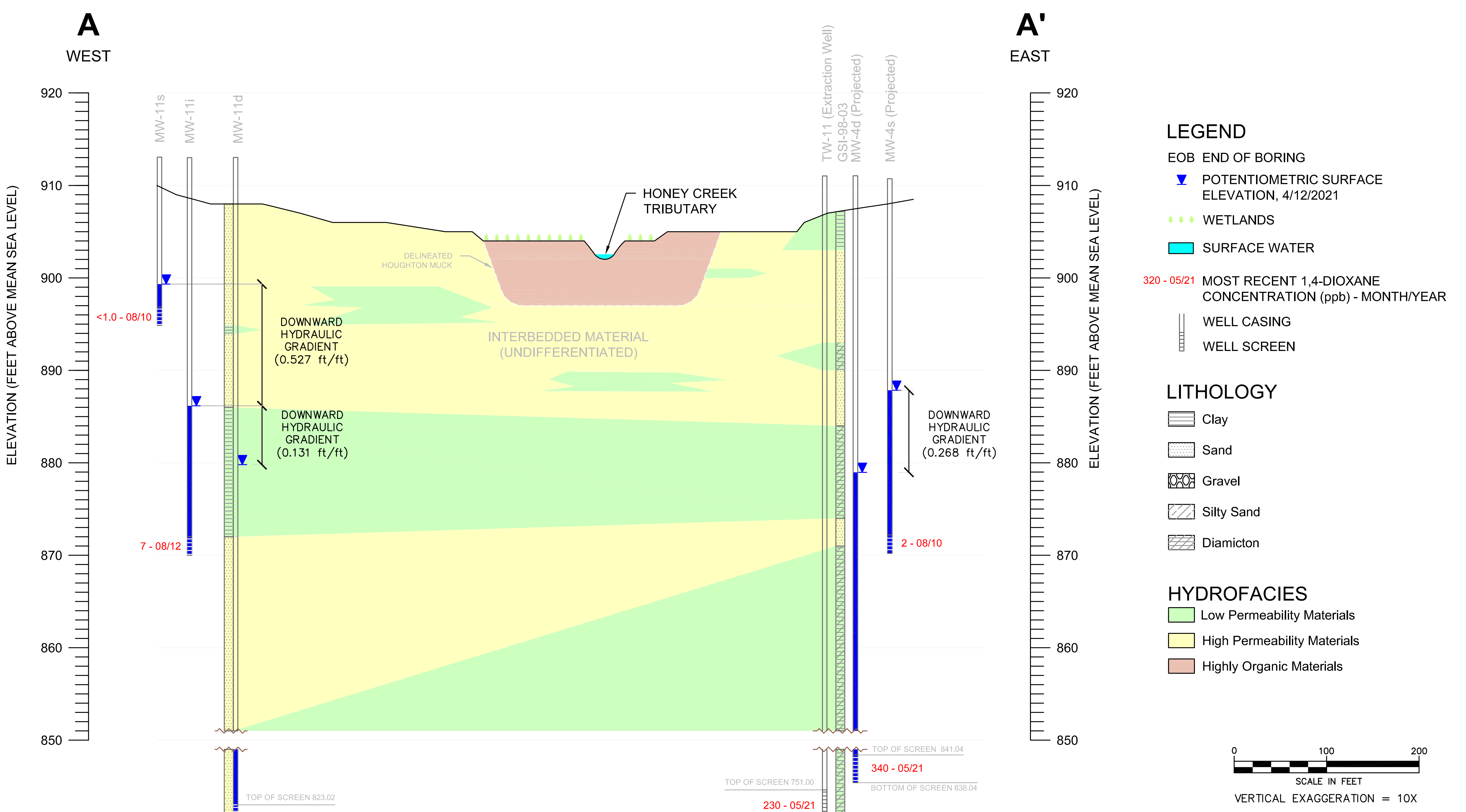
This work will require a wetlands permit. Gelman proposes to have a professional wetlands delineation made for this area in advance of the proposed investigation to determine the boundaries of the existing wetland to support the required wetlands permit application.

3.0 SCHEDULE

Gelman proposes to implement this investigation during the winter months to help facilitate access to Areas B and C. As such, field activities as outlined in this work plan would be conducted December 2021 through February 2022, weather-dependent and contingent on EGLE's turnaround of the wetland permit application. Gelman will prepare a report of its findings within two months of the data collection.

Attachment 1: Area A Conceptual Model

Attachment 1: Area A Conceptual Model



GELMAN SCIENCES INC
SCIO TOWNSHIP, WASHTENAW CO. MI
CROSS SECTION A-A'

ATTACHMENT 1 -
AREA A CONCEPTUAL MODEL

F&V PROJECT NO. 806500

F&V

Attachment 2: F&V SOP (Pore Water Sampling)

STANDARD OPERATING PROCEDURE (SOP-F25)

PORE WATER SAMPLING

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to describe the methods to be utilized when obtaining a pore water for analysis from soil or sediment.

2.0 EQUIPMENT AND MATERIALS

a. Appropriate health and safety gear.
b. Sample containers, sample labels, cooler, ice, and chain of custody forms.
c. Ruler and/or staff gauge for measuring water depth.
d. Decontamination supplies.
e. Pushpoint™ / Henry Sampler.
f. Guard rod.
g. Sample flange.
h. Sampling Equipment
   i. Option 1 – Sampling with a peristaltic pump
      - Multi-meter and flow through cell for measuring pH, specific conductivity, and temperature.
      - A probe guard for the multi-meter when taking surface water readings.
      - Calibration solutions.
      - A Turbidity Meter.
      - Peristaltic pump and tubing.
      - Flexible tubing for connections
   j. Option 2 – Sampling with Syringe
      - Syringe
      - 3-way valve
      - Tubing
      - Flexible tubing for connections
k. Digital camera.
l. GPS unit.
m. Tools, as necessary to work on the equipment.
n. Graduated cylinder.
o. Field Worksheets.

3.0 CONSIDERATIONS

a. Sample volumes may be limited. Communicate with laboratories regarding minimum sample volume required for analysis.
b. Depending on sampling objectives and site details, choose either the sampling with syringe OR the sampling with peristaltic pump options.
c. Samples should be collected from the least suspected contaminated area to the most suspected contaminated area.
d. Porewater should be collected from downstream to upstream sample locations.
e. Approach sample locations from the downstream side to minimize bottom sediment disturbance.
f. The sampler should stand down stream of the sampling device.
g. Use care to not disturb the sampling area. If the sampler is wading, the sampler should lean out and insert the pore water device as far as possible away from where the sampler is standing to reduce potential effects of the sampler on the integrity of the pore water sample.
h. If the surface water body must be waded to collect pore water samples, the water should not exceed three feet in depth. If the water exceeds three feet, samples will be collected by boat.
i. If possible, consider collecting a sample of the surface water that is upgradient of the potentially contaminated study area. This sample will be considered the surface water background water quality sample.
j. Water samples collected from a boat should be collected from the bow or upstream side of the boat, away from the motor, with care taken to avoid contamination of the sample.
k. A flange may not be necessary when collecting deep pore water samples.
l. Other parameters, if desired, can be measured in addition to pH, specific conductivity, temperature, and turbidity.

4.0 PROCEDURE

a. Verify that the sampling equipment is clean and decontaminated.
b. Calibrate equipment.
c. Place the flange on top of the sediment, and carefully work the edges into the sediment until the flange is flush with the sediment. If necessary, weigh down the flange to keep it on the sediment.
d. Install the guard rod into the sampler.
e. Insert the sampler with guard rod through the flange to the desired depth (usually 6-12 inches below the base of loose sediment, but actual depth will depend on the objectives of the specific investigation). The flange should fit snuggly around the body of the sample to prevent surface water from contaminating the power water sample.

f. Remove the guard rod.
g. Record the screen interval depth and the estimated thickness of the organic matter above the sediment.
h. Sample the pore water
    i. Option 1 – Using a Peristaltic Pump
        i. Attach the tubing to the pore water sampler and to the peristaltic pump.
        ii. Calculate the volume of the sampler and tubing.
        iii. Using a very slow setting on the peristaltic pump (50-200 ml/min.), purge the sampler of 110% of volume of the sampler plus tubing into a graduated cylinder.
        iv. Collect samples using laboratory supplied containers.
        v. Attach the multi-meter and flow cell to the tubing.
        vi. Continue purging the sampler on a very low setting (50-200 ml/min.) and record pH, specific conductivity, temperature, and turbidity.
        vii. Measure pH, specific conductivity, temperature, and turbidity of the surface water immediately upstream of the sample location.
    ii. Option 2 – Using a Syringe
        i. Attach the syringe to the Sampler and to a 3-way valve using tubing.
        ii. Calculate the volume of the sampler and tubing.
        iii. Using a very slow purge rate (50-200 ml/min.), purge the sampler of 110% of volume of the sampler plus tubing into a graduated cylinder.
        iv. Fill laboratory supplied containers using the syringe.
i. GPS the sample location.
j. Measure the depth of the surface water directly downstream of the sample location.
k. Take digital photographs of sample location from both upstream and downstream positions.
l. Remove the sampler from the sediment.
m. Decontaminate the equipment.
n. If desired, collect an upgradient/background surface water sample that is not in the potentially contaminated area. GPS this sample location.

5.0 RECORDS AND DOCUMENTATION

Sampling information will be documented onto the following field forms:
a. FF-01 Daily Field Report
b. FF-07 Troll Calibration Record
c. FF-14 Pore Water Sampling Worksheet
d. Multimeter Data-logger Output File

The following Field Data Sheets and SOPs may apply to this SOP:
a. FF-01 Daily Field Report
b. FF-07 Troll Calibration Record
c. SOP-F14 Troll 900 Use and Calibration
d. SOP-F21 Aqua Troll 600 Use and Calibration

6.0 RESPONSIBILITY

a. All field staff are to review and become familiar with this SOP.
b. Field staff will collect appropriate field notes and place them in the project file.
c. Field staff will note deviations from the original scope and stopping work if deviations or safe working conditions are not feasible.

7.0 REFERENCES

U.S. Environmental Protection Agency, Region 4, Laboratory Services and Applied Science Division, Pore Water Sampling, LSASDPROC-513-R4, December 14, 2020.

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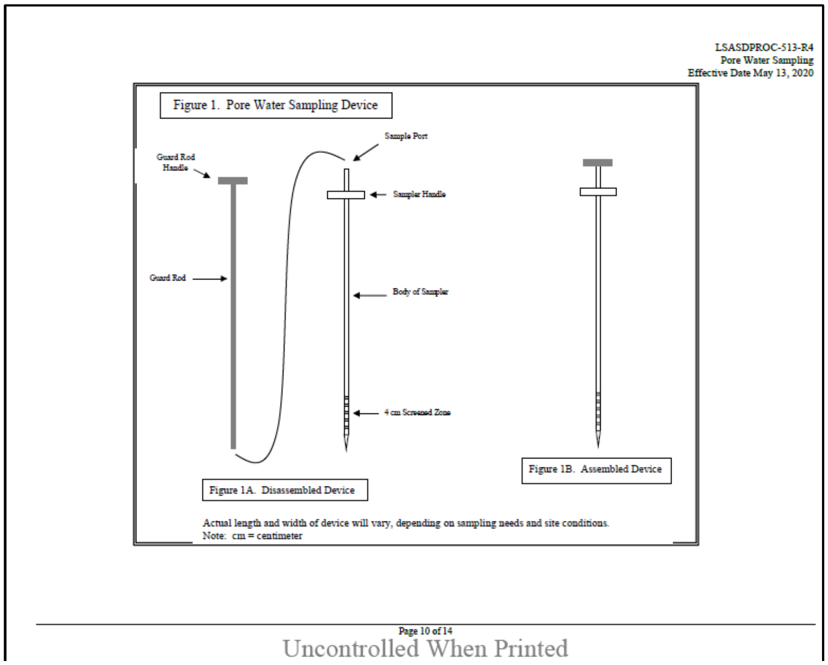
LSASDPROC-513-R4
Pore Water Sampling
Effective Date May 13, 2020
Figure 1. Pore Water Sampling Device
Sample Port
Guard Rod Handle
Sampler Handle
Guard Rod
Body of Sampler
4 cm Screened Zone
Figure 1B. Assembled Device
Figure 1A. Disassembled Device
Actual length and width of device will vary, depending on sampling needs and site conditions.
Note: cm = centimeter
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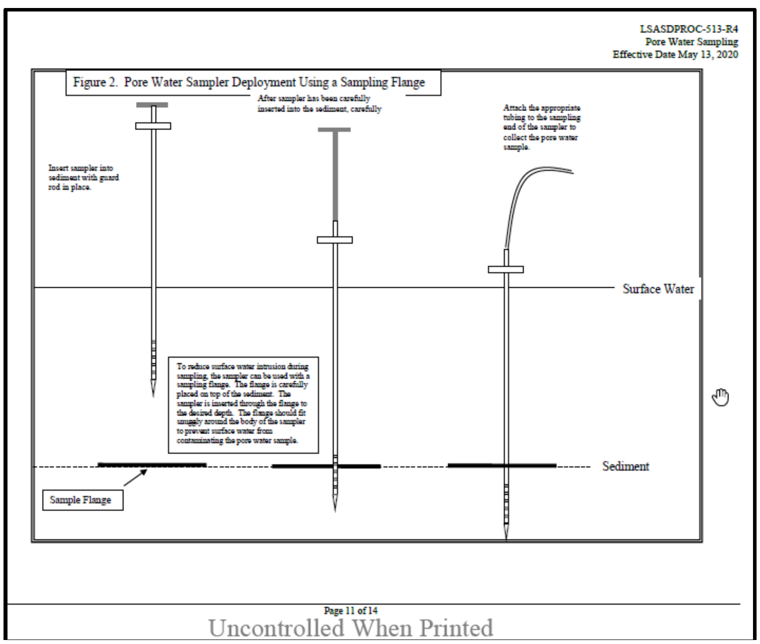
Uncontrolled When Printed


LSASDPROC-513-R4
Pore Water Sampling
Effective Date May 13, 2020
Figure 2. Pore Water Sampler Deployment Using a Sampling Flange
After sampler has been carefully inserted into the sediment, carefully
Attach the appropriate tubing to the sampling end of the sampler to collect the pore water sample.
Insert sampler into sediment with guard rod in place.
Surface Water
To reduce surface water intrusion during sampling, the sampler can be used with a sampling flange. The flange is carefully placed on top of the sediment. The sampler is inserted through the flange to the desired depth. The flange should fit snuggly around the body of the sampler to prevent surface water from contaminating the pore water sample.
Sediment
Sample Flange
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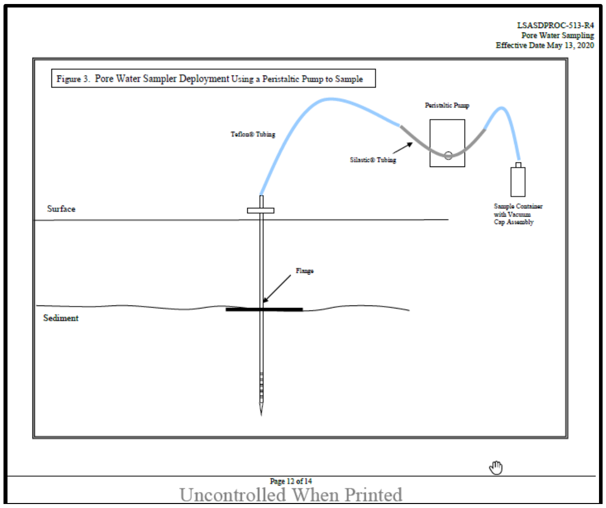
LSASDPROC-513-R4
Pore Water Sampling
Effective Date May 13, 2020

Figure 3. Pore Water Sampler Deployment Using a Peristaltic Pump to Sample

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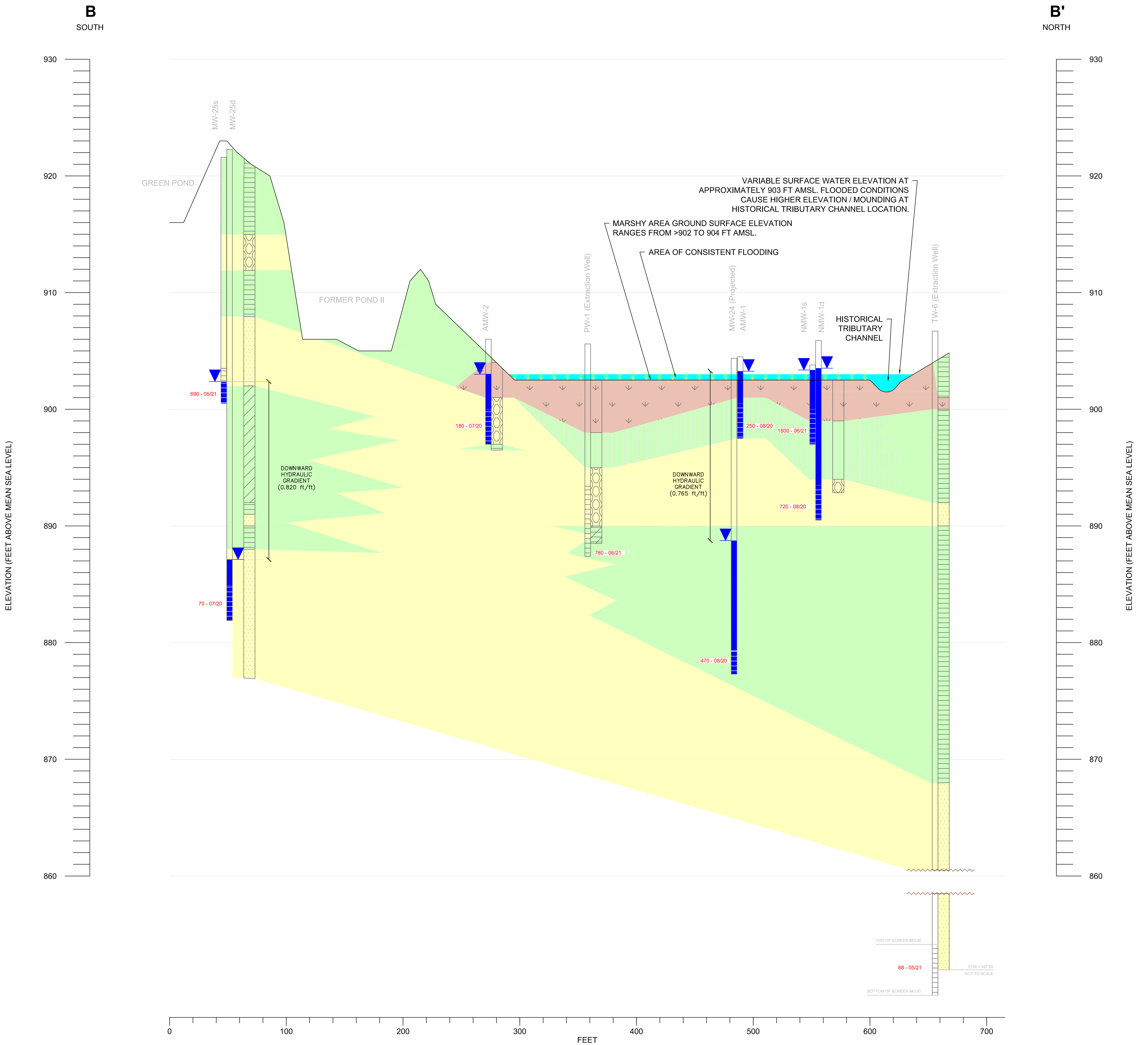
Uncontrolled When Printed

Attachment 3: Area B Conceptual Model



LEGEND

EOB	END OF BORING
▼	POTENTIOMETRIC SURFACE ELEVATION, 4/12/2021
	WETLANDS
	SURFACE WATER
320 - 05/21	MOST RECENT 1,4-DIOXANE CONCENTRATION (ppb) - MONTH/YEAR
	WELL CASING
	WELL SCREEN

LITHOLOGY

- Clay
- Sand
- Gravel
- Till
- Diamicton
- Peat
- Marl

HYDROFACIES

- Low Permeability Materials
- High Permeability Materials
- Highly Organic Materials

SCALE IN FEET 0 40 80
VERTICAL EXAGGERATION = 10X

FLEIS & VANDENBRINK
DESIGN. BUILD. OPERATE.

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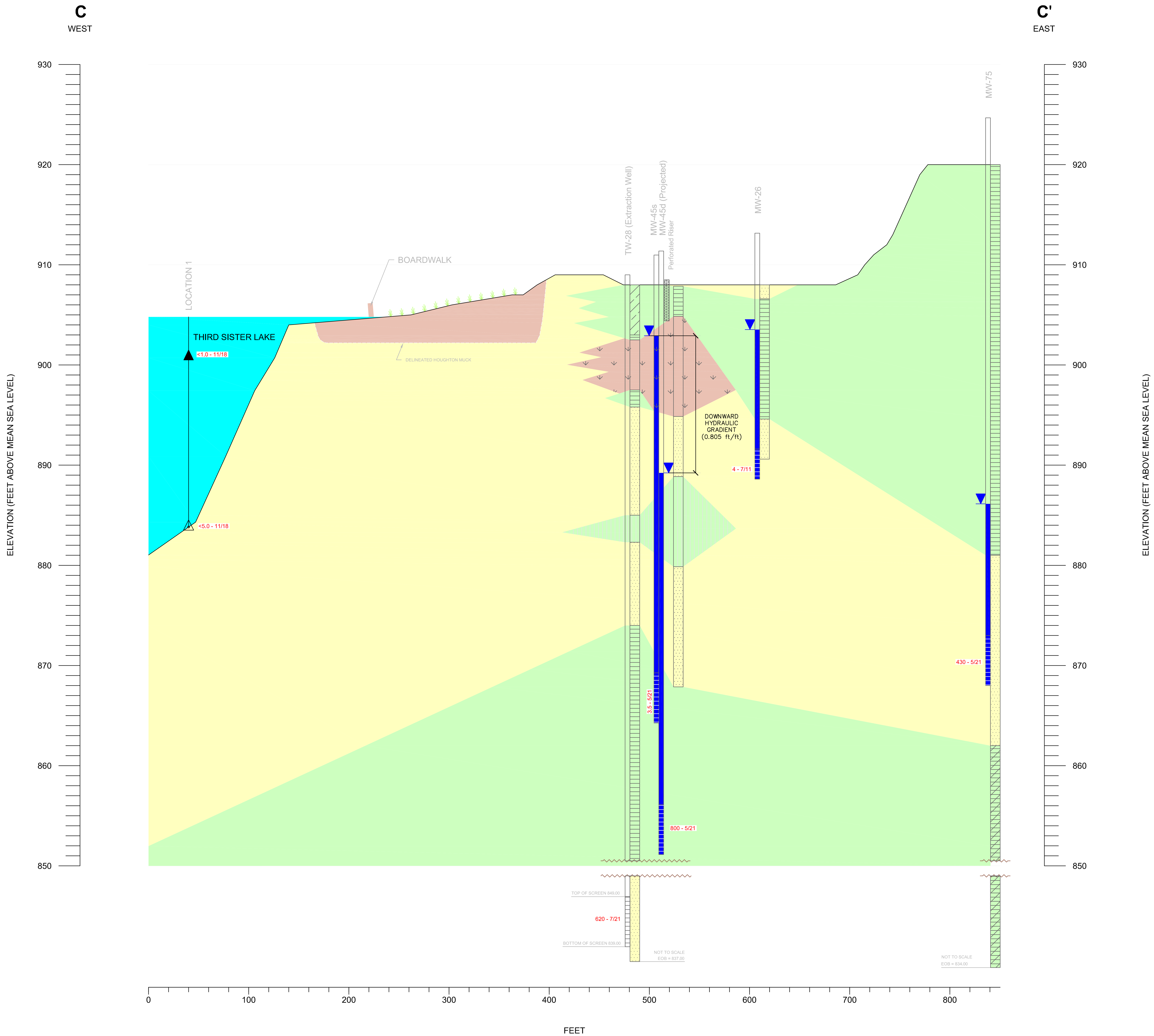
GELMAN SCIENCES INC
SCIO TOWNSHIP, WASHTENAW CO. MI
CROSS SECTION B-B'
ATTACHMENT 3 - AREA B CONCEPTUAL MODEL

DESIGN TEAM: PROJ MNGR: JWB; DESIGNED BY: KSHS; DRAWN BY: AWC; CHECK BY:

NOT FOR CONSTRUCTION

08/2021
F&V PROJECT NO. 806500

Attachment 4: Area C Conceptual Models



LEGEND

- EOB — END OF BORING
- POTENTIOMETRIC SURFACE ELEVATION, 4/12/2021
- SEDIMENT SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- WETLANDS
- SURFACE WATER
- 320 - 05/21 — MOST RECENT 1,4-DIOXANE CONCENTRATION (ppb) - MONTH/YEAR
- WELL CASING
- WELL SCREEN

LITHOLOGY

- Clay
- Sand
- Diamicton
- Peat
- Marl
- Sandy Clay

HYDROFACIES

- Low Permeability Materials
- High Permeability Materials
- Highly Organic Materials

SCALE IN FEET (0, 50, 100)

VERTICAL EXAGGERATION = 10X

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REVISION:

GELMAN SCIENCES INC
SCIO TOWNSHIP, WASHTENAW CO. MI
CROSS SECTION C-C'

ATTACHMENT 4 - AREA C CONCEPTUAL MODEL

DESIGN TEAM: PROJ MNGR: JWB; DESIGNED BY: KSHS; DRAWN BY: AWC; CHECK BY:

DRAWING INFORMATION: 806500 GSI CROSS SECTION C-C' 082421 adamc

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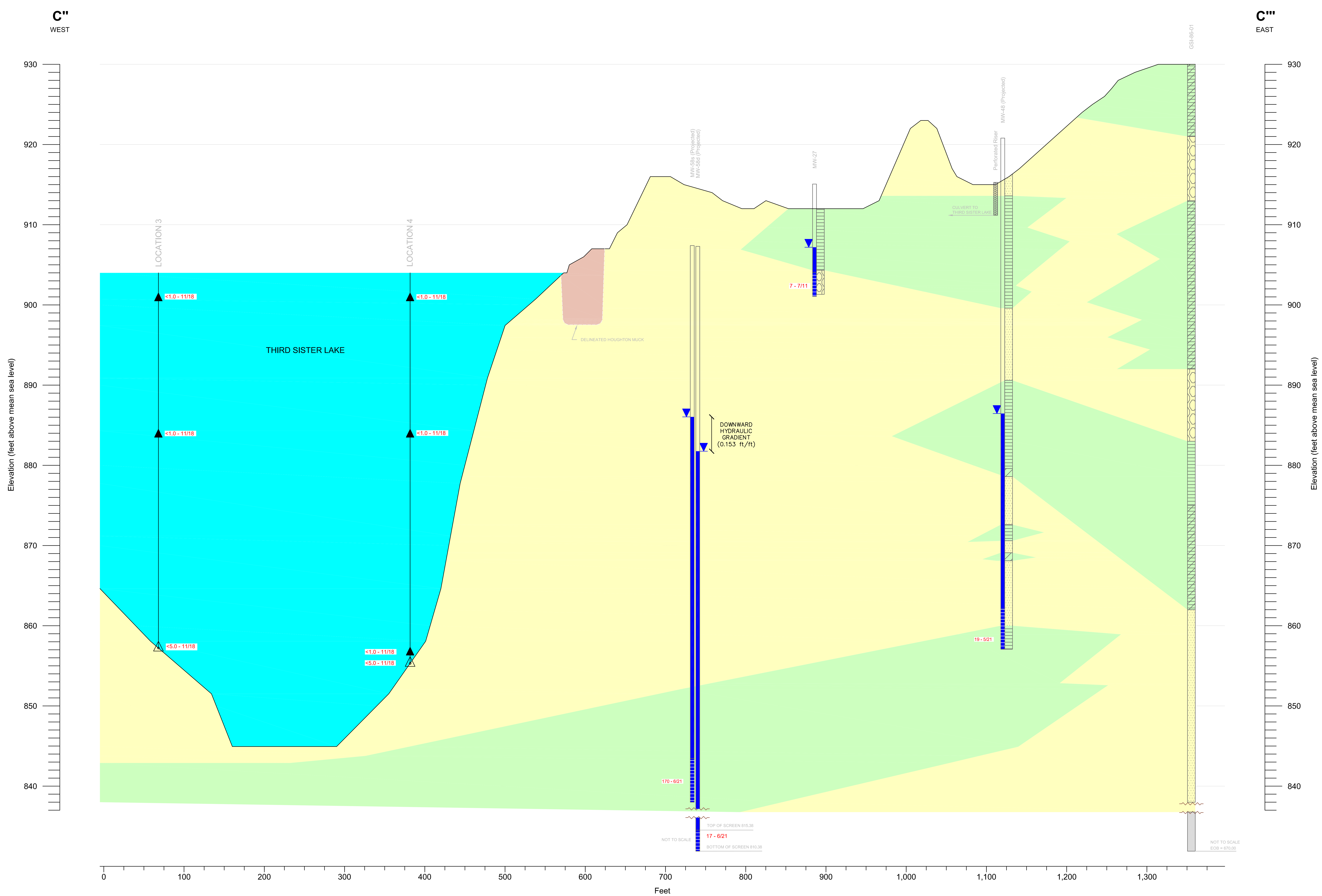
1 OF 2



LEGEND

EOB	END OF BORING
▼	POTENTIOMETRIC SURFACE ELEVATION, 4/12/2021
△	SEDIMENT SAMPLE LOCATION
▲	SURFACE WATER SAMPLE LOCATION
	WETLANDS
	SURFACE WATER
320 - 05/21	MOST RECENT 1,4-DIOXANE CONCENTRATION (ppb) - MONTH/YEAR
	WELL CASING
	WELL SCREEN

LITHOLOGY

- Clay
- Sand
- Gravel
- Diamicton
- Till
- Peat
- Marl
- Sandy Clay
- Houghton Muck
- Shale Bedrock

HYDROFACIES

- Low Permeability Materials
- High Permeability Materials
- Highly Organic Materials

0 60 120
SCALE IN FEET
VERTICAL EXAGGERATION = 10X

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8 7 6 5 4 3 2 1

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SCIO TOWNSHIP, WASHTENAW CO. MI
CROSS SECTION C''-C'''
ATTACHMENT 4 - AREA C CONCEPTUAL MODEL

DESIGN TEAM: PROJ MNGR: JWB; DESIGNED BY: KSHS; DRAWN BY: AWC
CHECK BY:

DRAWING INFORMATION
806500 C''-C'''
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