Pre-IRM Pilot Testing and Interim Remedial Measure Work Plan

Former Northern Circuits Site

East Syracuse, New York

Site #734124

October 2024

Pre-IRM Pilot Testing and Interim Remedial Measure Work Plan

Former Northern Circuits Site

East Syracuse, New York

Site #734124

October 2024

Prepared By:
Arcadis of New York, Inc.
201 Fuller Road, Suite 201
Albany, NY 12203
United States
Phone: 518 250 7300

Prepared For:
New York State Department of Environmental Conservation
615 Erie Boulevard West
Syracuse
New York 13204-2400

Our Ref:
30053689

New York State Department of
Environmental Conservation
Region 7
Syracuse, New York

Pre-IRM Pilot Testing and Interim Remedial Measure Work Plan

Northern Circuits, Incorporated
6 Adler Drive
East Syracuse, New York
Site #734124

Work Assignment #D009804-8.2

October 10, 2024

I, Mark Flusche, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER-10 Technical Guidance for Site Investigation and Remediation and that all activities were performed in full accordance with the DER approved scope of work and any DER approved modifications.

Mark Flusche, P.G.
PG-NY, #375

Arcadis of New York, Inc.
201 Fuller Road, Suite 201
Albany, NY 12203

Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

1,1-DCA	1,1-dichloroethane
1,2-DCA	1,2-dichloroethane
1,1-DCE	1,1-dichloroethene
1,1,1-TCA	1,1,1-trichlorethane
1,1,2-TCA	1,1,2-trichlorethane
bgs	below ground surface
CAMP	Community Air Monitoring Plan
CFC-12	dichlorodifluoromethane
CFC-113	1,1,2-trichloro-1,2,2-trifluoroethane
cis-1,2-DCE	cis-1,2-dichloroethene
cm/sec	centimeter per second
COC	constituent of concern
DER-10	DER-10 Technical Guidance for Site Investigation and Remediation
DNAPL	dense non-aqueous phase liquid
GAC	granular activated carbon
gpm	gallon per minute
GWET	groundwater extraction and treatment
HASP	Health and Safety Plan
HSA	hollow stem auger
IDW	investigation derived waste
in.Hg	inches of mercury
IRM	Interim Remedial Measures
KOT	knockout tank
LEL	lower explosive limit
µg/L	microgram per liter
MPE	multi-phase extraction
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OWS	oil/water separator
PCE	tetrachloroethene

PID	photoionization detector
PLC	programmable logic controller
POTW	publicly owned treatment works
PPE	personal protective equipment
psig	pounds per square inch gauge
PVC	polyvinyl chloride
ROI	radius of influence
scfm	standard cubic feet per minute
SGV	standard and guidance value
TCE	trichloroethene
TCL	Target Compound List
trans-1,2-DCE	trans-1,2-dichloroethene
USEPA	United States Environmental Protection Agency
VER	vacuum-enhanced recovery
VOC	volatile organic compound
Work Plan	Pre-IRM Pilot Testing and Interim Remedial Measure Work Plan

1 Introduction

This Pre-Interim Remedial Measure (IRM) Pilot Testing and IRM Work Plan (Work Plan) has been prepared to describe a planned IRM for the former Northern Circuits facility located at 6 Adler Drive (the “site”) in the Town of Dewitt, in Onondaga County, New York (**Figure 1**). The New York State Department of Environmental Conservation (NYSDEC) intends to implement an interim remedy at this site to address impacts to soil and groundwater identified during previous environmental investigations.

The Work Plan describes the basis of design and presents a conceptual system design for an IRM for source area impacted soil and groundwater. The results of the pre-IRM implementation pilot testing activities described herein will be used to finalize the design parameters for the IRM. The activities presented in this Work Plan will be conducted by Arcadis under NYSDEC Division of Environmental Remediation Standby Engineering Services Contract Work Assignment No. D007618-29 and by a NYSDEC call-out contractor under their NYSDEC contract and work assignment.

1.1 Background

The site is an approximately 1.3-acre property. The southern portion of the site contains an approximately 11,400-square-foot building (**Figures 2A and 2B**). From 1975 to 2010, the site building was used for circuit board manufacturing, metal plating, and/or photograph development (HRP Associates, Inc. 2012). The remainder of the site is covered by an asphalt parking area to the south and west and a grass lawn to the east and north. The ground surface topography at the site is generally flat.

Environmental investigations conducted at the site between 2009 and 2022 are detailed in the *Site Assessment Report* (LCS, Inc. 2009), *Site Characterization Report* (HRP Associates, Inc. 2012), *Remedial Investigation Report* (Arcadis of New York, Inc. [Arcadis] 2021), and *Supplemental Site Investigation Report* (Arcadis 2024). These investigations identified the following primary constituents of concern (COCs) for the site:

- Chlorinated ethenes: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 1,1-dichloroethene (1,1-DCE), and vinyl chloride;
- Chlorinated ethanes: 1,1,1-trichlorethane (1,1,1-TCA), 1,1,2-trichlorethane (1,1,2-TCA), 1,1-dichloroethane (1,1-DCA), 1,2-dichloroethane (1,2-DCA), and chloroethane,
- Chlorofluorocarbons: 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113) and dichlorodifluoromethane (CFC-12); and
- 1,4-dioxane.

Primary COCs were detected in soil, groundwater, and/or indoor air at concentrations greater than New York State Department of Health (NYSDOH) and NYSDEC applicable standards and guidance values (SGVs). In general, COCs were detected at the highest concentrations in samples collected on the eastern side of the site in an area associated with a wastewater sump (Sump 3) formerly fed by a series of floor drains and overhead pipes from work areas inside the site building. Although separate-phase liquid (other than rare trace sheens and blebs) was not observed during previous field activities (Arcadis 2021), two of the constituents listed above were detected in groundwater at concentrations that indicate they may be present as dense non-aqueous phase liquid (DNAPL): CFC-113 was present in a groundwater sample collected from the weathered shale near Sump 3 at a concentration near its aqueous solubility limit (of approximately 170,000 micrograms per liter [µg/L]); and PCE was detected in a sample from the same area at a concentration greater than 10% of its solubility limit (of approximately 200,000 µg/L). Based on these observations, an approximately 15-foot radius area around Sump 3 is considered the COC source area.

1.2 Site Geology and Hydrogeology

Native overburden materials in the site area are primarily lacustrine deposits; these materials overlie till that overlies bedrock (Muller and Caldwell 1986). Bedrock in the area is the Upper Silurian Vernon Formation, which is generally characterized as a sequence of shales and dolostones (Rickard and Fisher 1970). Lacustrine deposits were encountered during the remedial investigation field work between approximately 1 and 4 feet below grade and extending to the top of till, which was encountered approximately 17 to 30 feet below ground surface (bgs). Fill material at the site is topsoil, asphalt, and/or concrete. Till deposits beneath the site are generally 1 to 5 feet thick and composed of a compacted hard dry diamicton, characteristic of lodgment till. Very to moderately weathered shale bedrock with horizontal fractures and jointing was encountered from approximately 21 to 35 feet bgs. Auger refusal was typically encountered within 10 feet depth below the till/weathered bedrock interface.

The water table at the site occurs in the shallow lacustrine deposits. Depth to groundwater varies between approximately 3.0 and 8.0 feet bgs across the site. During storm events, soil is saturated at the ground surface in the COC source area. Groundwater flow in the fill and lacustrine deposits beneath the site is generally to the northeast (**Figure 3A**). Groundwater flow in the weathered bedrock below the till is roughly radial away from a bedrock high located under the neighboring property at 8 Adler Drive (**Figure 3B**). The differing groundwater flow directions above and below the till indicate that the till is acting as a semi-confining unit. Slug testing results for site wells screened in the lacustrine deposits indicate a hydraulic conductivity for those deposits of approximately 9.1×10^{-5} centimeters per second (cm/sec). Slug testing results for site wells screened in the weathered shale indicate a hydraulic conductivity for that unit of approximately 3.7×10^{-4} cm/sec. The regional groundwater flow direction is expected to be westward, toward Onondaga Lake. Based on the location and slope of drainage features and runoff observed on site, surface water runoff at the site drains north and intersects a drainage swale near the northern site property line (**Figures 2A and 2B**), which in turn drains east.

1.3 Source Area IRM Technology Discussion

The shallow water table, heterogeneous geology, and combination of COCs in the source area present challenging remedial conditions. The shallow water table precludes effective application of a soil vapor extraction remedy for removal of volatile COCs; additionally, this technology would not be effective at removing 1,4-dioxane. The heterogeneous source area geology complicates effective and efficient delivery of an in-situ amendment, such as a chemical oxidant, for source mass treatment. Any direct removal of source mass via excavation would be substantially impeded by the presence of the in-use building and buried infrastructure above the source area. Thermal treatment to target source area mass is expensive to implement and would also be complicated by the site utilities and in-use building above the source area.

Recognizing the aforementioned challenges, groundwater extraction and treatment (GWET) has been identified as a likely viable IRM that can be effectively and efficiently implemented to remove COC mass from source area soil and groundwater. A GWET at the site would target highly impacted groundwater in the source area and be capable of expansion to provide multi-phase extraction (MPE) if mobile, recoverable DNAPL is observed to be present.

1.4 Pre-IRM Pilot Testing Objectives

The pre-IRM pilot testing has two main objectives:

- Confirm that the groundwater extraction rate necessary for an effective and efficient GWET remedy is achievable in the source area; and
- Determine key design parameters, including sustainable pumping rates, radius of influence (ROI), influent concentrations, and potential mass recovery rates, for implementation of the IRM.

If mobile, recoverable DNAPL is observed to be present during these activities, the IRM may be expanded to an MPE system that can remove both highly impacted groundwater and separate phase liquid.

Key design parameters for the GWET IRM are described in Section 6 of this Work Plan. The pilot testing activities to be performed to gather data in regard to each parameter to finalize the IRM design are described in Section 5. Field planning, site preparation, and sampling tasks to be performed in advance of pilot testing and IRM implementation activities are described in Sections 2 through 4.

2 Planning and Site Preparation Activities

Activities to be performed prior to installing the IRM include:

- arranging site and access controls;
- preparing a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP);
- identifying an on-site staging area;
- acquiring necessary permits;
- identifying and clearing utilities in planned subsurface intrusive work areas;
- implementing waste handling and disposal procedures; and
- performing pre-IRM pilot testing

These activities are described further in the following subsections.

2.1 Site and Access Controls

Site access will be coordinated with the owner and notifications will be made to tenants of the site building prior to initiating the on-site activities described in this Work Plan. The planned work zone is shown on **Figure 4**; this work zone will be demarcated and isolated from users of the site during work activities with appropriate signage and barriers. The IRM system will be housed in securable 40-foot-long containers and fencing will be installed around aboveground pilot testing and IRM components left in place after work hours. Because the work area abuts the site boundary with the neighboring property at 8 Adler Drive, notifications will also be made to the owner and tenants of that property prior to initiating the on-site activities described in this Work Plan.

2.2 Health and Safety

The existing site-specific HASP will be updated to include planned work activities and incorporate related Job Safety Analyses for worker protection during implementation of the work. All workers will be required to have 40-hour HAZWOPER certification. The site safety officer will be required to have 8-hour HAZWOPER Site Supervisor certification. Level D personal protective equipment (PPE) will be the minimum required for individuals within the work zone.

In accordance with NYSDOH generic CAMP guidelines provided in Appendix 1A of *DER-10 Technical Guidance for Site Investigation and Remediation* (DER-10) (NYSDEC 2010), air monitoring will be performed during all subsurface intrusive work activities. Consistent with DER-10, two CAMP stations will be established at the site, one positioned upwind and the other downwind of the intrusive work area. Each CAMP station will monitor for volatile organic compounds (VOCs) using a field photoionization detector and for air particulates/dust using a respirable airborne dust aerosol monitor (DustTrak or equivalent).

2.3 Staging Area

A staging area for supplies, equipment, and vehicles will be established on site. Investigation derived waste (IDW) generated during field activities will be containerized in 55-gallon, UN-approved steel drums and staged on pallets in this on-site staging area. It is anticipated that the decontamination area for downhole tooling and equipment will also be established in this staging area.

2.4 Permitting

Required permits for the planned activities will be obtained before initiating work. It is currently anticipated that the only required permit will be an Industrial Wastewater Discharge Permit with the local publicly owned treatment works (POTW), which will be obtained prior to initiating the steady-state pumping test component of the planned pilot testing. The IRM treatment system will incorporate a low-profile air stripper for removal of dissolved phase VOCs; however, a permit is not anticipated to be required for this unit. Based on the NYSDEC's Division of Air Resources (DAR)-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants (NYSDEC 2021) and under Title 6 of the New York Codes Rules and Regulations (6 NYCRR) Part 212, Flowchart #1, air stripper system operation is exempt from permitting and is considered trivial under 6 NYCRR Section 201-3.3 (29) – Trivial Activities.

2.5 Utility Identification and Clearance

Multiple lines of evidence will be used to clear utilities prior to initiating ground intrusive activities. Ground intrusive activities for the Work Plan scope will be drilling for installation of two new extraction wells and three new monitoring wells and shallow excavation for decommissioning of two existing monitoring wells. Arcadis will mark subsurface intrusive locations in the field using spray paint and/or flags and review existing site maps and information to evaluate subsurface conditions at the planned work locations. Arcadis will also subcontract with a private geophysical survey firm to locate, mark, and map buried utilities and structures within the vicinity of the planned work locations. An Arcadis field engineer/geologist will oversee all utility clearance work. Using the results of the geophysical survey, the subcontractor and Arcadis will identify potential points of conflict between existing surface and subsurface structures/utilities and the planned work locations. Geophysical survey figures showing the location of identified utilities will be produced following completion of field work activities. Adjustments to drilling locations will be made as necessary. The drilling subcontractor will be responsible for calling One-Call (UDigNY) to mark subsurface utilities prior to any ground intrusive work, confirming mark out is completed, and providing an "all clear" One-Call ticket to Arcadis before the start of work.

2.6 Investigation-Derived Waste

Solid IDW (i.e., drill cuttings, PPE, plastic) generated during field activities will be containerized in UN-approved 55-gallon drums. Liquid IDW (i.e., decontamination water, extracted water) will be containerized in in UN-approved 55-gallon drums or large volume frac tanks. Samples will be collected as requested by the selected waste disposal facility to characterize the IDW and prepare waste profiles. It is anticipated that one composite water sample and one composite soil sample will be collected and analyzed by a NYSDEC-contracted laboratory for analytes as required by the designated disposal facility, including but not limited to Target Compound List (TCL) VOCs by United States Environmental Protection Agency (USEPA) Method 8260B, TCL semi-VOCs by USEPA Method 8270, and Resource Conservation and Recovery Act 8 metals by USEPA 6000/7000 Series for waste characterization purposes. A NYSDEC-subcontracted waste disposal firm will transport and dispose of IDW in accordance with local, state, and federal regulations.

Water collected during hydraulic testing pilot activities and generated during the IRM will be held in frac tanks. The water will be pre-treated and tested. If accepted by the local POTW, the treated groundwater would be discharge to the sanitary sewer. However, if the POTW does not issue a temporary discharge permit, the treated groundwater would be transported to an off-site disposal facility. If necessary, Arcadis and NYSDEC will assess additional disposal options for the treated groundwater, based on the pre-treatment analytical results.

3 Well Installation and Decommissioning

To support the IRM, two new extraction wells (EW-1S and EW-1D) and three new monitoring wells (MW-21S, MW-21D, and MW-22S) will be installed using hollow stem auger drilling methods. The locations of the proposed wells are shown on **Figure 5**. A private utility locator will be contracted to identify subsurface utilities near the proposed wells using ground penetrating radar and electromagnetic techniques. Locations for the proposed wells will be cleared of utilities using hand tools or a vacuum truck to a depth of 5 feet bgs.

3.1 Extraction Wells

The two new extraction wells will include one shallow well screened in overburden deposits (EW-1S) and one deep well screened in weathered bedrock (EW-1D). The two extraction wells (EW-1S and EW-1D) will be completed as 6-inch diameter wells as shown on **Drawing G-1 in Appendix A**.

EW-1S will be screened to target the overburden located above the weathered shale geology. The screened interval of EW-1S will be finalized based on field observations but is anticipated to be set at approximately 12-22 feet bgs. EW-1S will be installed using hollow stem auger (HSA) techniques. The well will be constructed with a 10-foot-long stainless steel wire-wrapped screen with a slot size of 0.010-inch. A 5-foot section of stainless steel riser will be installed between 7-12 feet bgs with the remaining riser 0-7 feet bgs completed as Schedule 40 polyvinyl chloride (PVC) riser. One foot of 6-inch-diameter stainless steel blank casing will be installed below the wire-wrapped screen as a sump. The annulus around the sump will be sealed with neat cement, and a 6-inch-diameter, stainless steel, threaded cap will be used to seal the bottom of the sump.

EW-1D will be screened in the weathered shale geology. The screened interval of EW-1D will be finalized based on field observations but is anticipated to be set at approximately 27-32 feet bgs. EW-1D will be installed using both HSA and roller bit techniques. The overburden deposits will be isolated from weathered bedrock with a steel casing during well installation to prevent potentially mobile DNAPL from migrating vertically. The well will first be advanced through overburden deposits using HSA (it is assumed that 12-¼” inner diameter augers will be used). The overburden deposits will then be isolated with a 10-inch diameter steel casing installed at least one foot into weathered bedrock below the till layer and grouted in place. After allowing the grout to cure for a minimum of 12 hours, the borehole will then be advanced through the weathered bedrock using a roller bit. The borehole will be completed approximately one foot into competent bedrock to allow installation of a bottom sump beneath the screened interval. The well will be constructed with a 5-foot-long stainless steel wire-wrapped screen with a slot size of 0.010-inch. The riser will be constructed with a 20-foot-long section of stainless steel riser between 7-27 feet bgs with the remaining riser 0-7 feet bgs completed as Schedule 40 PVC riser. One foot of 6-inch-diameter stainless steel blank casing will be installed below the wire-wrapped screen as a sump. The annulus around the sump will be sealed with neat cement, and a 6-inch-diameter, stainless steel, threaded cap will be used to seal the bottom of the sump.

A sand filter pack (US Silica FilPro® #00N or equivalent) will be installed within the annulus around each stainless steel wire-wrapped screen. The sand will be installed to two feet above the top of well screen in each case. A weighted measuring tape will be used to periodically tamp down the sand as the sand pack is installed. Following installation of the sand pack, each well will be gently developed to allow the sand to settle. Sand will be added to bring the top of the sand pack back up to two feet above the top of the well screen if settling occurs. Each extraction well will be sealed using a minimum 2-foot-thick layer of hydrated bentonite above the sand filter pack and the remainder of the annulus will be sealed with a cement-bentonite grout to 5 feet bgs. Each extraction well will be completed as flushmount with an 18-inch diameter steel protective casing secured with a 12-inch wide by 12-inch-deep concrete apron, as shown on **Drawing G-1 in Appendix A**.

3.2 Monitoring Wells

The three new monitoring wells will be used to collect field data during the pre-IRM hydraulic testing. One of the proposed monitoring wells (MW-22S) will be installed to replace the presumed destroyed monitoring well BH5/MW2 (which could not be located during the Remedial Investigation) and located approximately 5 feet from EW-1S. The other two proposed monitoring wells will be a shallow well screened in overburden deposits (MW-21S) and a deep well screened in weathered bedrock (MW-21D), located approximately 10 feet from EW-1S and EW-1D, respectively.

The three new monitoring wells (MW-21S, MW-21D, and MW-22S) will be completed as 2-inch diameter wells and constructed of 2-inch diameter Schedule 40 PVC screen and risers. The screened interval of MW-21S and MW-22S will target the overburden above the weathered shale and be set at an approximate depth of 12-22 feet bgs. Each well will be constructed with a 10-foot-long machine-slotted Schedule 40 PVC screen with a screen slot size of 0.010-inch and a Schedule 40 PVC bottom cap beneath the screened interval. The screened interval of MW-21D will target the weathered shale and be set at an approximate depth of 27-32 feet bgs. The well will be constructed with a 5-foot-long machine-slotted Schedule 40 PVC screen with a screen slot size of 0.010-inch and a Schedule 40 PVC bottom cap beneath the screened interval.

A sand filter pack (US Silica FilPro® #00N or equivalent) will be installed within the annulus around each well screen. Each monitoring well will be sealed using a minimum 2-foot-thick layer of hydrated bentonite above the sand filter pack and the remainder of the annulus will be sealed with a cement-bentonite grout to 2 feet bgs. Each new monitoring well will be completed as flushmount with an 8-inch diameter steel protective casing secured with a 6-inch-thick concrete pad. Monitoring well construction diagrams are included on **Figures 6A and 6B**.

3.3 Well Development

No sooner than two days following installation, the newly installed wells will be developed by surging and pumping the water column until the purge water becomes relatively clear and the turbidity is low or relatively stable based on well recharge. A surge block will be moved up and down across the screened intervals to remove fine-grained sediment from the formation near the well and boring wall, and from the filter material. After surging, a submersible pump will be used to remove water containing suspended sediments from each well.

The wells will be pumped at a steady flow rate while monitoring groundwater field quality parameters. A sufficient number of casing volumes (minimum of 10) will be removed from each well during the development process to achieve stabilization of the indicator parameters quantified by a turbidity measurement of less than 50 nephelometric turbidity units. Well development logs including the observed achievable pumping rates and the presence/absence of DNAPL will be created for each well documenting the development observations.

Well development activities related to extraction wells EW-1S and EW-1D will provide preliminary information regarding sustainable groundwater extraction rates from the overburden deposits and weathered shale, respectively, for use in the pre-IRM step and steady-state pumping tests described in Section 5.

3.4 Well Survey

The top of casing and ground surface elevations as well as the northing and easting for each new well location will be surveyed by a New York-licensed land surveyor. The ground surface elevation and top of casing for the newly installed wells will be measured relative to the North American Vertical Datum of 1988. Latitude and longitude of the new location will be measured at each newly installed well relative to the North American Datum of 1983.

3.5 Monitoring Well Decommissioning

Before initiating the pre-IRM hydraulic pilot testing, existing site monitoring wells HRP-MW-4, and HRP-MW-5 will be decommissioned. Decommissioning will be performed in general accordance with *NYSDEC Commissioner Policy 43: Groundwater Monitoring Well Decommissioning Policy* (CP-43). Both HRP-MW-4 and HRP-MW-5 were constructed in 2011. Monitoring well HRP-MW-5 was constructed with a 20-foot-long well screen that extends from the saturated overburden deposits through the till unit and into the weathered shale beneath the till. This long well screen provides a potential pathway between these two water-bearing zones that could interfere with implementation of the planned IRM. Monitoring well HRP-MW-4 was drilled through the site sewer line and should be decommissioned to eliminate the potential for the site sewer line to be further compromised during IRM installation and operation. Consistent with NYSDEC CP-43, each well will be decommissioned by tremie-grouting from total depth to 5 feet bgs. The well casing will then be cut at 5 feet bgs and removed along with the curb box and well riser.

Following decommissioning of HRP-MW-4, the section of damaged sewer pipe will be excavated and replaced in-kind. The new section of sewer pipe will be protected with suitable bedding material (e.g., sand), the remainder of the excavation will be backfilled with a crusher run gravel, and the surface will be restored to match the surrounding area (i.e., cement or asphalt).

4 Baseline Sampling and Geochemical Characterization

The baseline groundwater sampling and geochemical characterization event will include existing and newly installed site wells to (1) document conditions in advance of pre-IRM pilot testing; and (2) provide current water quality data to aid in the overall assessment of the implemented IRM. Sampling of the newly installed wells (EW-1S, EW-1D, MW-21S, MW-21D, and MW-22S) will be performed one month or more after their development to allow for equilibration of conditions in their vicinity. In addition to the five new monitoring wells, baseline groundwater sampling will be performed at seven existing monitoring wells: three wells located on site (MW-5D, MW-6S, and MW-6D) and eight wells located on the 8 Adler property to the east of the site (MW-7S, MW-7D, MW-8S, MW-8D, MW-9S, MW-9D, MW-12S, and MW-13S). The locations of these wells are shown on **Figure 5**.

Groundwater sampling will be performed in accordance with USEPA low flow groundwater sampling procedures (USEPA 1998). Groundwater samples will be analyzed for the following analytes: TCL VOCs using USEPA Method 8260B; 1,4-dioxane using USEPA Method 8270D SIM; chromium, arsenic, iron, and manganese using USEPA Method 6020B; and a suite of geochemical parameters using their specific analytical methods (dissolved oxygen, sulfate, nitrate, alkalinity, pH, sulfide, and total organic carbon).

5 Pre-IRM Pilot Testing

As described previously, the pre-IRM pilot testing has two main objectives:

- Confirm that the groundwater extraction rate necessary for an effective and efficient GWET remedy are achievable in the source area; and
- Determine key design parameters, including sustainable pumping rates, ROI, influent concentrations, and potential mass recovery rates, for implementation of the IRM.

If mobile, recoverable DNAPL is observed to be present during these activities, the IRM may be expanded to an MPE system that can remove both highly impacted groundwater and separate phase liquid.

5.1 Pilot Testing Equipment Setup

A temporary extraction and treatment setup will be mobilized to the site for the pilot testing. The system will be located on site within the pilot testing staging area as shown on **Figure 4**. Temporary construction fencing will be located around the treatment system to prevent unauthorized access. A process and flow diagram of the system is shown on **Drawings M-1 and M-2 in Appendix B**.

Extraction System Components

Groundwater, and DNAPL if present, will be recovered using extraction wells EW-1S and EW-1D, both of which will be equipped with pneumatic pumps. Extracted liquids will be conveyed via aboveground piping to an on-site temporary treatment system, described later in this subsection.

Anticipated liquid extraction system components are:

- Two (2) pneumatic pumps (QED AP4+ Short Bottom Loading or similar pumps capable of pumping 5 gallons per minute [gpm] at 40 feet total dynamic head) equipped with air cycle counters;
- Three hundred (300) feet of 1-inch diameter reinforced rubber hose with cam-lock fittings;
- Three hundred (300) feet of 1/2-inch diameter pressure rated pneumatic hose with pneumatic quick disconnect fittings;
- One (1) air compressor with a minimum rating of 15 standard cubic feet per minute (scfm) at 125 pounds per square inch gauge (psig);
- One (1) compressed air manifold (minimum two-legs) with ½-inch galvanized steel piping, ball valve, check valve, and a pressure filter regulator; and
- One (1) influent manifold (minimum two-legs) with a flow meter, ball valve, check valve, sampling port, and pressure gauge.

Treatment System Components

Extracted groundwater, and DNAPL if present, will first enter an oil/water separator (OWS) for removal of any non-emulsified DNAPL that may be present. Liquid that has passed through the OWS will be either transferred by gravity to an equalization tank or transferred directly, via batch discharge using a transfer pump, to a low-profile air stripper for removal of dissolved phase VOCs. Batch discharge would provide consistent air stripper performance and greater energy efficiency than continuously operated units because mixing in the storage tanks eliminates inconsistencies in feed water composition. Following the air stripper, groundwater will be pumped through two bag filters arranged in series for removal of suspended solids. Following the bag filters, the pre-treated groundwater will be processed through a liquid-phase granular activated carbon (GAC) filter vessel to remove residual VOCs and any emulsified DNAPL that may be present. Treated groundwater will temporarily be stored in frac tanks prior to being discharged to the local POTW sanitary sewer system or transported to an off-site disposal facility.

Anticipated liquid treatment system components are:

- One (1) 200-gallon OWS (for DNAPL separation and collection) equipped with low, high, and high-high liquid level switches and transfer pump;
- One (1) 500-gallon equalization tank equipped with low, high, and high-high liquid level switches and transfer pump (optional);
- Two (2) bag filter housings each equipped with 10- and 5-micron filters for solids removal prior to air stripper and GAC treatment;
- One (1) air stripper unit (QED EZR Tray 8.6 HF or equivalent) rated for 50 gpm flow rate and equipped with a transfer pump, pressure gauge/switch, air flow sensor, sump sight gauge, high-liquid level switch, and a 15-foot high 6-inch diameter exhaust;
- Two (2) 500-pound liquid-phase GAC vessels installed in series for polishing post-air stripper;
- A power source (e.g., diesel operated generator) sufficient to operate the treatment system uninterrupted for a minimum of 24 hours;
- Two (2) 21,000-gallon frac tanks to containerize the pre-treated extracted groundwater for characterization and disposal (optional);
- One (1) treatment system effluent line equipped with a flow meter and sample port and connected to the frac tanks(s); and
- Three hundred (300) feet of 2-inch diameter reinforced discharge rubber hose equipped with lockable cam-lock fittings and a 4-inch perforated downcomer pipe for temporary discharge into the local POTW manhole.

The rental system trailer(s) and frac tank(s) will have primary and secondary liquid level, pressure, and/or flow alarm switches and/or sensors interlocked with a programmable logic controller (PLC) that will automatically shut-down the system upon an alarm condition. The PLC will be connected to a cellular modem autodialer and programmed to contact the system operator in the event of an alarm condition.

Air stripper off-gas will be discharged to the atmosphere via a 6-inch diameter Schedule 40 PVC exhaust pipe that will extend above the on-site building roofline to a minimum height to achieve sufficient gas dispersion so that emissions remain below allowable emission limits provide in 6 NYCRR Part 212-2.2, Table 2 – high toxicity air contaminant list.

5.2 Pilot Testing Methodology

The pre-IRM pilot testing will consist of up to four components. The first testing component will be short-term falling head tests on select wells for approximately one field day total to assess hydraulic properties of the source area subsurface. The second testing component will consist of step groundwater pumping tests for approximately two field days total on EW-1S and EW-1D to assess sustainable groundwater extraction rates and operational parameters for a subsequent steady-rate pumping test. If the sustainable groundwater pumping flow rate from either extraction well is less than 1 gpm, the third testing component will be vacuum enhanced recovery (VER) testing, where a vacuum is applied to the extraction well to potentially increase yield.

The final testing component will be steady-state pumping tests during which sustainable extraction rates and optimal operating conditions determined by the preceding step tests will be applied and monitored over a period of days. Steady-rate testing will be conducted with the following configurations:

- only extraction well EW-1S operating;
- only extraction well EW-1D operating; and
- both EW-1S and EW-1D operating simultaneously.

Additional details for each testing component are provided in the following subsections.

5.2.1 Falling Head Testing

The objective of the short-term falling head testing is to evaluate the hydraulic properties of the overburden and weathered shale in the source area using existing well MW-5D and the newly installed extraction and monitoring wells. The falling head test data will also inform the ability to inject into the source area and assist in the feasibility evaluation of a potential injection-based remedy that may be considered post IRM.

Short-term falling head tests will be conducted at wells MW-5D, MW-21S, MW-21D, MW-22S, EW-1S, and EW-1D. Each falling head test will be conducted by first measuring and recording the static depth to water. Potable water, sourced either from a tested water supply or after treatment with GAC, will then be added rapidly to the well (by pouring from a bucket) until the water level in the well reaches the top of casing. Manual depth to water measurements will be recorded at the following approximate frequency as the added water leaves the well, anticipated to be:

a. every 15 seconds for the first minute;

b. every 30 seconds for the next 4 minutes;

c. every minute for the next 15 minutes; and

d. every 5 minutes as water levels continue to decrease or an hour has passed since initiating the test.

5.2.2 Step Pumping Testing

The objective of step pumping testing is to assess sustainable groundwater extraction rates from EW-1S and EW-1D. A step test evaluates pumping at increasing rates until a maximum sustainable pumping rate is reached. The testing results will be used to determine the pumping rates for the steady state testing described in Section 5.2.4.

5.2.2.1 Monitoring Setup

Transducer data loggers will be used for real-time collection of hydraulic head data during the step pumping tests. Data loggers will be deployed in the extraction wells (EW-1S and EW-1D) and in monitoring wells MW-21S, MW-21D, MW-22S, MW-5D, MW-6S, MW-6D, MW-7S, MW-7D, MW-8S, and MW-8D. Well locations are shown on **Figure 7**.

The transducers will be programmed to record at the fastest interval possible (once every second or faster) while not exceeding the data logger memory before the end of the test. A linear logging rate of every second for the test wells (EW-1S and EW-1D) and the monitoring wells is anticipated. Transducers will be positioned at approximately 1 foot from the bottom of the well and secured so they do not drop or change elevation over the course of the testing. The transducers in extraction wells EW-1S and EW-1D will be set approximately 1 foot above the pump intake and attached with a direct read cable for real-time monitoring via laptop or mobile device.

5.2.2.2 Step Testing Procedure

Three step tests each at three different pumping rates will be conducted at each of extraction wells EW-1S and EW-1D. Depth to water measurements will be measured by hand using a water level meter at each extraction and monitoring well prior to deploying transducers and prior to pump installation. Water levels and time of measurement will be recorded on a field form and be used to verify the water levels recorded by the transducer dataloggers.

Step testing will first be performed at EW-1S, with the submersible pump inlet set at one to two feet above the well completion depth. The first step test will use a flow rate of 0.5 gpm for 15 minutes. If minimal drawdown (i.e., less than 2 feet difference from the initial depth to water after 15 minutes) is observed, the flow rate will be increased in 0.5 gpm intervals until a steady 5-foot drawdown is achieved. At this point, pumping will be stopped and water level recovery in the extraction well will be monitored.

Manual depth to water measurements will be recorded at the extraction well over the course of the step tests at the following approximate frequency:

a. every 15 seconds for the first minute;

b. every 30 seconds for the next 3 minutes;

c. every minute for the next 15 minutes, or as long as water levels continue to change over time; and

d. every 15 minutes for the remainder of the step test if the water levels are remaining stable.

Hand water level measurements will also be recorded at a frequency of at least one reading every 30 minutes at each monitoring well over the course of the step testing.

If a step flow rate change causes the water level to drop below the pump intake depth, the flow rate will be stepped back incrementally until a flow rate is attained that does not cause drawdown; this flow rate will be noted as the maximum sustainable flow rate for the well. This maximum flow rate will be maintained for approximately one hour or until a stable water level is observed before turning off the pump, logging the time and water level, and commencing recovery monitoring.

After turning off the pump, water level recovery in the extraction well will be monitored to at least 95% of the pre-test water level. Manual depth to water measurements will be recorded as the water level rises using the same approximate frequency as described above for the extraction phase of the test. A final manual depth to water measurement will also be recorded at each observation monitoring well prior to removal of the transducer for data downloading.

Following completion of testing at EW-1S, the same step testing procedure will be implemented at EW-1D. Step testing at EW-1D will not be initiated until after static water levels have returned to pre-test levels following EW-1S testing, as documented prior to the initial step test, or on the day following completion of EW-1S testing.

5.2.3 VER Step Testing

VER step testing will only be performed if the sustainable flow rate during step testing of either EW-1S or EW-1D is at or below 1 gpm and hydraulic drawdown is measured in one or more of the adjacent monitoring wells. The objective of VER step testing would be to assess whether groundwater yield from the extraction wells can be increased through the application of a vacuum. The equipment, monitoring, and procedure for VER testing are described below.

5.2.3.1 Equipment and Monitoring Setup

To implement VER step testing, the extraction well will be equipped with a vacuum seal cap as detailed in **Figure G-1** in **Appendix A**. This cap will allow for the application of a vacuum to the well and simultaneous groundwater extraction via the pneumatic pump. Data loggers set up in the step pumping tests detailed in Section 5.2.2 will remain deployed in the same wells (EW-1S, EW-1D, MW-21S, MW-21D, MW-22S, MW-5D, MW-6S, MW-6D, MW-7S, MW-7D, MW-8S, and MW-8D) and set to record at the same intervals during the VER step testing. The closest monitoring wells to EW-1S and EW-1D (MW-21S, MW-21D, MW-22S, MW-5D) will also each be capped and outfitted with a ¼-inch ball valve, hose barb, and flexible hosing to allow for the measurement of induced vacuum and VOC concentration (using a photoionization detector [PID]) and to prevent short-circuiting of air flow from the surface.

Anticipated VER components are:

- One (1) vacuum pump rated for a minimum flow of 50 scfm at a pressure rating of -15 inches of mercury (in.Hg);
- One (1) influent manifold (minimum two-legs) with a y-strainer, flow meter, gate valve, sampling port, and pressure gauge;
- One (1) air/water knockout tank (KOT) rated for 50 scfm equipped with an inline air filter;
- One (1) effluent pipe equipped with a flow meter and pressure gauge; and
- One (1) transfer pump rated for 5 gpm at a pressure of -15 in.Hg.

A high vacuum blower will be used to apply vacuum to the test well (**Figure M-2** in **Appendix B**). A sampling port located on the vacuum side of the blower installed within an extraction hose or on vacuum blower influent piping will be used to monitor vapor concentrations, temperature, and air flow. A vacuum pump or similar will be used to collect vapor samples in 1-liter Tedlar® bags. A four-gas multimeter will be used to monitor lower explosive limit (LEL) and oxygen concentrations in the vapor recovery stream. A PID with a dehumidifier tip, calibrated to an isobutylene standard, will be used to measure ambient and system VOC vapor concentrations. Digital manometers will be used to measure the vacuum applied at the extraction wellhead and the induced vacuum in surrounding observation wells. A thermal anemometer will be used to measure vapor flow rates and temperature. Vapor flow rates will be confirmed by collecting secondary flow data from the system pitot tube, venturi meter, or orifice plate.

Extracted vapor will be directed through an air/water KOT to remove moisture from the process stream prior to running through the blower housing. Once through the blower housing, the vapor will be discharged to the atmosphere via a 4-inch Schedule 40 PVC exhaust pipe which extends above the on-site building roofline. The vacuum blower exhaust height will be determined following the same guidelines as the air stripper exhaust (see Section 5.1).

5.2.3.2 VER Step Testing Procedure

The pneumatic pump will be set to the maximum sustainable flow rate as determined in the step pumping test and allowed to run until groundwater levels are sustained at or just above the pump inlet. Vacuum will be applied to the extraction well in a series of three increasing steps. The actual applied vacuum set point used for each step will be established at the time of the test based on formation response. The optimal vacuum setting will not create water table upwelling in the formation. At each step, the following measurements will be made and recorded on field logs every 15 minutes or as frequently as possible, with a minimum of three sets of readings collected during each vacuum step (using the instrument noted in parenthesis):

- At the extraction test well
  - Applied vacuum (digital manometer and/or vacuum gage)
  - Soil vapor concentration (PID)
  - Soil air flow rate (thermal anemometer)
  - Air flow temperature (thermal anemometer)
  - LEL and oxygen (4-gas meter)
- At the extraction and treatment system
  - Groundwater flow rate and total volume recovered (system flow meter)
  - Blower vacuum and influent airflow rate pre- and post-dilution air (system meters, if used)
  - VOC, LEL, and oxygen concentration in vapor recovery stream (PID and 4-gas meter)
  - DNAPL recovery volume (if present in sufficient quantity to measure).
- At nearby observation wells (MW-21S, MW-21D, MW-22S, MW-5D)
  - Induced vacuum (digital manometer)
  - VOC concentration (PID)

During each step, the pneumatic pump rate will be incrementally adjusted to attempt to increase groundwater recovery rates through increasing the operating pneumatic air pressure. The system will be operated at each step until applied vacuum, extraction airflow rate, induced vacuum at the observation wells (MW-21S, MW-21D, MW-22S, MW-5D), and groundwater pumping rate stabilize or increases in groundwater extraction flow rate and change in VOC concentrations in the vapor influent stream can be estimated or for a maximum of 60 minutes.

At the completion of VER step testing, one sample of the untreated influent vapor recovery stream will be collected for laboratory analysis to compare with field-measured concentrations and estimate vapor-phase mass recovery. The samples will be collected in a 1-liter Tedlar® bags, sealed, labeled, transported under chain-of-custody to a state-certified laboratory, and analyzed for VOCs using USEPA Method TO-15.

If the addition of VER results in an increase in groundwater recovery rates during step testing, the steady-state testing described in Section 5.2.4 will be operated with vacuum applied to the well(s) where it is beneficial.

5.2.4 Steady State Testing

The objective of steady state testing is to assess the hydraulic response to sustained groundwater extraction, ROI, mass recovery rate, and other operating parameters attainable by operating extraction wells EW-1S and

EW-1D under pseudo-steady-state conditions. It is anticipated that three steady-rate pumping tests will be conducted for approximately three days each (including overnight) with the following configurations:

- only extraction well EW-1S operating;
- only extraction well EW-1D operating; and
- both EW-1S and EW-1D operating simultaneously.

Test conditions will be finalized based on the results of the step pumping and VER testing.

5.2.4.1 Monitoring Setup

All the transducer data loggers used in the step pumping testing will be left in place and set to record every second during the first two hours and every 30 seconds for the remainder of the test during the steady state testing.

5.2.4.2 Steady State Testing Procedure

Steady state testing will first be performed at EW-1S, with the submersible pump inlet set at 1 to 2 feet above the well completion depth. The first steady state test will use the sustainable maximum flow rate as determined by the step pumping testing. If VER was successfully used to increase groundwater recovery rates during the step pumping testing, the steady state testing will be performed with vacuum applied to the well. The extraction rate will be maintained for 72 hours.

System measurements will include:

- System pressure readings;
- Influent and effluent pH;
- DNAPL volume recovered daily, if any;
- Instantaneous and cumulative extraction rates (groundwater and soil vapor [if applicable]),
- Applied vacuum (if applicable); and
- Air stripper and VER (if applicable) off-gas concentrations (measured using a PID equipped with a dehumidifier tip).

Field measurements will include:

- Depth to groundwater;
- DNAPL thickness, if present;
- Applied vacuum at the extraction wellhead (if applicable);
- PID wellhead readings; and
- Induced vacuum at select monitoring wells (if applicable).

System maintenance conducted during testing will include periodic change out of bag filters as required based upon pressure differential readings across the bag filter housing units. After 72 hours, pumping will be stopped and water level recovery in the test extraction well will be monitored. Following the third planned day of operation of each test, the collected data will be analyzed to assess if the test objectives have been met. If not, the system may be operated for a longer period.

After steady state testing and recovery of EW-1S, the same procedures will be used for steady-state testing of EW-1D. Pumping will be performed at EW-1D for a period of three days at the sustainable rate and operating conditions identified in step pumping (with VER if applicable). After steady state testing and recovery of EW-1D, the same procedures will be used for testing both EW-1S and EW-1D simultaneously for a period of three days. At the conclusion of all steady state testing, dataloggers will be retrieved from the observation wells and the data will be downloaded.

The following sampling will be performed during each steady state test:

- System influent and effluent groundwater samples will be collected on the first day and the third day (or final day) of each test for analysis of TCL VOCs using USEPA Method 8260B and 1,4-dioxane using USEPA Method 8270D SIM .
- A post air stripper sample will be collected on the third day (or final day) of each test for analysis of TCL VOCs using USEPA Method 8260B on the third day (or final day) of testing.
- Influent, post air stripper, and post-GAC/effluent groundwater samples will be collected on the third day (or final day) of each test for analysis of field parameters (dissolved oxygen, pH, ORP, conductivity) using a YSI and for laboratory analysis of manganese, iron, total organic carbon, total dissolved solids, and total suspended solids.

Additionally, on the first day of operation and the final day of testing, the air stripper and VER (if applicable) effluent off-gas will be sampled for analysis of VOCs using USEPA Method TO-15.

6 Interim Remedial Measure – Basis of Design

This section describes the basis of design and presents a conceptual design for a GWET IRM for the site. The key parameters for basis of design are:

- A combined extraction rate of 5 gpm or more from an extraction well network operating in the source area (with possible inclusion of VER to create a pressure gradient toward the extraction wells that provides increased hydraulic capture); and
- A treatment system capable of treating influent flows as established by the pilot testing to meet POTW discharge permit requirements and other permitting requirements for all applicable COCs in both liquid and vapor streams.

The results of the pilot testing results will be used to finalize the IRM design. Section 6.1 describes the initial assessment of pilot testing data that will be performed, and Section 6.2 provides details of the conceptual IRM design.

6.1 Preliminary Pilot Testing Data Assessment

The following pilot testing activities will provide the data for preliminary assessment:

- Step pumping testing will establish sustainable groundwater extraction rates within the overburden deposits and weathered shale in the source area.
- VER step testing will provide information regarding whether applied vacuum can increase groundwater extraction rates.
- Steady state testing will further inform the hydraulic response to sustained groundwater extraction and the potential ROI and mass recovery rate of a system.

If these pilot testing activities indicate that a combined extraction rate of 5 gpm will not be feasible from a well network (with optional VER) installed in the source area, Arcadis will consult with NYSDEC regarding path forward for an IRM design.

6.2 Conceptual IRM System Design

The components of the conceptual IRM system design presented herein may be modified or changed based on the pilot testing results. Major design parameters and the pilot test data that will be used to finalize the design parameters are:

- Targeted source area extent
  - Iso-contour figures of COCs developed using baseline groundwater sampling results
  - DNAPL observations during pilot testing
- Sustainable extraction rate from wells screened in the source area weathered bedrock
  - EW-1D steady state testing sustainable pumping rate
- Sustainable extraction rate from wells screened in the source area overburden
  - EW-1S steady state testing sustainable pumping rate

- Applied vacuum and flowrate for VER (if applicable)
  - EW-1S steady state testing VER monitoring results
  - EW-1D steady state testing VER monitoring results
- ROI for the shallow extraction well network
  - Analysis of drawdown data collected in the shallow well network during steady state testing
- ROI for the deep extraction well network
  - Analysis of drawdown data collected in the deep well network during steady state testing
- Number and location of shallow and deep extraction wells
  - ROI
  - Targeted source area extent
- System design pumping rate
  - Sustainable pumping rates in overburden and weathered shale
  - Number of shallow and deep extraction wells
- System influent startup concentrations
  - Steady rate testing analytical data

6.2.1 Mechanical

Mechanical equipment that will be included in the IRM system are summarized below. The process equipment will be constructed off site and housed in a treatment system enclosure (Conex Box or a similar transportable and lockable structure). The enclosure will be positioned on site in an area that does not interfere with normal business operations. Ventilation and heating will be included in the structure to allow for safe and continuous operation throughout anticipated weather conditions.

6.2.1.1 Extraction Wells with Pneumatic Pumps

The system will consist of extraction wells screened in both the overburden and weathered bedrock to target source area impacts. The number and spacing of the extraction wells will be determined based upon pilot testing results. Pneumatic pumps set within the extraction wells will be used to transfer groundwater and DNAPL (if present) from the formation to the treatment system. Additional extraction wellheads will also be finished as below grade vaults to allow for subsurface piping that provides compressed air for pump operation and extracted fluids (e.g., groundwater, DNAPL, and soil vapor) from the extraction wells back to the system enclosure for treatment and discharge.

6.2.1.2 Air Compressor

An air compressor will be included and housed within the treatment system enclosure. The air compressor will be sized to provide enough flow capacity of compressed air at the required operating pressure for the total air demand of the system, including additional capacity for potential future expansion, and other miscellaneous minor pneumatic air demands for system operation and maintenance.

6.2.1.3 Subgrade Piping

Piping will be installed in trenches at a minimum of 4 feet bgs (i.e., frost line) to connect the extraction wells to the treatment system. Piping to be trenched includes extracted vapor piping (if required), compressed air piping, and water conveyance piping, each sized for the anticipated flow rate and pressure. Calculations will be performed and evaluated to determine proper equipment (e.g., pump, tanks, pipes) sizing. All piping will be pressure tested prior to backfill to verify proper installation. The trenches will be backfilled and compacted to prevent excessive settling. The disturbed areas of the site will be restored to pre-construction conditions.

6.2.1.4 Oil Water Separator

An OWS will be included in the full-scale system (for DNAPL separation and collection) and housed within the treatment system enclosure. The OWS will be sized to accommodate the system design flow rate as determined by the pilot testing.

6.2.1.5 Equalization Tank and Transfer Pump

An equalization tank will be provided in the full-scale system enclosure to contain the separated groundwater from the OWS and allow for batch treatment. The tank will be sized based on the design flow rate determined by the pilot testing and equipped with low, high, and high-high liquid level switches and transfer pump that will operate in batch mode. The batch discharge will support consistent air stripper performance and greater energy efficiency than continuously operated units because mixing in the storage tanks eliminates inconsistencies in feed water composition.

6.2.1.6 Air Stripper and Blower

An air stripper unit will be provided in the system enclosure for removal of dissolved phase VOCs compounds from the extracted groundwater. The air stripper will be sized based upon the anticipated influent design flow rate and concentrations as determined by the pilot testing. The air stripper unit will be of a shallow tray construction and equipped with a transfer pump, pressure gauge/switch, air flow sensor, sump sight gauge, high-liquid level switch, and a blower sized to provide airflow required for proper treatment.

6.2.1.7 Solids Filtration

The water will be treated, pre-GAC, for solids removal via bag filters, cartridge filters, or other filtration required as determined by evaluation of data collected during pilot testing. Solids will be treated to a level required to meet discharge requirements, prevent clogging, and maximize the life-span of the GAC media.

6.2.1.8 GAC Filtration

The air stripper-treated water will be polished for remaining dissolved phase VOCs utilizing GAC, if required based upon pilot testing data evaluation in relation to discharge requirements and air stripping treatment performance. The sizing and specification of the GAC filtration units will be determined during final design of the system.

6.2.1.9 Vacuum Pump and Associated Components (if applicable)

If pilot testing determines the need for VER, a vacuum pump/blower and associated components will be provided within the treatment enclosure and sized based upon pilot testing results. Extracted soil vapor will be transferred through an air/water KOT to remove moisture from the process stream prior to running through the blower housing (and vapor phase GAC, if required).

6.2.1.10 Vapor Piping and Off-Gas Controls

The air stripper off-gas and VER off-gas (if applicable) will be discharged to atmosphere above the on-site building roofline to a minimum height to achieve sufficient gas-dispersion so that the emissions remain below allowable emission limits provide in 6 NYCRR Part 212-2.2, Table 2 – high toxicity air contaminant list. The need for off-gas controls will be determined based upon an evaluation of the pilot testing results.

6.2.1.11 Process Piping and Fittings

Process piping, fittings, and valves, as well as any interconnections to existing and new system components (e.g., catch tank, GAC vessels, filtration vessels, and pumps), will generally be constructed of Schedule 80 PVC materials. However, if DNAPL is present and can be extracted using the well network, all materials that come into contact with DNAPL will be evaluated for compatibility. Pneumatic air lines will be constructed with a combination of pneumatically rated galvanized pipe and rubber hose materials. Process piping and fittings will include ball valves, sampling ports, flow meters, pressure gages, vacuum gages, and other instrumentation required to fulfill the operation, maintenance, and performance monitoring/tracking of the remedial system.

6.2.1.12 Discharge Piping

Discharge piping from the system enclosure to the sewer connection will be installed in a trench at a minimum of 4 feet bgs. The pipe sewer tie-in will be completed in accordance with the requirements of the local POTW permit. Head loss calculations will be performed and evaluated to determine proper pipe sizing. All piping will be pressure tested prior to backfill to verify proper installation. The trench will be backfilled and compacted to prevent excessive settling. The disturbed areas of the site will be restored to pre-construction conditions.

6.2.2 Electrical

The electrical service demand will be determined based upon the components of the final IRM design. A separate power drop and meter to connect the system to the local available electrical provider at the site will be arranged. Process equipment including the transfer pump(s), air compressor, vacuum pump, and air-stripper blower will be powered by individual motor starters with local disconnects.

6.2.3 Programable Logic Controller and Instrumentation

The system will have primary and secondary liquid level, pressure, and/or flow alarm switches and/or sensors interlocked with a PLC that will automatically shut-down the system upon an any alarm condition. The PLC will be connected to a cellular modem to allow for remote monitoring and be programmed to contact the system operator in the event of an alarm condition.

7 Schedule

Table 1 below summarizes the expected task sequence and estimated timing for the pre-IRM pilot testing an IRM implementation work, assuming that NYSDEC approval for the work is received in October 2024.

Table 1. Estimated Schedule

Month	Description
September - October 2024	• *Pre-IRM Pilot Testing and IRM Work Plan* to NYSDEC • NYSDEC review and approval of *Pre-IRM Pilot Testing and IRM Work Plan* and *Call-Out Contractor Work Plan*
November 2024	• Call-out contractor work assignment issuance and subcontractor procurement • Pre-IRM pilot test planning and site activities
December 2024	• Installation of new extraction and monitoring wells • Decommissioning of two existing monitoring wells
January 2024 – February 2025	• Baseline groundwater sampling • Mobilize pre-IRM pilot testing components •
March – April 2025	• Falling head, step pumping, VER, and steady-state pumping tests • Data compilation and processing • Preliminary pilot testing data assessment • Finalize IRM system design
May - June 2025	• Obtain final permits • Mobilize IRM components • Shakedown testing
July 2025	• IRM startup
October 2025	• *IRM Construction Completion Report* to NYSDEC

Operation and performance monitoring data and results for the IRM will be presented and discussed in a subsequent *Feasibility Study Report* for the site.

8 References

Arcadis of New York, Inc. (Arcadis), 2021. *Remedial Investigation Report*. Former Northern Circuits Site, 6 Adler Drive, East Syracuse, New York. September 17.

Arcadis, 2024. *Supplemental Site Investigation Report*. Former Northern Circuits Site, 6 Adler Drive, East Syracuse, New York. June.

HRP Associates, Inc., 2012. *Site Characterization Report*. Northern Circuits, 6 Adler Drive, East Syracuse, New York.

LCS, Inc., 2009. *Site Assessment Report*. Northern Circuits, 6 Adler Drive, East Syracuse, New York.

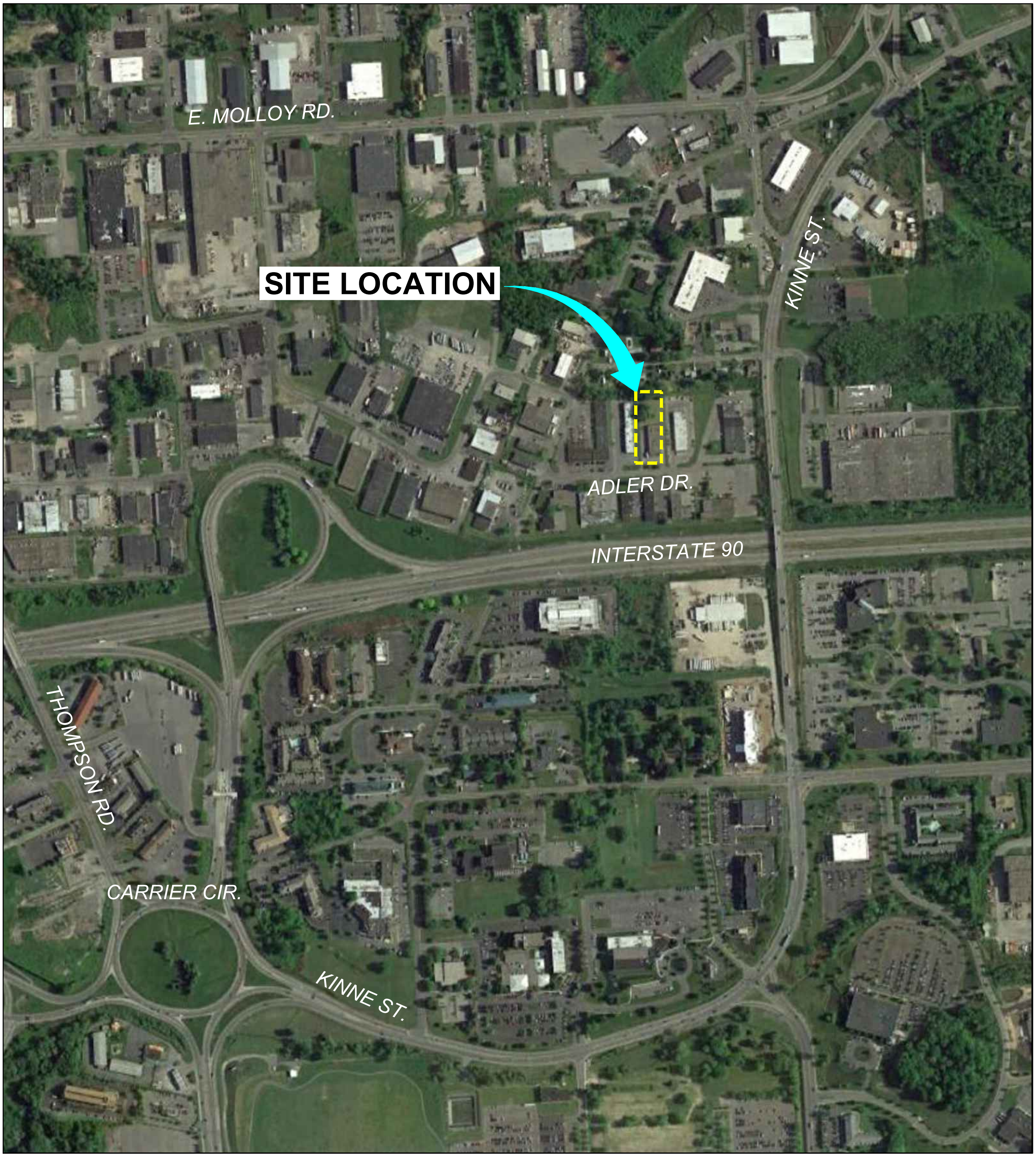
Muller, E.H. and D.H. Caldwell, 1986. *Surficial Geological Map of New York, Finger Lakes Sheet*. New York State Museum-Geological Survey, Map and Chart Series No. 40, Scale 1:250,000.

New York State Department of Environmental Conservation, 2010. *DER-10 Technical Guidance for Site Investigation and Remediation*.

Rickard, L.V. and D.W. Fisher, 1970. *Geologic Map of New York, Finger Lakes Sheet*. New York State Museum-Geological Survey, Map and Chart Series No. 15, Scale 1:250,000.

United States Environmental Protection Agency, Region II, 1998. *Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling Standard Operating Procedure*.

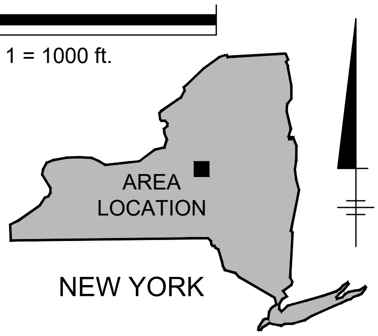
Figures



REFERENCE: BASE MAP GOOGLE EARTH IMAGERY 2016.

0 1000' 2000'

Approximate Scale: 1 = 1000 ft.



NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
NORTHERN CIRCUITS - SITE NO. 734124
6 ALDER DRIVE, EAST SYRACUSE, NEW YORK

SITE LOCATION MAP

ARCADIS

FIGURE
1

C:\Users\Ksartori\DC\ACCDocs\Arcadis ACC US\AUS-99999999-NYSDEC_734124_N CIRCUITS_E SYRACUSE_NY\Project Files\10_WIP\10T_ARC_ENV\2024\01-DWG\RIA-F01-SITE LOCATION MAP.dwg LAYOUT: 1 SAVED: 3/27/2024 7:32 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ----
PLOTSTYLETABLE: ---- PLOTTED: 3/27/2024 7:41 AM BY: SARTORI, KATHERINE

XREFS: X-RIA-FAP IMAGES: AERIAL PHOTO BASE.jpg

LEGEND:

- EXISTING MONITORING WELL
- MONITORING WELL (2022)
- SOIL BORING (2022)
- NEAR-SURFACE SOIL SAMPLE
- HISTORICAL SOIL SAMPLE
- SOIL VAPOR SAMPLE
- HISTORICAL BORING
- STALLED DIRECT PUSH BORING AND GRAB GROUNDWATER SAMPLE
- PAIRED SUB-SLAB VAPOR AND INDOOR AIR SAMPLE
- OUTDOOR AIR SAMPLE
- HISTORICAL SOIL VAPOR/SUB-SLAB VAPOR SAMPLE
- HISTORICAL INDOOR AIR SAMPLE
- EXISTING PROPERTY LINE
- EXISTING HYDRANT
- OH EXISTING OVERHEAD WIRE
- G EXISTING GAS
- E EXISTING ELECTRICAL
- W EXISTING WATER
- C EXISTING VERIZON CABLE
- T EXISTING TELEPHONE
- D EXISTING STORM DRAIN
- S EXISTING SANITARY SEWER
- ? EXISTING UNKNOWN UTILITY
- EXISTING UTILITY POLE
- EXISTING UTILITY POLE W/GUY WIRE
- EXISTING CATCH BASIN
- CO EXISTING CLEANOUT
- CONIFEROUS TREES
- DECIDUOUS TREES
- STORM INLET
- SSI INVESTIGATION AREA

NOTES:

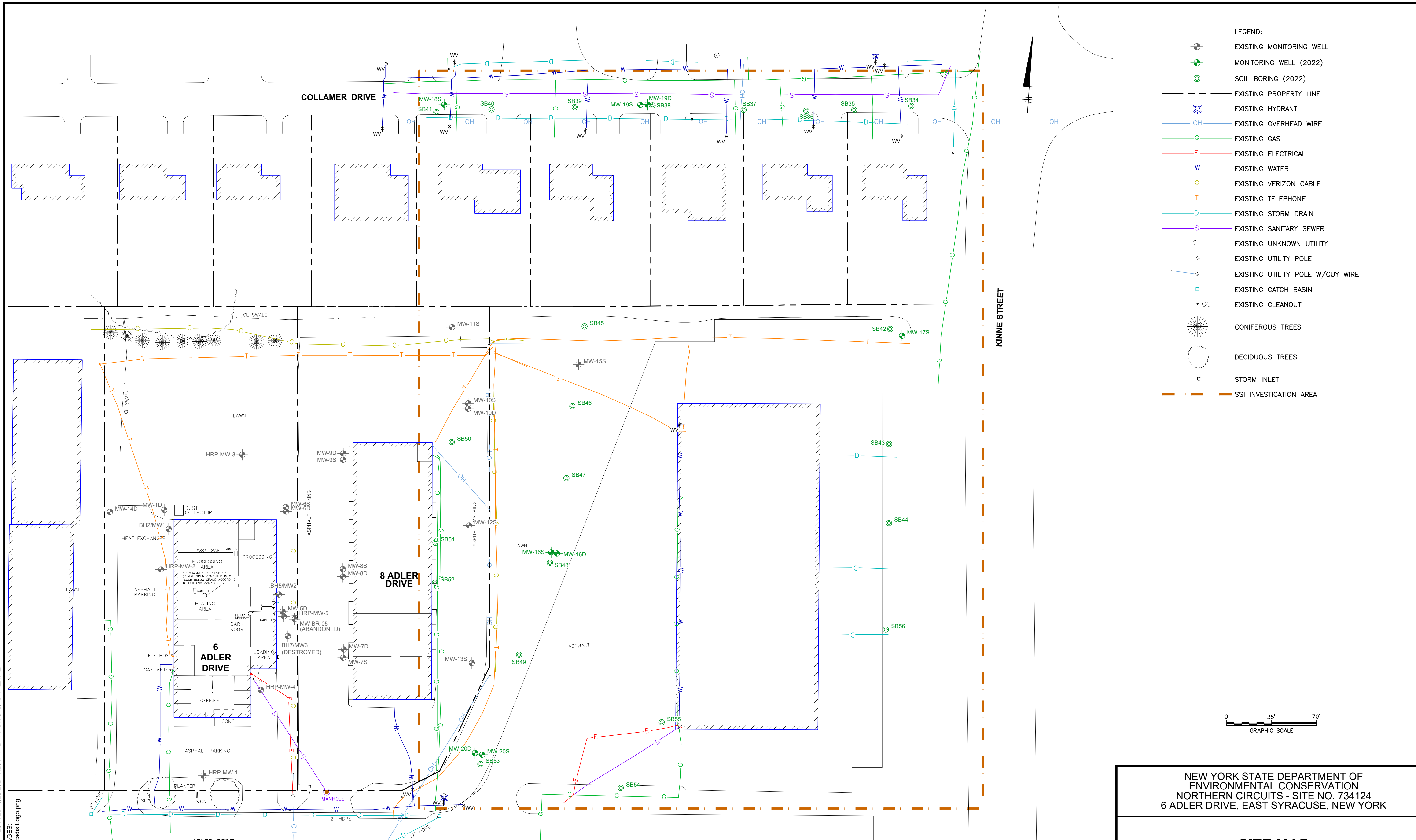
1. BASE MAP INFORMATION FROM A SURVEY BY YEC, INC. DATED AUGUST 2015 AT A SCALE OF 1" = 20'. ADDITIONAL BASEMAP DATA DIGITIZED FROM GOOGLE EARTH AERIAL PHOTO DATED 6/2/2011. UTILITY LOCATIONS ARE FROM FIELD MARKOUT ONLY AND ARE APPROXIMATE. PROPERTY LINES ARE APPROXIMATE ONLY FROM TAX MAPS. HISTORICAL BORING, LOCATIONS TAKEN FROM LENDER CONSULTING SERVICES, INC., 2009 AND HRP ASSOCIATES, IC., 2012. EXISTING SOIL BORING LOCATIONS AND MW-16S/D, MW-17S/D, MW-18S/D, MW-19S/D, MW-20S/D SURVEYED BY C.T. MALE ASSOCIATES JULY 27, 2022.
2. APPARENT HORIZONTAL COORDINATE SYSTEM IS NAD83. APPARENT VERTICAL COORDINATE SYSTEM IS NAVD 88. COORDINATE SYSTEMS ARE FROM GPS OBSERVATIONS ONLY.
3. INTERIOR FLOOR PLAN ADAPTED FROM HISTORICAL DRAWINGS FOR 6 ADLER DRIVE. WALLS WITHIN INDIVIDUAL UNITS AT 8 ADLER DR. ARE NOT SHOWN.
4. NOT ALL FEATURES ARE SHOWN ON THIS MAP.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN CIRCUITS - SITE NO. 734124
6 ADLER DRIVE, EAST SYRACUSE, NEW YORK

SITE MAP WITH HISTORICAL LOCATIONS AND AERIAL

ARCADIS

FIGURE 2A



NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY YEC, INC. DATED AUGUST 2015 AT A SCALE OF 1" = 20'. ADDITIONAL BASEMAP DATA DIGITIZED FROM GOOGLE EARTH AERIAL PHOTO DATED 6/2/2011. UTILITY LOCATIONS ARE FROM FIELD MARKOUT ONLY AND ARE APPROXIMATE. PROPERTY LINES ARE APPROXIMATE ONLY FROM TAX MAPS. HISTORICAL BORING, LOCATIONS TAKEN FROM LENDER CONSULTING SERVICES, INC., 2009 AND HRP ASSOCIATES, IC., 2012. EXISTING SOIL BORING LOCATIONS AND MW-16S/D, MW-17S/D, MW-18S/D, MW-19S/D, MW-20S/D SURVEYED BY C.T. MALE ASSOCIATES JULY 27, 2022.

2. APPARENT HORIZONTAL COORDINATE SYSTEM IS NAD83. APPARENT VERTICAL COORDINATE SYSTEM IS NAVD 88. COORDINATE SYSTEMS ARE FROM GPS OBSERVATIONS ONLY.

3. INTERIOR FLOOR PLAN ADAPTED FROM HISTORICAL DRAWINGS FOR 6 ADLER DRIVE. WALLS WITHIN INDIVIDUAL UNITS AT 8 ADLER DR. ARE NOT SHOWN.

4. NOT ALL FEATURES ARE SHOWN ON THIS MAP.

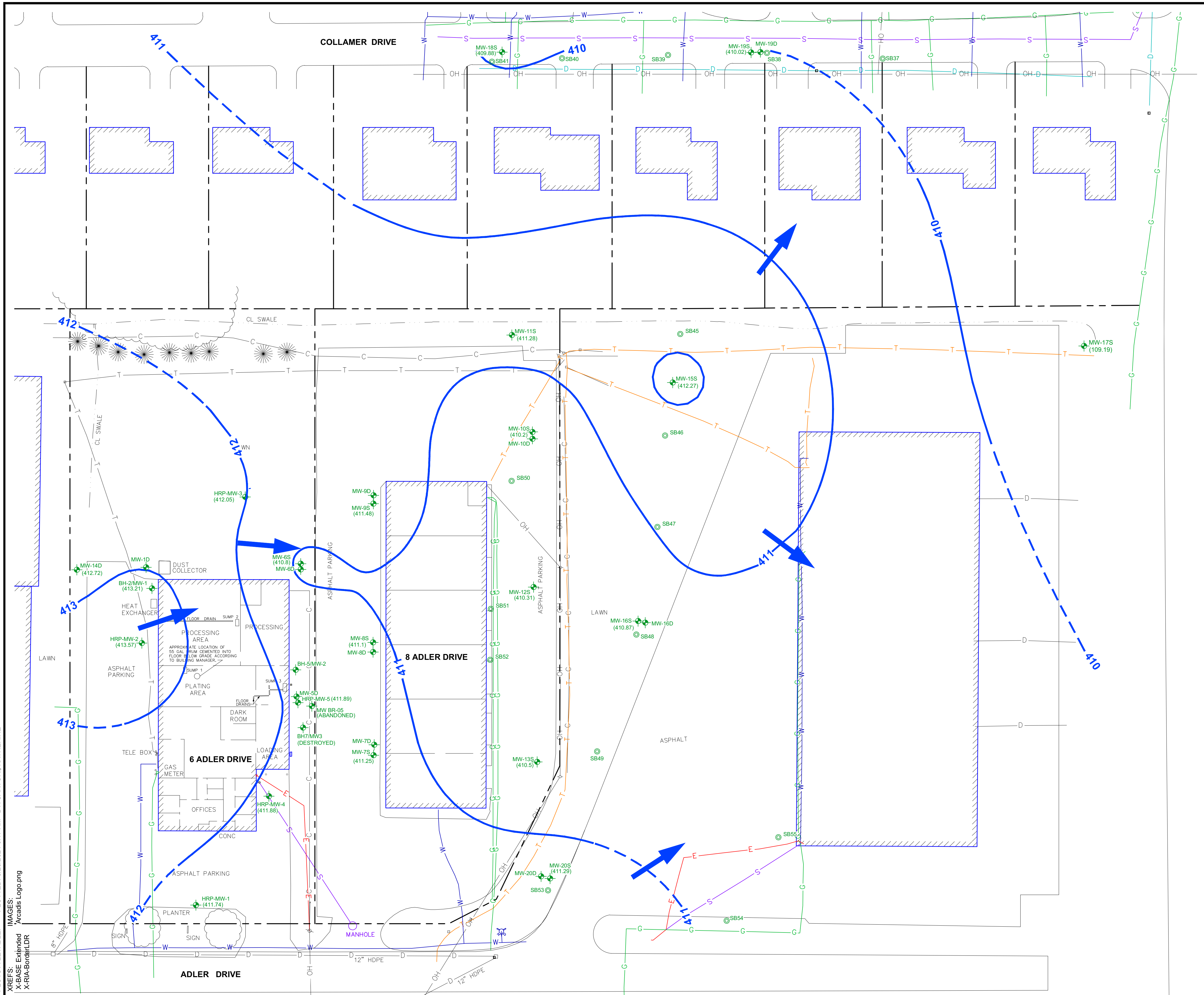
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN CIRCUITS - SITE NO. 734124
6 ADLER DRIVE, EAST SYRACUSE, NEW YORK

SITE MAP

ARCADIS

FIGURE **2B**

C:\Users\Ksartori\DC\ACCDocs\Arcadis ACC US\AUS-99999999-NYSDEC_734124_N CIRCUITS_E SYRACUSE_NY\Project Files\10_WIP\10T_ARC_ENV\2024\01-DWG\RIA-F02B-SITE PLAN SAMPLE LOCATIONS.dwg LAYOUT: 2B SAVED: 3/27/2024 3:52 PM ACADVER: 24.2S (LMS TECH) PAGESETUP: ----
PLOTSTYLETABLE: ---- PLOTTED: 3/28/2024 7:25 AM BY: SARTORI, KATHERINE
XREFS: X-RIA-BorderLDR X-Base
IMAGES: Arcadis Logo.png



LEGEND:

- MONITORING WELL
- SOIL BORING (2022)
- EXISTING PROPERTY LINE
- EXISTING HYDRANT
- OH — EXISTING OVERHEAD WIRE
- G — EXISTING GAS
- E — EXISTING ELECTRICAL
- W — EXISTING WATER
- C — EXISTING VERIZON CABLE
- T — EXISTING TELEPHONE
- D — EXISTING STORM DRAIN
- S — EXISTING SANITARY SEWER
- ? — EXISTING UNKNOWN UTILITY
- EXISTING UTILITY POLE
- EXISTING UTILITY POLE W/GUY WIRE
- EXISTING CATCH BASIN
- CO — EXISTING CLEANOUT
- CONIFEROUS TREES
- DECIDUOUS TREES
- STORM INLET
- (410.02) GROUNDWATER ELEVATION (FT)
- 410 GROUNDWATER ELEVATION CONTOUR (FT) DASHED WHERE INFERRED
- GROUNDWATER FLOW DIRECTION

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY YEC, INC. DATED AUGUST 2015 AT A SCALE OF 1" = 20'. ADDITIONAL BASEMAP DATA DIGITIZED FROM GOOGLE EARTH AERIAL PHOTO DATED 6/2/2011. UTILITY LOCATIONS ARE FROM FIELD MARKOUT ONLY AND ARE APPROXIMATE. PROPERTY LINES ARE APPROXIMATE ONLY FROM TAX MAPS.
2. APPARENT HORIZONTAL COORDINATE SYSTEM IS NAD83. APPARENT VERTICAL COORDINATE SYSTEM IS NAVD 88. COORDINATE SYSTEMS ARE FROM GPS OBSERVATIONS ONLY.
3. INTERIOR FLOOR PLAN ADAPTED FROM HISTORICAL DRAWINGS FOR 6 ADLER DRIVE. WALLS WITHIN INDIVIDUAL UNITS AT 8 ADLER DR. ARE NOT SHOWN.

0 30' 60'
GRAPHIC SCALE

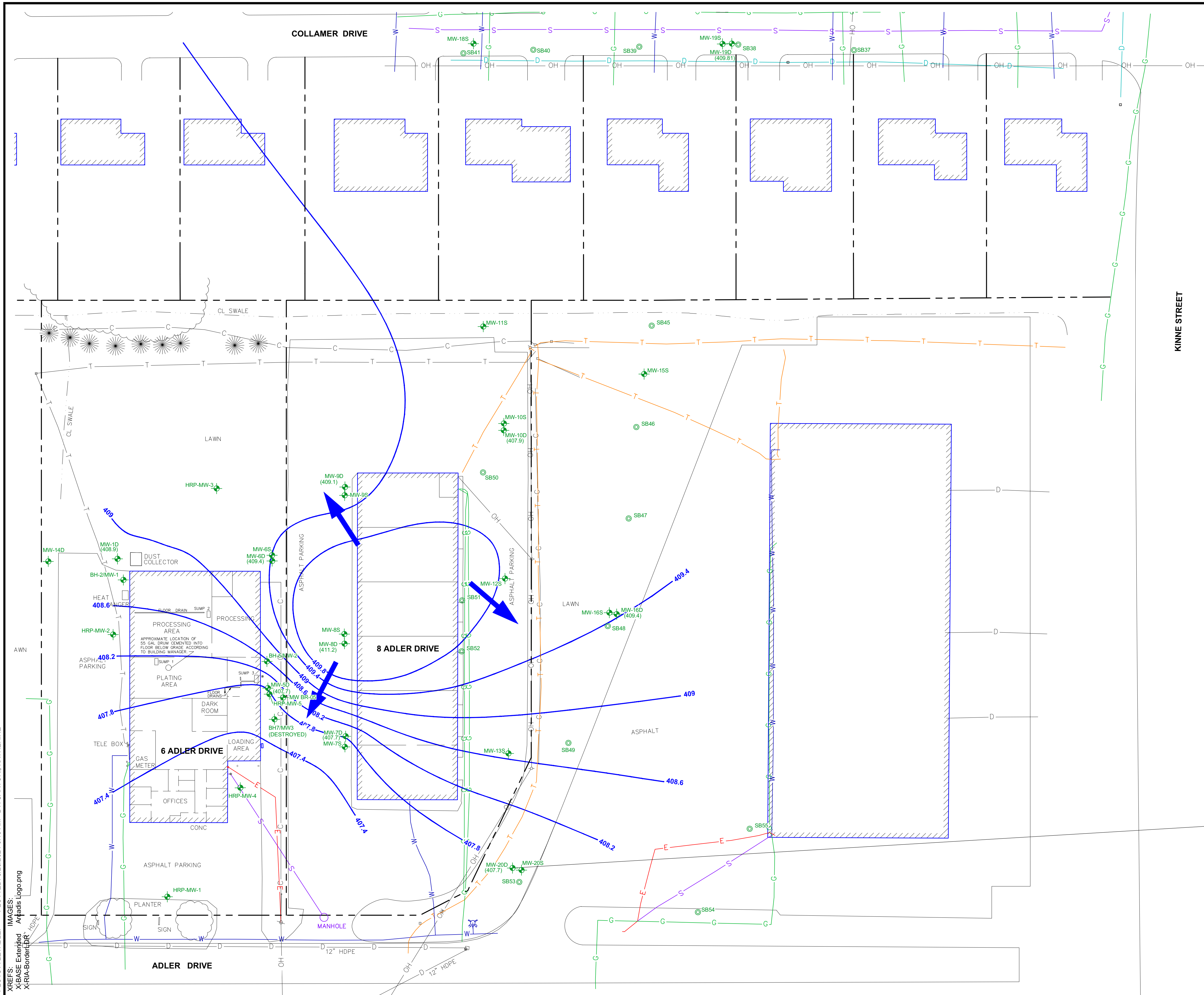
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN CIRCUITS - SITE NO. 734124
6 ADLER DRIVE, EAST SYRACUSE, NEW YORK

SHALLOW GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR MAP (AUGUST 5, 2022)

ARCADIS

FIGURE
3A

C:\Users\Kcarteri\DC\ACCDocs\Arcadis ACC US\AUS-99999999-NYSDEC_734124_N CIRCUITS_E SYRACUSE_NY\Project Files\10_WIP\10T_ARC_ENV\2024\01-DWG\RIA-F17-SHALLOW GWCONT-AUG2022.dwg LAYOUT: 17 SAVED: 3/28/2024 7:49 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ----
PLOTSTYLETABLE: ---- PLOTTED: 3/28/2024 9:17 AM BY: SARTORI, KATHERINE
IMAGES: Arcadis Logo.png
XREFS: X-BASE Extended X-RIA-BorderLDR



LEGEND:

- MONITORING WELL
- SOIL BORING (2022)
- EXISTING PROPERTY LINE
- EXISTING HYDRANT
- OH — EXISTING OVERHEAD WIRE
- G — EXISTING GAS
- E — EXISTING ELECTRICAL
- W — EXISTING WATER
- C — EXISTING VERIZON CABLE
- T — EXISTING TELEPHONE
- D — EXISTING STORM DRAIN
- S — EXISTING SANITARY SEWER
- ? — EXISTING UNKNOWN UTILITY
- EXISTING UTILITY POLE
- EXISTING UTILITY POLE W/GUY WIRE
- EXISTING CATCH BASIN
- • CO EXISTING CLEANOUT
- CONIFEROUS TREES
- DECIDUOUS TREES
- STORM INLET
- (408.9) GROUNDWATER ELEVATION (FT)
- 409 GROUNDWATER ELEVATION CONTOUR (FT)
- AMSL ABOVE MEAN SEA LEVEL

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY YEC, INC. DATED AUGUST 2015 AT A SCALE OF 1" = 20'. ADDITIONAL BASEMAP DATA DIGITIZED FROM GOOGLE EARTH AERIAL PHOTO DATED 6/2/2011. UTILITY LOCATIONS ARE FROM FIELD MARKOUT ONLY AND ARE APPROXIMATE. PROPERTY LINES ARE APPROXIMATE ONLY FROM TAX MAPS.
2. APPARENT HORIZONTAL COORDINATE SYSTEM IS NAD83. APPARENT VERTICAL COORDINATE SYSTEM IS NAVD 88. COORDINATE SYSTEMS ARE FROM GPS OBSERVATIONS ONLY.
3. INTERIOR FLOOR PLAN ADAPTED FROM HISTORICAL DRAWINGS FOR 6 ADLER DRIVE. WALLS WITHIN INDIVIDUAL UNITS AT 8 ADLER DR. ARE NOT SHOWN.

0 30' 60'
GRAPHIC SCALE

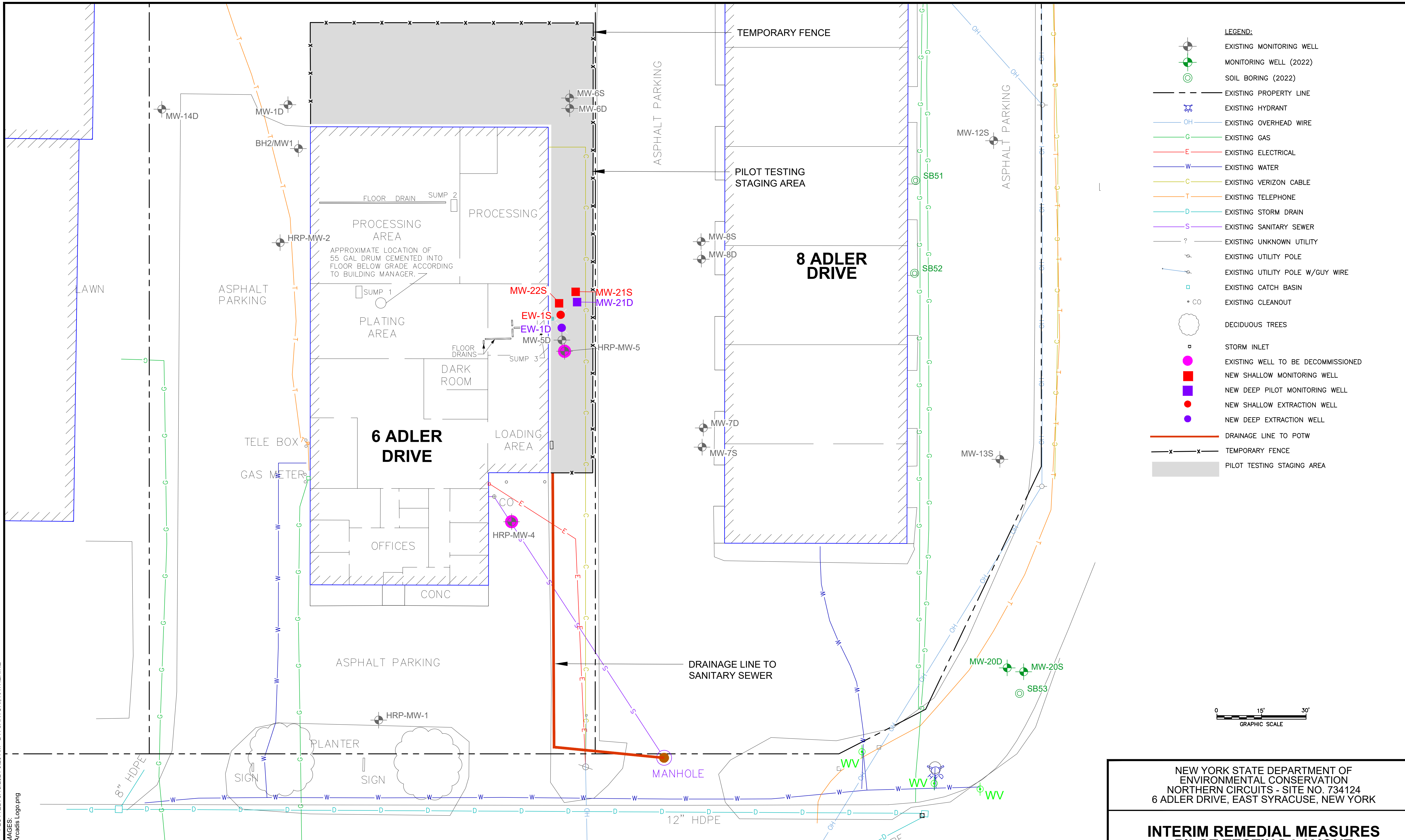
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN CIRCUITS - SITE NO. 734124
6 ADLER DRIVE, EAST SYRACUSE, NEW YORK

DEEP GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR MAP (AUGUST 5, 2022)

ARCADIS

FIGURE
3B

C:\Users\Ksartori\DC\ACCDocs\Arcadis ACC US\AUS-99999999-NYSDEC_734124_N CIRCUITS_E SYRACUSE_NY\Project Files\10_WIP\10T_ARC_ENV\2024\01-DWG\RIA-F18-DEEP GWCONT-AUG2022.dwg LAYOUT: 18 SAVED: 3/28/2024 7:55 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ----
PLOTSTYLETABLE: ---- PLOTTED: 3/28/2024 9:19 AM BY: SARTORI, KATHERINE
XREFS: IMAGES:
XBASE Extended Arcadis Logo.png
XRIA-Border-DR



NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY YEC, INC. DATED AUGUST 2015 AT A SCALE OF 1" = 20'. ADDITIONAL BASEMAP DATA DIGITIZED FROM GOOGLE EARTH AERIAL PHOTO DATED 6/2/2011. UTILITY LOCATIONS ARE FROM FIELD MARKOUT ONLY AND ARE APPROXIMATE. PROPERTY LINES ARE APPROXIMATE ONLY FROM TAX MAPS. HISTORICAL BORING, LOCATIONS TAKEN FROM LENDER CONSULTING SERVICES, INC., 2009 AND HRP ASSOCIATES, IC., 2012. EXISTING SOIL BORING LOCATIONS AND MW–16S/D, MW–17S/D, MW–18S/D, MW–19S/D, MW–20S/D SURVEYED BY C.T. MALE ASSOCIATES JULY 27, 2022.
2. APPARENT HORIZONTAL COORDINATE SYSTEM IS NAD83. APPARENT VERTICAL COORDINATE SYSTEM IS NAVD 88. COORDINATE SYSTEMS ARE FROM GPS OBSERVATIONS ONLY.
3. INTERIOR FLOOR PLAN ADAPTED FROM HISTORICAL DRAWINGS FOR 6 ADLER DRIVE. WALLS WITHIN INDIVIDUAL UNITS AT 8 ADLER DR. ARE NOT SHOWN.
4. NOT ALL FEATURES ARE SHOWN ON THIS MAP.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN CIRCUITS - SITE NO. 734124
6 ADLER DRIVE, EAST SYRACUSE, NEW YORK

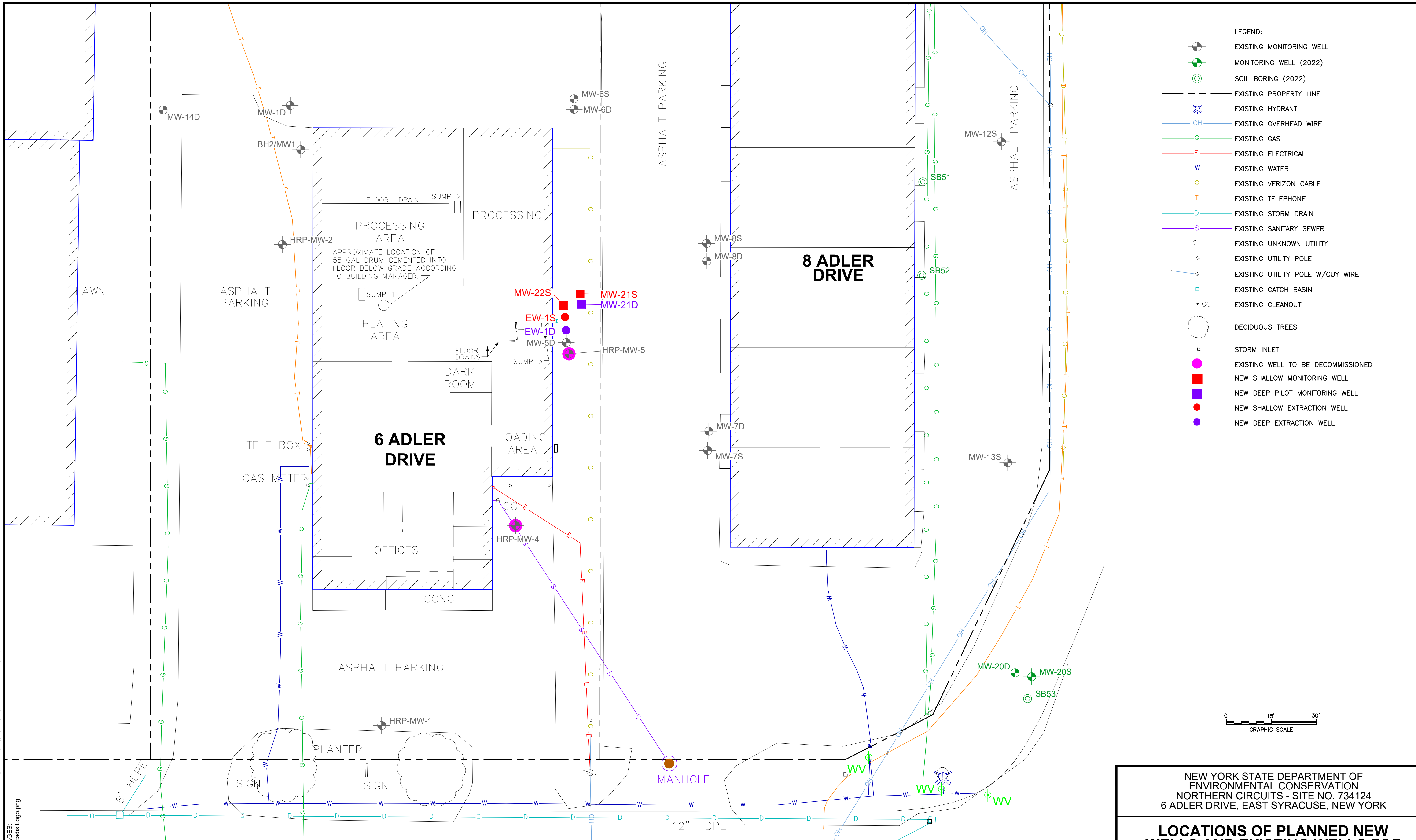
INTERIM REMEDIAL MEASURES PILOT TESTING LAYOUT

ARCADIS

FIGURE
4

IMAGES: Arcadis Logo.png
XREFS: X-RIA-BorderLDR X-Base

C:\Users\KSARTORI\DC\ACCDocs\Arcadis ACC US\AUS-99999999-NYSDEC_734124_N CIRCUITS_E SYRACUSE_NY\Project Files\10_WIP\10T_ARC_ENV\2024\01-DWG\RIA2-F04-PW LOC & WELL ABAND.dwg LAYOUT: 4 SAVED: 9/13/2024 7:55 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 9/13/2024 9:20 AM BY: SARTORI, KATHERINE



NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN CIRCUITS - SITE NO. 734124
6 ADLER DRIVE, EAST SYRACUSE, NEW YORK

LOCATIONS OF PLANNED NEW WELLS AND EXISTING WELLS FOR DECOMMISSIONING

ARCADIS

FIGURE 5

NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY YEC, INC. DATED AUGUST 2015 AT A SCALE OF 1" = 20'. ADDITIONAL BASEMAP DATA DIGITIZED FROM GOOGLE EARTH AERIAL PHOTO DATED 6/2/2011. UTILITY LOCATIONS ARE FROM FIELD MARKOUT ONLY AND ARE APPROXIMATE. PROPERTY LINES ARE APPROXIMATE ONLY FROM TAX MAPS. HISTORICAL BORING, LOCATIONS TAKEN FROM LENDER CONSULTING SERVICES, INC., 2009 AND HRP ASSOCIATES, IC., 2012. EXISTING SOIL BORING LOCATIONS AND MW–16S/D, MW–17S/D, MW–18S/D, MW–19S/D, MW–20S/D SURVEYED BY C.T. MALE ASSOCIATES JULY 27, 2022.
2. APPARENT HORIZONTAL COORDINATE SYSTEM IS NAD83. APPARENT VERTICAL COORDINATE SYSTEM IS NAVD 88. COORDINATE SYSTEMS ARE FROM GPS OBSERVATIONS ONLY.
3. INTERIOR FLOOR PLAN ADAPTED FROM HISTORICAL DRAWINGS FOR 6 ADLER DRIVE. WALLS WITHIN INDIVIDUAL UNITS AT 8 ADLER DR. ARE NOT SHOWN.
4. NOT ALL FEATURES ARE SHOWN ON THIS MAP.

XREFS: X-RIA-BorderLDR X-Base
IMAGES: Arcadis Logo.png

Figure 6A
MW-21S and MW-22S Well Construction Details

Northern Circuits – Town of DeWitt, Onondaga County, New York

MW-21S AND MW-22S WELL CONSTRUCTION DETAILS

(SCALE APPROXIMATE)

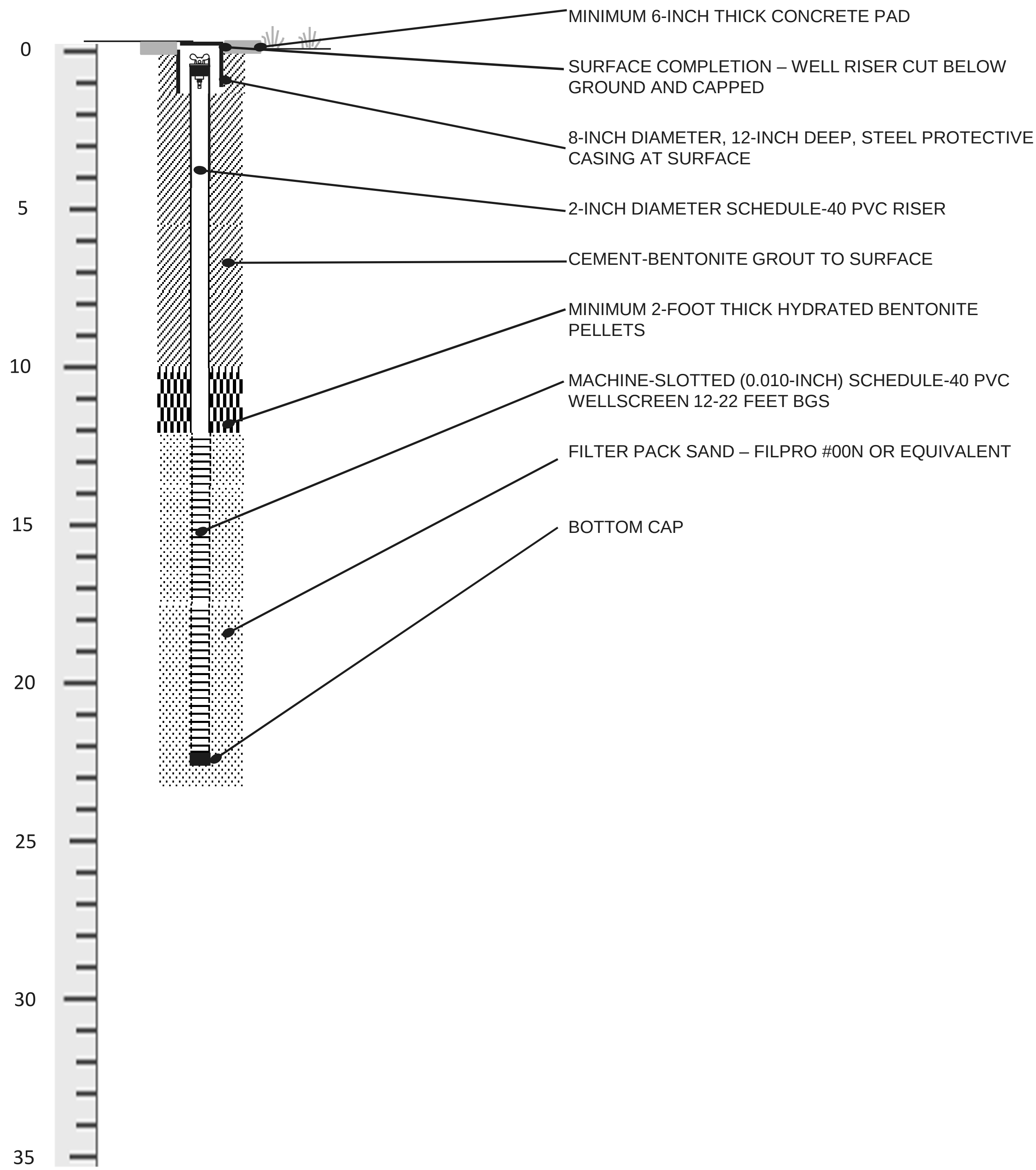
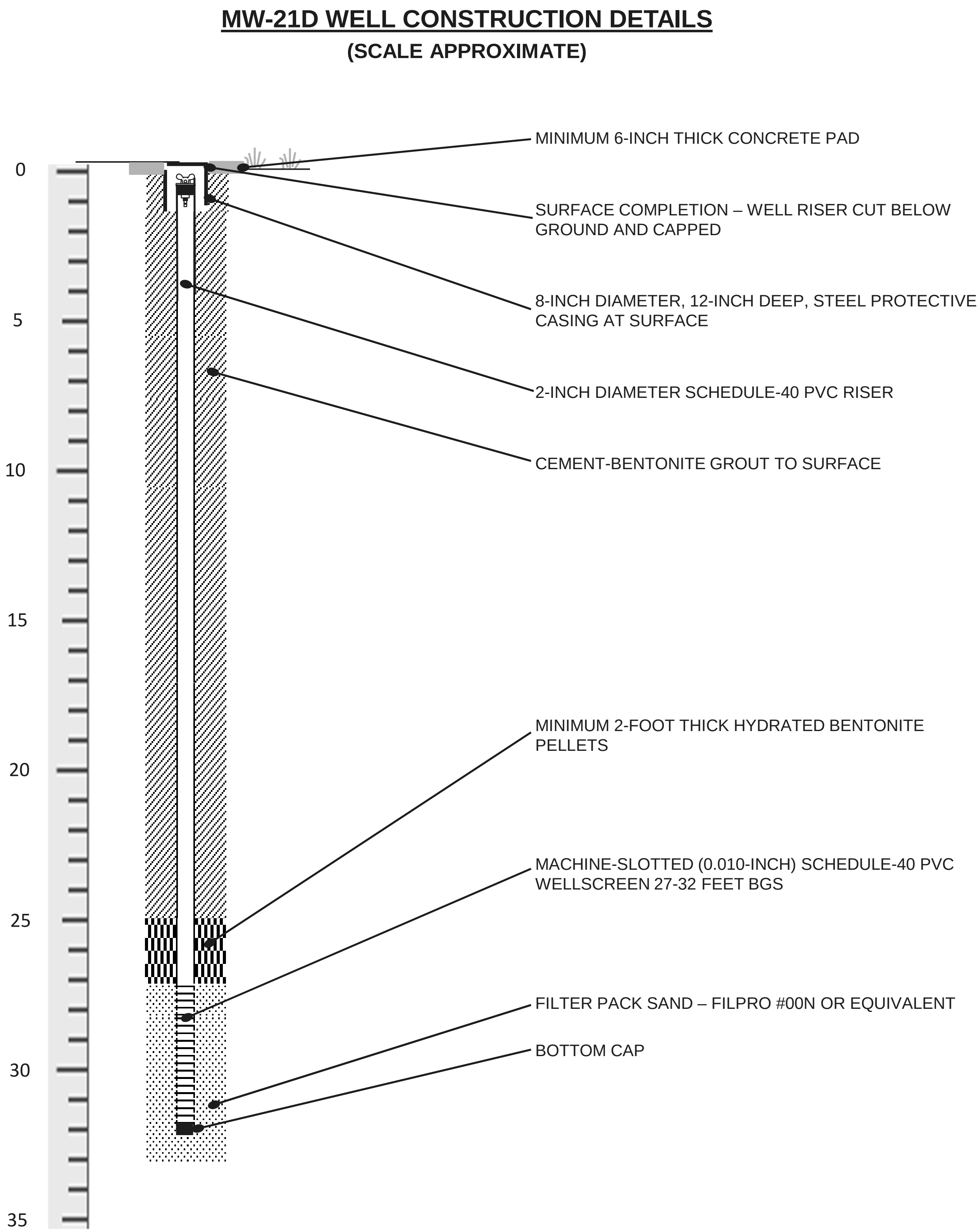
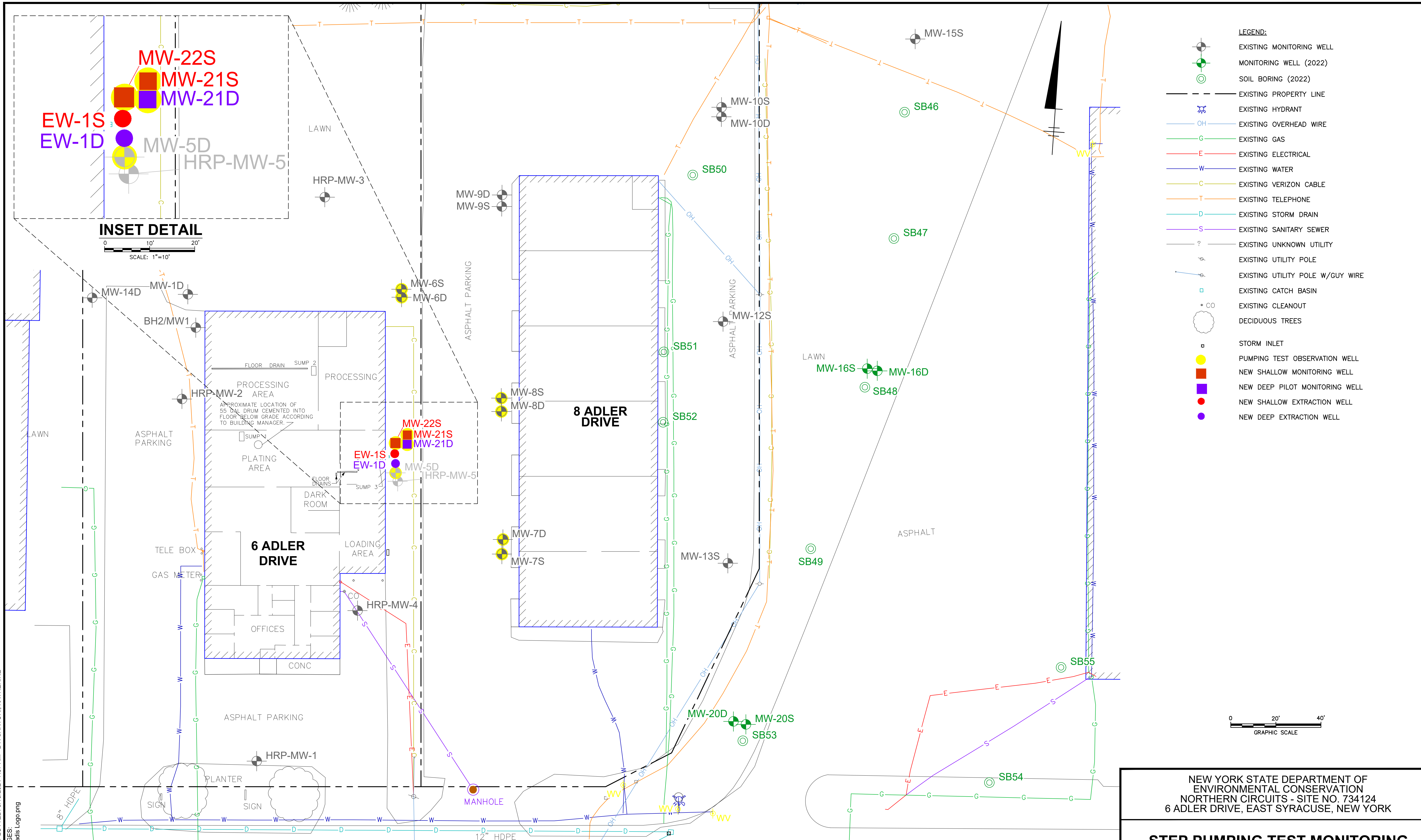


Figure 6B
MW-21D Well Construction Details

Northern Circuits – Town of DeWitt, Onondaga County, New York





NOTES:

1. BASE MAP INFORMATION FROM A SURVEY BY YEC, INC. DATED AUGUST 2015 AT A SCALE OF 1" = 20'. ADDITIONAL BASEMAP DATA DIGITIZED FROM GOOGLE EARTH AERIAL PHOTO DATED 6/2/2011. UTILITY LOCATIONS ARE FROM FIELD MARKOUT ONLY AND ARE APPROXIMATE. PROPERTY LINES ARE APPROXIMATE ONLY FROM TAX MAPS. HISTORICAL BORING, LOCATIONS TAKEN FROM LENDER CONSULTING SERVICES, INC., 2009 AND HRP ASSOCIATES, IC., 2012. EXISTING SOIL BORING LOCATIONS AND MW-16S/D, MW-17S/D, MW-18S/D, MW-19S/D, MW-20S/D SURVEYED BY C.T. MALE ASSOCIATES JULY 27, 2022.
2. APPARENT HORIZONTAL COORDINATE SYSTEM IS NAD83. APPARENT VERTICAL COORDINATE SYSTEM IS NAVD 88. COORDINATE SYSTEMS ARE FROM GPS OBSERVATIONS ONLY.
3. INTERIOR FLOOR PLAN ADAPTED FROM HISTORICAL DRAWINGS FOR 6 ADLER DRIVE. WALLS WITHIN INDIVIDUAL UNITS AT 8 ADLER DR. ARE NOT SHOWN.
4. NOT ALL FEATURES ARE SHOWN ON THIS MAP.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN CIRCUITS - SITE NO. 734124
6 ADLER DRIVE, EAST SYRACUSE, NEW YORK

STEP PUMPING TEST MONITORING WELL NETWORK

ARCADIS

FIGURE 7

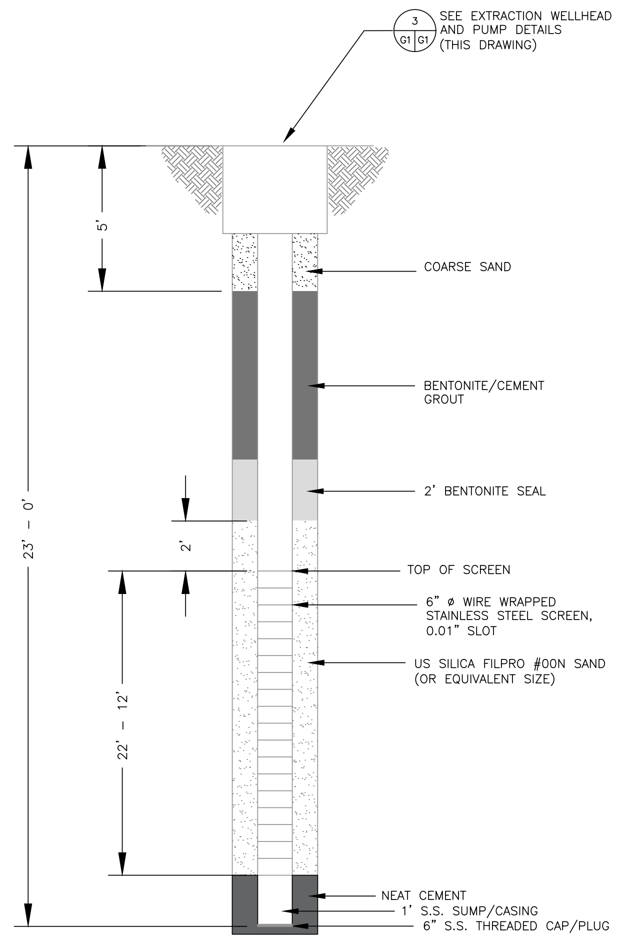
Appendix A

Extraction Well Details

CITY:ALBANY DIV/GROUP:SER-1 DB:T.CARIGNAN LD:T.CARIGNAN PIC: PM:
SHAREPOINT PF-81697616 CAD FILES

GENERAL NOTES:

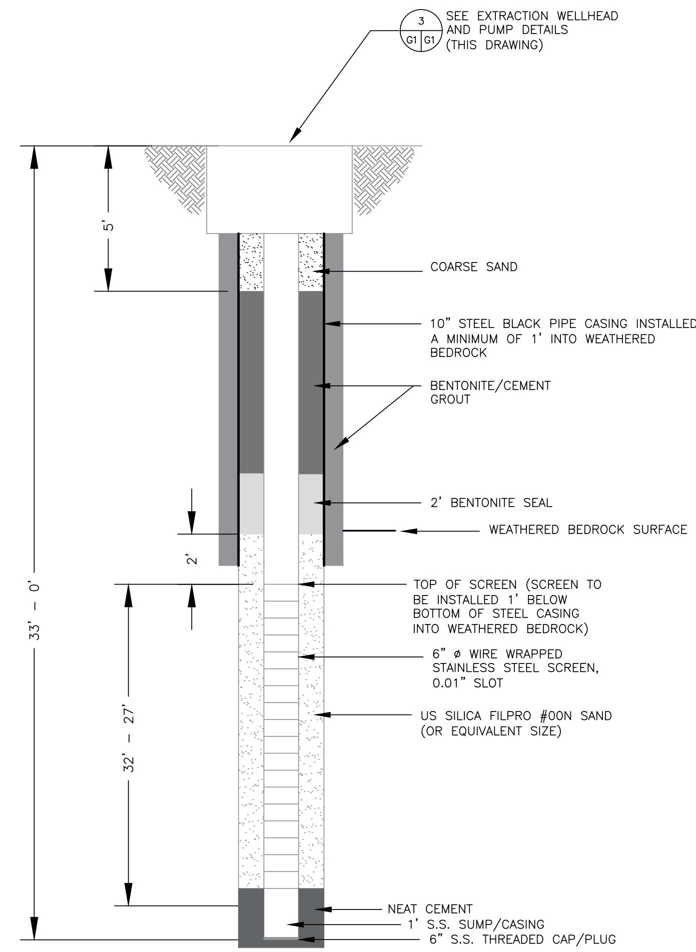
1. REFER TO DRAWINGS M-1 AND M-2 FOR THE SIZE AND MATERIAL USED FOR PROCESS PIPING.
2. EXTRACTION WELL LOCATIONS ARE SHOWN ON FIGURE 3.
3. FOLLOWING THE PLACEMENT OF THE FILTER SAND, BOTH EXTRACTION WELLS SHALL BE GENTLY DEVELOPED PRIOR TO PLACING BENTONITE SEAL.



CONSTRUCTION NOTES:
1. EW-1S SHALL BE SCREENED FROM 12 - 22 FT BGS, STAINLESS STEEL RISER 7 - 12 FT BGS, PVC SCH 40 RISER 0 -7 FT BGS.
2. FINAL WELL DEPTH AND SCREEN INTERVAL TO BE CONFIRMED BY FIELD GEOLOGIST.

1 G1 G1 **SHALLOW EXTRACTION WELL DETAIL**

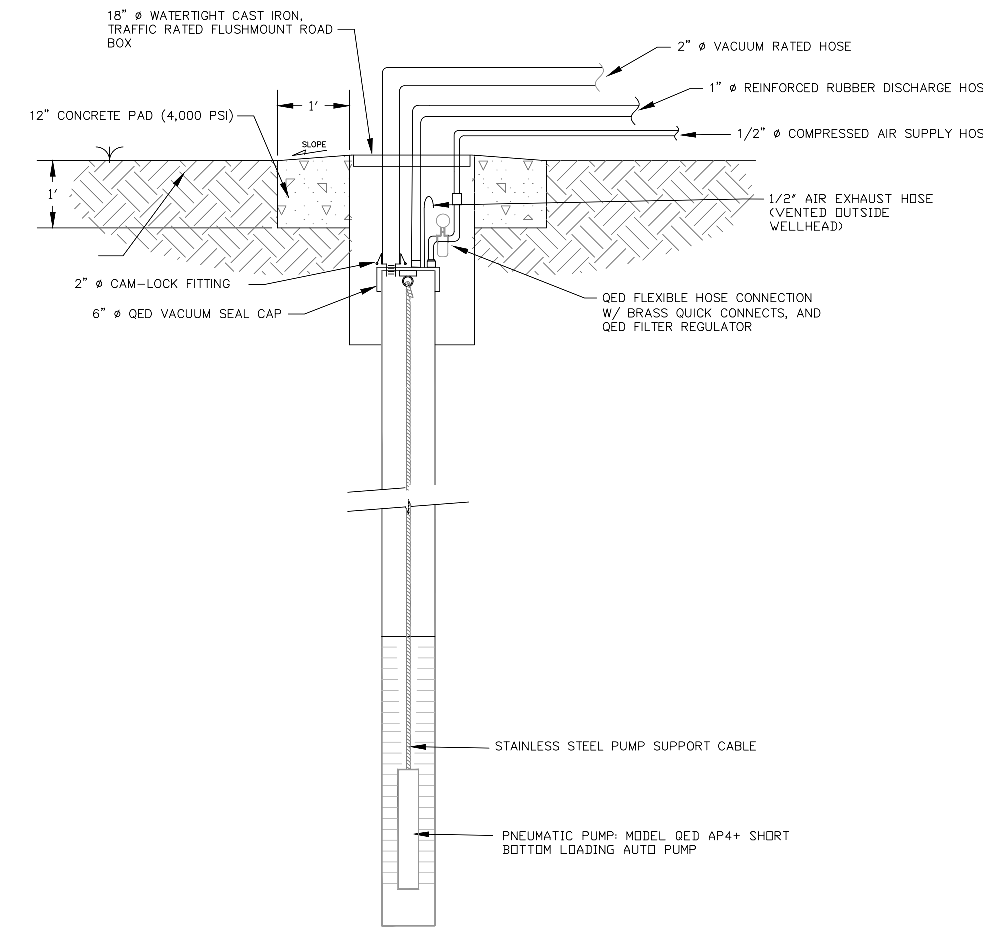
NOT TO SCALE



CONSTRUCTION NOTES:
1. EW-1D SHALL BE SCREENED FROM 27 - 32 FT BGS, STAINLESS STEEL RISER 7 - 27 FT BGS, PVC SCH 40 RISER 0 -7 FT BGS.
2. FINAL WELL DEPTH AND SCREEN INTERVAL TO BE CONFIRMED BY FIELD GEOLOGIST.

2 G1 G1 **DEEP EXTRACTION WELL DETAIL**

NOT TO SCALE



3 G1 G1 **TYPICAL EXTRACTION WELL CONSTRUCTION AND PUMP DETAIL**

NOT TO SCALE

SCALE(S) AS INDICATED	No.	Date	Revisions	By	Ckd	
	1	10.07.24	REVISED DRAFT SUBMITTAL TO NYSDEC	TC	CK	
	0	09.13.24	DRAFT SUBMITTAL TO NYSDEC	TC	RT	

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

Professional Engineer's Name: ###		
Professional Engineer's No.: ###		
State: NY	Date Signed: ###	Project Mgr.: ###
Designed by: ###	Drawn by: ###	Checked by: ###

DRAFT

ARCADIS

ARCADIS OF NEW YORK, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION • NORTHERN CIRCUITS - SITE NO. 734124

SYRACUSE, NEW YORK

EXTRACTION WELL/WELLHEAD DETAILS

GENERAL

ARCADIS Project No. 30053689

Date 09.13.2024

ARCADIS OF NEW YORK, INC.
201 FULLER ROAD
SUITE 201
ALBANY, NEW YORK
TEL. 518.250.7300

G-1

Appendix B

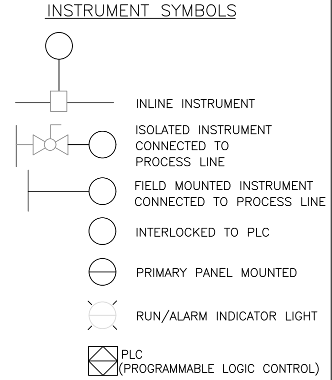
Treatment System Drawings

DRAWING NOT TO SCALE

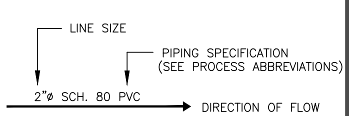
ABBREVIATIONS

AS	AIR STRIPPER
B	BLOWER
BV	BALL VALVE
CS	CARBON STEEL
CV	CHECK VALVE
FAL	FLOW ALARM LOW
FL	FAULT LIGHT
FIT	FLOW TOTALIZER INDICATOR
FT	FLOW TRANSMITTER
G	GREEN LIGHT
GAC	GRANULAR ACTIVATED CARBON
GALV	GALVANIZED
GPM	GALLONS PER MINUTE
HDPE	HIGH DENSITY POLYETHYLENE
HP	HORSE POWER
HOA	HAND-OFF-AUTO
HZ	HERTZ
HC	HOSE CONNECTION
HS	HAND SWITCH
LAHH	LEVEL ALARM HIGH HIGH
LALL	LEVEL ALARM LOW LOW
LGAC	LIQUID GRANULAR ACTIVATED CARBON
LSH	LEVEL SENSOR HIGH
LSHH	LEVEL SENSOR HIGH HIGH
LSL	LEVEL SENSOR LOW
M	MOTOR
PAHH	PRESSURE ALARM HIGH HIGH
PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LIGHT LOW
PI	PRESSURE INDICATOR
PRV	PRESSURE RELIEF VALVE
PSL	PRESSURE SWITCH LOW
PSH	PRESSURE SWITCH HIGH
PT	PRESSURE TRANSMITTER
PVC	POLYVINYL CHLORIDE
QD	QUICK DISCONNECT
R	RED LIGHT
SCH	SCHEDULE
SG	SIGHT GAUGE
SP	SAMPLE PORT
SV	SOLENOID VALVE
SDR	STANDARD DIMENSION RATIO
TAH	TEMPERATURE ALARM HIGH
TI	TEMPERATURE INDICATOR
TP	TRANSFER PUMP
TYP	TYPICAL
UN	UNION
VI	VACUUM INDICATOR
V	VOLT
VGAC	VAPOR GRANULAR ACTIVATED CARBON
YL	INDICATING LIGHT

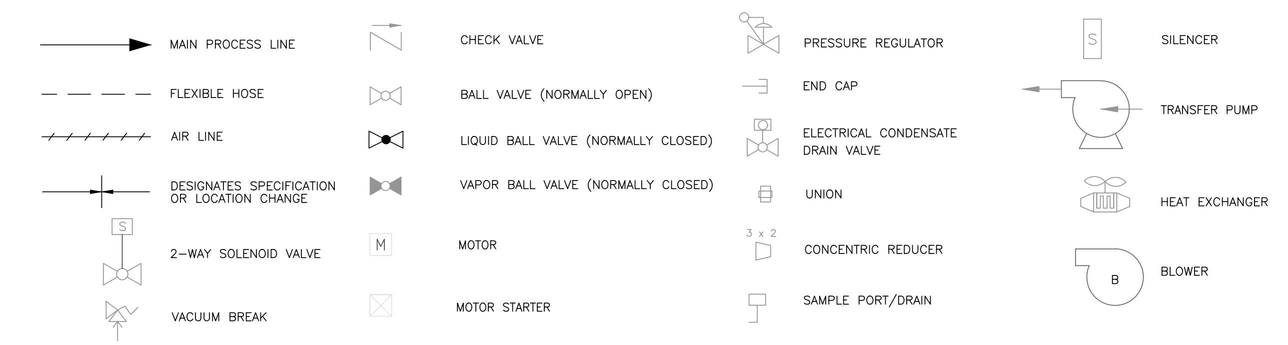
INSTRUMENT SYMBOLS

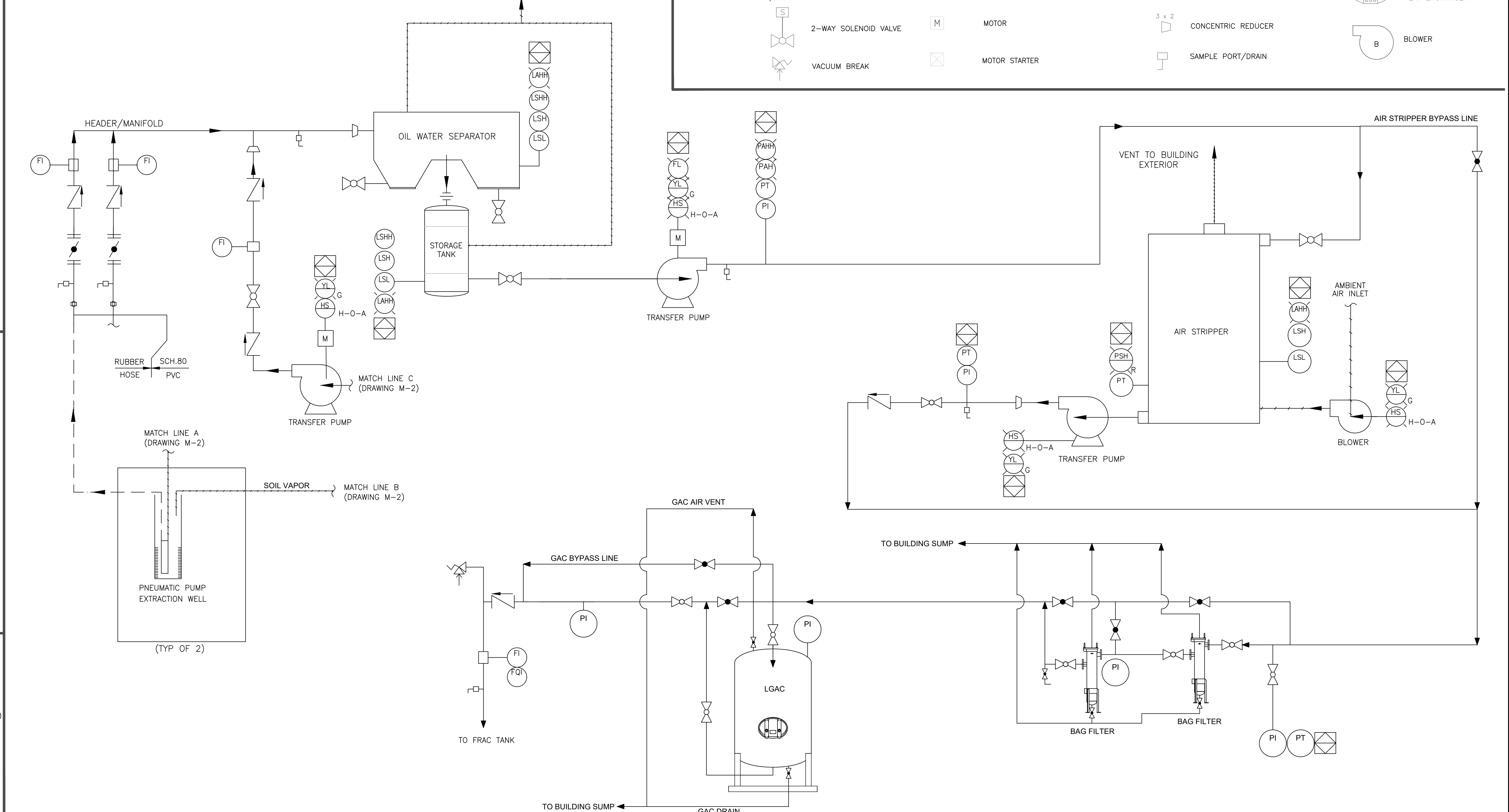


PIPE IDENTIFICATION



PROCESS SYMBOLS





LIQUID PHASE PROCESS FLOW

0	09.13.24	DRAFT TO NYSDEC	TC	RT	
No.	Date	Revisions	By	Ckd	

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

Professional Engineer's Name: ###
Professional Engineer's No.: ###
State: NY | Date Signed: #### | Project Mgr.: ###
Designed by: ### | Drawn by: ### | Checked by: ###

DRAFT

ARCADIS OF NEW YORK, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION • NORTHERN CIRCUITS - SITE NO. 734124
SYRACUSE, NEW YORK

EXAMPLE - LIQUID PHASE PROCESS & INSTRUMENTATION DIAGRAM, AND GENERAL LEGEND

MECHANICAL

ARCADIS Project No. 30053689
Date 09.13.2024

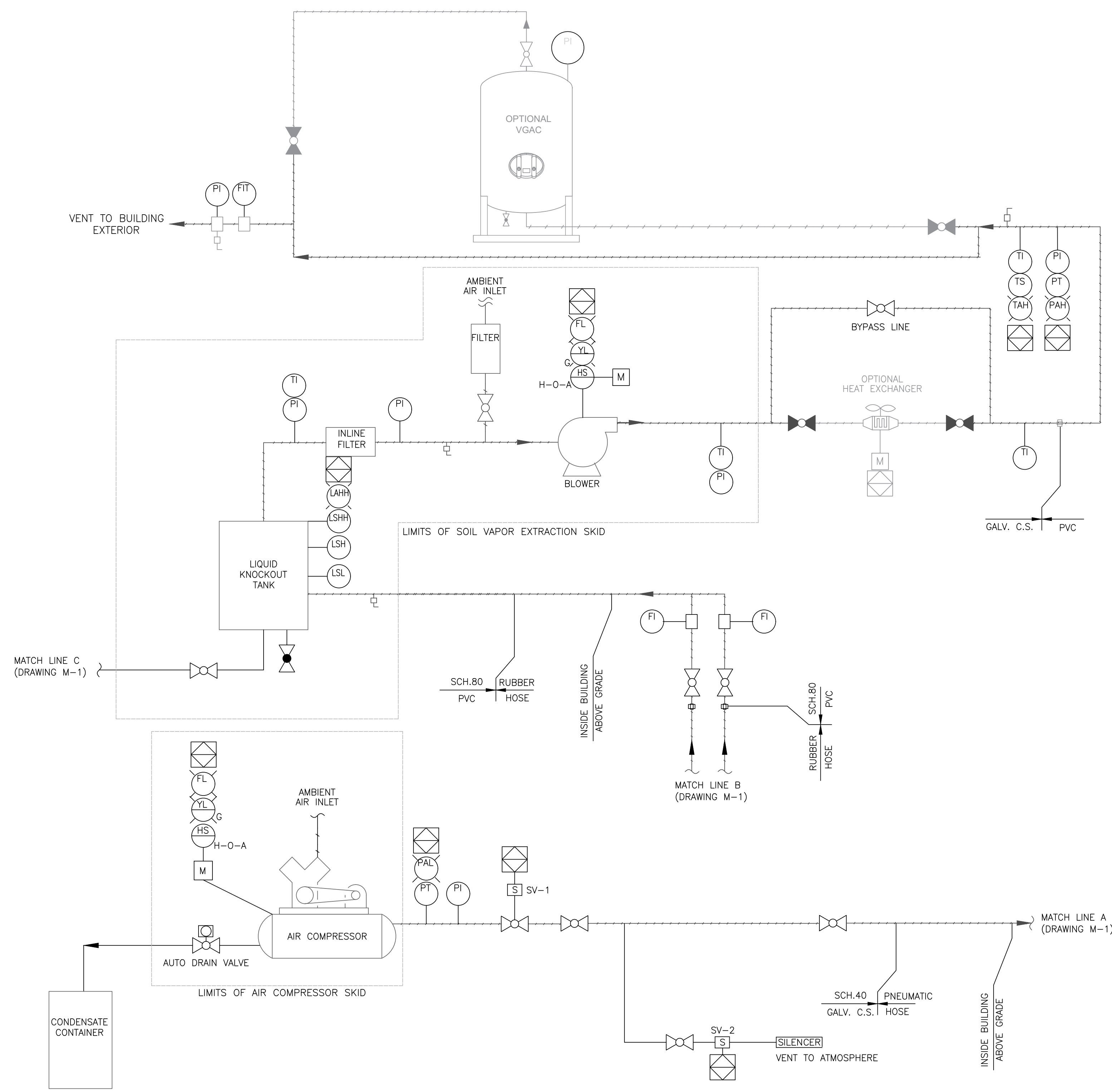
ARCADIS OF NEW YORK, INC.
201 FULLER ROAD
SUITE 201
ALBANY, NEW YORK
TEL. 518.250.7300

M-1

CITY:ALBANY DIV/GROUP:SER-1 DB:T.CARIGNAN LD:T.CARIGNAN PIC: PM:
SHAREPOINT PF-81697616 CAD FILES

GENERAL NOTE:

SEE RECORD DRAWING M-1 FOR GENERAL ABBREVIATIONS, PROCESS SYMBOLS, INSTRUMENT SYMBOLS, AND PIPE IDENTIFICATION.



VAPOR PHASE PROCESS FLOW

DRAWING NOT TO SCALE

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
0	09.13.24	DRAFT SUBMITTAL TO NYSDEC	TC	RT

Professional Engineer's Name: ###
Professional Engineer's No.: ###

State	Date Signed	Project Mgr.
NY	###	###
Designed by	Drawn by	Checked by
###	###	###

DRAFT

ARCADIS

ARCADIS OF NEW YORK, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION • NORTHERN CIRCUITS - SITE NO. 734124
SYRACUSE, NEW YORK

EXAMPLE - VAPOR PHASE PROCESS & INSTRUMENTATION DIAGRAM

MECHANICAL

ARCADIS Project No. 30053689
Date 09.13.2024

ARCADIS OF NEW YORK, INC.
201 FULLER ROAD
SUITE 201
ALBANY, NEW YORK
TEL. 518.250.7300

M-2

CITY:ALBANY DIV/GROUP:SER-1 DB:T.CARIGNAN LD:T.CARIGNAN PIC: PM:
SHAREPOINT PF-81697616 CAD FILES